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Serial No. 152

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

E. LESTER JONES, DIRECTOR

GS183
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UNITED STATES COAST PILOT

PHILIPPINE ISLANDS

PART II

PALAWAN, MINDANAO, AND SULU ARCHIPELAGO

FIRST EDITION

VK
911
U55
1st ed.
(1919)
pt. 2

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1921

National Oceanic and Atmospheric Administration

Climate Database Modernization Program

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March 28, 2002

THE COMPASS.

°	″	Points.	°	″	Points.	°	″	Points.
0	00	North:	120	56	SE. by E. ¼ E.	241	53	SW. by W. ½ W.
2	49	N. ¼ E.	123	45	SE. by E.:	244	41	SW. by W. ¾ W.
5	38	N. ½ E.	126	34	SE. ¾ E.	247	30	WSW.:
8	26	N. ¾ E.	129	23	SE. ½ E.	250	19	WSW. ¼ W.
11	15	N. by E.:	132	11	SE. ¼ E.	253	08	WSW. ½ W.
14	04	N. by E. ¼ E.	135	00	SE.:	255	56	WSW. ¾ W.
16	53	N. by E. ½ E.	137	49	SE. ¼ S.	258	45	W. by S.
19	41	N. by E. ¾ E.	140	38	SE. ½ S.	261	34	W. ¾ S.
22	30	NNE.:	143	26	SE. ¾ S.	264	23	W. ½ S.
25	19	NNE. ¼ E.	146	15	SE. by S.:	267	11	W. ¼ S.
28	08	NNE. ½ E.	149	04	SSE. ¾ E.	270	00	WEST:
30	56	NNE. ¾ E.	151	53	SSE. ½ E.	272	49	W. ¼ N.
33	45	NE. by N.:	154	41	SSE. ¼ E.	275	38	W. ½ N.
36	34	NE. ¾ N.	157	30	SSE.:	278	26	W. ¾ N.
39	23	NE. ½ N.	160	19	S. by E. ¾ E.	281	15	W. by N.
42	11	NE. ¼ N.	163	08	S. by E. ½ E.	284	04	WNW. ¾ W
45	00	NE.:	165	56	S. by E. ¼ E.	286	53	WNW. ½ W.
47	49	NE. ¼ E.	168	45	S. by E.:	289	41	WNW. ¼ W.
50	38	NE. ½ E.	171	34	S. ¾ E.	292	30	WNW.:
53	26	NE. ¾ E.	174	23	S. ½ E.	295	19	NW. by W. ¾ W.
56	15	NE. by E.:	177	11	S. ¼ E.	298	08	NW. by W. ½ W.
59	04	NE. by E. ¼ E.	180	00	South:	300	56	NW. by W. ¼ W.
61	53	NE. by E. ½ E.	182	49	S. ¼ W.	303	45	NW. by W.
64	41	NE. by E. ¾ E.	185	38	S. ½ W.	306	34	NW. ¾ W.
67	30	ENE.:	188	26	S. ¾ W.	309	23	NW. ½ W.
70	19	ENE. ¼ E.	191	15	S. by W.:	312	11	NW. ¼ W.
73	08	ENE. ½ E.	194	04	S. by W. ¼ W.	315	00	NW.:
75	56	ENE. ¾ E.	196	53	S. by W. ½ W.	317	49	NW. ¼ N.
78	45	E. by N.:	199	41	S. by W. ¾ W.	320	38	NW. ½ N.
81	34	E. ¾ N.	202	30	SSW.:	323	26	NW. ¾ N.
84	23	E. ½ N.	205	19	SSW. ¼ W.	326	15	NW. by N.
87	11	E. ¼ N.	208	08	SSW. ½ W.	329	04	NNW. ¾ W.
90	00	EAST.:	210	56	SSW. ¾ W.	331	53	NNW. ½ W.
92	49	E. ¼ S.	213	45	SW. by S.:	334	41	NNW. ¼ W.
95	38	E. ½ S.	216	34	SW. ¾ S.	337	30	NNW.:
98	26	E. ¾ S.	219	23	SW. ½ S.	340	19	N by W. ¾ W.
101	15	E. by S.	222	11	SW. ¼ S.	343	08	N. by W. ½ W.
104	04	ESE. ¾ E.	225	00	SW.:	345	56	N. by W. ¼ W.
106	53	ESE. ½ E.	227	49	SW. ¼ W.	348	45	N. by W.:
109	41	ESE. ¼ E.	230	38	SW. ½ W.	351	34	N. ¾ W.
112	30	ESE.:	233	26	SW. ¾ W.	354	23	N. ½ W.
115	19	SE. by E. ¾ E.	236	15	SW. by W.:	357	11	N. ¼ W.
118	08	SE. by E. ½ E.	239	04	SW. by W. ¼ W.			

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INTRODUCTORY.

DEPARTMENT OF COMMERCE,
U. S. COAST AND GEODETIC SURVEY,
Washington, D. C., December 31, 1920.

This publication covers the coasts of Palawan, Mindanao, Sulu Archipelago, with the adjacent islands and waters, and includes a short description of the north coast of Borneo, with the channels and islands adjacent to it, based on surveys by officers of the British Navy. The descriptions of Philippine Islands and waters is based mainly on the work of the United States Coast and Geodetic Survey. The waters of the southern part of the Sulu Sea, the Sulu Archipelago, and the west coast of Palawan have not yet been surveyed; the notes relating to those waters have been compiled from a variety of sources, principally from the Spanish Derrotero, the Eastern Archipelago Pilot, and the China Sea Directory, with additions and corrections from reconnoissances by United States and Philippine Islands Government vessels and the mercantile marine.

This volume covers the area formerly included in Sections V and VI–VII, Philippine Islands Sailing Directions, compiled by John Dow, nautical expert in the Manila field station of the United States Coast and Geodetic Survey, and it consists of a rearrangement and revision of the fourth edition of that publication, together with a large amount of new information gathered by the various field officers of the Survey. The present (first) edition has been prepared in the field station of the United States Coast and Geodetic Survey at Manila by R. J. Christman, acting chief of chart division, under the supervision of H. C. Denson, Director of Coast Surveys. The aids to navigation are corrected to December 31, 1920. Navigators are requested to notify the Director of Coast Surveys, Manila, P. I., of any errors or omissions they may find in this publication or of additional matter which they think should be inserted for the information of mariners.

E. LESTER JONES,
Director.

NOTE.

The true courses and bearings are given in degrees, reading clockwise from 0° at north to 360°, and are followed by the equivalent *magnetic* value from 0° at magnetic north to 360°, in pathentheses.

Bearings relating to the visibility of lights are given from seaward.

Heights for lights are given in feet above high water; for other features, above mean sea level.

Distances are in *nautical miles*, unless otherwise stated, and may be converted approximately to statute miles by adding 15 per cent to the distances given.

Depths are referred to the mean of lower low waters.

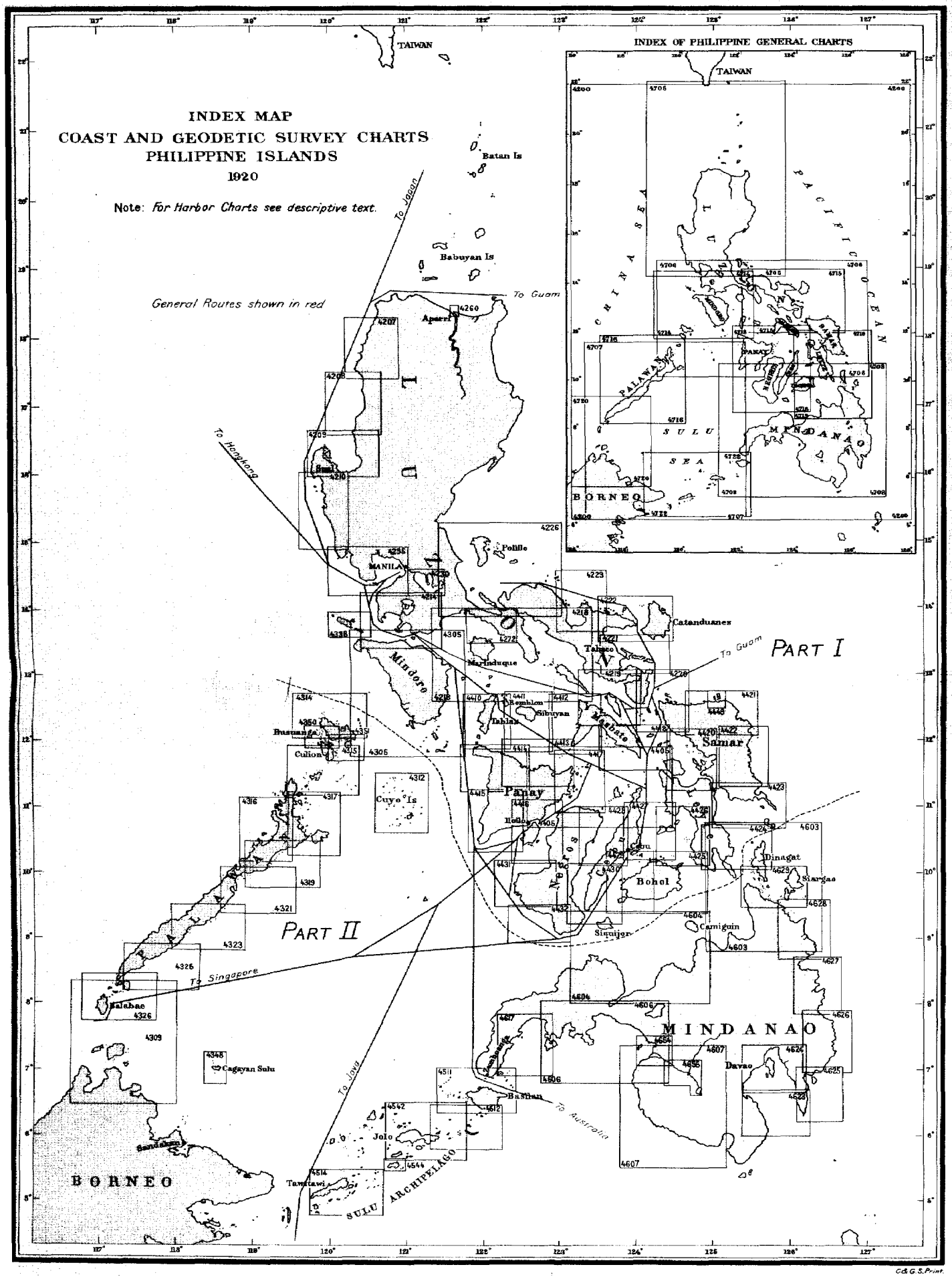
Currents are expressed in knots, which are nautical miles per hour, and are referred to by the direction toward which they set.

Winds are referred to by the direction from which they blow.

All charts referred to are published by the United States Coast and Geodetic Survey.

The aids to navigation described in this volume are corrected to December 31, 1920.

Notices to Mariners affecting the Charts and Sailing Directions of the Philippine Islands are published quarterly, and may be obtained free of charge on application to the Director of Coast Surveys, Manila, P. I.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PHILIPPINE ISLANDS
1920
Note: For Harbor Charts see descriptive text.
General Routes shown in red
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TAIWAN
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Babuyan Is
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To Singapore
To Java
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Polillo
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Cuyo
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PACIFIC OCEAN
PALAWAN
SULU SEA
PANAY
BOHOL
C&G.S.Print.

PHILIPPINE COAST PILOT.

PART II.—PALAWAN, MINDANAO, AND SULU ARCHIPELAGO.

NAVIGATIONAL AIDS AND THE USE OF CHARTS.

The Coast and Geodetic Survey is charged with the survey of the coasts, harbors, and tidal estuaries of the United States and its insular possessions, and issues the following publications relating to these waters as guides to navigation: Charts, Coast Pilots, Tide Tables, a catalogue of these publications, and Notices to Mariners, the last named published weekly by the Bureau of Lighthouses and the Coast and Geodetic Survey.

Charts bear three dates, which should be understood by persons using them: (1) The date (month and year) of the edition, printed on the late charts below the border in a central position and on the older ones on the face of the chart; (2) the date of the latest correction to the chart plate, printed in the lower left-hand corner below the border; (3) the date of issue, stamped below the border and just to the left of the subtitle.

Charts show all necessary corrections as to lights, beacons, buoys, and dangers, which have been received to the date of issue, being hand corrected since the latest date printed in the lower left-hand corner. All small but important corrections occurring subsequent to the date of issue of the chart are published in Notice to Mariners, and should be applied by hand to the chart immediately after the receipt of the notices.

The date of the edition of the chart remains unchanged until an extensive correction is made on the plate from which the chart is printed. The date is then changed and the issue is known as a new edition.

When a correction not of sufficient importance to require a new edition is made to a chart plate, the year, month, and day are noted in the lower left-hand corner.

All the notes on a chart should be read carefully, as in some cases they relate to the aids to navigation or to dangers that can not be clearly charted.

The charts are various in character, according to the objects to which they are designed to subserve. The most important distinctions are the following:

1. Sailing charts, mostly on a scale of approximately $\frac{1}{1200000}$, which exhibit the approaches to a large extent of coast, give the offshore surroundings, and enable the navigator to identify his position as he approaches from the open sea.

2. General charts of the coast, on scales of $\frac{1}{400000}$ and $\frac{1}{200000}$, intended especially for coastwise navigation.

3. Coast charts, on a scale of $\frac{1}{80000}$, by means of which the navigator is enabled to avail himself of the channels for entering the larger bays and harbors.

4. Harbor charts, on larger scales, intended to meet the needs of local navigation.

Note.—General charts of the Philippine Islands are on scales $\frac{1}{1600000}$, $\frac{1}{800000}$, and $\frac{1}{400000}$; coast charts are on scales $\frac{1}{100000}$ and $\frac{1}{200000}$.

Coast Pilots, relating to surveyed waters of the United States, Porto Rico, Alaska, and the Philippine Islands, contain all nautical descriptions of the coast, harbors, dangers, and directions for coasting and entering harbors. Similar information relating to Hawaii is published in Coast Pilot Notes.

Coast Pilots are corrected for important information received to the date of issue, which is stamped on the correction sheets accompanying the volume. From time to time, as the material accumulates, supplements are issued, containing the more important corrections since the publication of the volume. The supplements are printed on one side of the paper only, so that they maye be cut and pasted in the appropriate places in the volume. Supplements and other corrections for any volume can be furnished, free of charge, on application to the Coast and Geodetic Survey, Washington, D. C., provided the volume itself has not been superseded by a subsequent edition.

Tide Tables.—The Coast and Geodetic Survey Tide Tables are issued annually in advance of the year for which they are made and contain the predicted time and height of the tides for each day in the year at the principal ports of the world, including the United States and its possessions. A table of tidal differences is given by means of which the tides at more than 3,000 intermediate ports may be obtained. Separate reprints from the general Tide Tables are issued for the Atlantic and Pacific coasts of the United States and its dependencies.

Agencies for the sale of the Charts, Coast Pilots, and Tide Tables of the Coast and Geodetic Survey are established in many ports of the United States and in some foreign ports. They can also be purchased in the office of the Coast and Geodetic Survey, Washington, D. C., or any of the field stations. If ordered by mail, prepayment is obligatory. Remittances should be made by postal money order or express order, payable to the "Coast and Geodetic Survey." Postage stamps, checks, and drafts can not be accepted. The sending of money in an unregistered letter is unsafe. Only catalogue numbers of charts need be mentioned. The catalogue of charts and other publications of the survey can be obtained free of charge on application at any of the sale agencies or to the Coast and Geodetic Survey Office, Washington, D. C.

Other Publications.—A list of lights, buoys, beacons, and daymarks of the Philippine Island and Notices to Mariners, showing changes and additions to the same, are published by the Bureau of Commerce and Industry and may be obtained free of charge on application to the Director, Bureau of Commerce and Industry, Manila, P. I. Notice to Mariners, relating to Philippine waters, is published quarterly by the Coast and Geodetic Survey and may be obtained

free of charge on application to the Director of Coast Surveys, Manila, P. I.

USE OF CHARTS.

ACCURACY OF CHART.—The value of a chart depends upon the character and accuracy of the survey on which it is based, and the larger the scale of the chart the more important do these become. In these respects the source from which the information has been compiled is a good guide.

This applies particularly to the charts of the Alaska Peninsula, Aleutian Islands, Arctic Ocean, and parts of Bering Sea and the Philippine Islands. The early Russian and Spanish surveys were not made with great accuracy, and until they are replaced by later surveys these charts must be used with caution.

With respect to these regions the fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

A wide berth should therefore be given to every rocky shore or patch, and this rule should invariably be followed, viz, that instead of considering a coast to be clear unless it is shown to be foul, the contrary should be assumed.

With respect to a well-surveyed coast only a fractional part of the soundings obtained are shown on the chart, a sufficient number being selected to clearly indicate the contour of the bottom. When the bottom is uneven, the soundings will be found grouped closely together, and when the slopes are gradual fewer soundings are given. Each sounding represents an actual measure of depth and location at the time the survey was made.

Shores and shoals where sand and mud prevail, and especially bar harbors and the entrances of bays and rivers exposed to strong tidal currents and a heavy sea, are subject to continual change of a greater or less extent, and important ones may have taken place since the date of the last survey. In localities which are noted for frequent and radical changes, such as the entrance to a number of estuaries on the Atlantic, Gulf, and Pacific coasts, notes are printed on the charts calling attention to the fact.

It should also be remembered that in coral regions and where rocks abound it is always possible that a survey with lead and line, however detailed, may have failed to find every small obstruction. For these reasons when navigating such waters the customary sailing lines and channels should be followed and those areas avoided where the irregular and sudden changes in depth indicate conditions which are associated with pinnacle rocks or coral heads.

DREDGED CHANNELS.—These are generally shown on the chart by two broken lines to represent the side limits of the improvement. Before completion of the project the depth given is that shown by the latest survey received from the engineer in charge. After completion the depth given is the one proposed to be maintained by redredging when necessary.

The actual depth of a completed channel may be greater than the charted depth shortly after dredging, and less when shoaling occurs

as a result of storms or other causes. These changes are of too frequent occurrence and uncertain duration to chart. Therefore when a vessel's draft approximates the charted depth of a dredged channel, the latest information should be obtained before entering.

Danger Curves.—The curves of depth will be found useful in giving greater prominence to outlying dangers. It is a good plan to trace out with a colored pencil the curve next greater than the draft of the vessel using the chart and regard this as a "danger curve," which is not to be crossed without precaution.

Isolated soundings shoaler than surrounding depths should be avoided, as there is always the possibility that the shoalest spot may not have been found.

Caution in Using Small-Scale Charts.—It is obvious that dangers to navigation can not be shown with the same amount of detail on small scale as on those of larger scale; therefore, in approaching the land or dangerous banks regard should be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile.

For the same reason, bearings to near objects should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

Distortion of Printed Charts.—The paper on which charts are printed has to be dampened. On drying, distortion takes place from the inequalities of the paper, which varies with the paper and the amount of the original dampening; but it is not sufficient to affect ordinary navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted upon the chart, especially if the lines to objects be long. The larger the chart the greater the amount of this distortion.

Buoys.—Too much reliance should not be placed on buoys always maintaining their exact position, especially when in exposed positions; it is safer, when possible, to navigate by bearings or angles to fixed objects on shore and by the use of soundings.

Gas buoys and other unwatched lights can not be implicitly relied on; the light may be altogether extinguished, or, if intermittent, the apparatus may get out of order.

Lights.—The distances given in the Light Lists and on the charts for the visibility of lights are computed for a height of 15 feet for the observer's eye. The table of distances of visability due to height, published in the Light List, affords a means of ascertaining the effect of a greater or less height of the eye. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking for a light, the fact may be forgotten that from aloft the range of vision is increased. By noting a star immediately over the light a bearing may be afterwards obtained from the standard compass.

The actual power of a light should be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependance can be placed on its being seen.

The power of a light can be estimated by its candlepower as given in the Light Lists and in some cases by noting how much its visibility in clear weather falls short of the range due to the height at which it is placed. Thus a light standing 200 feet above the sea and recorded as visible only 10 miles in clear weather is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of sufficient power.

Fog Signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from the wind, large areas of silence have been found in different directions and at different distances from the origin of the sound signal, even in clear weather. Therefore, too much confidence should not be felt as to hearing a fog signal. The apparatus, moreover, for sounding the signal may require some time before it is in readiness to act. A fog often creeps imperceptibly toward the land and is not observed by those at a lighthouse until it is upon them, whereas a vessel may have been in it for many hours while approaching the land. In such a case no signal may be sounded. When sound travels against the wind it may be thrown upward; in such a case a man aloft might hear it when it is inaudible on deck. The conditions for hearing a signal will vary at the same station within short intervals of time; mariners must not, therefore, judge their distance from a fog signal by the force of the sound and must not assume that a signal is not sounding because they do not hear it.

Taken together, these facts should induce the utmost caution when nearing the land or danger in fog. The lead is generally the only safe guide and should be faithfully used.

Submarine Bells have an effective range of audibility greater than signal sounded in air, and a vessel equipped with receiving apparatus can determine the approximate bearing of the signal. These signals can be heard also on vessels not equipped with the receiving apparatus by observers below the water line, but a bearing of the signal can not then be readily determined.

Tides.—A knowledge of the tide, or vertical rise and fall of the water, is of great and direct importance whenever the depth at low water approximates to or is less than the draft of the vessel and wherever docks are constructed so as to be entered and left near the time of high water. But under all conditions such knowledge may be of indirect use, as it often enables the mariner to estimate in advance whether at a given time and place the current will be running flood or ebb. In using the tables slack water should not be confounded with high or low tide nor a flood or ebb current with flood or ebb tide. In some localities the rise or fall may be at a stand while the current is at its maximum velocity.

The Tide Tables published by the Coast and Geodetic Survey give the predicted times and heights of high and low waters for most of the principal ports of the world and tidal differences and constants for obtaining the tides at all important ports.

Plane of Reference for Soundings on Charts.—For the Atlantic coast of the United States and Porto Rico the plane of reference for soundings is the mean of all low waters; for the Pacific coast of

the United States and Alaska, with the exception noted below, and for the Hawaiian and Philippine Islands, it is the mean of the lower low waters. For Wrangell Strait, Alaska, it is 3 feet below mean lower low water.

For the Atlantic coast of the Canal Zone, Panama, the plane of reference for soundings is mean low water, and for the Pacific coast of the same it is low-water springs.

For foreign charts many different planes of reference are in use, but that most frequently adopted is low-water springs.

It should be remembered that whatever plane of reference is used for a chart there may be times when the tide falls below it. When the plane is mean low water or mean lower low water there will generally be as many low waters or lower low waters below those planes as above them. Also the wind may at times cause the water to fall below the plane of reference.

Tidal Currents.—In navigating coasts where the tidal range is considerable, special caution is necessary. It should be remembered that there are indrafts into all bays and bights, although the general set of the current is parallel to the shore.

The turn of the tidal current offshore is seldom coincident with the time of high and low water on the shore.

At the entrance to most harbors without important tributaries or branches the current turns at or soon after the times of high and low water within. The diurnal inequality in the velocity of current will be proportionately but half as great as in the height of the tides. Hence, though the heights of the tide may be such as to cause the surface of the water to vary but little in level for 10 or 12 hours, the ebb and flow will be much more regular in occurrence.

A swift current often occurs in narrow openings between two bodies of water, because the water at a given instant may be at different levels.

Along most shores not seriously affected by bays, tidal rivers, etc., the current usually turns soon after high and low waters.

Where there is a large tidal basin with a narrow entrance, the strength of the current in the entrance may occur near the time of high and low water, and slack water at about half tide outside.

The swiftest current in straight portions of tidal rivers is usually in the mid-channel, but in curved portions the strongest current is toward the outer edge of the curve.

Countercurrents and eddies may occur near the shore of straits, especially in bights and near points.

Tide Rips and Swirls occur in places where strong currents occur, caused by a change in the direction of the current, and especially over shoals or in places where the bottom is uneven. Such places should be avoided if exposed also to a heavy sea, especially with the wind opposing the current; when these conditions are at their worst the water is broken into heavy, choppy seas from all directions, which board the vessel, and also make it difficult to keep control owing to the baring of the propeller and the rudder.

Current Arrows on charts show only the usual or mean direction of a tidal stream or current. It must not be assumed that the direction of the current will not vary from that indicated by the arrow. In the same manner the velocity of the current constantly varies

with circumstances, and the rate given on the chart is a mean value, corresponding to an average range of tide. At some stations but few observations have been made.

FIXING POSITION.—The most accurate method available to the navigator of fixing a position relative to the shore is by plotting with a protractor, sextant angles between well-defined objects on the chart. This method, based on the "three-point problem" of geometry, should be in general use.

In many narrow waters, also where the objects may yet be at some distance, as in coral harbors or narrow passages among mud banks, navigation by sextant and protractor is invaluable, as a true position can in general be obtained only by its means. Positions by bearings are too rough to depend upon, and a small error in either taking or plotting a bearing might under such circumstances put the ship ashore.

For its successful employment it is necessary, first, that the objects be well chosen, and, second, that the observer be skillful and rapid in his use of the sextant. The latter is only a matter of practice.

Near objects should be used either for bearings or angles for position in preference to distant ones, although the latter may be more prominent, as a small error in the bearing or angle or in laying it on the chart has a greater effect in misplacing the position the longer the line to be drawn. On the other hand, distant objects should be used for direction because less affected by a small error or change of position.

The three-arm protractor consists of a graduated circle with one fixed and two movable radial arms. The zero of the graduation is at the fixed arm, and by turning the movable arms each one can be set at any desired angle with reference to the fixed arm.

To plot a position, the two angles observed between the three selected objects are set on the instrument, which is then moved over the chart until the three beveled edges in case of a metal instrument, or the radial lines in the case of a transparent or celluloid instrument, pass respectively and simultaneously through the three objects. The center of the instrument will then mark the ship's position, which may be pricked on the chart or marked with a pencil point through the center hole.

The tracing-paper protractor, consisting of a graduated circle printed on tracing paper, can be used as a substitute for the brass or celluloid instrument. The paper protractor also permits the laying down for simultaneous trial of a number of angles in cases of fixing important positions. Plain tracing paper may also be used if there are any suitable means of laying off the angles.

The value of a determination depends greatly on the relative positions of the objects observed. If the position sought lies on the circle passing through the three objects, it will be indeterminate, as it will plot all around the circle. An approach to this condition, which is called a revolver, must be avoided. In case of doubt, select from the chart three objects nearly in a straight line or with the middle object nearest the observer. Near objects are better than distant ones, and, in general, up to 90° the larger the angles the better, remembering always that large as well as small angles may plot on or near the circle and hence be worthless. If the objects

are well situated, even very small angles will give for navigating purposes a fair position when that obtained by bearings of the same objects would be of little value.

Accuracy requires that the two angles be simultaneous. If under way and there is but one observer, the angle that changes less rapidly may be observed both before and after the other angle and the proper value obtained by interpolation.

A single angle and a range give, in general, an excellent fix, easily obtained and plotted.

THE COMPASS.—It is not intended that the use of the compass to fix the position should be given up; there are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed. Where accuracy of position is desired angles should invariably be used, such as the fixing of a rock or shoal or of additions to a chart, as fresh soundings or new buildings. In such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained prevent any errors.

When only two objects are visible a sextant angle can be used to advantage with the compass bearings and a better fix obtained than by two bearings alone.

DOUBLING THE ANGLE ON THE BOW.—The method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "bow and beam bearing," the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives the maximum of accuracy and is an excellent fix for a departure, but does not insure safety, as the object observed and any dangers off it are abeam before the position is obtained.

By taking the bearings at two points and four points on the bow a fair position is obtained before the object is passed, the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current. Taking afterwards the beam bearing gives, with slight additional trouble, the distance of the object when abeam; such beam bearings and distances, with the times, should be continuously recorded as fresh departures, the importance of which will be appreciated in cases of being suddenly shut in by fog.

A graphic solution of the problem for any two bearings of the same object is frequently used. The two bearings are drawn on the chart, and the course is then drawn by means of the parallel rulers, so that the distance measured from the chart between the lines is equal to the distance made good by the vessel between the times of taking the bearings.

DANGER ANGLE.—The utility of the danger angle in passing outlying rocks or dangers should not be forgotten. In employing the horizontal danger angle, however, charts compiled from early Russian and Spanish sources, referred to in a preceding paragraph, should not be used.

SOUNDINGS.—In thick weather, when near or approaching the land or danger, soundings should be taken continuously and at regular intervals, and, with the character of the bottom, systematically recorded. By marking the soundings on tracing paper, according to

the scale of the chart, along a line representing the track of the ship, and then moving the paper over the chart parallel with the course until the observed soundings agree with those of the chart, the ship's position will in general be quite well determined.

SUMNER'S METHOD.—Among astronomical methods of fixing a ship's position the great utility of Sumner's method should be well understood, and this method should be in constant use. The Sumner line—that is, the line drawn through the two positions obtained by working the chronometer observation for longitude with two assumed latitudes, or by drawing through the position obtained with one latitude a line at right angles to the bearing of the body as obtained from the azimuth tables—gives at times invaluable information, as the ship must be somewhere on that line, provided the chronometer is correct. If directed toward the coast, it marks the bearing of a definite point; if parallel with the coast, the distance of the latter is shown. Thus the direction of the line may often be usefully taken as a course. A sounding at the same time with the observation may often give an approximate position on the line. A very accurate position can be obtained by observing two or more stars at morning or evening twilight, at which time the horizon is well defined. The Sumner lines thus obtained will, if the bearings of the stars differ three points or more, give an excellent result. A star or planet at twilight and the sun afterwards or before may be combined; also two observations of the sun, with sufficient interval to admit of a considerable change of bearing. In these cases one of the lines must be moved for the run of the ship. The moon is often visible during the day and in combination with the sun gives an excellent fix.

RADIO COMPASS positions are especially valuable at night and during fog or thick weather when other observations are not obtainable. For practical navigating purposes radio vibrations may be regarded as traveling in a straight line from the sending station to the receiving station. Instruments for determining the bearing of this line are now available. The necessary observations may be divided into two general classes: First, where the bearing of the ship's radio call is determined by one, two, or more radio stations on shore and the resulting position or bearing is reported to the vessel; secondly, where the bearings of two or more known shore radio stations are determined on the vessel itself and plotted as cross bearings. Experiments show that these bearings can be determined with a probable error of less than 2° and the accuracy of the resulting position is largely dependent on the skill and care of the observer. It must be remembered, however, that these lines are parts of great circles and if plotted as straight lines on a Mercator chart a considerable error may result when the ship and shore station are a long distance apart. The bearings may be corrected for this distortion, or still greater accuracy may be obtained by plotting the observed bearings on a special chart on the gnomonic projection and the resulting position transferred to the sailing chart.

Radio bearings may be combined with position lines obtained from astronomical observations and used in ways very similar to the well-known Sumner Line when avoiding dangerous shoals or when making the coast.

CHANGE OF VARIATION OF THE COMPASS.—The gradual change in the variation must not be forgotten in laying down positions by bear-

ings on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales or when the lines are long, the displacement of position from neglect of this change may be of importance. The compasses are reengraved for every new edition if the error is appreciable. Means for determining the amount of this error are provided by printing the date of constructing the compass and the annual change in variation near its edge.

The change in the magnetic variation in passing along some parts of the coast of the United States is so rapid as to materially affect the course of a vessel unless given constant attention. This is particularly the case in New England and parts of Alaska, where the lines of equal magnetic variation are close together and show rapid changes in magnetic variation from place to place, as indicated by the large differences in variation given on neighboring compass roses.

Local Magnetic Disturbance.—The term "local magnetic disturbance" or "local attraction" has reference only to the effects on the compass of magnetic masses external to the ship. Observation shows that such disturbance of the compass in a ship afloat is experienced only in a few places.

Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local center of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centers near together.

The law which has hitherto been found to hold good as regards local magnetic disturbances is that north of the magnetic equator the north end of the compass needle is attracted toward any center of disturbance; south of the magnetic equator it is repelled.

It is very desirable that whenever an area of local magnetic disturbance is noted the position should be fixed and the facts reported as far as they can be ascertained.

Use of Oil for Modifying the Effect of Breaking Waves.—Many experiences of late years have shown that the utility of oil for this purpose is undoubted and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil skillfully applied may prevent much damage both to ships(especially of the smaller classes) and to boats by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:

1. On free waves—i. e., waves in deep water—the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances, but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing else

is obtainable; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, either when running or lying-to or in wearing.

6. No experiences are related of its use when hoisting a boat at sea or in a seaway, but it is highly probable that much time would be saved and injury to the boat avoided by its use on such occasions.

7. In cold water the oil, being thickened by the lower temperature and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. For a ship at sea the best method of application appears to be to hang over the side in such a manner as to be in the water small canvas bags, capable of holding from 1 to 2 gallons of oil, the bags being pricked with a sail needle to facilitate leakage of the oil. The oil is also frequently distributed from canvas bags or oakum inserted in the closet bowls.

The positions of these bags should vary with the circumstances. Running before the wind, they should be hung on either bow—e. g., from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying-to, the weather bow and another position farther aft seem the best places from which to hang the bags, using sufficient line to permit them to draw to windward while the ship drifts.

9. Crossing a bar with a flood tide, to pour oil overboard and allow it to float in ahead of the boat, which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect can not be so much trusted.

On a bar, with the ebb tide running, it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil can be diffused well ahead of the boat and the bag readily hauled on board for refilling if necessary.

USE OF SOUNDING TUBES.

Although of undoubted value as a navigational instrument, the sounding tube is subject to certain defects which, operating singly or in combinations, may give results so misleading as to seriously endanger the vessels whose safety is entirely dependent upon an accurate knowledge of the depths.

Efforts have been made from time to time by the Coast and Geodetic Survey to utilize tubes for surveying operations. The results obtained, however, have been so unsatisfactory that the general use of such tubes for surveying work has been discouraged.

In practical tests, carefully made by surveying parties, where up-and-down casts of the lead were taken with tubes attached to the lead, errors in the tube amounting at times to as much as 25 per cent of the actual depths have been noted. Errors of 10 to 12 per cent of the actual depth were quite common.

It is also worthy of note that in the great majority of cases the tubes gave depths greater than the true depths, which, in actual use in coastwise navigation, would usually have resulted in the conclusion that the ship was farther offshore than was really the case.

There are various types of tubes in common use which are too well known to require detailed description here. They are all based on the general principle that air is elastic and can be compressed, and that if a column of air in a tube be lowered into the water in such a way that the air can not escape, yet at the same time the pressure of the water can be transmitted to it, the amount by which the air is compressed furnished a measure of the depth to which it was lowered.

Theoretically this principle is sound, but when we come to apply the theory to actual practice certain elements enter which result in errors in the depth determination. It is important to note that the amount of these errors depends on the depth; the greater the depth the greater the numerical value of the error.

The causes which produce these errors are as follows:

1. In order to give correct results the bore of the tube must be exactly cylindrical; in other words, the volume of air in any one inch of length of the tube must be exactly the same as in an inch in any other part. But because of the way in which glass tubes are made, it is very difficult to accomplish this. The bore may taper slightly or vary in other ways from a true cylinder. If tapering, the minimum diameter of bore may be at the top, middle, or bottom of the tube as submerged. If the minimum diameter be at the top, the tube will register depths less than the actual depths of water; and if at the bottom, the registered depth will be greater than the true depth.

This defect may be detected in a suspected tube by introducing a small quantity of mercury into the tube and comparing its length at different points along the bore. For satisfactory results, the length of this column should not vary more than 5 per cent.

2. In order that even a perfect tube should give accurate results the conditions of barometric pressure and air and water temperatures under which the sounding is being taken must be the same as those under which the scale for reading the depths was made.

In making the scale a barometric pressure of 29 inches is usually assumed as normal.

Then if in actual use the barometer registers above normal, the air in the tube is already partly compressed, and when lowered to any given depth the amount of compression due to water pressure is correspondingly diminished. With a barometer below normal the reverse is true, and it therefore follows that when the barometer reads above normal the tubes will register less than the true depths, whereas if the barometer reads below normal the registered depths will be greater than the true. The amount of error introduced from this cause is about 3 per cent of the depth for each inch of barometric pressure above or below normal.

The density of the air in the tube also depends directly upon its temperature. Therefore the difference between the temperature of the air in the tube before and after submergence will affect the accuracy of the sounding. Where the temperature of the tube in the air is greater than that of the tube in the water the depth recorded will be greater than the actual depth, and, conversely, when the temperature of the air is lower than that of the water the depth recorded will be less than the true depth. Also, the temperature of the water may vary at different depths, so that the actual amount of this error depends on the difference between the temperatures of the tube in the air and at the bottom.

The amount of error introduced from this cause is about 1 per cent of the depth for each three degrees Fahrenheit difference in temperature.

3. While the tubes are usually 24 inches long, and the scales are designed for that length of tube, the manner of closing the upper end of the tube may introduce an error. The thickness of the caps used for this purpose varies considerably in different makes of tubes, even when such caps are made of the same material. This variation in thickness results in moving the tube slightly up or down in the scale. Thus, with a thin cap the sounding read from the scale will be too deep; with a thick cap, the sounding read will be less than the true depth.

Copper caps put on with sealing wax have been found to vary sufficiently to produce errors of about 5 per cent of the depth in depths of 50 to 70 fathoms. Rubber caps seem to be more nearly uniform and to give better results when new. Rubber, however, deteriorates, and when used too long there is apt to be leakage of air.

When removable caps are used care should be taken to see that they are pushed home thoroughly before sounding.

4. The integrity of the air in the tube should be carefully preserved. Even a slight leakage of air will result in showing a sounding considerably in excess of the true depth.

Vessels sometimes approach dangers coming from depths of over 100 fathoms. As they approach they begin feeling for the bottom, sounding at infrequent intervals to pick up depths of 75 to 100 fathoms. So long as they get no bottom in such depths navigators feel secure. But a leaky tube may show no bottom at 100 fathoms when the ship is actually in much less depths, possibly resulting in disaster before the error is discovered.

Special precautions should, therefore, be taken on this point. Copper caps should be sealed in place with sealing wax, and rubber caps should be supplied with wire clamps, giving a tight fit.

5. Accumulated salt on the inner surface of the tube will cause the watermark to creep up and register greater than true depths.

The type of tube exemplified by the well-known Bassnett sounder is based on the same principle as the ordinary glass tube, but is more complicated in design. It consists essentially of a metal case containing a glass tube closed at the upper end. Inside the glass tube is a metal tube, through which the water enters and is trapped by a valve at the top of the metal tube.

In this device the scale is graduated directly on the glass tube, thus eliminating those errors due to thickness of cap; but, on the

other hand, the possibility of errors increases directly with the number of working parts of which the sounder is made.

In using sounders of this type care should be exercised to preserve perfectly gasketed joints between the bottom of the glass tube and the metal case and to keep the outlet valve well oiled and watertight.

Leaking valves and water remaining in the tube before a sounding is taken will give increased depths, while deficient depths may be recorded as a result of loss of water through suction at the inlet as the tube is being reeled in.

The Bassnett type, in common with all other forms of pressure tube, is subject to the above-described errors due to variations in temperature and barometric pressure.

It will be noted that wherever the amount of the various errors can be stated they are all small. Their importance lies in the fact that two or more of them, acting together, may result in considerable errors. As already stated, actual experiments show that errors of 10 to 12 per cent are not uncommon and that considerably greater errors may occur.

There are certain precautions which can be taken to eliminate or reduce these errors:

1. In purchasing tubes a type should be selected which can be used until broken or lost. The navigator can then make a study of the results obtained from each individual tube, and thus gain a fair idea of its accuracy under known conditions. This necessitates some permanent means of indentifying the various tubes used, which may readily be accomplished in the case of the glass tubes by means of various colored paints or threads.

2. Before undertaking the sounding necessary to make any particular landfall, the vessel should be stopped for an up-and-down cast of the lead in order to test the accuracy under the prevailing conditions of the tubes which are to be used. For this purpose it is not necessary to get bottom; simply run out 60 to 80 fathoms of wire and then see how closely the tubes register that amount. A number of tubes can be sent down at one time, and it is then possible to select one or two which register most nearly correct.

It is well to keep a permanent record of the results of each tube tested. By so doing the navigator will soon obtain valuable information as to the performance of the various tubes and the degree to which they may be trusted. Such a record should, of course, take into account the various conditions affecting the result.

It will be noted that the factors which produce errors may be divided roughly into three groups:

(*a*) *Inherent.*—Those which occur as a result of permanent defects in the tube, such as the variation of the bore from a true cylinder, variation in the thickness of the cap, etc.

(*b*) *External.*—Those which occur as a result of the conditions under which the sounding was taken, variations of temperature or barometric pressure from the normal, etc.

(*c*) *Accidental.*—Those which affect a single sounding, due to the failure of the tube to register properly, leakage of air, loss of water from leaky valves, errors due to the presence of salt in the tubes, etc.

These accidental errors are probably the most serious of the three types, both because they are apt to be larger in amount and because it is impossible to foresee when they will occur. But, on the other hand, they occur only as a result of a few known causes, already enumerated, and therefore by the exercise of proper caution in the use of the tubes they may be to a large extent eliminated. If the ordinary glass tube is used, see that the bore is thoroughly dry and free from salt and that the cap makes a tight fit. If using a sounder, see that the tube is free from water and that the valves are tight and well oiled.

And, above all, during the course of the sounding take an occasional up-and-down cast as a check, for by that means alone can one be sure that the proper results are being obtained.

The smallest possible number of tubes should be used. It is obviously much better to use, over and over again, one tube which is giving good results than to use a number whose errors are uncertain. This is particularly desirable where sounders involving valves are used.

If a tube shows no bottom at 100 fathoms, examine the arming to make sure that the lead actually failed to find bottom.

Finally, beware of overconfidence. Tubes which have been working properly for a number of soundings suddenly develop errors. It is chiefly for this reason that they have been discarded for surveying operations.

Assuming that the accidental errors can be reasonably controlled, the inherent and external errors present no serious difficulty.

As already indicated, the bore of a tube (or at least of any tube which is capable of constant use) can be tested with mercury, and those tubes rejected which show variations in bore greater than about 5 per cent.

Errors due to variations in the thickness of caps can be eliminated by using a scale graduated for a true length of 24 inches (the length of the glass tube) and removing the cap before the sounding is read.

Errors due to differences between air and water temperatures can be reduced to a minimum, which can usually be neglected by immersing the tube before using in a bucket of sea water, newly drawn, so that its temperature has not had time to change. Care should, of course, be taken to see that no water enters the tube. When this is done there may still remain an error due to the difference in temperature of the water at the surface and at the bottom. This may, if desired, be corrected by sending down a self-registering thermometer with the lead, but for the ordinary purposes of navigation this is a refinement which may be ignored.

There is no ready method available for correcting the error due to variations in the barometric pressure. The correction should be applied to the sounding recorded.

It is interesting to note that sounding tubes which give good results can readily be made from plain glass or metal tubes aboard ship—gauge glasses, for instance. One end of the tube is closed with a cork and sealing wax. A narrow strip of chart paper of uniform width, on which a line has been ruled with an indelible pencil, is inserted the entire length of the tube. The paper is held in place by bending the projecting lower end upward along the outside of

the tube and securing it with a rubber band. The height in which the water rises in the tube will be indicated by the blurring of the pencil line.

If the air column in the tube is 24 inches long, the sounding may be read from any scale graduated for tubes of that length. If of a different length, a special scale must be prepared; its graduations, compared to those of the 24-inch scale, will be proportional to the comparative lengths of the two tubes.

If certain precautions are taken, these tubes will give results which compare favorably with commercial tubes. The paper should be inserted uniformly in the tube, and its upper end, or a mark from which the measurement is taken, should coincide with the top of the air column. Metal tubes have the advantage of uniform bore, but if metal tubes are used the paper, in order to insure uniformity, should be fastened at the upper end when that end is being sealed and then stretched lightly at the bottom. The depth should always be read from the dry portion of the paper, as the wet portion is subject to considerable change in length.

GENERAL INFORMATION, PHILIPPINE ISLANDS.

A general and historical description of the Philippine Islands is given in Part I of the Coast Pilot of the Philippine Islands. This group of islands comprises over 7,000 islands, of which 462 have areas exceeding 1 square mile. The largest is Luzon, with an area of 40,814 square miles, with Mindanao next in size, having an area of 36,904 square miles. The census of 1918 gives the population as 10,350,640, of whom 855,368 are classed as non-Christians. These latter include the Moros and Igorotes, as well as the more backward hill people and wild tribes.

The insular government is modeled on that of the United States, with its executive, legislative, and judicial branches. The head of the executive branch is the Governor General, who is appointed by the President of the United States. The other officials appointed by the President are the vice governor, the insular auditor, deputy insular auditor, and the nine justices of the supreme court. The other executive and judicial officers are appointed by the Governor General with the advice and consent of the Senate of the Philippine Islands. The legislative branch is almost entirely elective. The islands are divided governmentally into 46 Provinces and 2 chartered cities (Manila and Baguio). The Provinces are divided into municipalities, districts, and townships, which are further subdivided into barrios and sitios, the latter being an unorganized settlement or small group of houses.

The industry of the Philippine Islands is principally agricultural. The principal articles of export are hemp, coconut oil, sugar, tobacco products, and copra; also embroideries and some gold bullion and silver ore are exported. The total value of exports in 1918 was ₱270,388,964, the peso being equivalent to 50 cents United States currency. The total value of imports during the same year was ₱197,198,423 and consisted of cotton and its manufactures, iron and steel and its manufactures, coal, rice, flour, automobiles, silk manufactures, leather goods, meat and other food products, etc. About two-thirds of the total trade was with the United States.

STORM WARNINGS.

TYPHOON SIGNALS (see Appendix, p. 344) are hoisted in accordance with advices from the central observatory of the Weather Bureau at Manila, and their meaning is the same wherever shown in the archipelago. The greater part of the area covered by this volume lies south of the typhoon belt, but is subject to sudden and severe tropical storms at times. The Manila observatory furnishes two regular daily weather reports to the Cavite naval radio station, and they are broadcasted for the information of mariners. During the progress of a typhoon special warnings are broadcasted, and inquiries from vessels are freely answered.

RADIO SERVICE.

TIME SIGNALS.—In cooperation with the Manila observatory, time signals are sent out from the Cavite naval radio station at 11 a. m. and 10 p. m. daily, including Sundays and holidays. The signals begin at 10.55 a. m. and 9.55 p. m., standard mean time of the one hundred and twentieth meridian east of Greenwich, and continue for five minutes, and during this interval every tick of the clock is transmitted except the twenty-eighth, twenty-ninth, fifty-fourth, fifty-fifth, fify-sixth, fifty-seventh, fifty-eighth, and fifty-ninth of each minute. The radio transmission is by a 5-kilowatt spark on a wave length of 952 meters, and by arc on a wave length of 5,000 meters. The daily weather reports immediately follow the time signals.

In addition to the time service by radio, time signals are sent daily over the lines of the Postal Telegraph and Cable service at 11 a. m., and mariners can avail themselves of this service at the principal ports of the islands by applying at the local telegraph offices.

The following is a list of governmental radio stations of the Philippine Islands. With the exception of the United States naval radio stations, they are open to general public service (commercial traffic). The insular government radio stations are under the control of the Bureau of of Posts and are operated in connection with the land wire and cable service of that bureau. Information concerning regulations, rates, and commercial work of United States radio stations may be obtained by addressing the Director of Naval Communication, Radio, Va.

Station.	Location.						Call signal.	Wave length.
	Latitude.			Longitude.				
	°	′	″	°	′	″		
United States naval radio stations:								
Cavite	14	28	55 N.	120	55	00 E.	NPO	600.
Olongapo	14	49	02	120	16	59	NPT	600.
United States Army radio station:								
Fort Mills, Corregidor Island	14	22	52	120	34	40	WVN	300; 600; 1,800.
Insular Government radio stations:								
San Jose, Mindoro	12	27	30	121	03	00	WVY	600.
Cuyo	10	51	25	121	00	20	WVX	600; 1,200.
Iloilo	10	40	00	122	35	00	KUVM	600; 1,200.
Cebu	10	25	00	123	50	00	KUXJ	600; 1,200.
Puerto Princesa	9	44	00	118	42	40	WVV	600; 1,200.
Malabang	7	35	20	124	04	10	WVT	600; 1,200.
Davao	7	04	00	125	36	20	WVO	600; 1,200.
Zamboanga	6	55	10	122	02	19	WVW	600; 1,200.
Jolo	6	02	40	121	00	00	WVS	600; 1,200.
Margosatubig	7	34	15	123	11	50	MG	600; 900.
Isabela de Basilan	6	40	00	121	50	50	KHI	200.
Malangas	7	37	—	123	01	—		
Malita	6	24	—	125	37	—		
Batangas	13	46	—	121	04	—		

VARIATIONS OF THE COMPASS.

The magnetic variations for 1920 at points mentioned are given below. The annual change may be neglected as it averages about 1′ for most places.

Locality.	Compass variation.	Locality.	Compass variation.
	Easterly. ° ′		*Easterly.* ° ′
Coron Bay	1 25	Iligan	1 55
Cuyo	1 30	Dapitan	1 55
Puerto Princesa	1 50	Zamboanga	2 10
Balabac Strait	2 05	Davao	2 10
Jolo	2 15	Mati	2 15
Surigao	1 45		

TIDES AND CURRENTS.

A general description of the tides and currents encountered in Philippine waters is given on page 31 of Part I, Coast Pilot, Philippine Islands, while the local peculiarities are mentioned in the body of this volume, with the description of the body of water affected.

Tide Tables for western North America, Eastern Asia, and many island groups of the Pacific Ocean, including the Philippine Islands, are published annually in advance by the United States Coast and Geodetic Survey. This volume furnishes, at the nominal cost of 10 cents, United States currency, full tidal data for the ports of the Philippine Islands.

It contains a table of full daily predictions of the times and heights of high and low waters for certain standard or principal ports along the coast; full explanations for the use of this table are given on page 8. The use of Table 2 of the Tide Tables should be known to every navigator. By means of this table the predictions given for the standard ports are extended so as to enable one to obtain complete tidal data for each day for stations only a few miles apart for the greater part of the coast, and with almost the same accuracy as though full predictions were given for all of these points.

Instead of using the height differences of Table 2, however, a more accurate method is that of multiplying both high and low water heights at the standard port by the ratio of ranges for the given port to obtain the heights of the corresponding high and low waters. The ratio of ranges is given in Table 2 of the Tide Tables. The minus sign before the predicted heights in the Tide Tables indicates that the water is below the plane of reference, which is mean lower low water.

The time of high or low water at any given port in Table 2 is found by taking the time of the corresponding tide for that day from the standard port for reference and applying to it the time difference for the given port from the third column of Table 2, adding it if the sign is plus and subtracting if minus.

CAUTION.—In using the Tide Tables slack water should not be confounded with high or low water. For ocean stations there is usually but little difference between the time of high or low water and the beginning of ebb or flood current; but for places in narrow channels, landlocked harbors, or on tidal rivers the time of slack current may differ by two or three hours from the time of high or low water stand, and local knowledge is required to enable one to make the proper allowance for this delay in the condition of tidal currents.

The figures given in Tables 1 and 2 of the Tide Tables are the times of high and low water, and these times are not necessarily the times of slack water.

COASTWISE NAVIGATION.

The navigation of coral seas demands constant vigilance. The lead gives little or no warning of the approach into danger, and the effect of uncertain and irregular currents is a constant source of danger on the longer courses. This is especially true of the Sulu Sea, where the shoals rise almost perpendicular from great depths and the currents vary not only with the seasons and the winds but from day to day. Aids to navigation are constantly being improved, but mariners are cautioned against relying too much on unwatched or automatic lights, as it has been found very difficult to keep them operating satisfactorily owing to the depredation of irresponsible natives.

The surveys of the west coast of Palawan, the southern part of the Sulu Sea, and the Sulu Archipelago are not yet completed and should be navigated with caution. In the area covered by the surveys good, safe courses can readily be laid out on the charts, and therefore no general routes are given here.

The best harbors of refuge on the coast of Palawan and adjacent islands are the following:

Coron, Halsey Harbor, Cuyo, Puerto Princesa, Port Ciego, Balabac, Ulugan Bay, and Malampaya Sound.

On Mindanao and adjacent islands: Nasipit, Misamis, Port Masinloc, Port Isabela, Port Banga, Port Sibulan, Dumanquilas Bay, Polloc Harbor, Port Lebac, Malalag Bay, Port Balete, Catarman Anchorage, Port Sibongo.

In Sulu Archipelago: Dalrymple Harbor and Port Bongao.

A description of these harbors and the directions for entering them are given in the detailed description of the coast, which includes landmarks, dangers, etc.

PALAWAN.

ISLANDS NORTHEAST OF PALAWAN.

CALAMIANES GROUP.

The Calamianes are a group of islands, including Busuanga, Coron, Culion, and a great number of smaller islands, situated southwestward from Mindoro, from which they are separated by Mindoro Strait. All the larger islands are, generally speaking, irregular in shape, hilly, and broken. The tops of the higher hills are covered with cogon, the lower slopes and valleys being wooded. The forests produce good lumber for building or cabinet work. Cultivation is not practiced to any great extent, timber and some cattle being the principal products exported.

Busuanga Island, the largest of the group, is about 34 miles long east and west and 18 miles wide at the widest part. It is very irregular in form with several large bays. **Mount Tundalara**, in the southern part, rising to a height of 2,140 feet, is the highest point of the island. This peak is frequently covered by clouds, but when visible forms a very good landmark.

From Macachin Point, the north point of the island, the coast trends in a general southeasterly direction for 23 miles and then northerly for 5 miles to Coconongon Point. Inagtapan Point, 2 miles eastward of Macachin Point, is the end of a ridge separating two low valleys extending across the island to the west coast. Two miles southward of this point lies Calauit Bay with the barrio of the same name on its northern shore. The Ditipac River empties into the head of the bay and also into Ilultuk Bay on the west coast, this making the northwest end of Busuanga an island locally known as Calauit Island. Launches drawing not more than 3 feet use the river as a cut-off, being careful to arrive at the eastern end when there is more than half tide on the flats at Calauit.

Minuit (chart 4335) is the headquarters of a large hacienda. A large concrete house, close to the shore, makes a good landmark for approaching the anchorage off Minuit. A partially protected anchorage may be found in the bay formed by the Busuanga shore and the small islands 1½ miles eastward of Minuit.

Port Caltom affords good protected anchorage. A long narrow coral reef extends from its head almost halfway to the entrance, with deep water on either side.

Pangauaran River entrance (chart 4335) is the best anchorage in this vicinity. Any small steamer can lie here securely and comfortably. A small stone pantalan with 5 feet of water at its end makes the shore easily accessible. To enter, from a point ¾ mile east of Malpagalen Island steer 180° (179° mag.) until the rocky point on the north side of Port Caltom is abeam, then steer 246° (245° mag.) for the entrance to the river. When the west entrance point is abeam change to 217° (216° mag.) and proceed to an anchorage in 10 to 12

fathoms, mud bottom. In entering, favor the west side of the entrance to avoid the coral reef that extends 100 yards off the east point. There is another good anchorage off the southeast end of **Cabilauan Island**, but it is difficult to approach unless weather and light conditions are favorable.

Dicapadiac, Dimalanta, Lauit, Liatui, and **Hadyibulac Islands** are small islands lying between Cabilauan and the Busuanga shore. A number of reefs and shoals exist in this area. Their position and character can be best understood by reference to the chart.

ISLANDS NORTHWARD OF BUSUANGA.

Dimipac Island, 439 feet high, lies about 2 miles northward of Macachin Point. It is covered with trees and vegetation and is almost surrounded by a coral reef about 100 yards wide. **Sail Rocks,** a group of bare rocks 109 feet high, lie 1 mile northward of Dimipac Island and **Northwest Rock,** 127 feet high, is 2 miles farther northwestward. This is a large flat-topped rock, about 200 yards in diameter, bare of vegetation and of dark appearance. **Tanobon Island,** lying 2 miles northeast of Inagtapan Point, is surrounded by a coral reef. Rocks extend off the northeast end for a distance of about 1 mile, and about 1 mile northwest by west of the island are two rocks about 4 feet above high water. The bottom in this vicinity is generally irregular, but the dangerous shoals are close inshore.

Colocoto Rocks, lying about 11 miles northeast of Macachin Point, are four large black rocks which appear as one when seen bearing 125° (124° mag.) or opposite direction. The largest rock is 214 feet high. They have precipitous sides, are underscored from 3 to 15 feet by the action of the sea, and the only vegetation is a small vine, invisible at a short distance away, so that they appear to be a slate-colored pile of barren rocks.

Dumunpalit Island, 300 feet high, is situated about 7 miles southeastward from Colocoto Rocks. It is small and rocky, with several detached rocks lying on the same reef. Outside the reef the water deepens rapidly to 20 fathoms or more.

Diboyoyan and **Dimaquiat** are two small islands lying, respectively, 5 miles northeastward and 4 miles eastward of Minuit. The first is surrounded by a coral reef. Outside the 5-fathom curve the depths increase rapidly. The latter is connected with Malpagalen Island, 1 mile southeastward, by a coral and sand bar of varying depth with 3¾ fathoms near the Dimaquiat end of the bar. A 4-fathom shoal lies 1⅛ miles northwest by west from Dimaquiat Island, with two separate shoals between it and the island. Eight separate shoals, varying in depth from 1½ to 6 fathoms, lie between Dimaquiat Island and the Busuanga shore. These shoals all rise abruptly from a very regular mud bottom.

Nanga Islands, 7 miles north-northeastward of Coconongon Point, are two small wooden islands 249 and 173 feet high. They are joined by a reef, with several small rocky islets on the same reef. There is another rocky islet, 95 feet high and steep-to on all sides, about 1 mile northeast of the northern Nanga Island.

Camanga Island, 213 feet high, with several small rocky islets of varying height, lies 2 miles southward of the Nanga Islands. The 90-foot islet, ½ mile westward of Camaga Island, is bold and makes

a conspicuous landmark. Neither the Nanga or the Camanga Islands are inhabited.

Tara Island, the largest of the islands northeast of Busuanga, is about 3 miles long and over ½ mile wide. The highest point, 477 feet, is in the southern part of the island. The hills of a light brown color, with a distinct greenish tint during the rainy season, are bare of trees and from a distance appear as separate islands. The lower slopes and valleys are covered with bamboo and jungle, with a few small cultivated areas. The western shore is mostly sand beach with a wide coral reef and outlying rocks and islets. The eastern shore is nearly all rocky with steep bluffs. A good anchorage in 17 fathoms may be found off the barrio on the western shore. A small stone pier has been built in a break of the reef, which makes an excellent landing for small boats.

Lagat, Bantac, and **Calanhayaun Islands** are ridges rather than detached summits. They are dark in color and covered with a good growth of timber. **Lagat**, 261 feet high, is very steep and has nearly bare eroded cliffs on both sides, which show red or yellow through the sparse vegetation. There is a coral reef extending south from the island and a detached reef with 1¼ fathoms spot off the north end. **Bantac Island,** 396 feet high, and **Calanhayaun Island,** 248 feet high at its southern end, are connected by a coral reef. There are a number of rocky islets on detached reefs westward of these islands that show up well to the northward and southward.

Lubutglubut, 366 feet high, and the brown rocks to the southward are practically bare, taking their dark color from the weathered rock. They are easily recognized and form excellent landmarks.

East coast of Busuanga.—Approaching Busuanga from the northeast, east, or southeast, **Mount Minangas,** 1,878 feet high, is the first to appear. It is the most northerly and highest of three cogon-covered peaks fairly close together on an irregular saw-toothed range of mountains lying along the east coast of the island. **Mount Coconongon** is a cone-shaped hill situated on the peninsula at the extreme northeast end of the island, is covered with trees and bushes, and stands out prominently from the mainland.

Minangas Bay (chart 4335), 6 miles southeastward of Coconongon Point, is the best protected anchorage on the east coast of Busuanga. From a distance the entrance can be distinguished by several long reddish-brown scars, where small landslides have recently occurred on the east end of Napuscud Island. Vessels should not attempt to enter by the north passage, as there are a number of coral heads in the fairway not easily seen from the bridge of a vessel. When entering Minangas Bay by the south passage favor the southeast shore of Napuscud Island, keeping within about 250 yards of the shore, rounding the south end of the island to a well-sheltered anchorage midway between Napuscud and Busuanga Islands in about 15 fathoms, mud bottom. A ¼-fathom shoal lies ¼ mile southward of the south end of Napuscud Island and a 1¼-fathom spot ¼ mile southeastward of the island. Both shoals are easily distinguished in a favorable light and avoided by favoring the island shore as recommended. The southern part of Minangas Bay is exposed to the northeast, and coral reefs extend a considerable distance offshore. Napuscud and Depagal Islands are connected by a reef and the channel between the latter and Busuanga is foul.

From Minangas Bay the coast trends southeast for 7 miles to **Alonon Point.** This coast is characterized by a succession of high cliff points with low mangrove bights with coral reefs. Several islands and rocks lie on the reef close inshore.

Port Borac, lying southwestward of Alonon Point, is easy to enter and is a very good anchorage for launches, but too small for large vessels. A stream empties into the bay. The bottom of the basin is mud, with no fringing reef; however, coral and sand is found along the shore at the entrance.

Dinaran Island, lying 1 mile southeast of Alonon Point, is about 1 mile long and ¼ mile wide, rises to a height of 248 feet, and all but the summit is covered with trees and bushes. The western shore is steep-to, but a coral reef extends ½ mile northeastward. There is a fair passage between Dinaran Island and Busuanga. A ridge with a 2-fathom shoal, about 2 miles north of Dinaran Island and 1 mile east by north of Salung Island, marks the eastern side of this passage, while a 1¾-fathom shoal, ½ mile east of Alonon Point, divides it into two deep channels.

Mataya Reef, lying southeast of Dinaran Island, is an extensive reef of coral and sand with its eastern edge marked by Mataya Island, 43 feet high. There is a channel between the reef and Dinaran Island, but nothing would be gained by using it. Shoal water extends about 1½ miles southward of **Mataya Island,** and vessels should keep about 2 miles off the island in passing. The channel westward of Dinaran Island and Mataya Reef is contracted by reefs and shoals that extend about ½ mile off the Basuanga shore southward of Port Borac.

Bocao Point, 116 feet high, is the southeastern point of Busuanga Island. A coral reef with two rocky islets, 45 and 50 feet high, lying near the outer edge, extends $\frac{3}{10}$ mile to the southeastward.

Dibatuc Island, 435 feet high, lies close to the eastern entrance to Coron Passage and forms an important landmark. The island is covered with bushes and small trees, has little soil, and is uninhabited.

Delian Island, 790 feet high, lies about 3 miles northeast of Calis Point, Coron Island. The eastern shore is rocky and cut up, with shoal water extending ¼ mile offshore; the western shore is more regular and steep-to. A shoal, with 3¾ fathoms least water, lies 1¼ miles east by north of the north end of the island.

Coron Island, as its name indicates, is high and rocky. From a distance the high pinnacle peaks appear as separate islands that merge into one island as they are approached. The highest peak, 2,010 feet, is in the west-central part of the island. **Calis Point,** the southern point of Coron, is a vertical face of rock 400 feet high and undercut to a depth of 20 feet. There are no protected anchorages along the shore of Coron. The basin just northward of Calis Point has no channel over the bar. The channel to the bay, 2 miles northward, is very narrow, with a reef in the middle of the entrance. The other two bays on the east coast are both filled with coral. A shoal with a least depth of 2 fathoms lies 6 miles eastward of Coron. Between this shoal and Coron there are two banks or ridges with shoals of 1 and 2 fathoms, the inner extending 5½ miles northeastward from the coast of Coron to within ¾ mile of Dibatuc Island. The west coast of Coron has a narrow fringing coral reef. **Coron Reef,** awash at low water, lies 2 miles southwesterly of the highest peak of Coron. The

reef extends about 3/5 mile parallel with the coast of Coron, the part awash being near the northern end. There are several shoals northward of Coron Reef, whose position may be best understood by reference to the chart.

The northwestern coast of Coron from Balolo Point to Limaa Point is steep and much broken up, but there are no dangers more than 1/4 mile offshore. A coral reef extends about 250 yards off Balolo Point, but Limaa Point is clear and may be passed close-to.

Coron Passage (chart 4351), 1/2 mile wide at its narrowest point, between Limaa Point, Coron, and Roja Point, Busuanga, has a dangerous 2-fathom shoal 4/5 mile 94° (93° mag.) from Limaa Point. The Busuanga shore should be avoided, as it has a broad fringing reef with shoals outside the part that bares. The **Maquinit Islands** lie on the shore reef eastward of Coron, and **East Maquinit Island**, 176 feet high, divides the passage into two channels. It is steep and may be passed close-to on either side. A reef awash 3/5 mile southwestward of Coron Point marks the southern side of the entrance to Coron Harbor. A narrow coral reef marked by a red buoy extends 700 yards off the southeast shore of Uson Island, and midway between the end of this reef and the reef awash is a coral shoal with a least depth of 3/4 fathom.

Directions for Coron Passage.—This passage is used by vessels trading between Manila, Coron, and Culion. Pass about 2 1/2 miles eastward and southward of Mataya Island and steer to pass close-to either northward or southward of Dibatuc Island and steer west until the tangent to Limaa Point bear 298° (297° mag.), change course to 302° (301° mag.) and keep close to the Coron coast. Round Limaa Point at a distance of 150 yards and pass northwest of East Maquinit Island at about the same distance. If bound for Culion, bring East Maquinit astern on a course 242° (241° mag.). This course will take the vessel about 200 yards off the end of the reef marked by a red buoy and the same distance off the edge of the reef fringing Balolo Point. When the southwest tangent to Tangat Island bears 330° (329° mag.) change course to 260° (259° mag.). If bound for Coron, when Coron Point bears 0° (359° mag.) steer 314° (313° mag.) to an anchorage in 10 to 12 fathoms, mud bottom. Better-protected anchorage may be found westward of the town of Coron about midway between Canitauan Island and Uson Island in 6 to 7 fathoms, mud bottom. Four beacons placed by the survey parties mark the channel temporarily. Without the beacons the entrance should not be attempted by strangers. Fresh water may be obtained from the pipes on a small wooden wharf on Uson Island.

Coron, the seat of the municipal government, is the principal town on the island of Busuanga. It has a population of about 700, and most of the business of the island passes through its harbor. A stone pier extends from the main street out to about low water, but, owing to the little water on the wide reef in front of the town, can only be used by small boats at or near high water. A pier with 3 3/4 fathoms of water at the outer end has been built about 1/2 mile southeast of the town. In going alongside the pier care must be taken to avoid a 2-fathom spot southward and a 3/4-fathom spot westward of the end of the pier. A good road leads from the pier to the town.

Uson Island, situated close to the southern shore of Busuanga, is undulating and of the same general appearance as Busuanga, the

higher hills being cogon covered. The highest hill, 670 feet, is in the southwestern part of the island. **Vega, Pedrasa, East, Cabilauan,** and **Marinon** are all small islands lying on the fringing shore reef. Cagbatan, 80 feet high, and Dimanglet, 290 feet high, lie southward of Uson and form good landmarks for navigation.

Port Uson, lying between Uson Island and Busuanga, affords several good typhoon anchorages. The best anchorage is in 8 to 9 fathoms, mud, between Uson and Baquit Islands. The eastern entrance, from Coron Harbor, is clear and wide, with a least depth of 4 fathoms in the channel between the two islands. The best approach to this anchorage from the west is through the narrow channel between Pinas and Uson Islands.

Another good anchorage is northward of Pinas Island in the approach to Malbato Bay; the head of the bay, however, is shallow with a rock awash about 300 yards southeastward of Dianglit Islet. A perfectly protected anchorage may be had in **Dipulao Cove,** northward of Baquit Island, in 2 to 4 fathoms, mud bottom. In entering vessels should favor the Baquit Island shore, as shoal water extends some distance off the Busuanga shore. The western entrance to Port Uson, between Uson Island and Mayanpayan Island, is clear and deep. A reef that bares at low water, lying 3/5 mile south of the southwest point of Uson Island and a 1¼-fathom shoal lying ¾ mile east-northeastward of the south end of Batunan Island, divide the approach to the entrance into three channels, the distance between the reef and the shoal being about 850 yards.

Port Luyucan, lying northeast of Apo Island, affords anchorage for small vessels only, as the available anchorage space is contracted by a 1¼-fathom shoal near the center of the port. The channel through the mangroves northward of Apo Island is sometimes used by bancas at high water.

Tangat Island, 1,510 feet high, is steep-to outside a narrow fringing reef. The channel eastward of the island is deep, but the reefs southward and westward of Calbi Island narrow it to less than 100 yards in navigable width close to the Tangat Island shore. The bay formed by Lusong, Busuanga, and Tangat Islands is clear and deep, with the exception of a rock awash, lying 3/5 mile southwestward of the north end of Tangat Island. Coral reefs extend about 975 yards southward of Ditalantang Point, and the head of the bay eastward is shoal. Cattle are brought down the river from Bintuan usually in flat-bottom boats and at high water.

West coast of Busuanga.—Beginning 2½ miles westward of Lusong Island, the coast trends north-northwest for 13 miles and then 4 miles south-southwest to **Detobet Point.** The large body of water formed by this bend in the coast line is known as **Gutob Bay.** A number of large fertile valleys are found on this part of Busuanga. Rice and corn are raised for local use. Lumber is the principal export, while some cattle are shipped to Manila by way of Coron. **Concepcion, Salvacion,** and **Busuanga** are the principal towns. The latter is the terminal of the telephone line from Coron and has a small stone pier on the bank of the Busuanga River, about 750 yards from its mouth, where small boats can land. There is a bar at the mouth of the river, over which small boats have difficulty in crossing at low water.

A coral reef that bares lies 1 mile southwestward of Salvacion Island, and there are several dangerous shoals from 1 to 1½ miles west of the mouth of the Busuanga River. Northward of these shoals the eastern part of the bay is shoal and foul. The best protected anchorage is between Bacbac and Capare Islands and the Busuanga shore northward of Detobet Point in 7 to 11 fathoms. No seas get into this area and the hills give good protection from all winds. **Manolaba Island** is connected with Capare by a reef. There is a rock awash ½ mile southward of Manolebeng Island, a rock awash ¼ mile eastward, and another rock that bares ½ mile northward; midway between the latter two is a ¼-fathom shoal. **Talampetan Island** and a 200-foot hill lie near the southern edge of the coral reef fringing Capare Island. A 1-fathom shoal lies 1 mile east by south and a 4¼-fathom shoal ½ mile southeast of Talampetan Island. **Talampolan Island,** lying ¾ mile westward of the south end of Capare Island, has a broad fringing reef. The channel between the two islands has several shoals. The best entrance to Gutob anchorage is between Talampolan Island and Detobet Point, keeping well northward of the reef that extends about ½ mile northwestward of the island. **Malajon Island,** about 2 miles westward of Detobet Point, is an almost barren rock rising abruptly on all sides and reaches a height of 779 feet. It may be passed close-to on all sides.

From Detobet Point the coast trends north by east for 11 miles to the northwest point of Busuanga. The town of **Buluang** lies in a bend of the coast 5 miles northward from Detobet Point. A break in the reef before the town furnishes anchorage for launches or small vessels, but there is no protection from westward. **Ilultuk Bay,** 2 miles northward, affords good anchorage in 6 to 7 fathoms of water about 1¼ miles from the entrance behind a point on the south shore. A small island, 121 feet high, lies near the south entrance point. **Elet Island,** 228 feet high, and **Kalampisauan Island,** 380 feet high, lie off the coast southwestward.

A pinnacle rock, 43 feet high, lies 1¼ miles northwest of Elinibinid Point and about due west of the northwest point of Busuanga. Halfway between the rock and the main shore is a small 3-fathom shoal. A large bank having 6 to 8 fathoms of water extends 1½ to 2½ miles southwest of the pinnacle rock.

There are several banks and shoals westward and northwestward of Busuanga whose position can be best understood by reference to the chart.

Culion Island lies southwest of Busuanga, from which it is separated by a strait from 3 to 4 miles wide with a number of islands which contract the navigable channel to about ½ mile at its narrowest part. The island of Culion has been reserved as a leper colony, and it is unlawful for any vessel to communicate with it without the permission of the chief of Culion leper colony, Bureau of Health. Culion is about 20 miles long in a north-northwest and opposite direction, and its greatest breadth is about 10 miles. It is irregular on its northern and eastern sides with a number of islands lying just off the coast, but the western side is nearly straight. **Maus Mountain,** with two peaks close together, in the southern part, rises to a height of 1,380 feet, and **Mount Oltaloro,** the highest peak on Culion, 2½ miles southeastward of Maus Mountain, rises to a height of 1,560 feet. Close to

the southern part of Culion is Dicabaito Island, which marks the northern side of Linapacan Strait.

Galoc Island (chart 4350), lying close to the north shore of Culion, is about 4 miles long and ¾ mile wide, rising to a height of 662 feet in the southwestern part. The shore is rocky and fringed by a coral reef. The channel between Galoc Island and Culion is narrow and can not be recommended, as there is a sharp turn in the narrowest part with a shoal close to the turning point and there are several reefs in mid-channel opposite the large reef-choked bay opening off this channel. The bay is only used in getting out firewood from the mangrove along the shore. **Napula Island** is a small island lying eastward of Galoc. The channel between Napula and Culion is almost closed by reefs.

Popototan Island is separated from Galoc southward by a wide, deep channel, in which vessels can find protected anchorage. This island is highest in the western part, rising to a height of 345 feet. The western shore is rocky; two small islands and a rocky ledge lie off the southwest point; the rest of the shore line is mostly sand beach and mangrove over a fringing coral reef. The few people living on the island are engaged in fishing. **West Nalaut Island**, the most western of the Calamianes Islands, is 235 feet high, about ⅕ square mile in area, and serves as a guide in entering Coron West Passage from the China Sea. The east third of the island is a low wooded sand spit. The shore line on the west side and up to the sand spit at both ends is very rocky. A fringing reef surrounds the entire island. The island is not inhabited. **East Nalaut Island** with its two peaks, 114 and 112 feet high, is also a good landmark for vessels coming from the northward and westward. There is no reef on the west side, and the shore line is being rapidly undermined.

Pamalican Islands lie 4 miles west by north of Kaniki Point, Busuanga. The main island of the group is a low sand island about 425 yards long, covered with trees reaching an elevation of about 70 feet.

North Cay and **South Cay** are two small sand islets covered with trees. **Maltatayoc Island** is long and narrow, the western part rising to a height of 220 feet. **Horse Island**, wooded and partly cultivated, rises to an elevation of 245 feet. The island to the north on the same reef is 215 feet high and there is a small island 63 feet high just eastward of the main island. **Malcatop Island**, partly cleared of timber and cultivated, rises to a height of 288 feet and is separated from East Malcatop by a narrow deep channel. The latter rises to a height of 128 feet near the south end and is partly cultivated by natives who come from Busuanga during the rainy season. The two **Malbinchilao Islands** and a 112-foot island lie on the same reef and are sparsely wooded. There are three houses on the sand beach at the northeast end of the middle island; the others are not inhabited. **Mangenguey Island**, 171 feet high, is rocky on the west side and has a prominent boulder, 20 feet high, a few yards offshore. **Rat Island**, 156 feet high, is separated from Malbinchilao to the westward by a narrow channel with 4 fathoms of water. **Pass Island**, lying 2 miles southeastward, rises to a height of 110 feet and is rocky on the west and southwest. The east end is a sand spit not fringed by coral, and in case of necessity a vessel might be beached there. The channel to the eastward between Pass Island and Lajo Island is ½ mile wide with a ¼-fathom

shoal midway in the southern part. Halfway between Pass Island and the southern end of Malbinchilao Island is a coral reef with several rocks awash at the western end and a sand bar awash at low water to the eastward of the rocks.

There are a number of channels among these islands, but some of them are complicated by shoals and should not be attempted without a careful study of the chart. The best channels leading from the westward to the main entrance between Calumbuyan and Lajo Islands are as follows: Southward of Popototan Island, this channel is clear and deep and needs no special directions. Northward of Popototan Island, head for Pass Island bearing 103° (102° mag.), when the east tangent of Rat Island bears 0° (359° mag.) change course to 81° (80° mag.) heading for a prominent tree on the 646-foot hill on the coast of Busuanga. A third channel lies between Maltatayoc and Horse Islands to the northward, and the Malbinchilao Islands southward, passing either westward and southward of the two Malcatop Islands, or northward and eastward of them. Two shoals with depths of 3 and 4¾ fathoms lie ½ mile southward of the east end of Maltatayoc Island, and a reef and shoal extend 700 yards southwestward of East Malcatop Island. This latter reef can be easily avoided by heading for Pass Island bearing 145° (144° mag.) until the south tangent of Calumbuyan Island bears 90° (89° mag.) when the course may be changed to 100° (99° mag.).

Tantangon, Dicoyan, Calumbuyan, Lajo, and **Lamud Islands** lie across the western entrance to the strait between Busuanga and Culion. As before stated, the best channel is between Calumbuyan and Lajo. This channel is over ½ mile wide, deep and clear. There is a narrow deep channel between Calumbuyan and Dicoyan. The channel between Dicoyan and Tantangon is almost ½ mile wide, with 9 fathoms in the middle, but there are two dangerous reefs in the western approach. The channel northward of Tantangon Island is narrow and tortuous. There is a narrow deep channel between Lamud and Culion, but no channel between Lamud and Lajo Islands, the reef between them baring at low water. Tantangon is low. Dicoyan has several hills rising to a height of 200 feet and more. Calumbuyan is steep and rises to a height of 225 feet. Lajo and Lamud are 660 feet and 570 feet, respectively. All of them are wooded and have fringing coral reef with some mangrove along the shore. **Darab,** 150 feet high, is a small island lying on the reef eastward of Lajo Island, and **Dibu,** 120 feet high, is a small island lying off the reef joining Lajo and Lamud Islands.

Manglet Island, lying southward of the main channel in the western entrance to Coron Bay, is steep-to on all sides. The island has several summits, the eastern and highest being 298 feet high. The northern shore is rock but the southern is mangrove. Southward of the island is the entrance of a large irregular bay formed by Lamud and Marily Islands and the coast of Culion. **Laput** and **Pachiri Islands** lie close to the Culion shore. **Alad, Bakbak, Magpa, Kalo, Nici,** and **Mona Islands** with several shoals lie in this bay. **Tampit, Ennanda, Demang, Lakit,** and **Naglayan Islands** lie on the shore reef fringing the southern shore of Marily Island. **Tending Island,** 220 feet high, lies in the channels between Naglayan, Chindonan, and Culion Islands. A reef extends off the northwestern end for about 300 yards. **Chindonan Island,** 615

feet high, is the easternmost of the islands lying along the southern side of this entrance to Coron Bay. **Cacayaren Island** lies on the northern shore reef and **Burgur** and **Inlulucut Islands** lie on the southern shore reef. A reef, steep-to on all sides, marked by a black and white beacon, lies 1 mile 150° (149° mag.) from Inlulucut Island.

Port Culion is a narrow inlet that affords good anchorage for small vessels but not much swinging room. The eastern side is formed by Sebik Island, and the Culion leper settlement lies on the western shore. The entrance is marked by two beacons and the remains of two piers lie on the reef off the settlement but are only used by bancas. A fringing reef contracts the available anchorage space. Vessels generally go to the pier about ¼ mile westward from the fort. This pier must be approached with care as the end is practically flush with the reef line. Both the fort and the cogon-covered hill back of the landing are prominent and make very good landmarks. A fixed red light, visible from a distance of 7 miles, is shown from the fort. Permission should be obtained from the chief of the Culion leper colony before going alongside the pier. Fresh water may be obtained from pipes on the pier.

Coron Bay is the large body of water lying between Coron, Busuanga, and Culion. There are a number of reefs, shoals, and banks in the bay whose position may be readily understood by reference to the chart. The entrance by way of Coron Passage has already been described. (See p. 25.) In approaching from southward and eastward the best entrance is just southward of Calis Point, Coron, where the channel is about 2½ miles wide, deep and clear. **Guintungauan Island**, the easternmost of the islands eastward of Culion, lies on the southern side of the channel. Shoal water extends about ¾ mile eastward and northward of it. The island rises to a height of 240 feet, is fringed by a coral reef, which extends about ½ mile westward of the island.

Bulalacao Island, 4 miles long by 2½ miles wide, rises to a height of 710 feet and is thickly wooded. **Bayuan Bay**, on the north side of the island, offers fair shelter for vessels during either monsoon. The shore of the island is very irregular, rocky points extending out from ¼ to ½ mile, the bights thus formed being fringed with coral. Several small islands lie on the shore reef. **Malaroroy, Cauayan,** and **Dicalubuan Islands**, at the western end are the most important, making excellent marks for passing through Tampel Pass. A shoal with a rock awash on its southern part lies 1$\frac{1}{10}$ miles northward of Mandalala Point. **Tampel Pass**, between Bulalacao Island and Malcapuya and Tampel Island, is sometimes used by vessels coming from northern Palawan ports. It is about ¾ mile wide, deep and clear. A reef bare at low water, lies 1¼ miles northeast of Tampel Island, and **Animosa Reef** lies 1¾ miles north of the north end of the island. Between these two reefs there are a number of dangerous shoals. **Malcapuya, Tampel, Sina,** and **Tambon Islands** are all connected by reefs: Tambon Island is about 3½ miles long by 1½ miles wide and is heavily wooded. **Bayaca** is a small islet on a detached reef, about ¾ mile northward of Tubigan Point. **Piedra Bianca**, 15 feet high, is a conspicuous white rock on a reef lying ¾ mile northwestward of Bayaca Islet and 1¼ miles westward of Animosa Reef.

Dunaun Island, 455 feet high, is a conspicuous landmark. The island is wooded and is connected with Culion by a reef that bares at low water. The channel between Dunaun and Culion and Tambon Islands is deep but narrow, being only about 200 yards wide at its narrowest point with a least depth of 8 fathoms. It is of little use as there are no ports in this part of Culion.

The east coast of Culion is irregular, steep, and wooded, with a number of islands and shoals off it. The principal islands are **Dibanca Islands, Cheron, Guinlep, Calipipit,** and **Dipalian. Ditaytayan Island,** 318 feet high, lies about 2 miles southwest of Bulalacao Island with the **Tres Marias Rocks** 1 mile eastward. Vessels going through Tampel Pass should pass about ½ mile westward of Ditaytayan Island. **Mininlay, Calumbagan,** and **Canipo Islands** lie on the western side of an extensive area of shoals extending 7 miles southward of Bulalacao Island. **Malaposo Island,** 294 feet high, lies on the eastern edge of this area and affords a good mark for avoiding these dangers. A shoal with a least known depth of 2½ fathoms lies 2¼ miles south-southeastward of Guintungauan Island. This is the easternmost danger of the shoals southward and eastward of Bulalacao Island. **Beta Shoal,** with a least known depth of 4¾ fathoms, lies about 5 miles eastward in latitude 11° 42′ 58″ N., longitude 120° 19′ 48″ E.

Tres Reyes are four rocky islets lying 4½ miles south by west from Canipo Island. They are steep-to with round summits, the highest being 81 feet. Shoal water extends off about 1 mile north-northwestward and vessels should give them a berth of 1½ miles when passing to northward or eastward of them. **Dicabaito Island,** separated from the south end of Culion by a narrow deep channel, is 750 feet high. The shore line is eroded and rocky. The island lies on the northern side of Linapacan Strait and forms an excellent landmark when approaching that strait from the China Sea. **Dicabaito Channel** (chart 4342) northward of the island, affords protected anchorage in 7 to 9 fathoms of water.

The west coast of Culion is fairly regular, steep, and rocky, with a fringe of coral in the shallow bights. **Saddle Rock,** lying about 2 miles northwestward of the entrance to Halsey Harbor, is a small rocky islet, 114 feet high, which, when seen from northward or southward, has the appearance of a saddle. It is fringed with a narrow reef, with rocks awash, which extends about ½ mile off its eastern side. These are the only dangers on the west coast of Culion that do not show above water.

Halsey Harbor (chart 4342) makes into the west coast of Culion Island, about 4 miles from its southern extremity, and extends in a northeasterly direction for about 5 miles. Saddle Rock, already described, serves to mark the entrance. The shores of Halsey Harbor are in general steep and the water deep. Anchorage may be taken up anywhere in the middle of the harbor in from 15 to 18 fathoms, mud bottom, with perfect protection from all winds. Small vessels can enter the North Arm, passing through the narrow channel between **Gage and Iguana Islands.** Water can generally be obtained from a small stream which discharges between the two highest hills on the southeast side of the harbor, about 3 miles above the entrance, but it can not be depended on during the dry season.

Halsey Harbor is of no commercial value at the present time, but would afford good refuge to a vessel overtaken by bad weather when in its vicinity.

Alava Island, 434 feet high, divides the entrance into two channels—**Research Channel**, north of the island, and **South Channel**, eastward. It is surrounded by a narrow reef, which, on the northeast and southern ends, extends about ⅓ mile from the shore.

South Channel, while comparatively straight, is narrow and has coral reefs on both sides which contract the navigable width to about 200 yards. The least depth is 12 fathoms, and when the light is such as to show the location of reefs (generally by a light-green color of the water) it is easy to navigate.

To enter by the south channel steer midway between Alava and Culion Islands, carefully avoiding the coral reefs on either side, and continue on, giving the northwest side of Rhodes Island a berth of about ¼ mile to clear the coral reef making off from it.

Research Channel is about ¾ mile wide at the narrowest part and has at this point a clear channel of nearly ½ mile, with depths of 21 to 26 fathoms. The reefs on the northern side of the channel do not extend out over ⅛ mile. On the southern side there is a reef extending from the northeasterly point of Alava Island in a northeasterly direction for about ⅓ mile, but there is plenty of room to give it a good berth.

To enter by Research Channel bring the highest part of Rhodes Island between the two peaks of Maus Mountain on a 95° (94° mag.) bearing and steer for them; this course will lead through the middle of the channel. Maus Mountain (or Tetas de Calamianes), situated about 4 miles eastward of the entrance, consists of two round-topped hills, each 1,380 feet in height. There are no dangers in going up the harbor. In general, keep in mid-channel and give all points a fair berth; at the place where the channel divides, about 3 miles from the entrance, give the coral reef off the low, wooded spit on the southeast side a good berth, as it extends westward from this point for over ⅛ mile.

CABULAUAN ISLANDS

are a small group of islands situated eastward of Linapacan Island, comprising Cabulauan, Nanga, Nangalao, Magranting, and Tubug Islands. The latter two are connected with Nangalao. They are all high and rocky. **Cabulauan** has a conspicuous rounding summit near the east shore which rises to a height of 775 feet. Along the south and west shores there are hills of lesser elevation. **Nangalao Island** rises to a height of 760 feet with lesser summits eastward and southwestward of the highest point. All the islands are sparsely wooded. Two rocky islets, 25 feet and 10 feet high, lie about 1¼ miles southward of Cabulauan Island. There is a shoal, with a least known depth of 4½ fathoms, 1¾ miles eastward, and another shoal, with 3¾ fathoms, 3 miles southeastward of Cabulauan Island.

Salimbubuc Island, 100 feet high, **Canaron Island**, 335 feet high, and Solitario Rock, 25 feet high, lie southeast of the Cabulauan Islands. rising out of a general depth of 30 to 40 fathoms of water. There is a 1¼-fathom shoal 8 miles westerly of Canaron Island. The area southward and southeastward of these islands has not yet been com-

pletely surveyed. While apparently clear, vessels should use due care if compelled to pass through this area.

Shoals.—Framjee Bank, Magallanes Bank, Narvaez Bank, Alpha Shoal, Beta Shoal, Aguirre Reef, Coutts Bank, Falmouth Banks, Areta Shoals, Panay Bank, Loreto Reef, Basco Reef, Alipio Reef, and a number of unnamed shoals and banks lie in the area eastward and southeastward of the Calamian group of islands. Their position and characteristics can readily be understood by reference to the chart. Discolored water generally marks those with less than 8 fathoms of water on them, but vessels will do well to avoid anything less than 10 fathoms, as large coral bowlders lie on some of them and the least depth may not have been found during the survey.

CUYO ISLANDS.

This group of islands is located on the eastern part of the submerged plateau on which the Calamianes and Palawan are situated. The depths are fairly uniform, gradually deepening from 30 fathoms to 100 fathoms eastward of the Cuyo Islands. The latter depth curve has a south-southwesterly trend from the vicinity of Seco Islands to near Sombrero Rock. Northeastward of this plateau there is a deep basin with numerous banks and shoals, but there are large stretches of good water, and the various islands furnish well-defined leading marks. The courses which would be pursued are various, and no directions are given, as they may be readily laid out on the chart, the islands forming excellent marks for avoiding the different shoals. The route to the eastward of the islands is generally used in the northeast monsoon from Basilan Strait to Mindoro Strait, thus taking advantage of the constant northerly current along the Panay Coast. All of the islands except Quiminatin are of volcanic origin.

Quiniluban Group, the northernmost of the Cuyo Islands, consists of several islands and rocks on a circular reef about 6 miles in diameter. They are of limestone formation, have no permanent streams, and very little wood, but are covered with tall grass. They are sparsely inhabited and there is some cultivation on the larger islands but they are of no commercial importance. The reef itself is flat and sandy with numerous coral heads, some of which bare at low water. Breakers are in evidence at the windward edge of the reef whenever the monsoons are blowing. Anchorage, partly protected from the sea during the northeast monsoon, may be had on the southwest side close up to the edge of the reef. **Quiniluban,** the largest of the group, lies near the northeast edge of the reef and rises to a height of 1,010 feet. From northerly directions it appears as a sharp cone. From easterly directions it appears as a ridge with a dome-shaped elevation in the center. It has the reddish-brown color of cogon regions and makes a prominent landmark.

Alcisiras Island, 510 feet high, lies southwest of Quiniluban with the small islands Calumpin, Yanuta, and Arorunga between them. **Mandit Island,** 183 feet high, lies ¾ mile northeastward of Alcisiras. **Maligun, Silad,** and **Tinitiuan Islands,** 515, 335, and 480 feet high, respectively, Tatay and Namaroc Islets and Cambug Rock lie on the northwestern part of the reef.

Halog Islands are two small islands lying on a reef about 3 miles southeast of Quiniluban Island. The northeastern one is 80 feet high and the other ½ mile southwestward of it 16 feet. The channel between the Halog and Quiniluban reefs is 2 miles wide and free from danger, though there are several banks with from 6 to 9 fathoms of water over them.

A reef with a least depth of 2¾ fathoms lies 7 miles 193° (192° mag.) from the highest point of Quiniluban Island. The reef is steep-to on the west, but a bank with 6 to 8 fathoms of water extends about 1½ miles eastward.

Pamalican Island, 7 miles southwestward of Quiniluban Island, is low, covered with a scrub growth and uninhabited. The higher of its two hills is 83 feet high. The island is surrounded by a coral reef which extends about 1 mile off the northeast side.

Manamoc Island lies about 3 miles southwest of Pamalican. It is 720 feet high, roughly circular in form, about 1¾ miles in diameter, and surrounded by a wide coral reef partly bare at low water. A break in the reef permits the shallow draft native boats to enter the lagoon in the southwestern part of the island. This lagoon has about 3 feet of water at low tide. The population of the island is estimated at 300 and the products are rice and coprax, but there is no regular communication among any of these islands.

Lean, 223 feet, **Imaruan**, 430 feet, and **Oco**, 90 feet in height, lie. respectively, 5 miles south, 6 miles south-southeast, and 10 miles east-southeast from Manamoc Island. These islets are all steep-to on the western sides with banks extending from ½ to 1½ miles northeastward.

Dit Island is an oblong-shaped island about 1½ miles in extent and rises to a height of 820 feet near the center. Two lesser peaks appear as shoulders on the higher peak when viewed from north or south. The shore line is composed of large stones and bowlders with the exception of one small sand beach on the west side and one on the south. Two small shoals with depths of 2¾ and 3½ fathoms lie ½ mile off the southwest part of the island. This part of the island should be given a berth of at least 1 mile.

Gosong Rocks, 15 feet high, are a group of rocks on a shoal about ¼ mile in diameter lying 2 miles 220° (219° mag.) from the south point of Dit Island. The channel between the rocks and Dit Island is deep and over 1 mile wide.

A shoal with a least depth of 3½ fathoms lies 5¾ miles 23° (22° mag.) from the highest part of Dit Island. The shoal lies on the southeastern part of a bank 2 miles in extent northwest and southeast and ½ mile wide with depths of 6 to 9 fathoms.

Maracañao Island, 431 feet high and about ½ mile in diameter, lies 8 miles eastward of the south end of Dit Island. The bank on which it lies is steep-to and free from dangers.

Chinaman Shoals are two shoals lying 4 miles 10° (9° mag.) and 6¼ miles 24° (23° mag.) from Maracañao Island, with a least depth of 3¼ and 4 fathoms, respectively. In the area between these shoals and Luzon Bank, lying 11 miles eastward of Maracañao Island, there are a number of banks with from 7 to 9 fathoms of water. Luzon Bank itself has a least known depth of 8 fathoms. There is a deep channel 16 miles wide between these banks, and the group of dangers

comprising Sultan Bank, 3¾ fathoms, Carmen Bank, 2½ fathoms, and Seco Islet, 9 feet above mean sea level. These banks lie on the northeast edge of the submerged plateau on which the Cuyos are situated and the water deepens abruptly northward and eastward of them.

Agutaya Island is the second largest of the Cuyo group with an area of about 4½ square miles. The northeastern part is hilly. The middle and highest of the four peaks, 885 feet high, is covered with cogon, the others being wooded. The western part of the island is 450 feet high in the center and slopes gradually to the beach. There are three barrios, **Agutaya, Villa Fria,** and **Villa Sol,** on the island, with an estimated population for the entire island of 3,000. Wide coral reefs, bare at low water, extend off the northwest and the southeast sides of the island.

Guinlabo, 2½ miles southward of Agutaya Island, is a small islet, 195 feet high, lying near the eastern edge of a shoal about ½ mile in diameter. The islet is steep on all sides except the northwest, where there is a rocky beach.

A reef with a least known depth of ¾ fathom lies 3¾ miles 263° (262° mag.) from Guinlabo Islet; another reef with a least known depth of 2 fathoms lies 8 miles westward of Agutaya Island in latitude 11° 08′ 40″ N., longitude 120° 48′ 12″ E. Both reefs lie on banks that rise steeply out of depths of 40 to 45 fathoms.

Matarabis Islet, situated about 11 miles east of the south end of Agutaya Island, is easily recognized by its steep conical hill, 364 feet high, which when viewed from northwest or southeast appears to be in the center of the island. This hill makes the islet the most prominent landmark in the group. The islet lies near the southern edge of a bank that slopes gradually toward the north. There is a bank with a least known depth of 5¾ fathoms about 3 miles 285° (284° mag.) from Matarabis Island.

Siparay, 260 feet high, is a small islet lying 5 miles southward of Matarabis. **Tacbubuc,** 300 feet high, lies 3 miles southwestward of it. Both islets are steep-to on the southeast and a berth of ½ mile clears all known dangers.

Tagauayan Islands (chart 4336) are two islands connected by a rocky ledge and between them form the best-protected anchorage in the Cuyo Islands. The larger island has three high ridges, the northern being 556 feet high, the middle 390 feet, and the southern 490 feet high. Both islands are steep-to except in Tagauayan Bay. The bay affords good anchorage during the southwest monsoon, though the wind draws with considerable force through between the two islands. Fair shelter from the northeast can be obtained behind the peninsula that forms the northern side of the bay. There is a ridge of shoals about the middle of the bay with a least depth of 2¾ fathoms near the center of the bay. A wreck, visible at all stages of the tide, lies on the beach at the head of the bay. This wreck, the sharp rock on the ledge between the islands, and several hilltops make good marks for entering the bay.

Cocoro Island, lying 4 miles south-southwest of the Tagauayan Islands, is steep-to and generally low with one hill, 293 feet high, in the southern part. The entire island is given over to the cultivation of rice and coconut trees.

Cuyo Island is about 6½ miles long and 5 miles wide, and consists of two hills joined by a low narrow neck of land. **Mount Bombon**, the northern hill, is 851 feet high and about 1½ miles across, with a rounded outline and profile. The slopes of the hill are smooth and fairly steep, reddish brown in color during the dry season, and are covered with short grass and a few small bushes and bamboo. The shores in both of the bights directly south of the mountain are mangrove, while that of the northern end of Cuyo Island is steep and rocky. **Mount Aguada**, 602 feet high, lies in the center of the southern and larger part of the island. It is a sharp hill with long slopes that are covered with a mixed vegetation comprising cultivated land, orange, mango, bamboo, nangca, papaya, and arica. The shores are low rocky ledges, or mangroves with coconut along the beaches. There are extensive coral reefs along the western shore and in the bight on the eastern side.

Lucbuan Hill is a sharp peak on the eastern side, rising to a height of 360 feet, making an excellent landmark when approaching the island from the eastward. **Putic Island** is 420 feet high and prominent from the northwestward; it rises to a sharp peak and has rough, steep, rocky shores on the seaward sides. It is connected to Cuyo Island by a reef almost dry at low water.

Cuyo (chart 4336) is a town of about 4,000 inhabitants, situated opposite a break in the reef on the west side of Cuyo Island. From the west and southwest, three iron roofs of school buildings are seen in the northern part of the town; south of these are the iron roof of the church and gray stone walls of the fort and bell tower and the red roof of the tribunal; and farther southward on the short stone mole is the light-colored storehouse from which a red lantern light is shown at night. The Philippine Weather Bureau maintains an observer at Cuyo. There is a wireless station and the town is connected with San Jose, Panay, by cable. Supplies of all kinds are scarce and expensive. Water is obtained from wells, is scarce and indifferent in quality.

Good anchorage for small vessels, protected from all winds except those from the southwest, may be found in a break in the reef off the end of the mole. During the southwest monsoon vessels are sometimes obliged to seek shelter close to the northern side of Bisucay Island.

Buoys.—There is a black can buoy marking the northern side of the entrance to the anchorage off Cuyo and a red nun buoy marking the southern side; both buoys are moored in 3 fathoms of water. A fixed red light visible 7 miles is exhibited from the cupola of an old tower near the end of the stone pier.

Direction.—Vessels bound for Cuyo should bring the pagoda on the end of the pier to bear 79° (78° mag.) and steer for it, passing midway between the point of the reef and anchoring 250 or 300 yards from the end of the pier in 2½ or 3 fathoms, sandy bottom. This course leads just southward of a 4½-fathom shoal, the southernmost of the Gosong Dangers. The depth at the entrance between the reefs is 4 fathoms, decreasing gradually toward the pier.

Indagamy Island, lying 1 mile westward of Putic Island, is small, steep, and rocky with an uneven rounded sky line reaching a height of 130 feet near the center.

Gosong Dangers.—A shoal with a least known depth of 2¼ fathoms lies 2¾ miles 305° (304° mag.) from Indagamy Island. This is the northernmost of a large number of dangers lying between the west coast of Cuyo, Putic, Bararin, and Bisucay Islands. There are several deep channels through this area, but the best approach to the town of Cuyo is through a deep channel ¾ mile wide just north of Bisucay Island. **Gosong Rock**, 10 feet high, lies 1¼ miles west-southwest of Indagamy Island.

Bararin Island, a small triangular-shaped island, 297 feet high, lies 4¼ miles west-northwest from the pier at Cuyo. It is steep-to on the western side, but a reef makes out from the southeastern shore. The island is covered with a scrub tropical growth and is of no commercial importance.

Bisucay Island is oblong in shape, 1½ by 1¼ miles, with a double-peaked hill, 320 feet high, near the middle. The hill slopes sharply from its summit to about the 100-foot elevation and then more gradually to the shore. Coconuts fringe the shore and the peak is wooded. There is a deep channel, about ¼ mile wide, between Bisucay and Cuyo Islands. The northeast point is low and sandy; the southeast point is rocky, with a 90-foot hill on it, which forms a good landmark for passing through the line of shoals south and southeast of it.

Imalaguan Island lies about 3 miles southward of Cuyo Island. It is about ⅓ mile across, 280 feet high, has three summits, and is covered with grass and bushes. There are several banks with 8 to 10 fathoms of water between it and the Cuyo shore.

Pandan, 82 feet high, is a small unimportant island lying on a bank about 4½ miles westward of Bisucay Island. The bank is about 3 miles long in a northwest and opposite direction and 1½ miles wide with general depths of 5 to 6 fathoms. A depth of 1½ fathoms is shown ¼ mile north of the island.

Canipo Island, 540 feet high, lying 8 miles northwestward of Cuyo Island, presents the appearance of a ridge with regular slopes from all directions. It is covered with grass and underbrush. Some rice and coprax is produced, but the island is of small importance and vessels should keep well outside the 10-fathom curve as there is always danger of coral heads in less water.

Paya, Patunga, Pamitinan, and **Lubic**, 180, 455, 422, and 483 feet high, respectively, are four small islands lying northwest and westward of Canipo. They are about 2½ miles apart in a northeast and opposite direction, and all are steep-to, ½ mile clearing all dangers. **Cauayan Island**, 240 feet high, lies 7½ miles northwest of Pamitinan, and **Tabac Rock**, 8 feet high, lies 7½ miles westward. A rock awash lies about ¼ mile northeast of Tabac Rock.

A rocky reef of small area with a least known depth of 2¾ fathoms lies 4½ miles 236° (235° mag.) from the south point of Lubic Island. **Round Islet**, the westernmost islet of the Cuyo Group, is of basaltic formation, 100 feet high, steep sided, and has only pandanus growing at the top.

Capnoyan is the most important of the islands lying southwest of Cuyo Island. It is roughly circular in shape, wooded, and rises near the southwest side to a short ridge, 468 feet high. Some cultivated areas and nipa houses are scattered over the island, the principal products being rice, corn, and cattle. The two villages on the eastern shore are almost hidden by coconut groves. The northern village

is marked by several black rocks on the sand beach near the high water line; the southern village by a boathouse at the beach. A narrow coral reef, with a sand beach at high-water line, surrounds the island with the exception of a short stretch at the southwest side, where there is a steep rocky bluff. The eastern side of the island is steep-to, but shoal water 5 to 6 fathoms extends southward to include Malcatop and Pangatatan Islands. This area has numerous coral bowlders. A 5½-fathom shoal lies about 1 mile northwest of the island.

Malcatop Island, 127 feet high, is covered with scrub trees and grass. It has two distinct summits, the northwestern one being the higher. The shore line is rocky, the northwestern and southern ends rising in steep rocky bluffs. The island is not inhabited but is partly cultivated by the natives from Capnoyan.

Pangatatan Island, 127 feet high, rises abruptly to its peak near the northern shore. There is a small sand beach on the northeast side. The island is covered with scrub trees, bamboo, and underbrush and is not inhabited.

Silat Island, 118 feet high, rises in an even slope from the northern shore for about one-third of its length, the southern end of the island being high and flat, with an almost perpendicular bluff at its southern end. The island is covered with trees, grass, and bamboo, and is only inhabited during the planting season, when the natives visit it to plant rice and camotes.

Quiminatin Island and **Quiminatin Chicos** differ in character from the other islands of the group, resembling more the structure of Coron Island. Quiminatin Island, 580 feet high, rises in steep precipices on all sides and is eroded and undercut from 10 to 15 feet at the water line. The northwest corner is separated from the rest of the island by a deep saddle and the western shore of this point is the only landing place for ascending to the summit. Some large pieces of rock have fallen from the cliffs and are almost awash and there is a small sand beach on the northern side. A little scrub growth clings to the rocks, otherwise the island is barren. The water is very deep close-to.

Quiminatin Chicos mark the eastern edge of a large shoal extending about 1¾ mile north and south and 1 mile east and west. The islands in structure and appearance are similar to Quiminatin, the larger one being 210 feet high. The shoal has a general depth of 4 fathoms with numerous coral bowlders, 4 or 5 feet in height, about ½ mile southwest of the islands exists a coral head with only 1½ fathoms of water over it. The edge of the shoal is abrupt, dropping into 20 fathoms of water in a very steep slope.

Santa Filomena Shoals are three shoal areas, lying 5 to 7 miles southwest of Quiminatin Island and having depths of 1¼, 2, and 1½ fathoms of water over coral heads that rise from a general depth of 3 to 5 fathoms. Each shoal is about ½ mile in diameter, steep-to with deep water between them. They are the outer dangers of the Cuyo Group in this direction.

Ramon and **Pacheco Shoals** are two shoals lying between the Santa Filomena Shoals and Capnoyan Island. They are smaller in area, steep-to, and have least depths of 2½ and 3½ fathoms, respectively.

Piedra Blanca or **White Rock** lies 24 miles 182° (181° mag.) from Mount Aguada on Cuyo Island. It is a low bare rock, the highest

part being 12 feet above high water. It lies on the south edge of a shoal that extends ½ mile eastward of the rock and 1¼ miles northwestward with depths of 4 to 8 fathoms of water. The shoal is steep-to, over 50 fathoms of water being found a short distance from the edge.

Queen of the Sea Bank is a coral shoal of considerable area with a least depth of 3½ fathoms of water in latitude 10° 24′.3 N., longitude 120° 28′.5 E. The southern and western sides are very steep, but on the northern and eastern sides the soundings give ample warning. The shoal consists of sand and coral heads, but is rarely visible and seldom if ever breaks in heavy weather. This is the only danger found in this vicinity. Elax Rock does not exist in the location formerly assigned to it.

Dalanganem Islands, situated on the western side of Cuyo West Pass, consist of Calandagan, Maducang, and four small islands or rocks. They are steep-to, rising abruptly from the sea, and have a rugged appearance, of a light brown or grayish color, depending upon the season.

Calandagan Island is the largest and most important of the group, being about 2¾ miles long by ¾ mile wide. **Mount Dalanganem**, at the southern end of the island, rises steeply and evenly to an east and west ridge, 704 feet in height. The southern and eastern slopes are barren and large bowlders lie at the base and along the lower slopes. The main part of the island, 1,024 feet high, is very rugged and is covered with grass, bushes, and trees, with some scattered houses and cleared spaces, where rice is planted in season. The northern slope consists of a series of saw-tooth hills, all of which are covered with trees, grass, and brush. **Tudela** is located on the neck of low land that joins the two parts of the island. It consists of about 20 houses, a school, and church, but is of no commercial importance. Fair weather anchorage may be had off the northeast side of Calandagan Island in 9 to 11 fathoms, coral and sand, and in 4 or 5 fathoms on the shoal that extends ¾ mile southward of the southwest end of the island.

Nasolot Island, to the northward of Calandagan, appears to be a continuation of the series of hills of that island, the channel separating the two being only about 200 yards wide and 2 fathoms deep. It is small, but rises to a height of 202 feet, the top of the peak being covered with trees and brush while the ends are bare.

Maducang Island, the second largest island of the group, has the same general appearance as Calandagan, but has less vegetation and no permanent inhabitants. The ridge rises to a height of 965 feet, the surface being mostly loose rock and gravel. **Anas Island**, 296 feet high, is connected to the southeast end of Maducang by a reef that bares at low water. The channel between Maducang and Calandagan has a depth of 9 fathoms and affords anchorage with a little protection under the lee of either island.

Casirahan Island lies 5 miles east of the north end of Calandagan Island. It is rocky and steep-to, the southwestern end is barren, the northeastern and higher part, 115 feet high, is covered with grass and scrub trees.

Cauayan Island (Bird Island) lies 2 miles 335° from Casirahan Island. It is a bare rock of a light gray color, and rises in almost

perpendicular cliffs to a height of 97 feet out of a depth of 20 fathoms. The northeast corner is somewhat less steep and a landing may be made there. A rock, almost awash at low water, lies about 100 yards westward of the south end of the island.

LINAPACAN ISLAND.

Linapacan Island is the largest of an extensive group of islands lying in Linapacan Strait between the northeast coast of Palawan and the Calamianes Islands. It is about 9 miles in extent, roughly triangular in shape and of a very irregular outline. It is mountainous throughout, rising to an elevation of 1,086 feet in the southeastern part. All the points are high, steep, and rocky with mangrove or sand beaches in the bays between them.

North Bay is a large bay open to northwest, on the north end of Linapacan Island. The head of the bay is divided into three parts by two projecting points. The old Spanish fort and barrio of **San Nicolas** are situated at the head of the western bay. There is a good launch anchorage in this bay in 6 to 7 fathoms, mud bottom.

Northwest Bay is also open to northwestward, but good, well-protected anchorage may be found in the easternmost of the two arms of the bay in 18 to 19 fathoms, mud bottom. In entering this bay, care must be taken to give the rocks making off from the shore ½ mile southeast of a small cogon-covered island, a good berth. Entrance to Northwest Bay is easy. **Vanguardia Islet,** 91 feet high and lying 3 miles northward of the western entrance point, makes a good mark for vessels approaching from northward, **Alerta Rock,** 70 feet high and lying 1½ miles southeastward of Vanguardia Islet, is a good landmark for vessels approaching from eastward. There is a rock, 60 feet high, 1 mile westward of the north end of the point separating North Bay and Northwest Bay and a rock awash ½ mile northeastward of the 60-foot rock. This rock, awash, is connected with Alerta Rock, 1 mile northwestward, by a bank with 7 fathoms of water. A deeper channel exists southeastward of the rock awash and the 60-foot rock, but the point is foul and should be given a good berth. There are a number of detached islets and rocks lying off the northwest point of Linapacan, but a berth of ½ mile will clear all dangers. **Calaylayan Bay,** on the western side of Linapacan Island, affords well-protected anchorage for launches and small vessels; the anchorage area is deep and is restricted by a wide coral reef making out from the eastern shore. **Cagdanao Island,** 291 feet high, lies before the entrance to the bay. It has coral reefs on the north, west, and south sides, but is steep-to on the east, the channel eastward of the island being ¼ mile wide, deep, and clear. A shoal with a least known depth of 5¾ fathoms lies 1 mile 316° (315° mag.) from Cagdanao Island. A rock, 25 feet high and joined by a coral reef to a small, unnamed island, 50 feet high, lies ¾ mile westward of Cagdanao Island.

South Bay, lying eastward of Bubulauan Point on the south coast of Linapacan, affords well-protected anchorage in the northeast arm of the bay. Anchorage for launches may be found back of Tondaje Island in 10 to 14 fathoms, mud bottom. The entrance to South Bay is wide and open, but care must be taken to avoid Goson Reef, lying

1¼ miles southwestward of the eastern entrance point, and also the rocks extending ¾ mile westward of the point. The eastern part of Linapacan is more regular with steep, wooded ridges close to the shore. A land slide, situated 1¾ miles northward of Sidsid Point, makes a prominent landmark for vessels approaching Linapacan Strait from the southeastward. A number of detached rocks and shoals lie off this coast, a 101-foot rock lying 1¼ miles 107° (106° mag.) from the landslide. Good anchorage in southwest weather may be had off the bario of San Miguel, westward of Patoyo Island, and for launches and small vessels in the channel westward of Maapdit Island. The channel west of Ile Island is much used by small launches not drawing over 4 feet to avoid the bad tide rips that often exist eastward of the island. **Patoyo Island** is easily recognized by its twin peaks, 740 feet high.

There are a large number of islands, rocks, and reefs, with deep channels between them, lying northeast of Linapacan Island. Their position may be best understood by reference to the chart. The channel between Dicabaito Island, the southernmost of the Calamianes, and Dicapulan and Binalabag Islands is 3 miles wide, deep and clear. There is a partially protected anchorage for launches on the south side of the latter island. **Beacon Rocks**, 13 feet high, lie almost 1 mile north of Pangaldauan Island, and a 2¾-fathom reef lies 1 mile westward of the island. **Dimanglet Island**, lying 1½ miles north of Bulauan Point, is readily recognized by its two peaks, 375 and 330 feet high, separated by low ground. The red cliffs on the higher peak show up well from westward. **Escucha Rock**, 80 feet high, lies ¾ mile northward, with a rock awash $\frac{4}{10}$ mile northwestward of it. Shoals with 2¾ fathoms least water lie ¼ mile northwest and southeast of Escucha Rock. **Inapupan, Bolina, Manlegad, Dimancal, Dimansig, Ariara,** and **Malbatan** form the northern side of a deep channel 1¼ miles wide with **Gued Islet** and reef about in the middle of the channel. **Mayokok Islet**, 75 feet high, lies about 1 mile northeast of Patoyo Island, and the **Hidong Islets**, a cluster of rocks from 2 to 25 feet high, lie 1¾ miles eastward of the same island. **Torres Reef**, 4¼ fathoms least water, lying 1½ miles 128° (127° mag.) from Debogso Islet, and **Sabino Reef**, 4¾ fathoms, lying in latitude 11° 30′ 00″ N., longitude 119° 59′ 50″ E., are the outer dangers to be avoided in approaching Linapacan Strait from the southeast.

Malubutgubut is the northwestern island of the Linapacan Group. It is easily recognized by its conical peak, 685 feet high, which, when viewed from northward, appears to be a pyramid. The island is partly wooded and partly covered with cogon. **Base Rock**, 12 feet high, lies 2½ miles north-northwestward and a 20-foot rock and a 15-foot rock, 1¼ and ¾ miles northward. **Nanga, Cacayatan, Lauanan,** and **Condut Islands** are joined together by a reef. **Debogso Rock**, 165 feet high, lies about ¾ mile westward of Cacayatan Island. **Calibang Island** is the largest of the islands westward of Linapacan Island. It is very irregular in shape, with a number of hills, the highest, 650 feet, being in the southeastern part of the island. **Barselisa**, a small islet, 205 feet high, lies 1 mile northward, and a rock awash lies 1 mile eastward of the north end of the island.

Between Calibang Island and Gintu Islands, 3 miles eastward, are a number of dangerous banks and shoals. **Gintu Island** is surrounded

by coral reef and a long reef extends northwestward having a narrow channel between it and the island northward. A 50-foot rock lies about 1 mile southwestward and a 6¾-fathom shoal 1¼ miles southward of the island. A 4¾-fathom shoal lies ¾ mile southeast of the 6¾-fathom shoal.

PALAWAN ISLAND,

the sixth island in point of size, is the most western of the Philippine Islands. It extends in a northeast and southwest direction between the parallels of 8° 21′ and 11° 25′ N. latitude, and is long, narrow, and high, forming the western boundary of the Sulu Sea. It has an area of about 4,027 square statute miles and a length of general shore line of about 674 miles (776 statute miles). The coast line is very irregular, being deeply indented by numerous bays and inlets, some of which form the finest harbors in the Archipelago. The shores are faced by numerous islands and reefs, and, owing to the unfinished surveys, navigation is conducted with difficulty. The island is sparsely inhabited and the interior little known.

NORTH COAST OF PALAWAN.

Between Crawford Point, on the west coast, and Darocotan Point, on the east coast, Palawan is about 8 miles wide. Midway between these two points a high promontory, 2 miles wide, extends northward for a distance of 5 miles. The shore line of the promontory is bold and irregular, there being only two small stretches of mangrove on the eastern side, the remainder being rock, or steep, sand beaches fringed with coral. The entire country is wooded. **North Hill**, 935 feet high and a 965-foot hill, are two prominent hills that lie in the same latitude about equal distances from the east and west coast, respectively. Southward of these hills there is a single high ridge rising to an elevation of 1,200 feet. Northward there are two lower hills, one 475 feet high, near Liber Point, the northwest point of Palawan, and a 550-foot hill close to Cabuli Point. These latter hills are inconspicuous except from an east or west direction.

Cabuli Island lies ¼ mile north of the northeast end of Palawan, from which it is separated by a channel having a depth of 5¾ fathoms. The island is 1½ miles long north and south, 455 feet high, with a rather flat summit, and is steep-to on all sides. A good range for the channel between Cabuli Island and Palawan is to keep the northerly of the Brother Islands halfway between a prominent knoll near the north end of Iloc Island and the highest peak near the center of the island.

EAST COAST OF PALAWAN.

General Remarks.—Surveys on the east coast of Palawan are still in progress. The observations made so far show that there are numerous dangerous shoals and coral reefs lying from 10 to 20 miles off this coast. The mountains of Palawan and the many small islands scattered along the coast afford ready marks for navigating the various channels. The directions given for entering the various ports are those used by the surveying vessels and have been found safe, but they are not intended in any way to lessen the necessity

of keeping that vigilant lookout which the navigation of coral seas on all occasions urgently demands. The adoption of the Palawan Passage in preference to the route on the east side of the island is recommended for sailing vessels bound for China ports. In the strength of the northeast monsoon sailing vessels may, taking the eastern route, reach the parallel of 10° N., or to the island of Dumaran, without any great difficulty; but to get beyond this they will experience considerable delay, even if they succeed at all, for the current at this season sets strongly southward between Palawan and the Cuyos, the velocity being almost in direct proportion to the strength of the wind.

The British surveying vessel *Royalist* in 1850 during the month of December was delayed 15 days, vainly endeavoring to get around Dumaran against the monsoon, and had, after all, to make the passage into the China Sea via Panay and Mindoro.

TIDAL CURRENTS.—The flood sets along the shore southward and the ebb northward. The maximum velocity observed was 1½ knots and the rise 7 feet. The currents on the east coast depend chiefly on the prevailing winds.

Brother Islands are two small islands separated by a deep channel almost ½ mile wide. Deep water exists between them and the Palawan Coast. The northern island, 110 feet high, lies ¾ mile east-southeast of Cabuli Point, and there is a shoal with 4¼ fathoms, least known depth, ¾ mile 140° (139° mag.) from this island.

Darocotan Bay, westward of Darocotan Point, is about 3 miles wide. There is a good anchorage in southwest weather about midway between Darocotan Island and the barrio Tiniguiban in 8 fathoms, mud bottom. To approach this anchorage enter the bay from the northward, keeping Darocotan Island about ½ mile distant. Launches and small boats can approach to within 300 yards of the town. The southern part of Darocotan Bay is foul, and vessels are advised not to proceed farther south than a line drawn west from Darocotan Point.

From Darocotan Point the coast trends southerly for 11 miles to Shark Fin Bay. It is faced by numerous islands and reefs, and is fringed by a coral reef extending out in places more than a mile. A rock with a least known depth of 1¼ fathoms lies 1¼ miles 114° (113° mag.) from Darocotan Point. A rock awash at one-fourth tide lies 1½ miles northeast of the town of Sibaltan. A line joining these two rocks and Malonao Rock, at the entrance to Imorigue Bay, bounds the outer limit of shoals along this coast. **Malonao Rock**, 30 feet high, is steep-to on all sides.

Imorigue Bay, between Batas Island and Palawan, is filled with reefs and does not afford good anchorage. Vessels desiring to enter the channel westward of Imorigue Island should bring a saw-tooth projection about halfway up the eastern side of Imorigue Island in range with Shark Fin Peak, bearing 221° (220° mag.) before Malonao Rock bears 316° (315° mag.). When the northwest point of Imorigue Island bears 241° (240° mag.) steer for it, rounding the point close-to, and follow a mid-channel course westward of Talaotauan Island.

Iloc Island, the largest of the islands between Batas and Linapacan Islands, lies on the east side of the inside route east of Palawan. It has two distinct mountain ranges separated by a valley

extending from the northwest to the southeast side. The island is heavily wooded. In the southern part of the island some timber has been cut and the land cleared and cultivated. The shore is fringed with coral reefs with the exception of a small stretch at the northeast end of the island which is undercut by the sea. A chain of rocks varying in height from 2 to 18 feet extends ½ mile off the north end of the island. A rock, 78 feet high, on the edge of the shore reef near the north end of the island and a small islet, 185 feet high, on the east side and about 1 mile from the south end make good landmarks when in this vicinity. A bank with a least known depth of 6¼ fathoms lies about ¾ mile eastward of the 185-foot islet.

Barangonan Island, lying 1 mile northeast of Iloc Island, has a double-peaked hill 385 feet high in the southwestern part, a 330-foot hill in the east, and a lesser elevation in the northwestern part. The island is easily recognized by the double peak, which is bare, while the other peaks in this locality are all wooded.

Dado Rock lies 2 miles east-southeast of Barangonan Island. It rises vertically from the water to a height of 75 feet and is much undercut by the sea. **Dado Bank,** with a least known depth of 8 fathoms, lies 1 mile southeastward.

Bagambangan Island, a triangular-shaped island, 550 feet high, lies 2 miles southeast of Iloc Island. It is wooded with the exception of a small area on the west side, which is partly under cultivation; about halfway up the east coast there is a prominent pinnacle rock 90 feet high. A conical rock, 152 feet high, having a reddish appearance, lies 1 mile southward of the island.

Maosonon Island, 1 mile west of Bagambangan Island, is partly cultivated. The shore on the west side is volcanic rock, much eroded and steep-to. A small rocky islet, 25 feet high, covered with scrub trees and brush, lies on the reef extending off the southeast point of the island. **Little Maosonon Island,** 139 feet high, lies ¾ mile westward of the northwest point of Bagambangan Island on the western edge of a coral reef ¾ mile long north and south and steep-to on all sides.

Binulbulan Island, 2 miles southwest of Iloc Island, has three distinct peaks, the northern and highest one being 660 feet high. The entire island is wooded. One mile off the southeast end of the island is a rocky island 155 feet high. Midway between this island and Binulbulan is another rocky islet 100 feet high. Shoals and detached rocks extend about ½ mile off the southeast end of Binulbulan Island.

Deribongan, Cagdanao, Maalequequen, and **Pangisian Islands.**—This group of islands lies 3 miles southwest of Bagambangan Island. **Deribongan Island** rises gradually from the sea to a peak 328 feet high near the central part of the island. A shoal with a least known depth of 4¾ fathoms lies 1¼ miles 84° (83° mag.) from Deribongan Island on the western part of an extensive bank. Halfway between Deribongan and Bagambangan Island is a small island, low and sandy at its west end and high and rocky at the east end, reaching an elevation of 120 feet. A rock 10 feet high lies 650 yards southwest of the islet, and a shoal with a least known depth of 5 fathoms lies 1 mile westward.

Cagdanao Island can be recognized from the northward by its bare cliffs, which rise vertically from the water 326 feet to the highest part of the island.

Maalequequen has an elevation of 296 feet at its south end and slopes gradually to the northward.

Pangisian Island has cliffs rising vertically from the water at its northeast end and a pinnacle rock, 150 feet high, inclined to the northward, stands out prominently. At distances of ½ and 1 mile southeast of Pangisian Island are two rocks, 41 and 75 feet high, respectively.

The channel between Deribongan and the other islands is over ½ mile wide, deep and clear, but there are a number of shoals and reefs eastward and southeastward of each of the other three islands. A rock awash lies ½ mile eastward of the south end of Maalequequen with a ¼-fathom spot westward of it.

Shoals.—The following shoals lie in the offshore passage eastward of the north end of Palawan: **Benito Shoal**, 6¾ fathoms, in latitude 11° 19′ 35″ N., longitude 119° 51′ 00″ E.; **Primo Reef**, 1¾ fathoms, in latitude 11° 15′ 14″ N., longitude 119° 51′ 28″ E.; **Ubaldo Reef**, 2¾ fathoms, in latitude 11° 12′ 14″ N., longitude 119° 48′ 30″ E. **Bera Bank**, with a least known depth of 7 fathoms, lies 2 miles west-southwestward of this shoal; and **Tejada Reef**, 5¼ fathoms, in latitude 11° 07′ 56″ N., longitude 119° 52′ 05″ E. They are all steep-to, the lead giving little indication of their existence.

Batas Island forms the northern side of Shark Fin Bay. It is about 5 miles long in an east-northeast and opposite direction and 2½ miles wide. The island is almost divided into two by the bays making into the low land between the two heavily wooded peaks. The western and higher peak has an elevation of 1,455 feet; the eastern, 1,220 feet. The shore is bordered by a reef with numerous shoals off the west and southwest part of the island. **Imorigue Island**, a prominent island 1,062 feet high, lying westward of Batas Island, is connected to it by a reef which bares at low water. **Talaotauan**, lying westward of Imorigue Island and separated from it by a narrow channel, is 157 feet high. The channel between it and Palawan has a depth of 7 fathoms and forms the northern entrance to the anchorage in Shark Fin Bay.

SHARK FIN BAY

is formed by Batas Island on the north, Maytiguid Island on the south, and the coast of Palawan on the west. Nearly the entire shore line is mangrove and is fringed with numerous reefs and shoals. The northwestern part of the bay, northeastward of the barrio of Oton, forms the best typhoon anchorage in this part of Palawan.

Miraya Island, 125 feet high and heavily wooded, lies 1¼ miles off the southeast end of Batas Island. **Macuao Island**, 80 feet high, lies about 2 miles southwest of Batas Island, near the head of the bay. These two islands form excellent marks for approaching the anchorage.

Directions.—The directions for entering the channel westward of Talaotauan Island through Imorigue Bay are given on page 43. To enter Shark Fin Bay from the northeast, round the east end of Batas Island in mid-channel. When the north end of Maalequequen

Island bears 45° (44° mag.), change course to 225° (224° mag.), passing about ⅖ mile westward of Miraya Island. When on line between Miraya and Macuao Islands change course to head about 3° to the left of Macuao Island, or a course 248° (247° mag.), and keep the north tangent of Miraya Island dead astern. Go nothing to the north of the line joining the two islands on account of several bad coral shoals on the north side of the bay.

When the southwest tangent of Imorique Island bears 340° (339° mag.) steer for it until Malapari, the largest of a small group of islands on the right, is abeam, then change the course to 280° (279° mag.) for a distance of ½ or ¾ mile and anchor in 8 to 10 fathoms, mud bottom. Small vessels can continue westward and southwestward behind the reef to within ¾ of a mile of the barrio of Oton. One red and three black buoys now mark this part of the channel into Oton.

When approaching Shark Fin Bay from the southward, from a point in mid-channel west of Dinit Island, steer north until the southern tangent to Malotamban Island is abeam, change course to 315° (314° mag.) heading for the highest peak of Batas Island, when Miraya Island bears 45° (44° mag.) head for Macuao Island bearing 260° (259° mag.); keep this course until the southwest tangent to Imorigue Island bears 340° (339° mag.), and follow the previous directions to the anchorage. A 480-foot hill to the northward is on range with the tangent to Imorigue Island on this bearing.

Maytiguid Island, lying on the south side of Shark Fin Bay, is separated from the coast of Palawan by Tanguingui Channel, which in some places is less than 200 yards wide. The island is irregular in shape, the shore line is fringed with mangroves except a few rocky points, and Negra Point at the south end, which is rocky, steep, and much undercut. There are two prominent high points on the island separated by a valley across the island. The north peak, 1,002 feet high, shows prominently to the northward, and is used in connection with Miraya Island as a range in coming down the inside passage from Iloc Island. The peak on the south side is 1,100 feet high, dome-shaped, and prominent when viewed from eastward. Practically all of Maytiguid Island is heavily wooded.

Nabat Island, 226 feet high, lying just off the south end of Maytiguid Island, has the same general appearance as Negra Point. It is of limestone formation with a prominent high point at each end. The shore is steep and has been much undercut by the action of the sea.

Islands and shoals eastward of Shark Fin Bay.—A coral patch, awash at low water, lies 1½ miles south of Miraya Island with a ¾-fathom patch ¼ mile northwestward of it. Miraya Island, in range with the east tangent of Batas Island, leads close eastward of the rock awash.

A group of four large islands and a number of smaller islands and shoals lie to the eastward of the inside passage along this part of Palawan, affording excellent protection to vessels using this passage. This passage is from 1 to 2 miles wide and easily navigated. The channels among the islands of the group are narrow and tortuous and should not be attempted except under the most favorable circumstances. **Calabugdong,** the largest island of the group, is about 3 miles long and 1 mile wide, and reaches an elevation of 692 feet in the

southern and higher of the two hills. A cliff 400 feet high halfway up the east side shows prominently when approaching from the northeast. The shore line on the west side, being well protected from the sea, is fringed with mangrove, while that on the east and north side is rocky with occasional stretches of sand beach.

Maobanen Island, 2¾ miles long and 1 mile wide, lies ½ mile south of Calabugdong Island. It is 706 feet high, the highest point being near the middle of the island and sloping uniformly in all directions. Unlike the other islands of this group, Maobanen is not heavily wooded, some of the peaks being bare and others covered with cogon. A rocky islet, 91 feet high, rising straight up from the water, lies 530 yards off the northeast end of Maobanen. On the northeast side of this islet is a conspicuous pinnacle rock, with rocks awash at half tide 100 yards northeast of it.

Casian Island lies ½ mile east of Maobanen Island. Near the southwest end of the island is a sharp conical peak 865 feet high, which stands out prominently among the more rounded peaks of this locality. Separating the high ground on the east side of the island from that on the west side is a low flat valley. The town of **Casian** is situated on a sand beach at the south end of this valley. Two beacons mark the entrance through the reef for small boats landing at the town.

Debangan Island, separated from Casian Island by a narrow channel 320 yards wide, has one prominent peak, 703 feet high. The island is wooded with the exception of a narrow strip along the west side, which is being cultivated. About 300 yards southwest of Debangan Island are several rocks, varying in height from 2 to 15 feet, and 425 yards northeast of the island is a rock 30 feet high, rising vertically from the water.

Cagdanao Island, lying about 1½ miles northeast of Casian Island, has a sharp prominent peak, 533 feet high. **Binga Island**, 385 feet high, is a small oblong island lying 2½ miles northeast of Cagdanao Island. A sharp, narrow, rocky point, 50 feet high, projects from the southeast end of the island, with a rocky islet, 30 feet high, lying 160 yards off the end of the point. Another rocky islet, 95 feet high, lies 215 yards off the north end of Binga Island.

Maqueriben Island, 295 feet high, lies just off the northeast end of Calabugdong Island, and **Malcorot**, 276 feet high, and the two **Butacan Islands**, 270 and 213 feet high, lie just off the northwest end. A ¾-fathom shoal lies almost ¾ mile 330° (329° mag.) from the western Butacan Island with a 4½-fathom shoal and a 3¼-fathom shoal ½ and 1 mile eastward of it. **Malotamban Island**, 168 feet high, is separated from the southwest coast of Calabugdong Island by a deep channel ¼ mile wide. **Dinit Island**, 247 feet high, is separated from the southwest end of Maobanen Island by a narrow, deep channel. The channel westward of the islands is over 1 mile wide, deep and clear.

Dadaliten Island, 257 feet high, lies near the western end of a shoal area nearly 2 miles long, bordering the north side of a channel 1¼ miles wide, leading from the eastward into the inside passage and into Taytay Bay.

The shore line along this part of the coast of Palawan is mostly fringed with mangroves. The country back of the coast is mountain-

ous and has many prominent peaks. **Shark Fin Peak,** 1,915 feet high, is the most prominent peak on the north end of Palawan. It is sharp and so inclined that it has the appearance of a shark's fin. From the peak a ridge runs south a distance of 3 miles, with peaks ranging from 1,700 to 1,900 feet, the ridge ending in a sharp peak known as Sharp Shoulder. A valley running northwest separates Shark Fin Peak from the mountains to the northward.

Silanga Peak, 1,535 feet high, is the highest peak on the peninsula formed by Shark Fin Bay, Tanguingui Channel, Silanga Bay, and Mesecoy Bay. From the peak the ground slopes abruptly to the northward and more gradually to the southward. A valley 1 mile wide separates Silanga Peak from the higher mountains westward.

The north and east shores of Silanga Bay are foul; the west shore is fringed by a wide coral reef. To enter the bay, from midway between Nabat and Maytiguid Islands steer 269° (268° mag.) until Silanga barrio bears 298° (297° mag.), then steer for it, anchoring about ¾ mile off the town in 10 to 12 fathoms. During the northeast monsoon, tide rips, dangerous to small boats, occasionally form off Nabat Island. Silanga Bay may also be entered by passing close southward of Nabat Island to avoid Royalist Reef, and passing midway between the Silanga Islands and Maytiguid on the above bearing.

TAYTAY BAY,

included between Maytiguid Island and Santa Cruz Point, is 10 miles wide at the entrance and extends about 7 miles westward. This part of Palawan is mountainous. A range, with several prominent peaks reaching a height of 1,400 to 1,500 feet parallels the coast about 2½ miles inland. West of the barrio of Polarican this range turns westward toward Bacuit Bay on the west coast, while another ridge slopes northeastward toward the barrio of Mesecoy. There is a low valley between this range and Shark Fin range northward. With the exception of about 1½ miles, at the town of Taytay, in the southwestern part of the bay, the entire shore line is fringed with mangroves. Reefs and shoals extend over 2 miles off the western shore of the bay.

Mesecoy Bay, northward of Talacanen Island, is filled with shoals and is of little importance. **Ditnot Islet,** lying 1¾ miles southeast of Talacanen Island, has a conical rock mound about 30 feet high at each end. **Quimbaludan Islet,** another small island in this part of the bay, lies 1¼ miles southeast of Silanga Point. **Quimbuluan** and **Guindabdaban** are two small islands, about 50 feet high, lying in the west central part of the bay with a third low rocky islet 1 mile southeastward of Quimbuluan.

Apulit Island, 585 feet high, lies 2½ miles southwestward of Negra Point, the northern entrance point to Taytay Bay. It is of limestone formation, easily recognized, and is an important landmark for vessels entering this bay. The island slopes gradually to the northward, but the southern point ends in a high bluff.

Royalist Reef, with a least known depth of ¾ fathom, lies 1½ miles eastward of Apulit. Between it and a ¼-fathom reef lying 1¾ miles 105° (104° mag.) from the south end of Nabat Island there is a clear, deep channel almost 1½ miles wide.

The two **Pabellones (Elephant** and **Castle Islands)**, lying 3 miles southward of Apulit Island, are also of limestone formation. They are separated by a narrow, deep channel, and a number of dangerous shoals lie eastward of them.

Calabadian Island, 1½ miles southeast of Castle Island, shows no indication of limestone formation. It is triangular in shape, has one peak 550 feet high near its center, from which the ground slopes gradually on all sides.

Malatpuso Rock, 77 feet high, lying 3½ miles eastward of the Pabellones Islands, stands out prominently when seen from any direction.

Binatican Island, 3½ miles north-northeast of Malatpuso Rock, is the easternmost of the islands lying off Taytay Bay. It is 1¾ miles long north and south and has one prominent peak, 570 feet high, near the north end. There are a number of shoals southward, eastward, and northeastward of the island and a 5¼-fathom shoal lies ¾ mile northwestward.

Directions.—There are several channels among the many shoals of Taytay Bay, but the following are recommended: When bound for Mesecoy, from a point about ½ mile southward of Nabat Island, steer for the south tangent of Talacanen Island bearing 266° (265° mag.). Hold this course until Quimbaludan Island is abeam, then haul southward. Anchor ½ mile southward or westward of Talacanen Island in 14 to 16 fathoms of water. When approaching from southward, from a point 1 mile south of Apulit Island steer for the east end of Talacanen Island bearing 297° (296° mag.). When Quimbaludan Island bears 45° (44° mag.) haul westward and anchor as above. Small vessels can approach much closer to Mesecoy but should not attempt to do so unless the light is favorable, as there are several dangerous reefs in the vicinity.

When bound for Taytay, from mid-channel westward of Dinit Island, steer 180° (179° mag.) when the south end of Apulit bears 270° (269° mag.) change course to 230° (232° mag.) passing between Apulit and Elephant Islands to an anchorage in 18 to 20 fathoms, mud bottom. A good anchorage is in 18 fathoms with Taytay Head bearing 273° (272° mag.) and Taytay fort 203° (202° mag.).

It is possible to approach close to the town of Taytay, but this should not be undertaken without a knowledge of the ranges through the narrow passage between the reefs. Keep the south end of Apulit Island in range with a prominent sag of the sky line of Casian Island, bearing 42½° true until the largest of a small group of black rocks on the edge of the reefs northward is in line with a notch in a prominent sag in the sky line westward of Silanga Peak bearing 350° true. When the fort on Taytay point bears 214° true haul westward and anchor in 3 to 5 fathoms, sand bottom, ⅓ mile northward of the fort.

The best entrance to Taytay Bay from offshore is between Debangan and Binatican Islands. A shoal with a least known depth of 3¼ fathoms lies 1½ miles northeast of Binatican Island, but between this shoal and Debangan Island the channel is deep and clear. From a point about 1 mile south of Debangan Island steer for the south end of Apulit Island, bearing 250° (249° mag.) until Nabat Island bears 315° (314° mag.); steer for the east tangent to Castle Island bearing 207° (206° mag.), and when Apulit south tangent bears

270° (269° mag.) change course to 233° (232° mag.) and follow the previous directions.

When entering the bay from southward keep to the north of a line joining the north tangent of Icadambanauan Island and Taytay Head. There is a 1¾-fathom shoal 1 mile north of Santa Cruz Point and a ¼-fathom patch ⅘ mile northeast of the same point. The west tangent of Apulit Island, in range with the 1,100-foot peak on Maytiguid Island, leads eastward of this reef.

From Santa Cruz Point the coast trends south-southeast for 20 miles to Esfuerzo Point and is very irregular, being cut into by deep bays and faced with islets and reefs. The mountains are wooded, the prominent points are rocky where the mountains come close to the shore, and the bays are generally lined with mangroves. Between Limbangan Point and Pangkang Point the coast recedes and forms Calauag Bay, at the head of which lies the barrio of **Calauag. Ibobor Island,** 600 feet high, lies across the entrance with a good channel to southward of it, the channel to westward being almost closed by reefs. **Piña** and **Tomandang** are two small islets lying along the western shore reef, while **Babarocon Islet** lies on the southern shore reef eastward of the latter. Reefs that bare at low water lie along the southern shore from ½ to 1 mile northeast of Babarocon Islet; two rocks awash and a reef with 1½ fathoms over it lies ¾ mile northward and 1 mile northeastward of Pangkang Point, the southern entrance point to the bay.

Icadambanauan Island lies 1 mile eastward of Santa Cruz Point. It may be recognized by its two hills, 500 and 512 feet high, at the north and the south ends of the island, respectively. Two groups of black rocks lie eastward of the island, and a white rock, 50 feet high, lies ¼ mile southwestward of a small wooded island off the southeast coast. **Calabucay Island,** 150 feet high, small and wooded, lies almost 3½ miles south-southeastward of Icadambanauan. There is a channel 1½ miles wide with a 2-fathom coral shoal in the western entrance.

Cagdanao Island, 250 feet high, lies 1½ miles southwestward of Calabucay Island. There is a ¼-fathom reef ½ mile northeastward of the island with deep water close-to. The recommended channel lies between this reef and Cagdanao Island.

Paly Island, 610 feet high, is a long narrow island lying 3½ miles east of Pangkang Point. The outer slopes of the island are steep-to and only sparsely wooded, so that the peculiar brown soil is plainly visible. The shore line is rocky with stretches of sand, shingle, or bowlders. Shoals extend northward, eastward, and southward of the island. There is a ½-fathom patch about 1¼ miles from the north end of the island and ¼ mile offshore, otherwise the west shore is clean and steep-to.

Dangerous ground.—In the area westward of a line joining Binga Island and the eastern point of Dumaran Island there are numerous dangerous coral shoals. Their position and the nature of the channels between them can best be understood by reference to the chart. The following courses are recommended:

Directions.—Vessels rounding the east end of Dumaran Island, bound for Taytay, should keep eastward of the line joining Binga Island and the east point of Dumaran until the highest point of Debangan Island bears 306° (305° mag.); steer for this peak until

Dadaliten Island bears 270° (269° mag.), when the course should be changed to 250° (249° mag.) to pass about 1 mile southward of Debangan and Dadaliten Islands and the previous directions for Taytay Bay be followed. If desiring to pass southward of Icadambanauan Island, when the peak on Calabadian Island bears 270° (269° mag.) steer for it until Calabucay Island bears 225° (224° mag.); steer for this island until the south tangent to Icadambanauan bears 271° (270° mag.), when the course should be changed to 254° (253° mag.); hold this course until the east tangent to Cagdanao Island bears 165° (164° mag.), keeping the east tangent of Cagdanao Island dead astern until the west tangent of Apulit Island is in range with the 1,100-foot peak on Maytiguid Island bearing 359° (358° mag.); hold this range until the north tangent of Icadambanauan Island bears 91° (90° mag.); then follow previous directions.

When bound for Calauag by the channel north of Paly Island, hold the 225° (224° mag.) course mentioned above until the west tangent to Paly Island bears 180° (179° mag.), steer for it; then steer for the prominent 950-foot peak, 1 mile south of Pangkang Point bearing 217° (216° mag.); then for the south tangent of Ibobor Island bearing 270° (269° mag.); then steer for Piña Island in range with the southern of two conical hilltops bearing 252° (251° mag.); when the low flat rock off Pangkang Point is in range with south tangent to Paly Island bearing 101° (100° mag.) change course to 223° (222° mag.), heading between Tomandang Island and Dasilag Point, favoring the latter point. When the north end of Babarocon Island is in range with the north end of Paly Island, steer this as a back range on a course of 243° (242° mag.) to an anchorage of from 1 to 5 fathoms, mud bottom.

Directions for the channel northward of Dumaran Island.—When about 5 miles eastward of North Point, Dumaran Island, bring the 22-foot rock 1 mile westward of Carbucao, to bear 270° (269° mag,) and steer for it; when the tangent to North Point bears 219° (218° mag.) head for it until the point is distant about ¼ mile; round the point at this distance until the summit of North Point bears 90° (89° mag.), then change course to 270° (269° mag.) and keep the summit of North Point astern until the 950-foot peak southward of Pangkang Point bears 281° (280° mag.) steer for this peak; when the east tangent of Cagdanao Island bears 317° (316° mag.) steer for it until the south tangent of Ibobor Island bears 270° (269° mag.). If bound for Calauag, change course to 270° (269° mag.) and follow the directions previously given. If bound northward change course to 338° (337° mag.) when north tangent of Cagdanao Island bears 287° (286° mag.); change course to 301° (300° mag.), keeping no less than 300 yards off the northeast part of Cagdanao Island and avoiding the ¼-fathom shoal northward of the course. Now bring the east tangent of Cagdanao Island astern and steer 345° (344° mag.) until on the range west tangent Apulit Island and 1,100-foot peak on Maytiguid Island bearing 359° (358° mag.) and follow directions for Taytay Bay.

Dumaran Channel is 1½ miles wide between the westernmost point of Dumaran Island and Esfuerzo Point, Palawan. The navigable area of the channel northward of Esfuerzo Point is much con-

tracted by islands and reefs. **Mayabacan Island, Central Island, South Island,** and **South Channel Island** lie on the eastern side of the channel, **Bivouac** and **North Channel Islands** in the middle, and **Capsalon Island** on the west. There is a channel westward of the latter, but it is not recommended, as nothing would be gained by using it. While the southern part of Dumaran Channel has numerous dangerous shoals, there are good leading marks for the channels usually used by vessels in this vicinity.

DIRECTION FOR DUMURAN CHANNEL.—If bound for Dumaran Channel from the southeast of Dumaran Island steer 261° (260° mag.), heading very carefully for Flechas Point until the clump of trees on top of the 1,010-foot peak west of Capayas bears 293° (292° mag.); if coming from the open sea steer 344° (343° mag.) for the southwest tangent to Dumaran Island, changing course to 293° (292° mag.) when the clump of trees gets on this bearing; hold this course until the umbrella-shaped tree on South Channel Island is in range with the east tangent to Paly Island, bearing 352° (351° mag.); run this range until the southern one of the double points of Esfuerzo Point is abeam, the 950-foot peak south of Pangkang Point then shows in the sag between the two elevations of Capsalon Island; steer this range 331° (330° mag.) until the east tangent of Bivouac Island low point bears 0° (359° mag.), and steer for it, passing South Channel Island ⅕ mile on starboard side. If bound for North Point, Dumaran Island, hold the 0° (359° mag.) course until the northwest tangent to Central Island bears 41° (40° mag.), then steer for it; when the west tangent of South Island bears 180° (179° mag.) steer 0° (359° mag.), the west ends of Maruyogruyog and South Islands are then in range, when the north point of Mayabacan Island bears 83° (82° mag.) change course to 30½° (29½° mag.), which will bring Bivouac Island summit dead astern; when the summit of North Point bears 90° (89° mag.) head for it, round North Point at a distance of about ¼ mile, and steer on a course 60° (59° mag.) for 4 miles.

If bound for north Palawan ports by the inside route continue the 0° (359° mag.) course for the east tangent to Bivouac Island and when the north tangent of Capsalon Island bears 297° (296° mag.) steer for it, changing to 322° (321° mag.) when the southwest tangent to South Island bears 142° (141° mag.), steering about a mid-channel course until the east tangent of Capsalon Island bears 178° (177° mag.); then change course to 358° (357° mag.), heading for the east tangent to Paly Island. When the east tangent of Cagdanao Island bears 317° (316° mag.) head for it and follow directions previously given. If desiring to go north by the channel east of Bivouac Island, when this island bears 210° (209° mag.) head for the southwest tangent to Paly Island, bearing 339° (338° mag.) until Cagdanao Island east tangent bears 317° (316° mag.).

There are several channels leading into Dumaran Channel from the southwestward. The simplest seems to be as follows: Bring the 550-foot hill southeastward of the town of Dumaran to bear 27° (26° mag.) before Mount Ilian, 4 miles northward of Flechas Point, bears 330° (329° mag.); steer for the 550-foot hill until the range South Channel Island to east tangent Paly Island is reached.

DUMARAN ISLAND,

separated from Esfuerzo Point by the channel of the same name, is about 15 miles east and west and has a greatest width of about 12 miles north and south. It is of irregular form and has no remarkable features by which to distinguish it, the interior of the island being a series of low hills, 400 to 500 feet high and heavily wooded. Most of the shore line is fringed with mangrove, and extensive coral reefs bare off Piyaui Point and eastward of North Point. Shoals extend off the north coast for a distance of about 3 miles and to a lesser distance off the south coast.

North Point is a prominent landmark. It is steep-to on the north and west and affords good protection against the northeast monsoon. Eastward of North Point the coast is foul and should be avoided. A shoal with a least known depth of 2¾ fathoms lies in the channel ¼ mile northward of North Point. **Cacbucao Island**, 115 feet high, lies 2½ miles northward of North Point, with a 22-foot rock 1¼ miles westward of it.

Pirata Head is the easternmost point of Dumaran Island. It is steep-to on the northeast, but a reef bares southeastward to **Maraquit Island**, which is 205 feet high and wooded. **Cotat Island**, 345 feet high, lies ¾ mile southeast of Maraquit Island. The channel between them is contracted by a 4¼-fathom shoal lying close to the latter island. **Mantulali Island**, 168 feet high, lies 1 mile southwest of Cotad Island with a 1¼-fathom shoal in the middle of the channel between them. **Langoy Island**, 329 feet high, is separated from Mantulali Island by a deep channel, about 1 mile wide. All these islands are steep-to from seaward, with high dark cliffs, and they mark the outer limit of dangers for this part of Dumaran Island.

Cambari Island, lying about 5 miles eastward of Pirata Head, is crescent shape, ½ mile in length, and about 230 feet high. The highest point is near the southern end, and the ground slopes to sea level at the northern end. The western side of the island has bare overhanging cliffs rising to the full height of the island over a wide bench about 5 feet above sea level.

Araceli Bay (chart 4355) is a large indentation on the southwest side of Pirata Head, affording good shelter in 4 to 5 fathoms, mud bottom, off the town of Araceli lying on the northeast shore of the bay. The shores of the bay are fringed by mangroves, and coral shoals bare a considerable distance out, northward of the town being the only place where small boats can approach close to shore at low water. The town is nearly obscured by coconut trees.

DIRECTIONS.—Vessels bound into Araceli Bay are advised to pass between Langoy and Mantulali Islands. From eastward a ship may pass between Maraquit and Cotad Islands, favoring the Cotad side of the channel, passing over coral bottom of 4 to 5 fathoms. The entrance between Cotad and Mantulali Islands is divided by a 1¼-fathom shoal. A range to pass between Baliog Point and Araceli Reef consists of a prominent black rock on reef off Araceli town in line with the west tangent of Araceli coconut grove and a large clump of trees on a prominent hill in the interior of Dumaran, bearing 348° (347° mag.). When Baliog Point is abeam, change to 315° (314° mag.) and proceed to an anchorage in 4 to 5 fathoms, mud bottom,

with the south tangent to Maraquit Island bearing about 100° (99° mag.) and the 257-foot hill back of Araceli bearing about 42° (41° mag.). A narrow winding channel leads to an excellent typhoon anchorage in the basin northwestward of the town. A depth of 2 fathoms may be carried through the channel, but vessels should not attempt to enter unless the channel is staked.

Bacaran, Langcan, and **Calasag Bays** are indentations in the southern coast of Dumaran Island, lying 4½, 6, and 9 miles southwestward of Pirata Head. The shores of all three bays are mangrove lined, with a few short stretches of sand beach. The coral reefs make off a considerable distance from shore, and the heads of the bays are shoal. There are several small settlements on the shores of the bays, Bohol, in Calasag Bay, being the largest. Each of the bays has a good anchorage protected from northeast monsoon weather, and Langcan Bay has a good typhoon anchorage for small vessels northwestward of Langcan Point.

Directions.—Coming from Araceli Bay, to pass between the offshore reefs and the coast of Dumaran Island, steer 229° (228° mag.), keeping the south tangent of Maraquit Island astern. To enter Bacaran Bay, when the 235-foot rounded hill eastward of Caran bears 3° (2° mag.) steer for it until the tangent to the point between Bacaran and Langcan Bays bears 268° (267° mag.); then change course to 328° (327° mag.) and proceed to an anchorage in 3 to 5 fathoms, mud bottom.

To enter Langcan Bay, continue the 229° (228° mag.) course until the hill on Langcan Point bears 320° (319° mag.); then steer for it and anchor southwestward of the village of Dagsauay in 2 to 3 fathoms, mud bottom. Better protected anchorage may be found northwestward of Langcan Point, being careful to avoid a 1¼-fathom shoal 870 yards 325° (324° mag.) from Langcan Point. To approach Langcan Bay from southward, steer 7° (6° mag.) for the western entrance point until the south tangent to Maraquit Island bears 49° (48° mag.); steer this course until the hill on Langcan Point bears 320° (319° mag.) and follow previous directions.

To enter Calasag Bay from the south, steer 344° (343° mag.) for Calasag Point until the mangrove island southwest of the town of Bohol bears 18° (17° mag.); steer for it until the first point north of Calasag Point bears 270° (269° mag.); then change course to 323° (322° mag.) and proceed to an anchorage in 4 or 5 fathoms, mud bottom. When approaching from Araceli, steer the 229° (228° mag.) course until the south tangent to Calasag Point bears 261° (260° mag.); steer for this point, and when the small mangrove island southwest of Bohol bears 352° (351° mag.) change course to 323° (322° mag.) and anchor as directed above.

From Calasag Point the coast trends westward for 6 miles to Piyaui Point, then northward for 5 miles to the head of Dumaran Bay. The first part of this stretch of coast has heavily wooded hills close to the shore, the points being high and rocky with a narrow coral fringe all along the shore line. Dangerous reefs and shoals extend out about ¾ mile at Calasag Point and widen out to 2 miles off Piyaui Point. **Sharp Hill,** a 525-foot hill close to the shore line, makes a prominent landmark for vessels approaching from southward. The western shore of Dumaran Island is fringed with mangroves.

Dumaran (chart 4355) lies near the head of Dumaran Bay, on the west coast of Dumaran Island. It is connected with Araceli, at the east end of the island, by a good trail and telephone line. **Dumaran Bay** is a good typhoon anchorage, but is difficult to approach unless the channel is well marked. The following directions have been used: Leave the Dumaran Channel range 352° (351° mag.) when the prominent cove about 1½ miles northward of Piyaui Point bears 90° (89° mag.) and steer for the cove until Dumaran Point comes abeam; then steer 45° (44° mag.), and when the east tangent to Dumaran Point bears 0° (359° mag.) head for it. When the left tangent to the largest island in the bay bears 45° (44° mag.), change course to 7° (6° mag.) to pass between two small reefs west of this island and head for the fort, bearing 54° (53° mag.), anchoring in 3 to 4 fathoms, mud bottom, with the west tangent of the largest island in the bay bearing 180° (179° mag.). Two black buoys and one red buoy have been placed to aid vessels entering the bay.

From Esfuerzo Point, Palawan, the coast trends southwest for 12 miles to Flechas Point. Heavily wooded mountains having well-defined peaks approach close to the shore at Flechas Point. **Drake Peak**, 1,260 feet high, the 1,010-foot peak about 2 miles southward, and **Mount Ilian** each has a well-defined clump of trees on the summit that makes an excellent landmark. The mountains in this vicinity are seldom obscured by clouds. Numerous shoals and reefs lie inside the 20-fathom curve, which in the vicinity of Flechas Point is about 8 miles offshore. There are deep channels between them, but nothing would be gained by a vessel venturing among them.

Capayas, a barrio lying about 7 miles northeast of Flechas Point, is the only settlement along this coast and is the headquarters of a lumber concession. To approach Capayas from the entrance to Dumaran Channel, steer 295° (294° mag.) for the 1,010-foot peak, being careful to avoid the shoals close-to on either side of this bearing. Head for Squall Point on the bearing 270° (269° mag.) for a distance of 1 mile, and then 348° (347° mag.) for 1 mile, to an anchorage off Capayas westward of Capayas Reef. A course of 330° (329° mag.), heading for a conspicuous dead tree, may be used instead of the 348° course.

To approach Flechas Point from the sea, head for **Bay Peak**, 1,795 feet high, on the bearing 307° (306° mag.) until Flechas Point bears 344° (343° mag.); then change course to 0° (359° mag.). To continue to Capayas, from a point 1 mile east of Flechas Point steer 18° (17° mag.) until the mouth of the Ilian River bears 267° (266° mag.); then change course to 87° (86° mag.); when Capayas Point bears 12° (11° mag.) change course to 37° (36° mag.) and when the conspicuous dead tree northward of the town bears 330° (329° mag.) head for it and anchor eastward of the town.

GREEN ISLAND BAY.

Between Flechas Point and Bold Point, 32 miles southwestward, the coast recedes about 7 miles, forming a large open bay known as Green Island Bay. The islands in the bay are all low and flat. Green Island and Johnson Island are the only ones distinguishable when passing offshore. At a distance of 6 or 8 miles only the tops

of the trees on Green Island are visible and they then appear like a hedge on the horizon. Johnson Island is a little higher and does not appear so flat, but this is due to the few higher trees near the center, as the island itself is flat.

There are numerous banks and shoals in Green Island Bay. They are usually surrounded by much deeper water, are generally smooth on top, with the shoalest part near the center. Under favorable conditions bottom can be seen in about 8 fathoms and often a shoal of this depth can be seen at a distance. The lead gives very little warning, and on any sudden change in depth the vessels should proceed with great caution. In the bay itself, the islands and sand cays afford ready means of fixing the position of the vessel while passing through the various channels. The most conspicuous landmarks when making the course from Langoy Island to Bold Point on the way to Puerto Princesa are Sharp Hill, the 525-foot hill near the south shore of Dumaran Island; Drake Peak, the 1,010-foot peak 2 miles southward of Drake Peak; Bay Peak, the highest peak, 1,210 feet of Barbacan Range; and the outer of two peaks northward of Bold Point on Palawan. The higher mountains in the interior of Palawan are frequently covered by clouds, while the peaks named above, though lower, are easily recognized and seldom obscured.

Flechas Point is steep and high, being the end of the ridge from Mount Baring. From the southward and southeastward, the point merges into the higher background and is not reliable as a landmark on account of its similarity in appearance to several other places. **Bay Peak,** 1,795 feet high, lying 3 miles westward, is separated from the higher peaks back of Flechas Point by a deep valley, and is easily recognized even at night on account of the lowland westward. Between Bay Peak and Barbacan Range there are many low hills. The highest point of **Barbacan Range** is a rounded hill, covered with trees, with a small knob on the western side. About 1½ miles northwest of the barrio Rizal there is a sharp, conical hill, heavily wooded, and about 3 miles farther inland is the end of a high, sharp, ridge which, when viewed from the southeastward, appears like a lone, sharp conical hill, and is an excellent landmark when the higher mountains are obscured by clouds. Stripe Peak, Mount St. Pauls, Liberty Cap, Cleopatra Neeble, and Escarpado are all high mountain masses, frequently obscured by clouds.

DIRECTIONS.—A course of 234° (233° mag.) from a point about 2 miles off Langoy Island carries a vessel well outside the numerous shoals along this part of the coast of Palawan to the entrance of Puerto Princesa.

Vessels entering Green Island Bay, if bound for Taradungan, Tumarbong, and Barbacan, should head for Bay Peak on a bearing of 307° (306° mag.) and pass westward along the coast, keeping from 1 to 2 miles off the shore, being careful to avoid a coral reef lying 1.4 miles 142° (141° mag.) from Tumarbong Point. The reefs break the sea, and anchorage may be taken up anywhere along the coast, the best protected anchorage being in 3 to 4 fathoms, mud bottom, northwestward of Shell Island. If bound for Malcampo, bring Stanlake Island to bear 323° (322° mag.) and steer for the middle of the island, keeping the sand cay ½ mile to the southward inside the tangents. When the sand cay is clearly visible, steer to pass ½ mile on either side and continue to pass ¼ mile off Stanlake Island, being

careful to avoid a coral reef about 1 mile northward of the island; anchor in 4 to 5 fathoms southeastward of the town. If bound for Rizal, steer for Reinard Island, bearing 270° (269° mag.) until the 690-foot hill northward of the town bears 340° (339° mag.); steer for this hill to an anchorage southeastward of the town in 3 to 5 fathoms, mud and sand. To enter Caramay Harbor from the eastward, steer 270° (269° mag.) for the north end of Reinard Island, pass ¼ to ½ mile northward of the island, and anchor off the barrio in 3 to 6 fathoms, mud bottom, or if desiring more shelter anchor northwestward of Reinard Island. Coming from southward, most vessels enter by the South Channel between Reinard and Verde del Norte Islands, being careful to avoid Zabala Reef, lying about 1 mile southeastward of Reinard Island.

It is possible for vessels to pass between the islands and reefs of Green Island Bay and the Palawan coast, but the channels are narrow and tortuous and should not be attempted by strangers.

There is an excellent typhoon anchorage in Pascoe Channel (chart 4319) behind Verde del Norte, but the channel for entering is very narrow and should not be attempted by a stranger unless marked. The best entrance is from northward. There is no channel between Verde del Sur and the coast of Palawan.

Charybdis Shoal, with a least known depth of 1⅚ fathoms of water, lies in latitude 10° 01′ .8 N., longitude 119° 32′ .4 E.; a small 9-fathom bank lies 1½ miles northwest of this shoal. A large bank with several shoal areas lies 8 miles southwest of Charybdis Shoal. Pasig Shoal, near the southeastern edge of the bank, has a least known depth of 1⅚ fathoms and is step-to on the eastern side, dropping off to over 100 fathoms in less than a mile. A $3^4/_6$-fathom patch and a $1^4/_6$-fathom patch lie 3 and 5 miles, respectively, northwestward of Pasig Shoal. These are probably the shoals formerly known as Charybdis and Constancia. West Pasig Shoal, with a least known depth of 2 fathoms, lies 4 miles westward of Constancia Shoal, with depths of 15 to 20 fathoms between them. These shoals seem to mark the southeastern edge of the submarine plateau making off from the northeast coast of Palawan and are the outer known dangers off this coast. With the sun in a suitable position they show plainly and may be readily avoided.

HONDA BAY.

From Bold Point the coast trends west by south for 25 miles, then south for 12 miles to the entrance to Puerto Princesa, forming Honda Bay (chart 4334). This large bay is similar to Green Island Bay, containing numerous islets, shoals, and banks, surrounded by a moderate depth of water. The head and east shore of the bay are fringed by a strip of mangrove about ¼ mile wide, but the north shore consists of sand and coral beaches with high hills rising almost from the water's edge. These hills are separated by deep conspicuous valleys and back of them rise the high mountain masses of this part of Palawan.

Bold Point is not conspicuous from seaward but may be readily recognized by the two peaks, **Sharp** and **Dome**, lying close together about 2 miles inland. These peaks are frequently seen when the higher mountains are in the clouds.

Mangrove Point is a good landmark as it is the only prominent clump of mangroves on this part of the coast. It may be easily picked up from about 5 miles offshore. Emmit Point is higher but inconspicuous. Coral reefs make off both points and between them form a sheltered cove locally known as Binduyan Cove, which affords protection for small boats and launches.

Pasco Point has a few scattered mangroves but is not prominent unless close inshore. A shoal with a least known depth of 5/6 fathom lies midway between Mangrove Point and Pasco Point and about 3/4 mile offshore. It lies near the northern edge of an extensive bank with depths of 4 and 5 fathoms. It is the first of the numerous detached dangers met with along this coast, being separated from the shoal water off Emmit Point by depth of 30 fathoms.

Tinabog is a small village, not visible from seaward, about 1½ miles west of Pasco Point. Anchorage may be taken up about 1 mile offshore eastward of the village in 11 fathoms, mud bottom, with the southeast point of Fondeado Island bearing 240° (238° mag.) and Pasco Point bearing 12° (10° mag.). Small vessels may find better protection in 7 to 10 fathoms, south of the mouth of the Tinabog River, with the reef awash bearing 270° (268° mag.) distant ½ mile.

Castiilo Point, 3 miles westward from Tinabog, probably derives its name from a rocky protuberance on the brow of the hill over it. This hill marks the western end of the bold range of hills which borders the coast from Green Island Bay and lies about midway between Tinabog and Babuyan, the two most important settlements on the north shore of Honda Bay. The **Babuyan River** can be entered at high tide by small boats and launches drawing not over 6 feet, which can go as far as the town. Small boats and bancas can ascend the river to the rapids 5½ miles above the town, the channel having a depth of about 3 feet. To enter the river, steer a course 328° (326° mag.), keeping the east tangent of Fondeado Island directly astern. This course brings the launch into the channel, which is easily followed.

Westward of Babuyan the immediate coast is low and swampy and is heavily wooded. The first 4 miles is a narrow sand beach, while the remainder is all fringed by mangroves. **Addison Point,** a rather indefinite landmark, forms the eastern side of Tapul Bay. **Bush Island,** lying in the entrance to Tapul Bay, is a low mangrove-covered island with a coral reef extending 380 yards from the south and east sides. The north and west sides are sandy. A rock, bare at high tide, lies 550 yards south of Addison Point. Between this rock and the Bush Island Reef is a good channel leading to a well-protected anchorage in Tapul Bay in 5 to 6 fathoms, mud bottom.

Tapul River is a salt-water slough extending 2 miles northward from the head of the bay, where it ends abruptly. The channel up to a small dock 1½ miles from the mouth of the slough is 20 to 30 yards wide and carries 6 feet of water. From Tapul a good trail leads through a low pass across the island of Palawan to Ulugan Bay on the west coast. Here the island of Palawan is only about 4 miles wide. Westward of this pass rises **Mount Peel,** 3,600 feet high. This peak, with **Mount Airy** and **Mount Herschel** to the southwest and the **Conical Peak,** 1,190 feet high, to the eastward, form the prominent landmarks for approaching Honda Bay from offshore.

The western shore of Honda Bay is fringed with low hills with lower land behind them. Immediately northward of the entrance to the Bacungan River lies a conspicuous red ridge; southward of the river there is a jumble of hills, valley, and peaks leading westward to Mount Beauford and Thumb Peak. The **Bacungan River** can be entered by large launches, which, at flood tide, can ascend to the town of the same name about 6 miles from its mouth. This river was formerly noted for its nipa.

ISLANDS AND SHOALS IN HONDA BAY.—**Fondeado Island**, 2½ miles southwest of Castillo Point, is about 2 miles in circumference, low and wooded, about 110 feet to tops of trees. The island is surrounded by a coral reef about 250 yards wide. The eastern half of the islands is covered by mangroves, with a fringe of mangroves along the shore to the northwest point, where a sand spit projects about 50 yards. Numerous shoals, several of which bare at low water, lie in the area between Fondeado Island and the shore northward. Deep channels separate the shoals from each other, but they are narrow and winding and no directions can be given. About ½ mile northward of the east end of Fondeado Island, anchorage may be had in 9 to 10 fathoms, sandy bottom, protected from the southwest by the island while the reef to the northeast breaks the sea from that direction.

Panglima Reef, with a least known depth of 3 fathoms, lies 8 miles east of Fondeado Island, and constitutes the outer danger of Honda Bay. An extensive bank lies 2½ miles northwest of Panglima Reef, with several shoal spots on it, the least water found being ⅚ fathom. A number of shoals, with depths of 3 to 5 fathoms of water over them, lie from 1 to 4 miles eastward and southeastward of Fondeado Island. Their position and character can best be understood by reference to the chart. The channel eastward and southward of Fondeado Island is the one recommended for vessels going from Tinabog to the anchorage off Babuyan River mouth.

Arrecife Island lies 2½ miles southwest of Fondeado Island on a large coral reef. The island is bordered by a white sand beach with some mangrove on its eastern and western sides. A clump of mangrove on the reef, about 480 yards southwest of the island, identifies it when approaching from seaward. A rock, with a least depth of ½ fathom, lies ¾ mile 70° (68° mag.) from the northern point of the island, and 1 mile eastward of this rock there is a pinnacle shoal with a least depth of 4⅔ fathoms. An extensive shoal, with a least depth of 1⅓ fathoms, lies 2¾ miles southward of Arricife Island on the north side of the channel leading into Tapul Bay.

Buguias, Parunponon, and **Kalungpang** are three small islands lying on the great barrier reef westward of Arrecife Island. The first two are covered with trees and mangroves; the last is grass covered only a few feet above sea level, and with Addison Point forms the range for entering the channel northward and eastward of Makesi Island.

A reef with a sand cay that bares lies ¾ mile east-northeast of Buguias Island. A channel, ¼ mile wide, separates this reef and Buguias Island from the foul area extending southward of Manogan. Buguias Island lies close to the northern edge of the barrier reef and may be passed at a distance of 200 yards. This constitutes the best channel leading from the Babuyan anchorage to Tapul Bay.

Makesi Island is a small wooded island lying on the northwest end of a long coral reef bordering the south side of the main channel into

Tapul Bay. A long narrow sand spit, which bares at half tide, extends off the southeast end of the island. This sand spit with the light green color of the reef renders it easy to pick up this reef, and this channel is easily navigated by keeping ⅓ to ½ mile off the edge of the reef. The channel which separates Makesi Island from the reef on which Meara and Frazer Islands lie is not recommended as it is narrow and the edges of the foul water are hard to pick up.

Meara and **Frazer Islands** are both heavily wooded. They are almost connected by a narrow sand spit just awash at hight water. A small rocky shoal lies 1 mile north of the east end of Frazer Island. A narrow deep channel separates this rock from a coral reef ½ mile in diameter, on which there is a sand cay bare at all stages of the tide. The channel into Tapul Bay lies eastward of this reef and sand cay.

Ramesamey Island is a small wooded island lying on an extensive reef in the western part of Honda Bay. It is steep-to on the west and is used by the natives as a resting place when traveling to and from Puerto Princesa. **Cañon Island** is merely a clump of mangroves. The channel between these islands and the coast is tortuous and foul and is used only by small boats and bancas.

Directions for Honda Bay.—The course usually followed from Bold Point to Puerto Princesa passes close to Panglima Reef and over the bank in latitude 9° 51′ N., longitude 119° 00′ E. Vessels should not cross Panglima Reef for, though closely developed, there is always the possibility of a coral head with less water over it.

To approach Tinabog, from a point 5 miles east of the south end of Fondeado Island steer 351° (349° mag.) for the 3,000-foot double peak on the eastern side of the Tinabog valley until about ¾ mile offshore, then steer 297° (295° mag.) for the middle of the anchorage and anchor in 4 fathoms with the bare reef bearing 223° and Pasco Point 72°.

To approach Babuyan anchorage from southward, bring Liberty Cap, the high mountain just westward of Mount St. Pauls, to bear 0° (358° mag.) and steer for it. This course leads clear of all dangers.

To enter Tapul Bay from southward, set a course to give Makesi Island reef a berth of ⅓ to ½ mile, and when the western end of Makesi Island bears 180° steer 342° (340° mag.) for a point midway between Addison Point and Bush Island, keeping Makesi Island directly astern. Favor Bush Island as the reef extending out from it is more easily picked up than the Addison Point reef.

To enter Tapul Bay from eastward, round Buguias Island, and when the southern edge of the island bears 90° steer 270° (268° mag.), heading for the center of Bush Island. In rounding up into the bay favor the Bush Island reef as above.

Between Honda Bay and Puerto Princesa, a barrier reef, about 200 yards wide, bare at low water, fringes the coast, lying about ½ mile offshore, and vessels should give this coast a berth of not less than 1½ miles.

PUERTO PRINCESA

(chart 4343) is a large inlet extending about 7 miles in a northwesterly direction. It is surrounded by a densely wooded plain, front-

ing a high mountain chain on which **Mount Beaufort** and **Thumb Peak** are conspicuous peaks. The latter, when seen from the southeast, appears as a steep conical mountain with a knob on the summit. Both peaks are prominent landmarks, but are frequently obscured by clouds. **Table Head**, though only 545 feet high, is a useful landmark for making Puerto Princesa. It is readily recognized, as it is only about 400 yards from the coast and is the lowest step of a gradually ascending range of hills extending to the southwest.

The entrance to Puerto Princesa lies between Bancaobancaon Point northward and Panagtaran Point 2 miles southward. Reefs and shoal water extending out from the entrance points contract the navigable channel to a width of about 1 mile. The range, Tidepole Point on Thumb Peak, leads clear of the reef on the north side of the entrance and Tidepole Point on Mount Beaufort clears the shoal water on the south side. The depth in the entrance is 34 fathoms, deepening to over 100 fathoms 1 mile outside.

Bancaobancaon Point, the northern entrance point, is low and fringed with mangroves, and a thin fringe of mangroves extends almost to Tidepole Point. The latter point is made conspicuous by the white lighthouse; the point itself is a reddish cliff only about 20 feet high. A fixed red light, visible 9 miles, is exhibited, 43 feet above high water, from an iron frame on the south side of the lighthouse.

Princesa Point, 38 feet high, is made conspicuous by the government buildings back of it. A wooden wharf with concrete approach extends in a northwest direction. It has a depth of 18 feet alongside and deepens to 30 feet 5 yards off the face of the wharf. **Gedeon Shoal** marked by a black buoy, lies 650 yards west of the wharf.

Extensive mud flats and numerous coral reefs fill the head of Puerto Princesa. An important shoal, with a least depth of 1½ fathoms, lies 1,300 yards 312° (310° mag.) from the end of the wharf. North of a line passing through this shoal and Iwahig River entrance the bottom is foul. A number of rivers empty through the mangroves into the head of the bay. The islands shown on the chart are little more than clumps of mangrove and are scarcely distinguishable from the shore near which they lie.

The **Iwahig River** entrance is marked by a red light and distinctive beacons which must be left to port on entering. They are maintained by the Iwahig Penal Colony, which is situated about 4 miles up the river, where there is a concrete boat landing. A depth of 6 feet at half tide can be carried into the river. The channel, which has been cleared by blasting, lies south of River Island and, after passing the beacons, launches should head for the fishing dock on that island. The river is subject to freshets and consequent changes in the channel which passes to southward of the small island about 3½ miles from the entrance.

Iwahig lies on the north side and about 150 yards back from the river, with which it is connected by a canal. It has a population of about 1,200. The colony has a sawmill, ice plant, and machine shop, where minor repairs may be made, and meat, rice, and vegetables may be obtained in case of emergency.

Vinagre Reef, with a rock awash near its center, lies in front of a large shoal bay, into which the Binuan and several smaller rivers

empty. It is almost midway between River Island and Nagplit Point. A shoal, with a least depth of 2⅙ fathoms, lies ⅛ mile northeast of the rock awash.

Abucayan and **Saguit Inlets** lie just inside the southern entrance point to Puerto Princesa. The shores of both bays are fringed with mangroves. **Heron Point** has been cleared and planted with coconuts. Abucayan Inlet is long and narrow, the entrance being contracted to about 200 yards by coral reefs, clearly visible under favorable conditions. Beyond the entrance the inlet widens to about ⅓ mile, but reefs, surrounded by deep water, lie off the shore reef, and local knowledge is necessary for its safe navigation.

Village Rocks, so named on account of their resemblance to a group of native huts when first seen, are two groups of rocks lying 250 and 450 yards from Red Cliff. Between them and Tabuntabun Point there is a clear channel ½ mile wide, which leads to an anchorage at the head of Saguit Inlet. This anchorage is usually used by vessels loading lumber in the vicinity.

Puerto Princesa, the capital of the Province of Palawan, lies on the eastern side of the harbor back of Princesa Point. Its white government buildings present an imposing appearance from the water. Fresh water may be obtained from a pipe line on the wharf and a limited amount of coal is stored here by the Province for the emergency use of vessels. Very few supplies are obtainable. A post office and radio station are maintained by the bureau of posts, and telephone communication may be had with Iwahig and Brooke Point. Good roads connect the town with Canigaran and Tagburos.

DIRECTIONS.—Vessels bound into Puerto Princesa should bring Tidepole Point to bear 304° (302° mag.) and pick up a range in the gap between Mount Beauford and Thumb Peak and steer in on this range. When in line between the entrance points, change to 290° (288° mag.), and when the lighthouse bears 40° (38° mag.) change course to 349° (347° mag.), heading for Caña Island. When the wharf comes abeam, change course to 35° (33° mag.) and anchor about 400 yards north of the end of the wharf in 9 to 10 fathoms, mud bottom. This anchorage is well protected and is recommended as a good typhoon anchorage.

PUERTO PRINCESA TO ISLAND BAY.

Binunsalian Bay lies between Bay Point and Table Head. Wide coral reefs fringe the shore, and it is open to southeast. A narrow channel leads from its head into an inner basin named Turtle Bay, which affords good shelter for launches and small boats. A sand and coral shoal, bare at low water and readily seen on entering, lies in the center of Turtle Bay.

Table Head, 548 feet high, lies close to the shore and is the first step in a gradually ascending range of hills that extends along the coast to the southwest. It is a conspicuous landmark and appears as the right tangent when Panagtaran Point sinks below the horizon. From offshore, **Mount Central**, a sharp peak 3,205 feet high, shows over the coastal range. It is the northern peak of a central range, which is separated from the still higher mountains near the west coast of Palawan by a deep valley. The **Anepahan Peaks**, twin peaks

4,250 and 4,200 feet high, lie in this latter range. The northern peak is sharp, the southern one flat and ridgelike. **Mount Aborlan**, 2,505 feet high, is the most conspicuous peak in the central range. A deep gorge separates the central range, with its higher peaks to the southwest of Mount Aborlan, from the Victoria Peaks to the southward. The latter, 5,500 feet high, is a massive mountain formation, with numerous peaks and deep gorges, which in the glare of the sun show up as big red scars in a dark background. The teeth are sharp twin peaks very steep on the south side. Another wide, fertile valley separates the Victoria Peaks from the Sultan range to the southward. **Sultan Peak** rises to a height of 3,835 feet, and the mountains in front of it terminate in a conspicuous headland near Calatugas.

A wide, level plain, heavily wooden and having some good pasture land, slopes from the shore back to the mountains of this part of Palawan. The greater part of the shore is fringed with mangroves, and a coral reef extends off from 50 to 200 yards. The deep water which comes up close to the coast at Puerto Princesa gives way about 7 miles to the southward to a gradually widening bank with many dangerous shoals upon it. Table Head, bearing nothing eastward of 0°, clears this bank, which deepens from depths of 10 and 20 fathoms to over 100 fathoms in less than half a mile. The edge of the bank is frequently marked by ripples, and a considerable current may be experienced in the vicinity, which, however, will not be felt farther offshore or on the bank itself. The navigation of this area is fairly simple. The mountain peaks furnish good landmarks for fixing the position of the vessel, and the dangerous shoals offshore can be easily picked up.

Tagbarunis Point, 1½ miles northeast of Inagauan, is a gently rounding, mangrove-covered point, not very conspicuous from seaward. The river emptying to northward of the point has about 3 feet of water on the bar at half tide, and small boats go up about ½ mile. **Inagauan** is not visible from seaward but may be identified by a high sand beach in front of the village. The 1,755-foot peak about 3 miles northwest of Inagauan is conspicuous on account of its perfect cone-shaped summit and the flat country immediately southward of it. The village consists of a single path running due west from the coast for about 1 mile. There is some cultivated land between the mangrove swamps north and south, and good pasture land extends back toward the high land. It is a station of the Iwahig colony locally known as Sugut. The Inagauan River, with 3 feet of water on the bar at half tide, empties into the sea 1 mile north of the village. Fresh water may be obtained about ½ mile up the river. Small boats can ascend the main branch about 2 miles farther. Fair weather anchorage may be had off Inagauan in about 5 fathoms, mud bottom. In approaching this anchorage from eastward care must be taken to avoid the 3-fathom shoal lying 1¼ miles off Tagbarunis Point.

Village Bay, between Maasin Point and the Puntog Islands, is very foul with numerous coral reefs and patches, making it unsafe for navigation. The Isog River, which empties into the northern part of the bay, is a deep salt-water slough having about 6 feet of water on the bar at half tide. Small boats can go up the left branch about 2 miles. The **Puntog Islands**, two small mangrove islands, lie on the

shore reef. Bancas and small boats can go up the Saub River for about 1 mile to a plantation and cattle ranch.

Malanao Island is a large flat mangrove-covered island, about 2 miles long and 1 mile wide with trees about 65 feet high. A coral reef extends about 600 yards southwest of the island. The channel between the island and the mainland is foul and vessels should not attempt to pass through the intricate channels among the reefs, many of which bare at low water. Launches drawing 6 to 8 feet pass through the channel leading close to Malanao Island. **Malanao Anchorage** (chart 4334), southwest of Malanao Island, affords well-protected anchorage in 3½ fathoms, mud bottom. The usual commercial anchorage is southward of Cutter Point off the Aborlan River in 4 to 5 fathoms.

Cutter Point is a gently rounding mangrove point with a hard coral reef 100 yards wide on its southern side. The Aborlan River empties into the sea through two mouths. The northern is the larger and deeper channel and boats that can cross the bar, about 3 feet at half tide, go as far as the wharf at Aborlan. The town of **Aborlan**, 2 miles up the river, is on a government reservation and is the political and educational center for the several tribes of Central Palawan. The telephone line from Iwahig to Brooke Point passes through the town. The anchorage off the town is best made by bringing the mouth of the river to bear 270° (268° mag.), passing about ⅓ mile southward of Malanao Island.

Calver Point is a double mangrove-covered point about 1 mile wide. The two points are separated by a small bay, **Lolo Bay**, with a light yellow sand beach which makes a useful leading mark for approaching the anchorage near the point. Good protection during the southwest monsoon may be obtained northward of Calver Point in 4 fathoms, mud bottom. In making Calver Point from the vicinity of Malanao Island the following course is recommended: From a point ⅓ mile south of the most southerly point of Malanao Island, steer 227° (225° mag.), heading for the southern point of Calver Point, keeping the eastern tangent of Malanao directly astern. To approach Calver Point from the eastward of Sombrero Island, bring the bright sand beach to bear 277° (275° mag.) and steer for it. This course will lead between the long reef off Sombrero Island and the ½-fathom shoal lying 1 mile southwestward of it. The Maasin River empties northward of the point and the Tigman River southward. They both are small and unimportant, the former having only about 1 foot of water on the sand flat at the mouth and is little more than a salt-water slough. Fresh water was found ½ mile up the Tigman River.

Sombrero Island is a thickly wooded sand cay about 10 feet high and 119 feet to the top of the highest tree. The coral reef on which it lies is about 1 mile long northeast and southwest and ½ mile wide. The island is about 800 yards long by 450 yards wide and forms a useful landmark for clearing the many dangerous reefs that lie off this coast.

Apoapuraguan Point and river lie 2 miles southwest of Calver Point. The point is low, mangrove-covered, with undercut coral cliffs about 10 feet high on its southern side. Good lumber is being taken out of the river, which is little more than a salt-water slough with 3 feet of

water on the bar at half tide. Vessels can pass between Calver Point and Native Point by keeping from ¼ to ½ mile offshore following the 5-fathom curve.

The **Malasgao River** empties into the sea about 1 mile north of Native Point through two channels. The southern and deeper one has about 3 feet of water on the bar at half tide. Inside the entrance points the channel is divided into three parts by two islands, the main channel passing between the islands. Small boats and bancas can ascend the river about 2 miles.

Native Point is low and heavily wooded with a few clumps of mangrove breaking a narrow sand beach extending along the line of vegetation. A coral reef 100 yards wide surrounds the point. From the southern end of the point the shore trends due north for 650 yards and then forms a long regular arc to Panacan Point, 3 miles southwestward. The latter point also points southward and the coast forms another arc to Casuarina Point. A shoal, with a least depth of 1⅙ fathoms of water, lies ¾ mile southward of Native Point. The course from Native Point to Panacan passes between the shoal and the point, heading for the western tangent to Rasa Island and favoring that island when heading in for the anchorage.

Arena Island is ¼ mile in extent, covered with trees 65 feet high, and lies on the western edge of an almost circular reef ½ mile in diameter. A number of dangerous coral shoals exist in the vicinity, the position and character of which can be best understood by reference to the chart.

Rasa Island (chart 4334), lying eastward of Mantaquin Bay, is a large irregular mangrove swamp on a coral reef that extends about 700 yards beyond the island at its northeast and southwest ends. It has only a very few deciduous trees and from offshore is hard to distinguish from the mainland. The channel between the island and the sand spit off Casuarina Point is only about 500 yards wide. Good anchorage protected from the northeast may be had in Mantaquin Bay in the lee of Rasa Island; and anchorage protected from all except the northeast may be had northward of Casuarina Point in about 4 fathoms, mud bottom.

Panacan, at the mouth of the Panacan River, may be recognized by a bright tin roof on a substantial house. It is little more than a plantation, the native village lying along the coast to the south of Casuarina Point. This place is also a shipping point for lumber. Vessels going into Panacan must take care to avoid the shoals lying ½ to 1 mile northward of Rasa Island.

Casuarina Point is long and sharp, and is made conspicuous by the high coniferous trees upon it. A long sand spit, bare at low water, makes off the point. A reef, bare at low water, lies ½ mile southward of the point, and a rock, almost awash at low water, lies ¼ mile southeast of this reef. The channel into Mantaquin Bay from the north lies east of these reefs.

From Casuarina Point the coast trends west and southwest for 6 miles to Bivouac Point. It is a succession of sand beaches and mangrove points and islands not distinguishable as islands from offshore. The Malinao River has good fresh water. Small boats and launches can cross the bar and ascend the river about ½ mile.

Emelina Island is the last of the off-lying islands northward of Island Bay. It is elliptical in form, low, covered with deciduous trees and has an outer fringe of mangrove; at the northern end there is a loose coral beach with grassy land back of it, and a narrow, white, sand and coral spit extends out about 250 yards at this point.

Bivouac Point is gently rounding and not conspicuous, being little more than a change of direction in the shore line. **Batonbaton River,** with only 1 foot of water at low tide, empties into the sea northward of the point, and the **Katabungan** empties westward. The latter can be entered at half tide by small boats and launches having about 3 feet of water at low tide in the channel between the sand spits, but is shoal inside. Both rivers have good fresh water. Batonbaton is an unimportant native settlement.

ISLAND BAY.

At Bivouac Point the coast turns to the westward for 14 miles, then southward for 18 miles to Nariz Point. The head of this indentation, between Relief Point and Crawford Cove forms Island Bay. The coast between Bivouac Point and Relief Point is fairly regular, low and flat, practically free from mangroves, and is fronted by a fine sand beach. At Batobato Point, a coral ledge and some loose bowlders extend out about 100 yards; the shore line turns north for about 200 yards to the Batobato River, a small fresh-water stream.

The waters of Island Bay and vicinity have a number of dangerous shoals and close in it is hazardous for vessels to navigate.

At 1 mile 202° (200° mag.) from Bivouac Point there is a shoal with 2½ fathoms of water over it. A shoal, with a least depth of 1⅔ fathoms, lies 4 miles 110° (108° mag.) from Relief Point and 3½ miles offshore. Several shoals with varying depths of water are shown inshore of this latter shoal. From Relief Point, in the northeast part of the bay, coral bottom, on which there are patches of 3 to 12 feet, extends 1¼ miles southwest.

A patch of 2½ fathoms lies midway between Relief Point and Arrecife Island and 3 miles offshore, with the north extremity of Arrecife Island bearing 236° (234° mag.) and Relief Point 20° (18° mag.).

Arrecife, Bessie, and **Gardiner Islands** are three low islands upward of a mile from each other, lying in a southwest and northeast direction in the southern part of Island Bay. Arrecife Island, the northeasternmost, has its eastern side surrounded by coral, which bares ½ mile from it, with 14 fathoms near the edge. Temple Island and others and a number of sand banks lie inshore and northward of these, fronting the head of the bay. The depth of water between and around them is 6 to 7 fathoms.

Puerto Separacion lies westward of Separation Point, which projects from the middle of Island Bay. Directions for approaching the anchorage are as follows: From a point about 1 mile south of Arrecife Island, steer 300° for the south tangent of the unnamed island to the northwestward of Bessie Island, with the 1,630-foot peak (Malanut Range) on range. When the large sand cay to the northward comes on range with the west tangent of Temple Island,

steer for it, course 27°. Skirt the western edge of this sand cay, then steer 343°, and anchor in suitable depth, 2 to 5 fathoms, soft mud, about ½ mile southwest of the blockhouse at Separation Point. Good shelter will be found here from all winds.

The coast from Crawford Cove, which is 1 mile in leangth with 5 fathoms of water at the entrance, trends southwestward for about 11 miles to Nariz Point, which is low and wooded with a small hill at the back of it. On the north side of Crawford Cove is the southern extremity of a coast range, and Davie Hill lies 2 miles south of it.

Shoal.—A shoal patch, covered with less than 3 fathoms of water, is reported to exist about 2 miles eastward of Eustasia Point and about 4 miles southward of Crawford Cove.

Altnacraig Shoal lies in latitude 9° 00′ N., longitude 118° 20′ E., and has a least known depth of 1⅙ fathoms. It is a bank about 1 mile in diameter with several coral heads on the northeastern part. The bottom is distinctly visible and discoloration of water may be seen at a disatnce of 1 mile. Irregular bottom extends to the southwestward, a depth of 11 fathoms being found about 5 miles distant in that direction. Heavy tide rips are frequently encountered and a strong current sets along the 100-fathom curve, and eddies seem to set in every direction across the shoal.

Marabout Shoal, on which the ship *Marabout*, drawing 24 feet, grounded in 1885, is composed of coral and considered to have a depth of about 3 fathoms. From it Tagalinog Island bears 246° (244° mag.) distant about 8 miles.

Tagalinog Island is a long, narrow, wooded island ⅝ by ⅛ mile in extent and surrounded by a coral reef 200 to 500 yards wide. The height to top of trees is 80 feet. The southeastern end at first appears to be a small island by itself, but on closer approach is seen to be connected with Tagalinog proper by a grass-covered sand spit. There is no anchorage near this island, the depths being upward of 100 fathoms close to the reef.

CAUTION.—It must be borne in mind that in a region which is so studded with isolated rocks and shoals not all dangers to navigation may be found during the survey, and extreme caution is necessary when navigating in this vicinity.

ISLAND BAY TO CORAL BAY.

Caramay Bay, 1 mile northeast of Nariz Point, is shoal but affords good protection for launches and small boats. The Caramay River empties into the head of the bay, is shallow, and does not afford good fresh water.

Nariz Point is low with young mangrove bordering the shore. The bay to the westward is filled with coral. A shoal, with a least-known depth of 5½ fathoms, lies 2 miles southeast of the point. A similar shoal lies 4 miles southwestward of this shoal on the outer side of a deep, clear channel over 1 mile wide, which parallels this coast.

From Nariz Point the coast trends southwest, is low and heavily wooded. This lowland extends a distance of 2½ to 3 miles inland to the base of the mountain range of this part of Palawan. The shore is bordered by a coral reef, with several shoals and rocks close inshore. About midway between Nariz Point and Filantropia Point there is a small mangrove point. A rock with a depth of only 2 feet

of water over it lies almost 1 mile off this point, with a reef awash midway between it and the point. At **Filantropia** the coral reef extends out about 700 yards, and launches and small vessels can find some protection from the monsoon behind it. The axis of the clear channel mentioned above passes about 2 miles off Brooke Point and Filantropia Point and 1 mile off Nariz Point.

Brooke Point, situated about midway between Nariz Point and the Segyam Islands, is low and not prominent from seaward. A small reef makes off the point, but there is no shelter except for small launches. The place is of little commercial importance but is the seat of government for the Moro settlement of Palawan. A fixed red light, visible 7 miles, is exhibited at a height of 35 feet above high water from the cupola of the blockhouse on the extremity of Brooke Point.

Addison Peak, 3,110 feet high, is a good landmark. The peak is very steep on both east and west sides and usually clear of clouds except in the rainy season. The mountains in the interior are frequently cloud covered.

Tami Point, 5 miles southwestward of Brooke Point, has a reef extending out about 500 yards. **Tacbolulu** is a small settlement to the southward of the point. It is of no commercial importance. The **Segyam Islands** are two large clumps of mangroves growing on the shore reef about 3 miles eastward of Bonobono. The best passage along this part of Palawan is close to the shore reef inside the maze of shoals existing about 3 miles offshore.

San Antonio Bay.—From the Segyam Islands the coast trends westward and then southward to Sarap Point, forming a deep bay with a large number of dangerous shoals. Discolored water from several rivers that empty into the western part of the bay makes these shoals hard to see. **Bonobono,** on the north shore of the bay, is the most important settlement, and it is connected with Brooke Point by a telephone line. The **Iwahig River** has about 2½ feet of water on the bar at low water, with deeper water inside. It is the largest river in southern Palawan and, rising in the foothills of Mount Escarpado, drains a fertile and populous valley.

Huevo Bank is a series of small shoals lying eastward of San Antonio Bay. Deep water exists in the channel between the shoals, but vessels should not attempt to pass through them.

Egg Island is a small sand cay situated on a reef extending about ½ mile in northeast and southwest direction. The position of the cay is continually shifting, due to storms.

Gull Bank is a large reef which bares at about half tide. On its southeast side the water deepens abruptly to 20 fathoms.

Pirate Island is a small, flat island with a number of high trees on its northeast point. Anchorage sheltered from southwest winds may be had behind Pirate Island in 16 fathoms, sticky mud. The reef extending to the northeastward of the island affords good protection from the sea.

CAUTION.—Vessels having no object in coming into San Antonio Bay should not close this part of the coast nearer than 8 miles, as local knowledge is indispensable for safe navigation among the numerous coral shoals of this region.

Iglesia Point, about 6 miles southwestward of Sarap Point, is low and flat, consisting mostly of mangrove. A flat-topped hill just

back of the point forms a good landmark for this vicinity. A fair anchorage in the northeast monsoon exists just westward of the point in 6 to 7 fathoms, mud bottom, being careful to avoid swinging on a 2-fathom shoal almost in the center of the anchorage space.

Coral Bay is the name given to the area between Pandanan and Bugsuk Islands and the coast of Palawan. It contains many shoals and reefs, the latter frequently having sand cays near their western edges. The area between Arrecife and Bowen Islands is extremely foul. These reefs break the swell coming from the Sulu Sea during the northeast monsoon, but leave a choppy sea on the bay. To enter Coral Bay, pass northward of Arrecife Island, using the sand cays for fixing the vessel's position. A good typhoon anchorage exists in Coral Bay, behind the larger of the Cabugan Islands, southwestward of Rawnsley Point, in 7 fathoms, sticky mud bottom. Coral Bay may also be entered from westward through a deep, narrow channel between Pandanan Island and the coast of Palawan.

Outlying island and dangers.—Ursula Island is situated about 10 miles southward of Iglesia Point. It is low, covered with trees, and surrounded by sand. The south side is steep-to, but a reef bares nearly 1 mile in a northeast direction from the north part of the island. Vessels bound along the Palawan coast should pass to the northwest of Ursula Island, as there are several dangerous shoals to the southeast of the island.

At 2½ miles 306° (304° mag.) from the summit of Ursula Island is a 1½-fathom coral patch; a 1⅙-fathom patch lies 2½ miles 346° (344° mag.) from Ursula Island; and a 3¼-fathom patch lies 5 miles 10° (8° mag.) from Ursula Island. Those dangers lie in the middle of an otherwise clear channel, 4 miles wide, between Ursula Island and the foul ground extending northeastward of Bugsuk Island.

Argyll Shoal, with a least known depth of 2 fathoms, lies 4 miles 86° (84° mag.) from Ursula Island. A shoal with a least known depth of 4 fathoms lies 3 miles 183° (181° mag.) from Ursula Island and a shoal with 5 fathoms of water 1 mile eastward of the 4-fathom shoal. Between these shoals and Argyll Shoal there are several banks of 8 fathoms and possibly less water on them.

Circe Shoal.—The Spanish Government schooner *Circe*, 1862, obtained a sounding of 4½ fathoms on a bank of coral which is placed on the charts in latitude 8° 26′ N., longitude 117° 56′ E.

Wakefield Shoal, on which the ship *Wakefield* struck in 1889, has a least depth of 3½ fathoms over coral and sand. It is almost 1½ miles in length in an east-northeast and opposite direction by 400 yards in breadth, and lies with Iglesia Point 289° (287° mag.) and Mantalingajan Mountain 331° (329° mag.) in about latitude 8° 21′ N., longitude 117° 55′ 30″ E. The shoalest spot is on its southwest side, and close off it there was no bottom at 90 fathoms. It is not improbable that Wakefield and Circe Shoals are identical.

A shoal about 1 mile long northeast and southwest by ½ mile wide lies 4 miles southwest of Wakefield Shoal. The least water found was 2½ fathoms.

Wright Shoal lies with Ursula Island bearing 276° (274° mag.) distant 9 miles. It is 1¼ miles in length east and west, ½ mile in breadth with 1¾ fathoms on its shoalest part, and 47 to 70 fathoms close around it.

Ginn Shoal.—A shoal has been reported about 7½ miles 159° (157° mag.) from Wright Shoal. This shoal was first seen from aloft, bearing 170° (168° mag.) distant about 4 miles (Ursula Island being just visible from the deck); soon afterwards Wright Shoal was seen from aloft bearing 339° (337° mag.) distant about 3½ miles. Wright Shoal appeared a light-green color without breakers; Ginn Shoal was white in color with the sea breaking near its center (wind and sea moderate) and was therefore considered to have less water on it than Wright Shoal. The two shoals appeared to be of about the same extent.

ISLANDS AND CHANNELS SOUTH OF PALAWAN.

Dalagican Island lies on the southeast edge of a large coral reef. It is low and sandy and is now planted with coconuts. The channel between the reef and Cape Buliluyan is about ½ mile wide with 6 to 8 fathoms of water in it.

Canimeran is a small islet lying 2½ miles westward from Dalagican Island, on a reef over ½ mile wide and 1¼ miles long north and south. Shoals with 3 and 4 fathoms of water extend over 2 miles northward of the islet.

Patongong Islet, situated 1¼ miles southwest of Canimeran, lies on the southeastern edge of a coral reef over 2 miles long in an east and west direction. The channel between the two islets is about ½ mile wide and appears to be the best approach to the channel leading along the north side of Pandanan Island.

Pandanan Island is roughly rectangular in shape, 5 miles long northeast and southwest and 2½ miles wide. It is low, flat, and densely wooded with a shore line varied between mangrove and rock about 10 feet high. The channel between Pandanan Island and Dalagican and the Palawan coast is about ¾ mile wide and easily navigated. An intricate mass of coral and deep channels extends northeastward of Pandanan Island into Coral Bay.

Bugsuk Island, low, flat, rectangular in shape, with an area of about 33 square miles, lies eastward of Pandanan Island. It is densely wooded and a wide coral reef encircles the island. An estuary or river divides the island at high water, the northern entrance having a depth of over 3 feet but the western entrance being blocked by mangroves. The channel between Bugsuk and Pandanan is deep but narrowed to a width of about 400 yards by the shore reefs and leads into a maze of shoals at its northern end in Coral Bay.

Bowen is a small heavily wooded islet lying on a coral reef northward of Bugsuk Island. **Apo, Gabung,** and **Byan Islands** lie on the northern edge of the wide coral reef extending southwestward of Bugsuk Island.

Bancalan Island, lying 3¼ miles southwesterly from Pandanan Island, is 3 miles in length by 1¾ miles in breadth. The island is half encircled by a reef usually discernible by the breakers and the light-green color of the water inside, and which at the northwestern extremity extends nearly 1¾ miles from shore. There are numerous isolated coral patches from 1 to 3 fathoms in the channel between it and Mantangule Island.

Mantangule and **Canabungan Islands.**—Mantangule, lying 2 miles southeastward of Bancalan Island, is 4 miles in length and 1¾ miles

in breadth. Canabungan Island, lying southwestward of Mantangule, is 1¾ miles in length and about ⅓ mile in breadth. **Malinsono Island** is a small island joined to Mantangule by a coral reef. All these islands are low, densely wooded, and fringed by coral and sand. There are no landmarks except the islands and their points.

ANCHORAGES.—Vessels may anchor anywhere within the area between Pandanan, Bancalan, and Mantangule Islands, where the shoals do not interfere, in 7 to 15 fathoms of water, mud, and sand bottom. For very rough weather the southern entrance to the channel leading between Bugsuk and Pandanan Islands or the channel itself is recommended. No sea can get into this latter anchorage, though the place may be subject to heavy winds in typhoon weather.

The channels leading to these anchorages are intricate. The best channel, if they admit of a choice, appears to be northward of Bancalan Island. Between its reef and that extending from Patongong it is 1½ miles wide, but a 3-fathom coral patch lying in the center, just within the entrance, contracts it to one-half that width. It should be attempted only when the reefs are distinctly visible from aloft.

The following remarks may prove of value, but they must not be absolutely relied upon:

To enter by this channel sight the edge of Bancalan Reef, which is always well-defined, and keep along it at ½ mile distance until the western extremity of the island bears 199° (197° mag.) to clear a small 3-fathom knoll detached 600 yards from the reef; then close the reef immediately to avoid the central patch, and keep 400 to 600 yards off, steering for Patawan Islet, off Bancalan, in line with the north end of Malinsono. Do not approach Bancalan within 600 yards.

During the southwest monsoon anchorage may be obtained between Bancalan and Patawan in 8 or 9 fathoms, sandy bottom, with the latter island bearing 114° (112° mag.). In the northeast monsoon the best anchorage is southeastward of Patawan in 9 to 10 fathoms, taking care to pass between it and Bancalan, as the ground eastward is foul.

The channel between Bancalan and Mantangule has a number of shoals of from 2 to 4 fathoms, and no direction can be given. The shoals are dark in color and hard to pick up even in the best of light. The channel between Mantangule and Byan was used many times by the steamer *Pathfinder* and is considered safe for vessels of 15-foot draft, being careful to keep to the channel proper, between the dangerous reefs on either side. A course 12° (10° mag.) to pass midway between Mantangule and Byan Islands seems to be safe but leads midway betwen a reef with bowlders awash and a 5-foot spot 750 yards eastward of it. To avoid this area, as soon as the south tangent of Gabung Island opens northward of Byan Island, haul eastward and follow the edge of the reef until the west end of Gabung Island bears south, when the course may be shaped for the anchorage. The passage between Malinsono Island and the reefs extending southward of Pandanan Island has several shoal spots in it, and in the absence of aids to navigation a careful lookout must be kept.

BALABAC ISLAND,

lying 17 miles southwesterly from Cape Buliluyan, is nearly 17 miles in length north and south and 9 miles in breadth. On the southern half of the island are several ranges of high hills exhibiting great variety of outline. Only a few, however, are of sufficient importance to require description. **Steepfall Range**, about 2 miles from Cape Melville, the south point of the island, is composed of several hills in a semicircular form, and, being nearly of the same elevation, 850 feet, presents a table-topped appearance, whence the sides fall in a precipitous manner; hence the name. Northward of Steepfall, other ranges varying in height from 1,200 to 1,300 feet extend to Dalawan Bay. **Balabac Peak**, situated 2 miles northwestward of Dalawan Bay, has the greatest elevation on the island, 1,890 feet. Northward other ranges extend as far as Calandorang Bay. On the northern part of the island are several detached hills, the highest being 750 feet high. **Ramos Island**, lying northward of Balabac, is about 4 miles in extent and is separated from Balabac by Candaraman Inlet, which is nearly blocked by islets and shoals.

Port Ciego or **Blind Harbor** lies in the opening nearly 2 miles wide between Ramos and Balabac Islands. Coral reefs almost block the entrances, leaving deep but narrow channels, through which there flows a strong tidal current, the flood flowing eastward through Candaraman Inlet and ebb in the opposite direction. Bad whirls and eddies are formed during spring tides. The best anchorage is eastward or westward of Albay Island in Candaraman Inlet in 4 to 7 fathoms, mud bottom. Good anchorage may be had in the heads of the bays out of the channel currents. In entering from westward follow the shore reef of Ramos Island and pass north of Sanz Island. The reefs are easily seen on rising tides and high water, but on a falling tide and low water they are often obscured by the mud from the numerous mangrove inlets.

From Port Ciego to Cape Disaster, the northern extremity of Ramos Island, and round eastward the coast is low with two small cliffy hills a little inland. The coast reef bares nearly 1 mile off at low water.

Northwest Shoal lies 2 to 3 miles westward of Ramos Island and has as little as 1¾ fathoms of water in places.

EAST COAST OF BALABAC.

The east coast of Balabac is tolerably bold, with deep water close to it in many places.

Calandorang Bay (chart 4347), situated 5 miles southward of Candaraman Inlet, is over ½ mile wide between Sarmiento and Espina Points, with depths of from 5 to 20 fathoms. It is shallow for 1 mile from its head and 800 yards seaward of the town, with isolated patches between the 3 and 5 fathom curves. Off the town are depths of 1½ and 2 fathoms, according to the distance. The south point of the entrance is formed by Almirante Gil Hill, 105 feet in height. The north point is mangrove with hills a short distance inside. Coral reefs with shallow water beyond extend about 200 yards off both points and to a greater distance off the points within on the northern shore, which is all mangrove.

Balabac.—The Spanish Government in 1858 erected a military station here named Balabac, on the south shore, for the purpose of developing the trade of Palawan and other neighboring islands. Balabac has been opened as a temporary port of entry.

An occulting white light, visible 15 miles, is exhibited from a white-framed structure 33 feet high, on Espina Point.

CLIMATE.—The dry season is from November to April and the wet season from May to October, and the average temperature from one year's observation was 79°.

Water can be obtained from a little stream near the coal pier, but no supplies can be had. There is a landing pier at the town.

TIDES.—It is high water, full and change, at Calandorang Bay at 11^h; springs rise 6 feet.

DIRECTIONS—ANCHORAGE.—A steam vessel will find no difficulty in entering Calandorang Bay, guided by the plan. Steer in midway between the entrance points and, when Espina Point bears 159° (157° mag.), steer for the bluff westward of the town, bearing 233° (231° mag.), proceeding slowly, as the depths decrease quickly inside the 10-fathom curve. Anchor when Espina Point bears 109° (107° mag.) in about 8 fathoms. Small vessels can go farther in on the line of bearing of the bluff. The anchorage is good, with a bottom of mud, and perfectly secure in the southwest monsoon season. In the opposite season the monsoon sometimes blows into the bay with force, raising a choppy sea, so that vessels should anchor nearer the north shore in that season.

The Caimanes Estero, which discharges into the western part of the bay, is reported to offer perfectly protected anchorage for small vessels, 90 or 100 feet long, drawing 7 to 9 feet. The channel is marked at present by stakes, and a vessel drawing 8 feet can enter at high water.

A sailing vessel from southward should make for Dalawan Bay if the wind be likely to fail and await a more favorable opportunity for entering Calandorang Bay, for, on account of the deep water, which is unsuited for anchorage, if the wind should fail when within a mile or so of the port the vessel would be swept toward the numerous dangers northward, there being a current in that direction during the southwest monsoon.

Dalawan Bay (chart 4347), situated 6 miles southward of Calandorang Bay, is convenient for wood and water and affords good shelter during the southwest monsoon. Dalawan Bay will be readily recognized by the lowland extending in a west-northwest direction from the beach across the island separating the highland about Balabac Peak from **Transept Hill**, a smooth, table-topped hill, 1,319 feet in height, on the south side of the bay.

The bay is about 1 mile wide between the entrance points and extends about ¾ mile westward, with anchorage in 7 to 12 fathoms, mud bottom, shoaling gradually to the sandy beach at the head. The shores of the bay are densely wooded, the entrance points on either side being fronted with mangroves. The best anchorage is nearly in the center of the bay in 9 fathoms, mud bottom, nearly ½ mile from the beach. Reefs, bare at low water, project from both points at the entrance, contracting the channel to about ½ mile in width; that on the northern side has a rock at its extremity named **Buoy Rock**, lying 400 yards south from the shore, and which, being gen-

erally uncovered, forms a good mark for entering the bay. The spit on the south side bares 300 yards from the shore, but a rocky spit extends 700 yards beyond this in a northeasterly direction, having in some parts only 3 feet of water, with 5 and 7 fathoms close to the edge. A stream is situated in the southwest corner of the bay northward of White Rock. Its channel is continually shifting in consequence of freshets, but boats can enter near high water.

TIDES.—It is high water, full and change, at Dalawan Bay at 11^h; springs rises 5 feet.

WATER.—About ¼ mile southeastward of White Rock is a rivulet of good water; in the dry season the water must be obtained some distance up to be good. It is navigable for boats on ordinary occasions about 1 mile, where there are a few houses and some cultivated ground.

Clarendon Bay (chart 4347), situated 5½ miles southwesterly from Dalawan Bay and ¾ mile northeasterly from Cape Melville, is about ¾ mile long in a northwesterly direction and has a greatest breadth of about ½ mile, with depths of 4 to 6 fathoms, mud bottom.

From **West Point**, the western entrance point, the reef extends off a very short distance, but from **East Point**, the eastern entrance point, it projects more than 400 yards, leaving a navigable channel of about 150 yards wide between the 3-fathom curves.

Clarendon Bay is of no commercial importance and is used only by the lighthouse tender when communicating with Cape Melville Lighthouse.

BUOYS.—The following buoys are established in Clarendon Bay: A second-class red nun buoy, moored in 3 fathoms, sandy bottom, marks the edge of the spit southwestward from East Point.

A black third-class can buoy, moored in 3 fathoms, sandy bottom, marks the edge of the bank in the southwestern part of the bay.

DIRECTIONS.—Vessels entering Clarendon Bay should bring the middle of the entrance to bear 321° (319° mag.) and steer for it; pass close to the red buoy, keeping a good lookout for the reefs on either side and anchor off the black buoy in 4½ or 5 fathoms, muddy bottom. The head of the bay is reported to be foul.

Cape Melville, the southern extremity of Balabac Island, is fronted by a reef to the distance of ½ mile and, with the point westward, has detached patches extending off to a distance of 1¼ miles. A flashing white light, visible 24 miles, is exhibited from an octagonal stone tower 90 feet high, 1½ miles northwestward from Cape Melville and ⅜ mile from the sea.

West coast of Balabac—Dangers.—The west coast of Balabac is fronted by numerous reefs which extends several miles off. The most important are **Gnat Reef**, **Balabac Great Reef**, and **Ada Reef**, which bare and extend from 2 to 3½ miles offshore, while seaward of them are the Southwestern Banks and the Western Shoals, with depths of 2 to 4 fathoms and possibly less, from 4 to 6½ miles offshore. The chart will afford better information than a written description.

DIRECTIONS.—When standing toward the dangers off-lying the west coast of Balabac, in the afternoon when the sun will be astern, the outer shoals, and also the reefs, will generally be seen in sufficient time to avoid them; but if the sun be ahead the outer shoals are difficult to make out until close to them. The soundings are so variable and uncertain under the depths of 30 fathoms as to afford

little assistance. A good lookout is therefore of the first importance. At night the soundings, coupled with bearings of the light, must be carefully attended to if near these dangers, and a vessel should not approach to a less depth than 40 fathoms off the southwest and west parts of the island nor 50 fathoms off the northwest part.

INSHORE CHANNEL.—There is said to be a channel between Balabac Great Reef and the island, 200 yards wide in its narrowest part and with not less than 4½ fathoms of water. There are many isolated dangers in it, and there seems no reason for any stranger attempting it. West Point shows out very distinctly when viewed from northeastward and southwestward and is a useful object for bearings when nearing the shoals.

Secam Island is long and narrow, about 1 mile in length, and has trees about 100 feet high. It is situated on the west side of the entrance of North Balabac Strait and separated from Cape Disaster by Bate Channel, which is 1¾ miles wide, with depths of 25 to 50 fathoms in the fairway, and with deep water close to the reef surrounding the island. This reef extends 1½ miles northwestward from the western extremity of the island, with patches of coral on it, which cover only at high water.

Depths of 4 to 9 fathoms extend about 1 mile westward and northward of the west end of the reef.

Anchorage tolerably sheltered from southwest winds may be obtained on the north side of Secam Island in 19 to 20 fathoms, bottom sand and coral, about ¾ mile from shore, with the east end of the island bearing south, the reef westward affording protection from the swell. In bad weather a second anchor should be let go in time, as the squalls, which often succeed each other rapidly, are sometimes most violent, and, once off the bank in deep water, a sailing vessel would be awkwardly situated, as there is no other anchorage for which she could run.

TIDES AND TIDAL CURRENTS.—It is high water at Secam Island, full and change, at $10^h\ 40^m$; rise, 5 feet. The flood stream sets eastward and the ebb westward; maximum velocity observed, 2½ knots.

Candaraman Island, situated on a reef very steep-to, 1½ miles eastward of the northern part of Balabac Island, is a low, flat island 1¼ miles in length and ¾ mile in breadth. It is separated from Balabac Island and from Caxisigan Island, lying off Candaraman Inlet, by a channel rather more than ½ mile wide, with depths of 30 to 44 fathoms.

A reef extends ½ mile northward of Caxisigan Island, and there are patches of 1¼ to 3 fathoms for the distance of 1 mile beyond it.

There is also a patch of 4 fathoms 400 yards southeasterly of its southern extremity.

Shoal.—A shoal 50 to 80 feet in extent, with 5 fathoms over it, has been reported to lie with Canabungan Island, bearing 339° (337° mag.) distant about 2½ miles. This shoal is charted where there are depths of 34 to 94 fathoms and lies in the fairway both of North Channel and North Balabac Strait.

NORTH BALABAC STRAIT,

formed on the north by Canabungan, Mantangule, and Bancalan Islands, and on the south by Candaraman, Ramos, and Secam Islands, is 11 miles in length and has a least navigable breadth of 2 miles, with

from 25 to 50 fathoms water throughout. There is generally a strong current in the narrow part of the strait, depending on the monsoon.

DIRECTIONS.—Vessels entering North Balabac Strait from eastward should pass Canabungan Island within 1½ miles from the south end, or if bound from southward, pass the same distance eastward of Candaraman Island, by which means the shoal charted 2½ to 3 miles from these islands will be avoided; thence midway between Bancalan and Secam Islands into the China Sea, or they may pass between Ramos Island and Secam, keeping a little toward Secam Island to avoid the edge of the reef which extends about ¾ mile from Cape Disaster, on which the sea generally breaks.

If entering from northward, steer to pass midway between Secam and Bancalan Islands on about a 142° (140° mag.) course, avoiding the reef which extends northwestward from Secam Island and is usually visible. This course continued should carry a vessel midway between Canabungan and Candaraman Islands. If coming from southward or westward, do not approach Balabac Island nearer than 12 miles until Balabac Peak bears southward of 120° (118° mag.) or until Martin Hill, on Ramos Island, bears 92° (90° mag.), when Secam Island may be steered for on a 70° (68° mag.) bearing.

Nasubata Island is a cleft rock of sandstone formation 90 feet high, covered with trees. It lies on Nasubatta Reef, 400 to 600 yards from its northern edge. This reef is nearly 2 miles in extent, bare at low water, and steep-to.

Roughton Island is a large, wooded sand cay, situated on the northwest part of a reef that is 2½ miles in length in a northeasterly and southwesterly direction by about 1 mile in breadth. This reef is steep-to, except on its northeast side, where shallow water extends from 400 to 600 yards, and ¾ mile northward of the east point is a patch of 2¼ fathoms. The channel between Roughton Reef and Nasubata Reef is 1¼ miles wide and has depths of about 100 fathoms in the center.

BALABAC STRAIT.

General remarks.—Balabac Strait, between the China and Sulu Seas, lies between Balabac Island on the north and Balambangan and Banguey Islands on the south. The greater part is occupied by numerous coral dangers, divided into groups, each group being distinguished by a special denomination, such as Great Danger Bank, Mangsee Danger, etc. This arrangement distinctly defines the limits of the various channels, of which there are eight between the dangers.

Balabac Peak and **Banguey Peak** lie nearly 356½° (354½° mag.) and 176½° (174½° mag.) from each other, 38 miles apart; and as most of the dangers and channels are eastward of this line, these peaks are of the first importance for determining the position of a vessel when navigating the strait, especially for those bound east.

CURRENTS.—The velocity of the current through Balabac Strait depends on the prevailing winds. In the months of October and November, after a succession of westerly winds, it was found to set constantly eastward, slackening only on the ebb tide, while in July, after a continuance of unusually fine weather, with light east and southeast winds, it set with the same velocity, from ¾ to 2½ knots, in the opposite direction. The mean velocity observed for 13 consecutive hours was 1¾ knots.

North Channel is 4½ miles wide between Nasubata and Canabungan Island Reefs and 6 miles wide between Roughton Reef and the reefs extending 1½ miles off Gabung and Byan Islands. In the fairway there are depths of above 100 fathoms in places.

CAUTION.—The only difficulty likely to arise in the navigation of this channel by a sailing vessel will be caused by the tidal stream when combined with the current which runs with considerable velocity during the strength of the monsoons, requiring a favorable breeze to enable vessels to make headway against it. But no danger is likely to occur if they keep northward of the deep water, where there is anchorage.

Nasubata Channel is 5 miles wide between Roughton Reef and Comiran Danger Bank, with depths of above 100 fathoms in the fairway. In navigating this channel it is only necessary to guard against the effects of the tidal stream, which when combined with the current sweeps through it in the direction of North Balabac Strait with considerable velocity at times.

Comiran Danger Bank, 2½ miles in length east-northeast and west-southwest and 1 mile in breadth, includes within its limits Comiran Island and two shoals.

Comiran Island lies 7 miles 153° (151° mag.) from Nasubata Island and 8 miles from the coast of Balabac. It is small, wooded, and surrounded by a reef extending 200 to 400 yards from the shore. Turtles in great numbers resort here at times. An automatic acetylene light showing one red flash every 3 seconds, visible 12 miles, is exhibited at a height of 56 feet above high water, from a white steel frame tower in the center of Comiran Island.

A shoal nearly ½ mile in extent with 2 and 3 fathoms of water lies southwestward of Comiran Island, its outer edge being distant nearly 1¼ miles, and another shoal, about the same size, having 2¾ to 3 fathoms, lies about the same distance in an easterly direction. Both are fairly steep-to. A shoal about 1 mile in extent, with general depths of 6 to 8 fathoms, has a patch of 4¾ fathoms on its south side midway between Comiran Island and the east end of Lumbucan Island. There is also a patch of 6 fathoms in the channel northward of it.

Comiran Channel is over 3 miles wide between the dangers surrounding Lumbucan and Comiran Danger Bank, with depths of 15 to 25 fathoms in the fairway on either side of the bank mentioned above. It is not recommended, as there are other and better channels, though there seems to be no difficulty in navigating it. Cape Melville Light, bearing 252° (250° mag.), apparently leads through.

Lumbucan Island, about 100 feet high, is about ¾ mile in length and wooded. It is surrounded by a reef, and shallow water of a less depth than 3 fathoms extends 1½ miles southwestward and over 1 mile northeastward of it. At 2 to 3½ miles northeastward of the island on the same bank are the Northeast Shoals with depths of 1¾ to 3 fathoms. At 2 miles eastward of the island are patches of 3½ to 5 fathoms, and 1 mile southward is a shoal with 1¾ to 3 fathoms, known as South Shoal. The island and all dangers stand on the Lumbucan Danger Bank. A sounding of 7½ fathoms, position doubtful, is shown on the charts, 2¾ miles 190° (188° mag.) from the west end of Lumbucan Island.

Lumbucan Channel, lying between Lumbucan Island and Bank on the north and Ellis Shoal and Simanahan Reef on the south, is from 4 to 5 miles wide, with depths of 13 to 25 fathoms, and apparently free from danger. **Doorly Patches** divide the channel at its eastern end, but the least known depth over them is 6 fathoms and they are steep-to.

Ellis Shoal, situated about 6 miles 200° (198° mag.) from the west end of Lumbucan Island and in the western approach to Simanahan Channel, is composed of coral, nearly 3 miles in length east and west and 1 mile in breadth. It has a least depth of 2¾ fathoms near its center, from which Balabac Peak bears 330° (328° mag.) distant 14 miles.

Simanahan Reef, situated 7¼ miles 132° (130° mag.) from the east end of Lumbucan Island, lies on the center of a coral bank 5 miles in length by 1 mile in breadth. The reef, bare at low water to about 1 mile in extent, has a sand bank near its center which is just below the surface at high water. This serves, even when covered, from the light color of the water over it, to point out the position of the reef from some distance. The shallow part of the bank, under a depth of 3 fathoms, encompassing the reef, is about 3 miles in extent.

Simanahan Channel, between Simanahan Reef and Great Danger Bank, is apparently free from danger with depths of 23 to 30 fathoms. All that is necessary for its safe navigation is to pass about ¾ mile southward of the reef on a 90° (88° mag.) or 270° (268° mag.) course, avoiding Ellis Shoal, but occasion can seldom arise to render this a convenient channel by which to proceed.

Bank.—A bank on which the least depth obtained was 7 fathoms lies eastward of the approach to Simanahan Channel. This bank has not been examined and there may be less water over it; the bottom was plainly visible. Approximate position: Latitude 7° 40′ N., longitude 117° 38′ E.

Great Danger Bank comprises many reefs among which no vessel should venture. It is 14 miles in length in a west-northwest and opposite direction and 7½ miles in breadth at the northwest end, gradually decreasing toward its southeast extremity. On the southeast reef is a sand cay.

Southeast Shoals comprises several coral patches situated near the southeast extremity of the bank, extending over a space about 2½ miles in length, with depths of 1¾ to 4 fathoms, the shallowest being situated 100° (98° mag.) distant 3 miles from Sand Cay.

Sand Cay, the only conspicuous object marking any part of the bank, stands at the southern side of it, about 4 miles westward of the southeast extremity. The cay is situated near the center of a coral reef, 3 miles in length, from each end of which shallow water (under 3 fathoms) extends ½ mile, with patches of 3 to 5 fathoms beyond, and in a northerly direction, also, nearly as far as the Middle Shoals.

Northwest Shoals, situated at the northwest extremity of the bank, occupy a space of about 5 miles in length, with depths of 1½ to 3 fathoms.

North Patches, two in number, lie near the north edge of the bank, with 3½ fathoms least water.

Middle Shoals are a cluster of coral patches forming the middle of Great Danger Bank. They cover a space of about 6 miles east and west, with as little as 2 fathoms in one or more places.

Middle Channel, separating Great Danger Bank from Mangsee Danger, is 1 mile wide at its narrowest part, with depths of 16 to 33 fathoms in the fairway.

Ray Bank, of sand and coral, is 1 mile in length, ½ mile in breadth, and steep-to, with a least known depth of 4 fathoms near the center. It lies on the north side of the approach to Middle Channel and 6 miles westward of Northwest Shoals on Great Danger Bank, with Balabac Peak bearing 341° (339° mag.) distant 16 miles from the 4-fathom spot.

DIRECTIONS.—Middle Channel lies out of the usual track of vessels, but may be used if necessary. From a position about 2 miles south of Sand Cay steer 292° (290° mag.); when Salingsingan Island, on Mangsee Danger Bank, is abeam, distant about 1 mile, the course should be altered to 283° (281° mag.); when Balabac Peak bears 351° (349° mag.) all dangers will be passed and the course may be shaped as desired.

Mangsee Danger Bank, situated southward of Great Danger Bank, from which it is separated by Middle Channel, includes within its limits the Mangsee and Salingsingan Islands, with the dangers adjacent; also Loxdale, Jessie, and many smaller shoals. This bank is 10 miles in length in an east by south and opposite direction and 4 miles in breadth at the eastern end, tapering to the western extremity.

Loxdale Shoal, at the west end of the bank, is a coral shoal nearly 1¾ miles in length and from 600 to 1,000 yards in breadth, with 2½ to 3 fathoms of water, and fairly steep-to. From the west end of this danger, Balabac Peak bears 336° (334° mag.) and Salingsingan Island 95° (93° mag.).

Salingsingan Island, situated 253° (251° mag.) distant 5 miles from Sand Cay, on Great Danger Bank, is composed of sand and coral and covered with trees. It is rather more than ½ mile east and west and 200 yards wide. A shoal nearly awash in places stretches off ¾ mile eastward and 1¾ miles westward from the island, the breadth of the latter being nearly 1 mile.

Jessie Shoal, with a least depth of 1 fathom, lying 2½ miles 115° (113° mag.) from Salingsingan Island, is 1½ miles in length and ½ mile in breadth. This danger is situated on the eastern part of the bank, and shallow patches outlie its extremities.

North Mangsee Island, situated about 2 miles southward from Salingsingan Island, is covered with trees which rise to an apex near the center, 130 feet above high water. The island is ¾ mile in length and from its east end reefs and shoals extend beyond those projecting from South Mangsee, for a distance of 2¼ miles, and some patches of 4 to 7 fathoms ½ mile farther eastward. From the west end a line of reefs extends in a 290° (288° mag.) direction for 3½ miles.

South Mangsee Island, covered with trees, is round, about ½ mile in diameter, and stands on a reef which extends from it 1 mile eastward, 1,200 yards westward, and less distances in other directions.

Mangsee Great Reef, situated southwestward from Great Danger Bank, from which it is separated by a channel more than 1 mile wide, is 5 miles in length in an east and west direction by 2¾ miles in breadth and steep-to on its southern side. It is nearly everywhere covered at high water, but a sand cay upon the eastern part is gen-

erally visible from aloft when near the edge. At low water the reef presents a vast expanse of coral and sand, with lagoons here and there.

From the west end of the reef, shallow water, under 10 fathoms, extends about 2 miles in a west-southwest direction, with irregular depths; the least known is 4 fathoms, but this locality should be avoided. Banguey Peak, bearing southward of 205° (203° mag.), leads westward of it.

Kestrel Rock.—H. M. S. *Kestrel* passed over a patch with 5 fathoms water eastward of Mangsee Channel, with Banguey Peak bearing 240° (238° mag.) and the southwest extremity of South Mangsee Island 297° (295° mag.). A late report states that there is a depth of only 3½ fathoms on Kestrel Rock. Soundings of 8 fathoms were obtained by H. M. S. *Comus*, in 1882, on a shoal about 1 mile southward of Kestrel Rock. Caution should be exercised while in this neighborhood.

Rock.—A rock covered at high water and marked position doubtful is shown on some charts in approximately latitude 7° 28′ 30″ N., longitude 117° 32′ E. No further information in regard to this rock is available.

Mangsee Channel, separating Mangsee Great Reef from Mangsee Danger Bank, is 1 mile wide at the narrowest part, where the depths are irregular. It is deep throughout, having from 18 to 33 fathoms in the fairway. The reefs on the north side are steep-to; Mangsee Great Reef, forming the south side, is less so.

Directions.—Navigators will rarely have occasion to use this channel, but in case of necessity the following directions may be of assistance: With a proper lookout no difficulty will be found in passing safely through. Coming from westward, having sighted the Mangsee Islands, bring the center of South Mangsee to bear 103° (101° mag.) and steer for it; when the west end of North Mangsee bears 69° (67° mag.), steer 137° (135° mag.), passing midway between South Mangsee and the Great Reef.

Main Channel, between Mangsee Great Reef, northward, and Banguey Island southward, is 5½ miles wide, but the navigable width is contracted to 1½ miles by reefs extending northward from Banguey Island. Vessels coming from southwestward and bound through Balabac Strait during the northeast monsoon will find this channel the most convenient.

Directions.—When approaching from westward do not bring the north hill on Banguey Island to bear eastward of 108° (106° mag.) until Siagut Point, the northern point of Balambangan Island, bears 180° (178° mag.). From a position 2½ miles northward of Siagut Point a 79° (77° mag.) course should carry a vessel about ¾ mile southward of Mangsee Great Reef. The light-green color of the water over this reef will, even at high tide, enable a good lookout aloft to make out the edge sufficiently far off to permit a vessel being guided past it at a safe distance. From about ¾ mile off its south end steer to pass about 2 miles southward of South Mangsee Island and the same distance northward of Kestrel Rock; thence a course about 92° (90° mag.) until the Muligi Islands bears 137° (135° mag.), when they may be steered for. This is the route usually adopted by vessels bound to Jolo and Sandakan, the channels southward being much encumbered with shoals.

PALAWAN PASSAGE

is a deep passage 35 to 40 miles wide, lying between the wide bank which fronts the western side of Palawan and an extensive area of dangerous ground in the China Sea. The western side of Palawan Passage is indicated on the charts by a dotted line which no vessel should attempt to cross as the area defined by it is unsurveyed and is known to abound with dangers.

Dangers on the western side of the passage.—The principal dangers shown on the charts, lying close to the dotted line on the western side of the passage, are: Half Moon; Investigator, N. E.; Carnatic and Seahorse or Routh Shoals.

Half Moon Shoal has a rock named **Inclined Rock**, situated in latitude 8° 51′ N., longitude 116° 16′ E., which always shows above water, on its southeastern side. The shoal, formed by a belt of coral even with the surface, of an average width of 200 yards, is of oblong shape, nearly 3 miles in a northeast and opposite direction, with a breadth of 1 mile. On the eastern side, at 400 and 1,000 yards southward from Inclined Rock, there are two channels into the lagoon, the southern of which has a depth of from 4 to 9 fathoms in it and is marked by a cluster of rocks on its north side awash at half tide and which generally show. Other half-tide rocks are interspersed over the belt. The average depth in the lagoon is 14 to 16 fathoms, with numerous patches of coral scattered about it. From the shoals, Balabac Peak (not in sight) bears 141° (139° mag.) distant 71 miles. The tide rises and falls about 4 feet at Half Moon Shoal.

Investigator NE Shoal, shown on the charts in latitude 9° 12′ N., longitude 116° 23′ E., is apparently awash.

Carnatic Shoal, charted in latitude 10° 06′ N., longitude 117° 21′ E., is said to have as litle as 3½ fathoms over it. The British surveying vessel *Royalist*, in 1853, could not discover this shoal in the position assigned it, or succeed in obtaining soundings with from 100 to 200 fathoms of line when in the neighborhood.

Seahorse or **Routh Shoal**, forming the northernmost known danger on the western side of Palawan Passage, is a pear-shaped coral reef 8 miles in length in a north-northeast and opposite direction and from 3 to 4½ miles in breadth. The least known depth is 4½ fathoms in latitude 10° 50′ N., longitude 117° 47′ E., which was found on a patch about ¾ mile in extent at the northern extremity of the shoal. Nothing less than 6 fathoms was obtained on any of the other patches surrounding the lagoon; the depths in the lagoon vary from 17 to 20 fathoms at the edge to 35 fathoms in the center.

Dangers in Palawan Passage.—The only charted dangers in the fairway of Palawan Passage are the Royal Captain and Bombay Shoals and King Robert Reef.

Royal Captain Shoal lies about 24 miles 69° (67° mag.) from Half Moon Shoal, contracting the Palawan Passage, which is here the narrowest part, to about 30 miles between it and the shoal heads on Paragua Ridge and other 4 and 5 fathoms patches lying southwestward from it. **Observation Rock**, at its northern extremity, in latitude 9° 02′ N., longitude 116° 39′ E., shows at half tide and from it Bulanjao Range bears 120° (118° mag.) distant 48 miles. In clear weather the high land of Mantalingajan is visible from this

distance. The shoal is elliptical, the length being 1¾ miles in a northwest and opposite direction with a breadth of 1 mile. The coral belt, on which a few rocks are visible at low water, is covered at high water and varies in width from 100 to 400 yards. There are depths of from 15 to 17 fathoms, sand and coral, with several coral patches in the lagoon. There is no entrance but at high water boats can cross the belt. The outer edge is steep-to having no bottom with upward of 100 fathoms within 100 yards of the reef.

Bombay Shoal, lying 31° (29° mag.) 29 miles from Royal Captain Shoal, is circular in shape, about 1 mile in diameter and steep-to. From **Madagascar Rock**, on its northeastern extremity, in latitude 9° 26′ N., longitude 116° 56′ E., which shows at half ebb, Mantalingajan Mountain bears 130° (128° mag.) distant 56½ miles and is visible in clear weather. The lagoon, in which there are depths of 16 to 18 fathoms, sandy bottom, is completely inclosed by a coral belt on which three or four rocks show at half tide. There is a tidal range of about 4 feet here and the flood was observed setting northeastward.

King Robert Reef is shown on some charts as existing about 51 miles 58° (56° mag.) from Bombay Shoal and the same distance southward from Seahorse Bank in latitude 9° 52′ 40″ N., longitude 117° 38′ 30″ E., but no further information in regard to it is available.

WEST COAST OF PALAWAN.

The west coast of Palawan is fronted by a bank studded with innumerable shoals and reefs. The 100-fathom curve, marking the outer edge of this bank, is about 20 miles northwest of Cape Buliluyan. From this position it trends in a general northeast by north direction and is about 26 miles off at the northern end of the island. This bank has not been thoroughly surveyed and new dangers are frequently reported. Navigators are advised to keep outside of the 100-fathom curve unless they are possessed of local knowledge or are obliged to enter the ports of western Palawan. A brief description, as they are known to exist at present, will be given.

Cape Buliluyan, the southern part of Palawan, is a low shelving point, fronted by mangroves, having on its south side depths of 4 to 8 fathoms close-to, and on the eastern side, between it and the north end of Pandanan Island, where the channel is 1,600 yards wide, from 28 to 30 fathoms. The western side is fronted by a reef, bare at low water, to the distance of 600 to 1,000 yards, with depths of 6 fathoms, mud bottom, close to the edge.

Coral patches with depths of 4 to 5 fathoms lie ¾ mile off the southwestern part of Cape Buliluyan. The sea bottom of this region is composed largely of dark coral and is seldom visible in depths greater than 4 fathoms.

Off Welcome Point, 3¾ miles northward of Cape Buliluyan, rocky ground with 2 to 4 fathoms of water extends about 3 miles from the shore.

Capyas, a small, low, wooded island lying 6 miles northward of Cape Buliluyan, has a reef extending 800 yards northward of it. The south side of the island is steep-to. Between it and the shore are depths of 4 to 7 fathoms.

Rocky ground lies 2½ miles westward of Capyas, with depths of 2 fathoms only in places and 25 and 30 fathoms close to the western edge.

At 1½ miles northward of Capyas Island a spit projects from Reposo Point, having on it a dry sand bank 1¼ miles from the shore. Foul ground extends nearly 2 miles beyond this, with depths of ¼ fathom, rocky bottom, to 2 fathoms in places.

Alimudin Point, about 7 miles northward of Reposo Point, is a wooded promontory forming the southern entrance point of Canipan Bay. The intermediate coast is chiefly mangrove, indented with bays lined with reefs bare at low water and extending from 600 to 1,400 yards, having 10 or 12 fathoms of water close to their edges. Rocky patches, with from 2 to 5 fathoms of water, lie 2½ miles northwesterly from Alimudin Point.

Southwest or **Triple Hill.**—A low range of hills commencing abreast of Capyas Island lies parallel with the coast, about 1½ miles inshore, of which Southwest Hill, with a small triple summit 900 feet high, is the highest and most conspicuous. At the northern extremity of the range there is a hill named West Coast Hill.

Murex Shoal.—The S. S. *Murex* is reported to have struck, in 1901, on a reef from which Balabac Peak bears 167° (165° mag.) distant 34 miles. It is plotted in latitude 9° 28′ 30′ N., longitude 116° 56′ E., position doubtful. No sounding was obtained on the reef, but the depth nearby was 7 fathoms. As far as known this is the southernmost of the outer dangers off the west coast of Palawan.

Herefordshire Shoal.—The position of this shoal has not been accurately determined and it is charted about 4 miles within the edge of the bank, in latitude 8° 35′ N., longitude 117° 01′ E. Shoal water has recently been reported about 1 mile westward from the above position.

South Regent Shoal is a patch of sand and coral ½ mile in extent with depths of 1½ fathoms and 13 fathoms around. It lies with the southern extremity of Palawan bearing 155° (153° mag.) and the summit of Bulanjao in line with Alimudin Point.

On the latter line, 2¼ miles inshore of this shoal, are two other patches, each 600 yards in extent, 600 yards apart, with 2 fathoms of water.

Kamonga Shoal, situated 110° (108° mag.) 3¾ miles from South Regent Shoal, is a 2-fathom patch, 600 yards in extent. Shallow Shoal is charted about 5 miles 238° (236° mag.) from Kamonga Shoal. The depths in the vicinity of these shoals vary from 30 to 35 fathoms, mud bottom, decreasing to 18 and 20 fathoms near the shore, with occasional patches of 4 and 5 fathoms, coral bottom.

Canipan Bay.—Siacle Point, 2½ miles northward of Alimudin Point, is a wooded promontory, higher than that of Alimudin, and forms the northern extremity of Canipan Bay. In the center of a sandy beach southward of this the Canipan River discharges. It is navigable for boats for about 2 miles, where, on some rising ground on the left bank, is a Malay village. There is only 1 foot depth at low water over a reef at the entrance to the river. The shore of the bay is lined with coral, which, in the southwest corner, bares 1 mile off. A patch of 3 fathoms lies 325° (323° mag.), distant 1¼ miles from Siacle Point.

Simagup Bay, on the north side of Siacle Point, is small, with reefs baring nearly across the entrance and a rocky spit extending about 1 mile from Koreti Point, its northern extremity.

Canipan Hill, 976 feet in height, on the eastern shore of Simagup Bay, is steep and conical, with two peaks when seen from northwestward, the southern being the sharper of the two. Next to the Bulanjao Range, Canipan Hill is the highest and most conspicuous object on this part of the coast.

Bulanjao Range.—Eastward of Canipan Hill and nearly in the center of the island (here about 13 miles wide) is the high land of Bulanjao Range, which attains an elevation of about 3,500 feet. It is of reddish aspect, rising gradually on the south from a range of hills behind Canipan. It has a long, smooth summit, of which it is difficult to distinguish the highest part. The northern slope has several small, sharp peaks with steep shoulders and ravines, among the most conspicuous of which is **Low-hock,** generally visible even when the adjacent hills are obscured.

Sepangow Bay, situated 5½ miles northeasterly from Siacle Point, has apparently two deep inlets, with Cliff Point, a small red cliff, northward, and two green islets southward. These islets lie near each other, immediately under **Steep Hill,** the shoulder of a coast range. There are depths of 8 to 9 fathoms at the entrance of the bay, but when well within the points the mud bares across it.

WATER.—At 3¾ miles northeasterly from Cliff Point is Rock Point, a long bluff head with a small rock lying off it. Southward of this point is a sandy bay, the shore of which is lined with casuarina trees, where, at the western extremity, near Pinos Point, there is a good flow of fresh water. Water can also be obtained from the Coloby Rivulet, 1 mile southward of Pinos Point, where there is a depth of 4 fathoms close to the beach.

Off Pinos Point, and also between it and Rock Point, reefs dry nearly ¾ mile from the shore, about 1,200 yards beyond which are two patches of 3 and 4 fathoms, coral bottom, with 12 and 15 fathoms between them and the reef.

North Regent Shoal, about 5 miles east-northeastward of the assigned position of Herefordshire Shoal, is a coral shoal with 1½ fathoms of water, about 800 yards in extent and steep-to. It lies with Southwest Hill bearing 131° (129° mag.) and Pagoda Cliff 78° (76° mag.).

A patch of 2 fathoms lies 2 miles 69° (67° mag.) from North Regent Shoal.

Breaker Reef, with a few rocks bare at low water, lies 55° (53° mag.), distant about 5 miles from North Regent Shoal. It is about 600 yards in extent, steep-to, and is situated with Southwest Hill bearing 153° (151° mag.) and Pagoda Cliff 83° (81° mag.) showing southward of a double peak on the Iwiig Range.

Rock.—A rock covered by 2¾ fathoms lies 1¾ miles westward of Breaker Reef. This rock is called Breaker Reef on the charts, and the rocks which bare eastward are not named, but the above description agrees with the Derrotero and is probably correct.

Foul ground.—A patch of 4½ fathoms lies 356° (354° mag.) 3 miles from Breaker Reef; a patch of 4½ fathoms 322° (320° mag.) 6 miles, only 2 miles within the 100-fathom curve; a patch of 4

fathoms 289° (287° mag.) distant 5 miles; one of 5 fathoms 277° (275° mag.) distant 7 miles, and a shoal with 4 fathoms 120° (118° mag.) distant 2 miles from Breaker Reef. There are other patches, from 6 to 10 fathoms, coral bottom, near the edge of the bank, with depths of 30 to 70 fathoms around, generally mud bottom. These will be seen on the chart.

Perigee Bank.—The coast between Siacle Point and Cliff Point is dangerous to approach, as rocky, uneven ground, with many shallow patches, extends in some places 2½ miles from the shore. The largest of these is Perigee Bank, about 1 mile in extent and steep-to, with from 1 to 2¼ fathoms over it, on which the sea breaks during strong winds. It lies westward of Sepangow Bay and 305° (303° mag.) 2¼ miles from Providence Point.

Coloby Patch, situated 24° (22° mag.), 3¾ miles from the southwestern extremity of Perigee Bank, is 400 yards in extent, with a least depth of 2½ fathoms water and 22 to 25 fathoms close-to. It lies with Siacle Point bearing 196° (194° mag.) and Balansungain Island (showing as a small flat island with a peak in the center) showing clear of Rock Point. There are patches of 6 to 8 fathoms within 1 mile of it.

Antelope Shoal, situated 277° (275° mag.), 3½ miles from Coloboy Patch and 7 miles offshore, is the largest of the Antelope cluster. It is a narrow strip of sand and coral, 1,400 yards in extent, with 2½ fathoms of water and 30 and 35 fathoms on either side. From its center Balansungain Island bears 89° (87° mag.) and Canipan Hill 153° (151° mag.).

At 1¾ miles 246° (244° mag.) from this shoal is a 3-fathom patch. There is also another of the same depth 345° (343° mag.), about 1½ miles from it.

At 1 mile 64° (62° mag.) from the shoal is a shoal of sand and coral with 2 fathoms of water and a smaller patch with the same depth ¾ mile north of the latter. All these are steep-to.

Northeast Antelope Shoal, situated 47° (45° mag.), 2¾ miles from Antelope Shoal, is 600 yards in extent and steep-to. Not less than 3 fathoms depth has been found on it. From this shoal the summit of Pagoda Cliff is just seen over the shoulder of Iwiig Range, in line with the flat Balansungain Island bearing 106° (104° mag.) and Canipan Hill bearing 170° (168° mag.).

The lead does not give the slightest indication when in the proximity of these shoals, but they can generally be discovered from the masthead.

Large quantities of seaweed are frequently seen in this neighborhood.

Marasi Bay.—From Rock Point the coast trends eastward 4 miles, forming Marasi Bay, off the north point of which and distant 1,200 yards is the bush islet of Litalita, connected with the shore by a reef which also extends the same distance northward of it.

Balansungain Peak.—From Rock Point a low ridge extends along the south shore of Marasi Bay, on which is Balansungain Peak, 947 feet high, and which, when seen from southward, is conspicuous on account of being so sharp.

Iwiig Range.—At the back of the above ridge, fronting Bulanjao and lying parallel with the coast, is a higher range, named Iwiig,

with Double Hill in the center, 1,814 feet high, from which a flat shoulder extends; the range then gradually slopes toward some low hills on the plain northward, overlooking the eastern shore of Marasi Bay.

Balansungain Islands.—In the southwestern part of Marasi Bay, at 1 mile from Rock Point, are two islands of sandstone formation, named Balansungain, lying 600 to 1,000 yards from the shore. The westernmost is flat, and is nearly connected with the shore by a spit that bares at low water. Reefs, which always show, extend from both extremities of these islands parallel with the shore; and in the bay there are several coral patches, with small sand banks, bare at low water.

Rocky ground extends 1½ miles in a north-northwest direction from the Balansungain Islands, having in some places only 3 fathoms of water with 19 fathoms close-to. Also 1¾ miles northerly from the flat island and 274° (272° mag.) 2¼ miles from Litalita there is a patch of 4 fathoms with 18 fathoms, mud bottom, around it. Foul ground more or less extends from this 4-fathom patch to the head of the bay.

There are also two other rocky patches lying, respectively, 319° (317° mag.) and 305° (303° mag.) 3 miles from the flat Balansungain Island and 27° (25° mag.) from Siacle Point. They are each ½ mile in extent, and have 4 and 5 fathoms water, with depths of 20 fathoms between, and 28 and 30 fathoms westward of them.

Mountains; aspect.—Pagoda Cliff, situated 6 miles inland of Marasi Bay, is a remarkable limestone cliff, 2,016 feet in height, having a table summit with two clefts which form pinnacles at either extremity, the southern pinnacle being the sharper. There is a small rock in the gap, conspicuous on the southeast and opposite bearing. Pagoda Cliff rises immediately above a plain which extends across the island separating the Bulanjao and Mantalingajan Ranges, being connected with the latter by a high ridge with various peaks of similar character and formation, among the most conspicuous of which are the **Hat** or Panalingajan and the **Fin**, a very sharp pinnacle, and three sharp hills under the fall of Mantalingajan.

Mantalingajan Mountain, 6,843 feet high, is of reddish barren aspect, and when viewed from the westward has a table summit, the north end being the highest part, while a long, smooth shoulder, terminating in three nipples, slopes gradually southward. It has several spurs and lower ranges fronting it, the most remarkable of which is Sharp Peak, 2,814 feet high, 5¾ miles northward.

Landargun and **Gantung Mountains.**—From Mantalingajan Mountain a high central range extends in a northeasterly direction to the parallel of 9° 15′ N., having on it several remarkable peaks, the two highest of which are Landargun, 5,397 feet; and Gantung, 5,868 feet. Toward the termination of this range there is a table hill with a sharp nipple, **Calibugon**, 1,793 feet; and at the extremity, 2½ miles farther northeastward, is **Corumi**, a conical hill of less elevation.

The coast from Litalita Islet trends northeastward 13½ miles to Pampandugang Point; it is low and has small bays in some of which are rivulets of fresh water.

For 5 miles, as far as Washington Point, the coast is fronted by a a reef which extends from ¾ to 1½ miles offshore, having openings here and there with depths of 3 to 6 fathoms. Beyond Washington Point only the points of the bays have spits extending 600 to 1,000 yards off with 5 and 6 fathoms close to the edge. The depths in the bays decrease gradually to 2 fathoms, mud bottom, near the beach.

Culasian Bay (chart 4346) lies between Washington Point and Jervois Point. There was formerly a Spanish military post on the eastern shore of the bay. The settlement of Culasian is situated on the south shore of the bay. Anchorage may be found about ½ mile northward of the town in 4 fathoms, care being taken to avoid the rocky spit making out westward from the mouth of the Candoaga River, which empties on the east side of the bay.

CAUTION.—Vessels should not approach this part of the coast within 3 miles unless bound into Culasian Bay. The land gives no warning when near a reef and the water is not sufficiently clear to see the danger. The depths from 3 to 5 miles offshore vary from 15 to 17 and 25 fathoms, muddy bottom, with occasional shoaler patches of sand or coral.

Shoals.—At 4 miles 342° (340° mag.) from Washington Point is a 5-fathom patch, 800 yards in extent, lying 3¼ miles from the shore. There is a patch of 8 fathoms about 1 mile southwestward of it. A shoal on which the least depth found was 4 fathoms is reported to exist about 6 miles 267° (265° mag.) from Washington Point.

Brechtel Shoal, about 1 mile in extent, the center of three shoals, lies in the approach to Culasian Bay, with Washington Point 130° (128° mag.) distant about 1½ miles and Litalita 200° (198° mag.). A patch on which the sea breaks lies 1¼ miles westward of Jervois Point.

Illan Hill, frequently a useful object on this part of the coast, when the high land is obscured, is a detached hill 600 feet high, covered with wood, lying 1 mile from the coast within Townsend Point. There is a low table hill 1¼ miles northeastward, and a conical hill the same distance southwestward of it, the latter apparently being connected with it by ridges which extend along the coast close to Jervois Point. There are also several wooded hills on the plain, not, however, sufficiently conspicuous to be of service to the navigator.

Pampandugang Point; water.—At 1½ miles southward of Pampandugang Point in the bight of a small bay eastward of Townsend Point is a rivulet from which in favorable weather a supply of good water may be obtained, the entrance being protected by a coral spit. Care is required in approaching, as foul ground with shallow water extends 1¾ miles in a northerly and 1 mile in a westerly direction from Pampandugang Point, with 12 fathoms close-to.

Merlin Shoal Patches.—The westernmost of these lies 14° (12° mag.) distant 9½ miles from Breaker Reef. Two small shoals bear 86° (84° mag.), distant, respectively, 3¼ and 4 miles from the first named.

A shoal with 4 fathoms lies with Eran Quoin bearing 65° (63° mag.) and Low Hock Hill 162° (160° mag.); a shoal with depth of 5 fathoms lies 249° (247° mag.) from the 4-fathom shoal, distant nearly 2 miles; a shoal with 7 fathoms lies 249° (247° mag.), distant nearly 5 miles, and also a shoal of 2 fathoms with Siacle Point 194° (192° mag.) and Litalita Island 122° (120° mag.).

A shoal with 7 fathoms over it has been reported with Washington Point bearing 89° (87° mag.), distant 4 miles, and Litalita Island 170° (168° mag.). Shoal water has also been reported in a position from which Washington Point bears 92° (90° mag.) and Canipan Hill 166° (164° mag.).

Paragua Ridge, the center of which is situated about 16 miles 7° (5° mag.) from Breaker Reef, parallel with and 1 mile inside the edge of the bank, is formed of coarse sand and shells, and is 8 miles in length, with a narrow ridge of coral having gaps through it. On the ridge the least water found was 5 fathoms, the average depth being 6 to 9 fathoms, with 20 to 30 fathoms close-to. The outer edge of this ridge is steep-to, having in many places 60 to 70 fathoms within 400 or 600 yards from it. From the center of the ridge, where the least depth, 5 fathoms, was found Mantalingajan Mountain bore 103° (101° mag.) and Canipan Hill 162° (160° mag.).

Vanguard Shoal is a coral patch 400 yards in extent, with 1 foot of water, lying 12 miles offshore, with Canipan Hill bearing 176° (174° mag.) and Mantalingajan Mountain 104° (102° mag.). Between this shoal and Paragua Ridge the depths vary from 30 to 50 fathoms.

Scalesby Castle Shoal is a coral patch 400 yards in extent, with a depth of 2½ fathoms, and 30 fathoms close-to, lying 1½ miles within the edge of the bank. From this shoal Bulanjao High Peak bears 171° (169° mag.), Pagoda Cliff 151° (149° mag.), and Eran Quoin 96° (94° mag.).

There is a shoal with 3 fathoms on it lying 8 miles 86° (84° mag.) from Scalesby Castle Shoal, and another with 4½ fathoms 12 miles 91° (89° mag.) from the same.

Collingwood Shoal, lying 61° (59° mag.), distant 15 miles from Scalesby Castle Shoal, and 6 miles within the edge of the bank, is ½ mile in extent and on it the least water found was 2¼ fathoms, with 26 to 28 fathoms close to its outer or western edge, the depths in the neighborhood being 40 to 45 fathoms, soft mud. From this shoal Eran Quoin, in the direction of the nearest land, bears 142° (140° mag.) distant 12 miles; and Pagoda Cliff (which is very conspicuous on this bearing over the lowland, and generally discernible when the elevated objects are obscured), 182° (180° mag.).

Coral Patches.—From Scalesby Castle Shoal to the parallel of 9° 35′ N., a distance of over 40 miles, the coral patches on the edge of the bank of soundings are so numerous that to give a description or bearing for each separately would tend more to confuse than make clear the direction for this part of the passage. The least water that has been found on them is 4½ fathoms, and they may generally be distinguished by an ordinary lookout from the masthead. Two patches of this depth are charted near the edge at 12 and 33 miles northeastward of Scalesby Castle Shoal. It is, however, recommended to avoid the neighborhood, as it is impossible to say whether there may or may not be shoaler spots that have escaped detection. The average depth upon the patches is from 6 to 7 and 9 fathoms, with 15 and 20 fathoms close to their edges.

From Pampandugang Point the coast trends in a northeasterly direction 11½ miles to Eran Point, which, as well as the intermediate land, is low, densely wooded, and fronted by reefs baring from ½ to ¾ mile from shore. At 1½ miles eastward of Pam-

pandugang Point is a sandy bay, where there is a rivulet of good water. The shore of this bay for a distance of nearly 1½ miles appears free from reefs. Patches of sand and coral, however, nearly bare, lie ½ mile off its entrance with depths of 3 to 4 fathoms between.

Eran Quoin, a wedge-shaped hill, 518 feet high, stands on the plain between Baja and Eran Points.

The depths off this part of the coast are generally more regular than those southward, and with the exception of a few 6 or 8 fathoms patches gradually increase from 7 and 9 fathoms near the shore reef to 30 fathoms, mud bottom, at 6 miles off. There is a small 3-fathom patch lying 1½ miles westward of Eran Point and half that distance from Becher Point, with the latter in line with Eran Quoin.

Eran Bay, eastward of Eran Point, may be readily recognized by Eran Quoin. It is the first bay on the coast from southward which affords anchorage in southwest winds, and where water, wood, and a few supplies may be obtained.

Eran Bay is 4 miles wide at the entrance and open northward. At the head of the bay there is a projection named Truce Head, off which and connected with it at low water is a sandy islet named Bivouac. From this islet the reef extends in a northerly direction ¾ mile. In the southwest part of Eran Bay is Eran River, which boats can enter under ordinary circumstances and obtain a supply of good water without going very far up. There are rivulets of fresh water eastward of Truce Head, but in this part of the bay there is a good deal of coral and foul ground.

Anchorage.—The best anchorage is eastward of Eran Point, 1 mile from the shore, in 6½ or 7 fathoms, stiff mud bottom, with Eran Quoin bearing 233° (231° mag.), and Bivouac Islet 126° (124° mag.) midway between Eran Point and the reef off Bivouac Islet, or closer up if necessary, recollecting that as the beach is approached the bay becomes contracted by reefs, which on the western shore gradually extend from 400 yards off at Eran Point to ½ mile westward of Bivouac Islet. Vessels should not anchor in any part of the bay eastward of Bivouac Islet, as reefs with off-lying patches project some distance from the shore and a heavily rolling sea sometimes sets in.

Tides.—It is high water, full and change, in Eran Bay at $10^h\ 10^m$; springs rise 6¼ feet.

Gantung Mountain, which rises to an elevation of 5,868 feet, and False Sharp Peak (the latter liable to be mistaken when first seen for Sharp Peak, 2,814 feet in height and farther south) overlook this bay and have spurs which approach very near the coast.

Between the two is Waterfall Peak (an abrupt rocky shoulder worn bare by the action of the water usually seen running down the side), the commencement of another range lying parallel to that of Gantung, and which from the identity of the features near the northern extremity is designated False Corumi.

From Eran Bay the coast trends north-northeastward about 4 miles to Isabel Point, thence northeastward about 10 miles to Hummock Point. It is similar in character to the coast southward of Eran Point, having low, abrupt points, from which reefs, bare at low water, project 600 or 800 yards. The bights of the bays formed by these points, in some of which there are streams of fresh water, are usually free from coral and have from 2 to 3 fathoms close to the beach.

Aspect.—Pulute Range, which is about 7 miles inland, is 3,067 feet high, with a deep saddle southward and a high and a low sharp nipple, the former 2,930 feet in height, on the slope northward. Between this and the coast range are hills of less elevation.

Point Hill, on **Hummock Point,** is 560 feet in height. From it a low range extends along the coast 5 miles in a southwesterly direction, terminating in a triple-top hill. On the plain southwestward of this range is a high, wooded mound, between which and False Sharp Peak, over Eran Bay and fronting the Corumi Range, are other hills of nearly equal elevation.

Rock.—A sunken pinnacle rock covered by 1½ fathoms of water lies 1½ miles 339° (337° mag.) from Isabel Point, with the south end of Malapackun touching the northern extremity of Marantao Island.

Malapackun and **Marantao Islands.**—At 3 miles 261° (259° mag.) from Hummock Point and 1¼ miles offshore is Malapackun, a wooded island 340 feet high, with a double summit and a round islet 400 yards southward of it. There is a channel inshore with 9 and 10 fathoms, but it is not recommended, as fringing reefs project from 800 to 1,600 yards from the coast, increasing in distance toward Hummock Point and inclosing Marantao Island, 247 feet in height, 1 mile westward of the point.

CAUTION.—Vessels approaching the coast immediately northward of Eran Bay should keep Malapackun Island open of Isabel Point, as the ground is foul in that vicinity; nor should any part of the coast between Eran Bay and Malapackun be approached nearer than 2 miles, as doubtless other patches exist besides those that have been charted. Beyond the distance of 2 miles from the shore the depths vary from 15 to 25 fathoms, mud bottom, with occasional patches of 5 and 7 fathoms, coral botton.

Nakoda Bay (chart 4346) is formed by Maricaban, Mariquit, and Nakoda Islands, which lie in the bight of the coast between Hummock Point and Albion Head on the reef which fronts the shore as far as the outer extremity of Nakoda. This reef is steep-to and may be avoided by keeping Sirinao Island open northward of Nakoda. Nakoda is described as a high island (probably about 200 feet), but the other two are mangrove islands.

Anchorage for small vessels may be obtained here in 4 fathoms, tolerably sheltered in either monsoon. The best position during the northeast monsoon is under the southeast end of Sirinao and in the opposite season southeast of Nakoda Island, observing that the shore reef extends 1 mile nearly northwestward of Albion Head and that a detached reef lies about ¼ mile off the east side of Nakoda.

The entrance between Nakoda and Sirinao is about 800 yards wide between the reefs encircling these islands, with depths of 8 to 11 fathoms. The eastern entrance between Albion Head and Sirinao is only about 200 yards wide between the reefs and is not recommended.

Triple Cima Island is situated about 1 mile northward of Nakoda Island in the approach to Nakoda Bay. It is somewhat flat, with three peaks, the highest being 162 feet in height. A reef encircles the island to a distance of about 200 yards.

Sirinao Island is about ¾ mile southeastward of Triple Cima, and there are depths of 12 fathoms in the channel between them. Sirinao

Island is about ¾ mile in length, the highest part (280 feet above the sea) being at the northwestern extremity. The southern extremity is a sand tongue, 1 mile distant from the northern part of Albion Head, but the channel between is reduced to about 200 yards in width by the reefs on either side. The island is fronted by a reef which extends nearly ½ mile eastward of it, but much less in other directions.

Reefs.—Nearly ¾ mile northeastward from the highest part of Triple Cima is a 5-fathom patch of coral, with 12 and 15 fathoms, mud bottom, around it. At 1½ to 1¾ miles 72° (70° mag.) from the southeast end of the island are patches of 1 to 3 fathoms, apparently steep-to.

Albion Head, forming the western entrance to Malanut Bay, is a bold, perpendicular limestone cliff, with stalactite caves, is luxuriantly wooded, and has several peaks of nearly equal elevation, the highest being 690 feet.

Malanut Bay (chart 4346) affords shelter in all seasons for moderate-draft vessels, being protected on the west by Albion Head and on the north by Bajallanura Island and its surrounding reef. Bajallanura is low and flat, and reefs extend from it from 1 to 1½ miles in a northwest direction and to about half that distance from the other sides, with outlying patches in places.

Fairway Reef.—A coral reef obstructs the fairway between Sirinao and Bajallanura. According to the original survey it was about ½ mile in length north and south, with a channel on the eastern side of it about 300 yards wide. From its northern extremity Albion Head east tangent bore 176° (174° mag.) and the northern extremity of Bajallanura 81° (79° mag.); from the southern extremity Albion Head was on the same bearing, and Back Cap Peak, seen over the southern extremity of Bajallanura Island, bore 86° (84° mag.).

The existing plan shows the reef to be of less extent, and in two portions, but it is advisable to pass northward of it, as formerly recommended, where the channel is about 300 yards wide.

Tides.—It is high water, full and change, in Malanut Bay, at $10^h\ 15^m$; springs rise 6 feet. The current is scarcely perceptible.

Directions—Anchorage.—The plan should be used with caution. The reef off the west side of Bajallanura Island bares at low-water springs, which is the best time to enter. At high water the edge of the reef is not well defined.

Approaching from westward or northward, steer to pass about 400 yards northward and eastward of Triple Cima Island, and when abreast of it, bearing about 227° (225° mag.), steer 103° (101° mag.) until Albion Head bears 159° (157° mag.); then proceed as directed below:

In making the entrance from northeastward, the northwest point of Triple Cima should not be brought westward of 249° (247° mag.) until the eastern side of Albion Head bears 159° (157° mag.) in order to avoid the previously described reefs outlying the reefs extending northwestward from Bajallanura Island.

With the eastern side of Albion Head bearing 159° (157° mag.), Malanut Mound, about 6 miles inland, will be seen just clear of it; then steer so as to keep the summit of this hill about its own width open to Albion Head until the northern part of Sirinao Island bears

268° (266° mag.), when the edge of the reef surrounding Bajallanura Island will probably be discerned. Close this reef to a distance of 100 yards, passing between it and the coral reef in the fairway, until the eastern side of Albion Head bears 185° (183° mag.), when a 170° (168° mag.) course heading for the town will lead to the anchorage clear of the reefs on either side. The best anchorage is about ½ mile eastward of Albion Head in 4 fathoms, stiff mud bottom, about 2 miles distant from the military post at the head of the bay.

SETTLEMENT.—A military post named Alfonso XIII was established by the Spaniards at the mouth of a small stream at the head of Malanut Bay, but at present there are only one or two native houses on the beach, and the pier is in ruins.

Malanut River discharges in the southeastern part of Malanut Bay, at the western extremity of a sandy beach, about ½ mile eastward of the settlement. Here fresh water may be procured with considerable facility when the river is swollen, but in the dry season it is difficult for boats to proceed any distance up, because of the rocky nature of the bed and because an extensive mud flat bares at low water off the entrance.

Supplies are scarce, high priced, and difficult to obtain.

Malanut Range, situated on the southern side of Malanut Bay, is 1,630 feet in height and extends southeastward two-thirds of the way across the island, where it terminates in the conical mound, Malanut, 1,290 feet in height.

Viewing the range end on in a southeast or northwest direction, it assumes the form of a precipitous cliff, with slips on its south side.

Treacherous Bay, situated about 6½ miles northeastward of Albion Head, is overlooked by two remarkable peaked hills—**Devils Cap** and **Back Cap**. The foot of Devils Cap, 625 feet in height which is the one nearer the shore, breaks through the mangroves and forms a conspicuous yellow-looking cliff on the shore. Three-fourths of a mile to the southwest of it is a stream of fresh water. Back Cap, the higher and inshore peak, is 720 feet in height and has a small table spur at the back.

Palm Island, the outermost and smallest of a group of four islands lying between 3 and 4 miles northward of Treacherous Bay, is 100 feet high and has some dark rocks on a sand bank ¼ mile northeastward of it.

The two islands, **Tidepole** and **Pateian,** immediately inshore of Palm Island are moderately elevated, the higher, Tidepole Island, being 205 feet high, with a rock on its northwest side. Double Island, fronting an indentation in the coast, consists of two low, flat islands, connected by a small neck of sand.

Reefs, partly bare at low water, extend 1,200 yards in a southwesterly and 800 yards in a westerly direction from Double Island. The channel within it and also throughout the bay is encumbered with a reef with 5 and 6 fathoms close to the edge. The passages between Double Island and the islands westward have from 8 to 12 fathoms of water.

CAUTION.—It is recommended not to stand into Treacherous Bay, as the reefs northward as well as northwestward of Bajallanura Island extend a long distance off and the water is usually so muddy that they can not be seen.

The depths vary from 10 to 14 fathoms, mud bottom, in the bay. The points of the coast are fronted by reefs projecting from ¾ to upward of 1 mile, and in the center of the bay there is a 3-fathom patch with 13 fathoms close-to. From this patch Tidepole Island bears 36° (34° mag.) and Back Cap Peak 126° (124° mag.).

The depths off the coast outside of Treacherous Bay are 25 to 30 fathoms, the bottom consisting chiefly of broken coral with a thin stratum of mud in some places. There is a 4¼-fathom patch in the offing, 800 yards in extent, with 20 to 30 fathoms around, with Triple Cima Island bearing 164° (162° mag.), distant 8¾ miles, and Palm Island 120° (118° mag.).

The coast from Double Island to Bahia Honda Point, 3 miles northeastward, is low and thickly wooded, and should not be approached nearer than 2 miles, as the edge of the reef bares ½ mile from the points, with rocky ground in some places 1 mile beyond.

From Bahia Honda Point the coast trends northeastward for about 18 miles to Long Point. Near the latter apparently a third separation takes place in the high central range of hills. The lowland, however, at this part is considerably above the level of that which divides the range southward.

Victoria Peak, a sharp double peak, the third highest on Palawan Island, attaining an elevation of 5,680 feet, occupies a central position in the intermediate range, from which several lower ranges of not less remarkable features extend on either side, forming ravines and gorges thickly wooded. On the south part of the range, End Peak, 4,512 feet high, is the most conspicuous, having a small double top with a shoulder at the back, from which the land falls rather abruptly. The southern face slopes gradually toward the plain behind Back Cap Peak, while a part of the same ridge, on which is Sultan Peak, 3,820 feet high, lies in a southeasterly direction and terminates in a long table spur overlooking Island Bay, on the opposite side of the island.

Valley Cone.—From a range immediately in front of Victoria Peak a spur extends to Steep Point, 4½ miles northeastward of Bahia Honda Point, forming on the north side a valley, at the head of which is Valley Cone, a remarkable conical hill lying beneath three sharp peaks on the ridge above.

The plain in front of Valley Cone is densely wooded, and about 3 miles from Steep Point, lying close to the coast, is Cuckold Hill, 280 feet high.

On the north side of the valley the hills again approach the coast near Bluff Point, 2 miles northeastward of Cockold Hill, and thence extend along the shore to Moorsom Point, a distance of 3 miles.

Gap Range.—Immediately overlooking these hills is **Brow Shoulder,** 3,840 feet above the sea, forming the extremity of a ridge which here takes a sudden trend to the eastward, attains an elevation of about 5,000 feet at its highest part, and has two peaks on it.

The northern face of this range is a steep slope, with deep ravines and some conical hills, at the foot of which **Brow Cone,** 1,180 feet high, over Bluff Point, is conspicuous.

Water.—A copious stream of fresh water flows into the sea immediately northward of Cuckold Hill.

The bay northward of Bahia Honda Point is bold to approach to ½ mile, the depth at that distance from it being 10 to 12 fathoms;

but from Steep Point to Bluff Point the coast is fronted by a reef extending from 600 to 1,000 yards off, the edge of which is bare in some places, and has a black rock on it at nearly 1 mile northward of Steep Point.

In a small bay southward of Bluff Point is a high rock close to the shore.

Peaked Island, 110 feet high, with a rock 23 feet high nearly ¾ mile westward of it, lies off the entrance of the fresh-water stream before mentioned, and about 1 mile from the shore, to which the reefs bare halfway at low-water springs, leaving a channel between the reefs and the shore into the river.

About 1 mile southwesterly from Peaked Island, and the same distance from the shore, there is a 3-foot patch, from which rocky ground extends 1 mile in a southwesterly direction, with 18 to 20 fathoms, mud bottom, close-to; and westward 1¼ miles from the rock 23 feet high off Peaked Island there is a 4½-fathom coral patch with 17 and 23 fathoms of water close-to. To avoid both these shoals keep Back Cap Peak (720 feet) open westward of the lowland about Bahia Honda Point.

Moorsom Point, situated 3¼ miles northeastward of Bluff Point, is rather a prominent headland, moderately elevated, with a small rock above water ½ mile westward of it. A reef awash lies 1½ miles northward of the point and 1 mile from shore, with a depth of 7 fathoms inside it.

Water.—There is a stream of fresh water in a sandy bay on the north side of Moorsom Point, and also at the extremity of the beach nearly 1 mile northeastward.

Long Point, situated 5½ miles northeasterly from Moorsom Point, is densely wooded, moderately elevated, and slopes gradually from the center, terminating in a rocky coast with several sandy bights. A reef extends 400 yards from the northernmost point.

Apurauan Point lies close southward of Long Point. A vessel may obtain a few supplies, such as fowls and vegetables, from the natives, who occupy small farms scattered over a considerable tract of country inland and which are approached by the river.

The river is fresh, but is impracticable as a watering place, owing to a reef which extends ¼ mile from the point and bares across the entrance. A low, wooded range, partially cleared, with some huts upon it, extends along the coast southward of the river.

The natives cultivate rice, corn, sweet potatoes, tobacco, and cotton in small quantities, and manufacture from the fiber of the plantain the colored textile fabrics usually worn by them. Beeswax and tortoise shell form articles of export.

Anchorage.—The best anchorage is in 7 to 8 fathoms, bottom stiff mud and shells, about ½ mile from shore, with Long Point bearing 0° (358° mag.) and Peaked Island 225° (223° mag.). Small vessels may anchor closer in, depending on draft. There is good shelter from northward and eastward, but otherwise exposed. Rocky ground extends 1 mile westward of Apurauan Point. At ¾ mile 261° (259° mag.) from the point there is a depth of only 3 feet, with 4 to 9 fathoms close-to.

Aspect.—Inland from Long Point are two peaks of nearly equal elevation, the northernmost, named Anepahan, being the sharper. They are connected with Long Point by a gradual slope in the range,

on which are some round-topped hills, usually visible when the more elevated land is hidden.

There is a deep valley northward, overlooked by a sharp shoulder 3,606 feet in height, which is the commencement of another central range extending to Ulugan Bay.

The most remarkable peaks of this range are **Mount Stavely**, 3,930 feet high (a needle peak rising from the center of a table top immediately northward of the sharp shoulder), and two dome-shaped mountains rather northward. The southernmost of these, named **Thumb Peak**, 4,260 feet high, is the highest part of the range. The other, **Mount Beaufort**, 3,680 feet in height, has a hollow in the highest part.

From Mount Beaufort the range gradually falls and is again almost separated between Mount Herschel and Mount Peel, a low ridge only connecting the two. **Mount Herschel** is 2,316 feet in height and slopes gradually southwestward.

South and North Rocks are two rocks lying parallel with and 1 mile offshore at 3 and 5 miles northeastward of Long Point.

South Rock is 20 feet high and bold to approach, the depth around it being 18 to 20 fathoms. **North Rock** is nearly covered at high water.

Water.—There are some streams of fresh water in the bay abreast of South Rock, but where the best stream flows the shore is fronted with coral, which extends 400 yards from it, with 3 and 4 fathoms close to the edge.

Breakers have been reported in a position with South Rock bearing 153° (151° mag.) distant 7 miles.

Anepahan, about 10 miles northeasterly of Long Point, is a small settlement with some cleared ground on the spur of a hill that approaches the coast from the high range and terminates in a small, rocky point. The coast, 2 miles on either side of this point, is fronted by coral, which extends about 400 yards off, with 3 to 5 fathoms close to the edge.

Hen and Chickens.—**Bluff Point**, 12 miles northeasterly from Anepahan, is formed by a spur from Mount Herschel and has a bay northward of it. Halfway between this bay and Table Point, 6 miles beyond, is a small group of islets and rocks named Hen and Chickens, lying 1½ miles from the shore, with 19 to 27 fathoms between them and Sprat Point. The outer group consists of three instead of two islands, as charted, the outer one being omitted from the charts. The northwest islet is about 80 feet high. One and one-half miles northward of it is a bare reef or rock, close to which the depth is 25 fathoms.

The depths in the bay vary from 20 to 30 fathoms, mud bottom; but northwest from Sprat Point in the direction of the bare reef is a rocky ledge, nearly 1 mile from the point, on which the least water found was 4½ fathoms.

Water.—On the shore are numerous sandy bays, free from coral, with streams of fresh water in some of them, the supply depending on the season.

Table Point, nearly 3 miles northeast of the Hen and Chickens, is a conical hill with a detached rock close off it. At 2 miles eastward, under a table range at the foot of Mount Peel, is a waterfall.

OFFLYING SHOALS.—**York Breakers**, on which the *Countess of London* is supposed to have been wrecked in November, 1816, in latitude 9° 53′ N., longitude 118° 08′ E., is a coral shoal 800 yards in extent, with 1 foot of water, and except in fine weather generally breaks. It lies 6½ miles within the edge of the bank and is steep-to, having 45 fathoms close to the edge. From York Breakers, Victoria Peak bears 163° (161° mag.) and Mount Peel 79° (77° mag.).

Coral patches.—There is a coral patch of 3½ fathoms lying 223° (221° mag.), 4 miles from the center of York Breakers; and 1½ miles westward of it is another, with 4 fathoms, the latter lying 3½ miles within the edge of the bank, with a bank of coarse sand intervening, on which the least known depth is 11 fathoms.

The depths in the neighborhood of these shoals are from 40 to 50 fathoms, mud bottom.

Middle Shoal, situated 12 miles offshore, is 400 yards in extent, with 3½ fathoms water, and 16 to 20 fathoms close-to. From this shoal Mount Peel bears 86° (84° mag.) and Mount Stavely 151° (149° mag.).

Albay Shoal.—The Spanish gunboat *Albay* (1888) reported the discovery of a shoal having 6 to 9 fathoms of water on it, bottom coral and rock, with Long Point Hill 204° (202° mag.), Aspera or Bluff Point 114° (112° mag.), and Table (Mesa) Point 71° (69° mag.).

Duhme Shoal.—The German ship *Minerva* (1882) reported having sighted heavy breakers in approximately latitude 10° 06′ N., longitude 118° 30′ E., having an extent of about 2 miles, with the appearance of very shoal water.

Gode Shoal, reported in 1860, is charted in latitude 10° 13′ 30″ N., longitude 118° 24′ 30″ E. No further information in regard to this shoal is available.

Mount Airy, a double-topped summit at the front of Mount Peel, overlooks Fish Bay, to the southward of which, between it and Mount Herschel, the ridge is low.

Mount Peel, 3,600 feet in height, has an abrupt fall in the spur extending toward Mount Airy. The northern and western faces have sharp ridges with deep ravines extending to the coast, giving it a bold, rocky appearance; and on the eastern side a second peak, Baheli, precisely similar in appearance, rises to a height of 2,406 feet, from which a slope extends in a southeasterly direction nearly across the island.

Karsoglan, a high, wedge-shaped hill as seen from westward, lying northward of and connected with Mount Peel by a low ridge, is close to the shore between Table Point and Northwest Head, and forms part of the range which overlooks Oyster Inlet in Ulugan Bay.

On the peninsula northward of Karsoglan are hills of less elevation, connected with each other by the low ridges which form the head of the inlets in Ulugan Bay.

Northwest Head, 600 feet in height, the northern extremity of the peninsula which forms the western side of Ulugan Bay, terminates in a bold, precipitous cliff, with a detached rock about 40 feet high at the north foot of it.

Ulugan Bay (chart 4346), within Northwest Head, is 2 miles wide at the entrance between Cordelia Point and Broken Head and 6 miles

in length in a southerly direction. Oyster Inlet, southwestward of Rita Island, affords apparently snug anchorage in 10 to 14 fathoms, mud bottom. The other inlets are apparently all shallow, but the bay has not less than 14 fathoms in the fairway, as far as the reef which fronts its head to the distance of about 1 mile.

The northern part of the eastern shore of the bay is bold, cliffy land, and of reddish-brown aspect. **Sangbauen**, the north peak, 1,816 feet high, has a small table summit, when seen in a northeasterly direction, and two sharp nipples on the brow in front of it. Bentoan, 1,730 feet high, situated immediately southward of Sangbauen, and separated from it by a wooded valley, which forms the back of Watering Bay, is sharp when viewed as above, and has a lower range adjoining it southward, with four distinct peaks. The remainder of the eastern shore is a shelving mangrove coast, fronting a low, wooded range on which Harbor Hill, 960 feet high, with a conical hill 1,120 feet high southeastward of it, are the most conspicuous. This land is separated from the high land of Bentoan by a shallow inlet named Tagnipa, at the head of which is a wooded limestone cliff named Deans Head.

Camungyan Island, 140 feet in height, lies 1¼ miles northward of Northwest Head, on the western side of the approach to Ulugan Bay from northward. At 250 yards 27° (26° mag.) from the summit of Camungyan Island is a rock which generally shows, with another rock, visible only at low water, 100 yards northward of it.

A rocky ledge, consisting of sand and coral, extends 1 mile southward of Camungyan Island, almost across the passage, on which the average depth is 9 to 12 fathoms, with 20 to 25 fathoms on either side; but less water may exist.

Rita Island.—The western shore of Ulugan Bay is undulating highland, with three inlets, and is fronted by Rita Island, 1½ miles in length north and south by about 200 yards in breadth. It has a detached rock at its northern extremity, 45 feet in height, named Observatory Rock, from which rocky ground, with 5 and 7 fathoms of water, extends in a northerly direction about 400 yards. The eastern shore of the island is steep-to, having about 20 fathoms within 200 yards of the coral which fringes it. A reef, dry at low water, extends nearly 200 yards off Tidepole Point, the southern extremity of the island. The edge of the reef is generally well defined by the discoloration of the water.

The channel westward of Rita Island is about 600 yards wide and has 13 to 17 fathoms in the southern portion, but abreast of South Inlet it is encumbered with coral patches having from 4 to 8 fathoms between them. In heavy northerly gales this channel appears to break right across.

Position.—Observatory Rock, at the north end of Rita Island, is in latitude 10° 06′ 11″ N., longitude 118° 46′ 26″ E.

Magsiapo Reef, with only 1¼ to 3 fathoms in places, extends about ½ mile westward and northwestward of **Reef Islet**, which islet lies nearly 400 yards from Marabay Point, on the eastern shore of Ulugan Bay. Depths of 4 to 8 fathoms on a prong of the reef are charted some 1,200 yards northwestward of the islet, and there are patches of 1½ to 2½ fathoms at the same distance southwestward of the islet.

At 1½ miles 206° (205° mag.) from Reef Islet is the center of a rocky patch more than ½ mile in extent, upon which the sea generally breaks at low water. The high nipple, 1,254 feet, on the brow of Sangbauen well open of Broken Head, bearing eastward of 9° (8° mag.), leads westward of Magsiapo Reef, and is a good guide for keeping vessels westward when working out of the bay until they are northward of the entrance to Tagnipa Inlet.

Caiholo and **Baheli** are two small rivers which empty near the southwest corner of Ulugan Bay, and in the rainy season have fresh water near their entrance. Caiholo River breaks through the mangrove between the high ranges of Karsoglan and Caiholo. It is navigable for boats for about ½ mile, where a good stream of water is generally running, but, owing to the extensive reefs which encumber the head of the bay, neither this river nor the Baheli River are good watering places. The Baheli has a small islet at the entrance and is navigable for boats about 1¼ miles.

Tarakaiawan Islet lies between the two rivers. Nearly ½ mile southward of it is a white rock which, though small, generally forms a conspicuous object after entering the bay.

Oyster Inlet, the southernmost inlet on the western shore, is 1¾ miles in length in a west-northwest direction, being separated from the coast outside by a low ridge nearly ¼ mile in breadth. Reefs which project from both points contract the channel at the entrance to ¼ mile in width. They also fringe the shore within to the extent of 200 yards, gradually increasing toward the head of the inlet, where a bank of mud and rocks extends off ½ mile. On this bank good oysters were found. There is a depth of 19 fathoms at the entrance, which depth gradually decreases over a stiff muddy bottom to 9 fathoms close to the reef at the head of the inlet.

At 700 yards eastward of Coral Point, the southern entrance point to Oyster Inlet, there are some detached coral patches, nearly awash at low water.

The two inlets northward of Oyster Inlet are shallow.

Anchorage.—There is anchorage in Ulugan Bay off the south end of Rita Island, at the entrance of Oyster Inlet, in 20 fathoms, bottom stiff mud. No experience was had of this anchorage in the northeast monsoon. During westerly gales the swell sets home to the head of Ulugan Bay, breaking heavily on the reefs, especially on the eastern shore. In the month of November, during one of these which shifted northwest, H. M. S. *Royalist*, riding with a whole cable at this anchorage, was at times pitching forecastle under. Oyster Inlet would appear to afford sheltered anchorage, at any rate, for a steam vessel.

Water.—Good water can be obtained in Watering Bay, 1 mile southward of Mount Sangbauen. It is not, however, practicable to land there at all times, for, except in fine weather, a heavy swell usually sets in on the stony beach. The anchorage is open. Sailing vessels being compelled to water here should not anchor nearer than 1 mile from shore, and they should be prepared to weigh on the slightest indication of a westerly wind, as the swell is liable to come in suddenly. The *Royalist*, while at anchor off this bay in the month of November, was caught in a strong, westerly wind, which brought in a heavy swell, and with difficulty escaped, being obliged to slip her cable.

WINDS.—During the fine season—that is, from April to July or August—fresh southeast winds usually blow over the lowlands at the head of the bay.

TIDES.—It is high water, full and change, in Ulugan Bay at $9^h\ 30^m$; springs rise 4½ feet.

No perceptible stream was observed in the bay, except after heavy rains or when westerly winds have prevailed, when there is a slight outset.

DIRECTIONS.—Vessels bound to Ulugan Bay or any of the harbors of Palawan northward should not, except under favorable circumstances, come within the 100-fathom line of soundings, southward of the parallel of 10° N.

In coming from southward it is recommended to be near the edge of the bank at daylight, with Mount Peel bearing about 102° (101° mag.), when Camungyan Island, at the entrance of Ulugan Bay, will bear 86° (85° mag.), distant about 35 miles. Approaching in this direction, the bay will be readily recognized when a considerable distance off, by some high, rugged land and a remarkable dome-shaped hill named St. Paul, just seen over a lower range forming the north point of the bay. At the back of this will be seen Cleopatra Needle (sharp peak), the southernmost and highest of a range extending 5½ miles in a northeasterly direction. Southward is Mount Peel, already noticed, comparatively an isolated mountain, sloping gradually from the summit to the base.

A patch of 6 fathoms and the charted position of Duhme Breakers should be given a wide berth and a good lookout kept for other dangers which might possibly exist. Approaching from northward the bay is more readily distinguished by an apparent complete separation between Mount Peel and the high land southwestward of Cleopatra Range, the low land at the head of Ulugan Range not being discernible until within a few miles of Piedras Point.

The bay presents no difficulties to a steam vessel. In a sailing vessel, if with a southwesterly or westerly wind, pass southward of Camungyan Island, not borrowing too much on Northwest Head, where the vessel is liable to meet baffing wind under the land. Pass at a convenient distance eastward of Rita Island, observing the clearing mark for Magsiapo Reef, and proceed to the anchorage off or in Oyster Inlet.

St. Paul Bay.—Eastward of Piedras Point, the northeastern point of Ulugan Bay, and separated from it by a low, wooded valley, is **Mount Bloomfield,** a table land of upward of 2,000 feet in height, with several nipples on the summit, and steep water courses down the side, terminating in a bold, barren-looking coast, immediately eastward of which is St. Paul Bay.

Overlooking the bay on the south are some dome-shaped hills and perpendicular cliffs of limestone formation, the most conspicuous of which is **St. Paul Peak,** 3,370 feet in height, from which the bay derives its name. Eastward of this is a range, named by the old navigators the Four Peaks, of which Cleopatra Needle, 5,200 feet in height, is the southernmost and highest.

The northern termination of the range is abrupt, and there is a high, round-topped hill lying almost immediately under and between it and the coast.

Cliff Head, 10 miles northeastward of Piedras Point and forming the northern extremity of St. Paul Bay, is a long, wooded promontory terminating in a steep cliff 350 feet in height. A smaller head, with a rocky islet on its north side, juts out into the bay immediately southward of it, 1 mile southwestward of which is a rock awash, with 5 to 9 fathoms water close-to.

The shore of St. Paul Bay is bold to approach, having 7 fathoms near the points and from 12 to 16 fathoms, bottom fine sand and shells in the center.

Jibboom Bay, the entrance of which lies between Cliff Head and Peaked Point, 4½ miles northward of it, has a group of islands and rock near the center. **Bay Island,** the largest, has a flat summit 307 feet above the sea. Abreast of this group on the south side of the bay is Long Point, with deep, sandy bays on either side and a hill, 2,015 feet high, with a nipple shoulder at the back. The depths in the center of Jibboom Bay are 12 to 15 fathoms and 5 fathoms at its head. The inlet on the southeast side of the upper part of the bay is shallow.

Shelter from northeast winds will be found in 15 fathoms about ¾ mile southeastward of Bay Island Group, with **Zoe,** the easternmost islet, and **Peaked Point,** the northern extremity of the bay, in line. There would be more shelter for a steamer nearer the head of the bay. The channel northward of the group is 1 mile wide, with a depth of about 16 fathoms.

From Peaked Point (which has a detached rock, about 100 feet high, close off it) the coast trends northward for 2½ miles to a steep, bold point named **Amalingat,** at the foot of which lies Ninepin Rock, with a reef awash 100 yards westward of it.

Off the next point eastward are the two islands, Catalat, and Cacbolo, which form the western side of Mayday Bay.

Cacbolo Island lies 1¾ miles from shore and is separated from Catalat by a channel ⅔ mile wide. It has two peaks of nearly equal elevation (about 400 feet), and there is a sandy bay on the eastern side. The north and west faces are bold, steep cliffs, and close off the northeast extremity of the island is a reef awash.

Catalat Island, the larger of the two, 1½ miles in length, has a clump of trees near the summit, and is connected with the main by a ledge on which there are two pyramidal rocks.

Mayday Bay, immediately eastward of Catalat and Cacbolo Islands, affords more convenient anchorage for wooding and watering than any of those described southward on this side of Palawan.

It is 3½ miles wide at the entrance between Cacbolo and Cacnipa Islands, 5½ miles in length, and is formed on the eastern side by a long, irregularly shaped promontory, the continuation of the high range jutting out in a northerly direction from the island.

Cacnipa Island lies off the extremity of the promontory, and is separated from it by a channel 800 yards wide, in which is Passage Reef, with rocks about 6 feet high on it. The island is steep and bold, 1,050 feet high and 1¾ miles in diameter, with two peaks, the southern being higher. Thumb Rock lies off the southwestern point and Peaked Rock 600 yards from the northern shore of the island.

In the southeastern part of Mayday Bay is Conical Head, with deep, sandy bays on either side of it. The bay on the north side has from 14 to 20 fathoms, while that on the south side has from 17 to

20 fathoms at the entrance. Some fresh-water streams discharge through the beach. The depths at the entrance of Mayday Bay are 25 to 27 fathoms, bottom sand and mud, gradually decreasing to 19 fathoms close to Conical Head. The points in the bay appear to be steep-to, and there is no known danger in it but what shows.

Water.—The watering place is at the head of a cove named Watering Bay, in the southwest corner. There is good anchorage in 19 fathoms off the entrance, midway between it and Conical Head, with the eastern sides of Catalet and Cacbolo in line. The stream falls from the rocks on the south side of the cove, where at half tide a boat can go almost under it.

Boayan Island, lying 3 miles northeastward of Cacnipa Island, is an irregular-shaped island 910 feet in height, nearly 5 miles east and west and 3½ miles in breadth in one place, but in some parts less than ½ mile. Its northwestern extremity terminates in a bold head, with a double peak 725 feet in height, and the shore all around, except on the south side, partakes of somewhat similar features.

Shelter from southwest winds will be found on the northeast side of Boayan, in about 14 fathoms, at ¾ mile northward of Broughton Point, the eastern extremity of the island. Two islands lie from 700 to 800 yards off Bluff Point, the southwest extremity of Boayan Island. Saddle Island, the southernmost, 170 feet high, has a reef awash between it and the point, and also some peaked rocks extending 400 yards from its southeastern side. Lump Island, the northernmost, is abrupt and has two islets inshore of it.

Royalist Shoal, composed of coral with 2½ fathoms over it, lies 120° (119° mag.), distant 1 mile from Saddle Island, with the summit of Catalat open of the southeastern side of Cacnipa Island, bearing 227° (226° mag.).

Boayan Reef, awash, lies ½ mile from the southern coast of Boayan and 75° (74° mag.), nearly 3 miles from Saddle Island. There is a depth of 24 fathoms at 400 yards south of this reef.

Albaguen Island, lying 2½ miles southward of Boayan, is 570 feet in height and nearly 1½ miles in length, with a conspicuous red stripe (land slip) on the northwest side, close to which and connected to the island by a small isthmus is a conical head named Isthmus Cone.

Port Barton.—Albaguen Island is the outer and largest of a group of islands stretching in a northwesterly direction from the eastern shore across the mouth of a deep bay, and which, together with the promontory forming the eastern side of Mayday Bay, incloses a spacious sheet of water to which the name of Port Barton has been given. It affords shelter at all seasons of the year.

The entrance to Port Barton is between Riddle and Bubon Points, the latter being approximately in latitude 10° 29′ N., longitude 119° 07′ E.

From the entrance the harbor extends 5½ miles in a southerly direction, and near its head is Endeavor Island, having Wedge Islet lying off its southeastern face, half way to the shore. There is, however, nothing to induce vessels to go beyond Middle Reef, nearly 3 miles within the entrance, the harbor affording no good watering place, although there are several streams in the mangroves bordering the shore, which is apparently rocky in that direction. The depths in the entrance of the harbor are about 25 fathoms, decreasing gradu-

ally to 5 and 6 fathoms close to the edges of the reefs which fringe the shore at the head of it.

Queens Bay.—South, 1¾ miles from Bubon Point, the western entrance point, is Oyster Point, and between is Queens Bay, overlooked by Queens Peak, 1,030 feet in height. Its shore is fringed with coral, extending from 200 to 400 yards off, with deep water close to the edge.

Capsalay, Double, and **Regatta Islands.**—Capsalay, the inner and next island in point of size to Albaguen of the group forming the northeastern side of Port Barton, is connected with Caramatan Point, on the mainland, by a reef almost bare at low water. At 800 yards southward from the eastern extremity of the island are two rocks awash, with 6 fathoms close-to.

At less than 200 yards from the western extremity of Capsalay is Double Island, nearly ½ mile in length, the south side of which is foul to a distance of 200 yards. Northwesterly from Double Island, and separated by a channel 300 yards wide, with 6 feet of water in it, is Regatta Island, about ⅓ mile in length.

Savage, Cone, Dean, Bush, and **Morison,** small islets forming a chain between Albaguen and Capsalay, are out of the usual track and do not require any special description.

Capsalay Reef, a coral patch 200 yards in extent and nearly awash, lies ½ mile southward of the western extremity of Double Island, with Riddle Point in line with the southwest extremity of Regatta Island, and Oyster Point in line with Queens Peak.

Middle Reef, 400 yards in extent and awash at low water, lies 221° (220° mag.), nearly 1¼ miles from Capsalay Reef, and 131° (130° mag.) from Oyster Point. From this reef the bottom appears more or less rocky in an east-southeast direction to the shore.

Anchorage.—If requiring only shelter in Port Barton, and in the southwest monsoon, vessels may anchor in the northern part of the bay in 20 fathoms, bottom stiff mud, with Queens Peak bearing about 227° (226° mag.) and Bubon Point 0° (358° mag.), with Bluff Point, the western extremity of Boayan Island, just shut in. Here a vessel would be landlocked. In northeast winds, vessels wishing to seek close shelter for repairs, etc., will find good anchorage in 12 fathoms, mud bottom, farther eastward, south of Capsalay Island, care being taken in approaching it to avoid Capsalay Reef.

Tides.—It is high water, full and change, at Port Barton at $9^h\ 25^m$. Springs rise 4 feet.

About 2 miles northeastward of Caramatan Point is Betbet Point, with a conical hill near and an islet of the same name north of it, from which a coral spit projects nearly ⅔ mile in a west-northwest direction.

The coral reef extends nearly ⅓ mile in a northeasterly direction from the shore on the north side of Capsalay Island and nearly ⅔ mile in a northerly direction from Caramatan Point on the mainland abreast, with 9 to 13 fathoms close to the edge.

Pagdanan Bay.—At ⅔ mile northeasterly from Betbet Point is Reef Point, between which and Pagdanan Peninsula is Pagdanan Bay, 2½ miles wide at the entrance and about the same in depth. The Pagdanan Range rises to a height of about 2,000 feet at the back of the bay.

Reefs lie off the points of the bay, some to the extent of ½ mile.

Water.—A fresh-water stream discharges at the foot of Green Head, in Pagdanan Bay, and there are also others in the south part, near Squall Point.

DIRECTIONS—ANCHORAGE.—The depths in the western approach to the bay southward of Boayan Island average about 24 fathoms, mud bottom. In the bay there are 10 to 12 fathoms. Vessels not wishing to go into Port Barton will find good shelter from southwest winds, northward of Capsalay Island, and from northeast winds, in Pagdanan Bay. Approaching either anchorage from westward, care must be taken not to bring the southern peak of Saddle Island westward of 315° (314° mag.) till the highest part of Catalat is seen in the center of the passage southward of Cacnipa Island bearing 231° (230° mag.) to avoid Royalist Shoal.

Pagdanan Point, the northern extremity of the bay, is a peninsula head of reddish aspect, 445 feet in height. **Confusion Rock**, white, and about 40 feet high, lies 600 yards northwestward from it. Immediately southward of this point is an extensive landslip and a double island almost connected with the shore at low water.

Niaporay Island and **Rock.**—Niaporay Island, 354 feet in height, lies in the channel between Pagdanan Point and Boayan Island; at ½ mile from the latter and 125° (124° mag.) ½ mile from the nearest point of Niaporay Island is Niaporay Rock, the southernmost of two rocks which lie nearly in the center of the channel. There is a depth of 1½ fathoms over Niaporay Rock at low water, the soundings in the immediate neighborhood varying from 4 to 12 fathoms on either side. From this rock Queens Peak is in line with the southeast extremity of Albaguen Island, bearing 227° (226° mag.).

There is also a 2½-fathom patch lying 69° (68° mag.) ½ mile from the summit of Niaporay Island, with 4 to 5 fathoms of water close-to.

Pagdanan Rock, the northernmost of two rocks in the northern channel, has 2½ fathoms of water on it, with 7 and 10 fathoms close-to, and lies 35° (34° mag.) 1 mile from Niaporay Rock, with Confusion Rock in line with the western extremity of Pagdanan Peninsula and the eastern extremity of Niaporay Island nearly in line with Isthmus Cone joining Albaguen Island.

Imuruan Bay, between Boayan Island and Emergency Point, is about 12 miles wide at the entrance. Its eastern shore is backed by a high range of hills, of which Bay Peak, abreast of Imuruan Island, is the most conspicuous.

From the low neck of Pagdanan Peninsula the shore of the bay for 8½ miles is almost one continuous sand beach, with small, rocky heads here and there, the two southernmost having each a rock above water off them. The coast hence is bold and rocky for 2½ miles, beyond which is a sand beach for 3 miles. Thence to Emergency Point the shore is rocky. The shore throughout the bay is bold to approach, having 3 to 5 fathoms close to the beach. At the entrance the depths vary from 20 to 30 fathoms, mud bottom.

ANCHORAGE.—Shelter from northeast winds will be found in the bay, eastward of Emergency Point, in 7 to 10 fathoms, mud bottom.

A group of rocks above water lies 96° (95° mag.) about 1¼ miles from Emergency Point, and there is a rock awash 400 yards northeastward of the group.

Wedge Island, in the entrance to Imuruan Bay, 4¾ miles southwestward of Emergency Point, is small, wedge-shaped, 180 feet in height, and thickly wooded.

Bay Islands.—Imuruan, the larger of the two, is situated 155° (154° mag.) 4¼ miles from Emergency Point, and is separated from the coast by a channel 1¼ miles wide, with 4 to 7 fathoms of water in it. The island is 500 feet high and 1 mile long, with a reef extending 600 yards from the eastern side. **Lampinigan** is a small island situated about 400 yards westward of Imuruan.

Mount Capoas, situated 2½ miles northeastward of Emergency Point and about 2 miles from the sea, is a table-land 3,350 feet in height, with a high and a low sharp nipple at the western shoulder and a conspicuous landslip extending two-thirds of the way from the summit to the base immediately under it. The table part is a sharp, uneven ridge extending 1 mile in an east and west direction, from which the land falls suddenly on all sides.

The mount rises near the southwestern extremity of an extensive peninsula, which, on the north, forms part of the secure and capacious sound of Malampaya, and on the south Imuruan Bay.

Cape Capoas, situated 7 miles northwestward of Emergency Point, is a bold, projecting headland with two peaks, and is the extreme western point of the peninsula on which Mount Capoas is situated.

Conflagration Hill Island is situated 2 miles southeastward of Cape Capoas, near one of the points of the several bays with which the coast is indented. It is a steep, conical island, connected with the shore at low water with a small head similar in feature but of whitish aspect forming its southern extremity.

Shelter from northeast winds may be found in the first bay eastward of the island, westward of **Low Capoas**, a peak 1,560 feet in height. A rocky cliff in the center of the bay divides the sand beach. From this head a reef awash extends nearly 800 yards in a southwesterly direction, with 4 fathoms close to the edge.

There are three smaller bays between this island and Enterprise Point, southward of Cape Capoas.

Northward of Cape Capoas for 6 miles to Diente Point, the southwestern entrance of Malampaya Sound, the coast is deeply indented, the heads of some of the bays being separated from those corresponding to them on the opposite side of the peninsula in Malampaya Sound by very narrow isthmuses.

Inlulutoc Bay, the largest of these bays, is 1⅔ miles wide at the entrance and 2½ miles in length. It lies nearly midway between Capoas and Diente Points and affords good shelter in the northeast monsoon. On the north side of the bay is **Saddle Hill**, 1,000 feet in height, which, together with **Chinongab Peak** (1,216 feet), 2 miles 74° (73° mag.) from it, form conspicuous objects to identify the locality. There are no dangers known in any of these bays but what are visible. The bights and some of the points are fringed with coral, the edges of which can be discerned by keeping an ordinary lookout. The outer coast is bold, rocky, and precipitous in some places, with deep water close-to. Wreck Head, a bold, rocky cliff, forms the north point of Inlulutoc Bay.

ANCHORAGE AND WATER.—There is good anchorage in Inlulutoc Bay, on the north side, with offshore winds, between Teodore Point

and Anchorage Island (the only reliable bay for vessels to enter), with Saddle Hill bearing 350° (349° mag.), in 15 or 16 fathoms, mud bottom.

In the bay, north of the anchorage and at the foot of Saddle Hill, are two streams of fresh water. The shore, however, is difficult of access, owing to the coral fringing the bay, which off Teodore Point extends out 100 yards.

Cape Ross.—In the bay northward of Wreck Head, between it and Cape Ross, under Saddle Hill, is a conspicuous landslip. Cape Ross is the western extremity of the ridge extending from Diente Hill.

Offlying dangers.—**Crescent Reef**, with 4 fathoms of water, in latitude 10° 40′ N., longitude 118° 42′ E., is a narrow strip of coral, ¾ mile in length in an east-northeast and opposite direction, lying 1½ miles within the edge of the bank and 22 miles from the nearest shore. There are depths of 40 to 44 fathoms within ½ mile from its edge.

From the center of Crescent Reef, Sangbauen, the north peak of Ulugan Bay, bears 168° (167° mag.); summit of Cacnipa Island 115° (114° mag.) and the highest part of Boayan Island 103° (102° mag.).

At 2½ miles southward of Crescent Reef there is a 7-fathom patch with depths of 24 and 50 fathoms close-to, and 69° (68° mag.) 2½ miles from the same is another, 600 yards in extent, having only 4½ fathoms of water on it, with 40 fathoms close-to.

Capoas Cluster.—Near the outer edge of the bank, at 9 to 15 miles northeastward of Crescent Reef, is a cluster of coral patches covered by from 4 to 6 fathoms of water. They are too closely grouped and too far offshore for bearings to be of any advantage to navigate between them.

The Bank.—From the northernmost of the Capoas Cluster, from which Diente Hill bears 86° (85° mag.), distant 20 miles, the 100-fathom curve at the edge of the bank trends northerly to the parallel of 11° 12′ N., where it gradually takes a northeasterly direction and does not approach the north point of Palawan nearer than 23 miles. The bank is steep-to. Here and there it has comparatively shallow ridges (15 to 20 fathoms) of coarse sand and broken coral, on which there are some 7 and 9 fathoms patches lying close to the edge. The northernmost and shoalest of these that has been discovered, and on which the depth is 7 fathoms, lies 1½ miles within the edge of the bank in latitude 11° 29′ N., longitude 11° 01′ E., 26 miles from the nearest part of Palawan. The depths in this vicinity vary from 20 to 40 fathoms. The nature of the bottom near the patches is usually fine sand, but when fairly on the bank, especially off the north part of Palawan, stiff green mud predominates. The bank farther northward does not appear to be as steep as that abreast of the island.

Directions.—Northward of the parallel of 10° N. the depths on the bank are more regular, and the coral patches lying near the edges have generally more water on them than those southward, seldom having less than 7 and 9 fathoms to the parallel of 10° 40′ N., where they have as little as 4 fathoms in some places. Sailing vessels, therefore, bound to Ulugan Bay or wishing to close the land for the purpose of working up inshore should approach the bank about the

parallel 10° 07′, with Mount Peel on about a 103° (102° mag.) bearing. The bank on this parallel extends 30 miles from the coast.

The first soundings obtained on the edge will generally be 18 or 20 fathoms, coarse sand and broken coral, or, perhaps, if a little northward of the bearing given, 9 to 12 fathoms, coral, when the bottom will be visible, after which the depths will be more regular, the 40 and 50 fathoms soundings being chiefly on a stiff muddy bottom, while in less water, sand and mud or sand and broken coral will predominate. If when soundings are first struck in the position stated the vessel can head for Camungyan Island at the entrance of Ulugan Bay the reported position of Duhme Breakers will be avoided.

MALAMPAYA SOUND

(chart 4349) formed on the northeast of Capoas Peninsula is about 19 miles in length in a southeasterly direction, varying in breadth from 2 to 4¼ miles. It is one of the finest harbors that can be desired, being almost free from sunken dangers and containing along its shores, bays, and inlets capable of affording shelter to a large number of vessels of deep draft. The entrance is nearly closed by Tuluran Island, with a channel named Blockade Strait, 1,200 yards wide, southward of it. Endeavor Strait, the channel eastward of the island, is only 200 yards wide in places and is shallow. At about 4 miles within Blockade Strait the sound is contracted by long, projecting headlands from either shore, forming a second strait (containing several islands), which opens into an expanse of water 9 miles in length and 4 miles in width, named the Inner Sound, with depths of 9 fathoms, mud bottom, in the deeper portion. Here are the settlements of Pancol and Guinlo.

Blockade Strait, the channel southward of Tuluran Island, is about 1,200 yards wide in its narrowest part, with depths of 20 to 30 fathoms in the fairway. Within this part the strait is about 1 mile wide for 1¼ miles, with depths of 14 to 20 fathoms, whence it opens into the outer portion of Malampaya Sound, where there are depths of 14 to 15 fathoms. Besides Entrance Rock and White Round Islet there are other small rocks and islets above water in the entrance and on the south side of the narrow part of the strait.

Islands and dangers.—Diente Point, the northwestern extremity of Capoas Peninsula, is the western limit of the principal channel leading to Malampaya Sound. **Notch Islet**, 176 feet in height, lies off its northeastern extremity, and at 300 yards northward of the islet is a reef of rocks awash, with a rock 15 feet high on it.

Tuluran Island, on the eastern side of the entrance of Malampaya Sound, is about 4½ miles in length north and south and 1½ miles in breadth. Two sharp peaks, attaining heights of 1,272 and 1,267 feet, lie near the center of the island, and there are several other peaks of considerable elevation on it. **Tuluran Table**, the southernmost, is 1,033 feet above the sea and not unlike Mount Capoas. The northern and western sides are bold, rocky, and precipitous in some parts, with conspicuous watercourses here and there.

At the northwestern point of the island is **Peaked Islet**, a remarkable peaked islet, with two rocks awash, 200 yards northwestward.

Entrance and Pillar Rocks.—Nearly ⅔ mile north-northeastward from Notch Islet, off Diente Point, is a cluster of small rocks nearly 400 yards in length, with depths of 16 to 20 fathoms close-to. Pillar Rock, 30 feet high, is the westernmost, and Entrance Rock the easternmost.

White Round Islet is small, 80 feet high, and lies 286° (285° mag.) nearly 1¼ miles from Bold Head, the western extremity of Tuluran Island.

Pyramid Rocks are 50 feet high and ¼ mile in extent. The highest rock lies 21° (20° mag.) nearly 2 miles from White Round Islet.

The passage between White Round Islet and Pyramid Rocks is safe, but between the latter and Peaked Islet there is a coral patch with 1 fathom water, 41° (40° mag.), ¼ mile from the highest Pyramid Rock.

Cone Islet is a conical islet 237 feet high, lying in the approach to Bolalo Bay, on the south side of Blockade Strait.

Largon Islet, situated 600 yards 345° (344° mag.) from Cone Islet, is 130 feet high and has rocks above water which extend 800 yards northward. **Largon Rock,** the northernmost, is 13 feet high.

Bolalo Bay, on the south side of Blockade Strait, is a deep inlet affording good shelter from southwest winds. It is 2¼ miles deep in a southerly direction and about ½ mile wide, the head being separated from the north part of Inlulutoc Bay by a narrow isthmus.

Chinongab, a sharp peak 1,216 feet high, with a small table ridge, lies within the eastern shore of Bolalo Bay.

The southern shore of Blockade Strait, within Parmidiaran Point, forms a bay, the southeasternmost point of which has a reef awash extending nearly 200 yards off, and steep-to. White Rock lies about midway between the points of the bay, with 16 fathoms water close outside it.

Endeavor Strait, eastward of Tuluran Island, has its southern entrance between Pilar Rock Point and Endeavor Point and is rather more than ¾ mile wide. The strait runs nearly north and south and is (including the passage inside a chain of islets and needle rocks, with numerous reefs awash, extending nearly 2 miles in a north direction from the northeast point of Tuluran) 6 miles in length and barely 200 yards wide in the narrowest part.

Endeavor Strait should not be used by sailing vessels, as the winds are baffling, especially in the narrows, from the high land on either side.

Coral fringes the shore on both sides of the strait, and nearly in the center of a bay 700 yards northward of Exertion Point, on the west shore, is a rock awash at low water, with 10 to 12 fathoms around.

The depths at the southern entrance of the strait are 19 and 20 fathoms, decreasing gradually to 9 and 10 fathoms toward the narrows, where 4 and 5 fathoms, mud bottom, are found.

There is a snug cove at the head of an inlet, ½ mile deep, close northward of Endeavor Point.

Between Blockade Strait and the second, or inner, entrance the western shore of Malampaya Sound has three deep bays, in each of which the ground is quite clear, and shelter may be found from all winds, but the two southern bays have no watering places. The shore on the opposite side, except in fine weather, has a little swell

breaking on it, setting directly in through Blockade Strait, and in the bay under the highland in the northeast corner are some islands and white rocks.

Pirate Bay, the northernmost of the three bays just mentioned, will be found the most convenient for vessels merely requiring shelter, wood, or water. It is about ¾ mile in extent, and its shores are clear all around at 100 yards off. The depths are about 14 fathoms in the middle, bottom stiff mud, and 7 to 9 fathoms close to the head of the bay.

WATER.—The watering place, affording a good supply, is at the southwest head of the bay.

Tenabian Island, forming the south side of Pirate Bay, is triangular in shape, about ⅔ mile in length, and 325 feet high. The passage westward of this island is 400 yards wide, but is reduced to half that width by the reef which extends from the island. **Bay Rock**, above water, lies 300 yards off the south side of the island.

Malapina Island, 156 feet high, lies 1 mile eastward of Tenabian, near the fairway.

Boat Rock lies just in the entrance of Northeast Bay, 1¼ miles eastward of Malapina Island. The ground is somewhat foul for 300 yards southwestward of this rock.

Northeast Bay Island, Crane, Janet, and other islands lie in Northeast Bay.

Inner Strait, Tacbolo Island.—In the inner strait, which is 3½ miles long in a southeasterly direction and about 2½ miles wide, are several islands, the northwesternmost of which is Tacbolo, 300 feet in height and nearly 1 mile in length. Southwestward of it and off Passage Island is the principal passage leading into the inner sound.

Calabuctung Islets.—Between the north point of Tacbolo and the headland on the east side of the strait is the large Calabuctung Islet, and at ⅓ mile westward of it is the smaller islet of the same name.

Passage, Eniaran, and **Durangan Islands.**—Passage Island, the largest in the strait, is 1 mile in extent and is separated from the southeast point of Tacbolo by a channel 200 yards wide, with 5 fathoms water, and from Tuluan Hill, the middle point on the eastern shore, by a boat channel 150 yards wide. Eniaran Islet, with a flat rock on its western side, lies close off the western point of Passage Island, and off the western point of a bay on the south side of the latter island is Balolo Rock. Rocks extend ¼ mile westward of Balolo Rock, terminating in Cansea Rock, awash at low water and steep-to.

Durangan Island is oval, 386 feet high, and ½ mile in length, with two small, black rocks at the eastern extremity, and occupies the center of the channel between the southwest side of Passage Island and Balulu Point on the western shore.

The channel between Passage Island and Durangan is 600 yards wide. Cansea Rock is the only danger known that is not visible.

Southward of Durangan Island the channel is about the same width and has depths of 9 to 12 fathoms, mud bottom. Nearly in the center is **Calonhogon**, the westernmost of two small islands 800 yards apart. **Bartoc**, the easternmost, has a reef extending 100 yards from both extremities.

Malaoton and Ibelbel Islands.—Nearly 1 mile southeastward of Durangan Island is **Malaoton Island**, nearly ½ mile in length, with

an average breadth of about 200 yards. A white pillar rock lies nearly 200 yards off its southwest point.

Ibelbel Island, about 400 yards in diameter, lies southeastward of Passage Island, with a clear passage between them.

Vinalo Island, eastward of Ibelbel Island and near Balauan Point on the eastern shore, is about 300 yards in length.

Mallarois Island, less than 200 yards in extent, is 93 feet in height and has a precipitous cliff on the south side, with some rocks detached from the east end. It lies southward from Vinalo. The channel between them is 400 yards wide and is said to be safe.

Damao Island, the southern limit of the inner strait, is 226 feet high, nearly ¾ mile in length (including a partly detached islet), and lies 600 yards from the southern shore. Peaked Islet, 83 feet high, lies off its northern extremity. In the channel separating Damao Island from the shore are islets and rocks awash.

Alligator Bay is the northernmost of two large bays on the southern side of the inner strait, and, next to Pirate Bay, is the most convenient place in the sound for watering.

Palcocotan Island lies near the northern entrance. Alligator Island lies toward the head of the bay, south of the watering place, and southeastward of it is a double cone island. The depths at the entrance of the bay are 10 to 12 fathoms, mud bottom, decreasing gradually to 3 and 4 fathoms near the shore.

WATER.—In the southeast corner of the bay the main stream from Mount Capoas discharges through some low ground, but the watering place is on the north shore of the bay, in the first small indentation southwestward of Green Head.

Malipu Bay is separated from Alligator Bay by the chain of hills of which Balulu Point is the northern extremity, and has its eastern limit at Damao Island. Hunch Hill, 454 feet high, lies on the southeastern side of the bay, and near the western shore is Chinicaran Island, with an isthmus head on the north face. The passage between the island and the shore is shallow.

The depth in Malipu Bay range from 6 to 8 fathoms, decreasing gradually to 2 fathoms toward the shores of the bay.

Inner Sound; Pancol.—The inner sound of Malampaya opens immediately southeastward of Damao and Mallarois Islands, and in a bay on the northern side is the village of Pancol. It is reported that the present location of this village is about ¾ mile eastward of that shown on some charts.

Vessels can anchor as close in to the village as the draft will allow, this anchorage being safe at all seasons.

The average depth in the center of the inner sound is 6½ fathoms, mud bottom, from which it shoals gradually on all sides, except toward the entrance, where it deepens.

Malampaya River discharges into a shallow bay on the eastern side of the sound, about 3 miles from Pancol. A high, round island, named Malutone, with an island on either side, lies across the entrance of this bay, leaving a channel into it of little more than 400 yards width, with 1¾ fathoms of water. At low water the mud at the entrance of the river bares to nearly abreast of the two islets on the south side of the bay.

The river, which is navigable for boats about 2 miles, trends in a southeasterly direction. Near its head is a good footpath, leading

to the village of Taytay on the east coast, a distance of 2 to 3 miles only.

Guinlo, a village similar to Pancol, lies on the eastern shore near the head of the sound, about 5 miles from Pancol. It can not, however, be approached within 1 mile by a vessel of over 12 feet draft, as the water shoals gradually from 3 fathoms at 4 miles southward of Pancol toward the head, where at low water the mud bares nearly to Bay Islet, or 1 mile from the mangroves.

Immediately southward of Guinlo the hills at the head of the sound on either side recede and are separated by a large plain, which extends through the island almost to the opposite coast. Some of the water of this plain is discharged into Malampaya Sound by a river having its outlet through the mangroves close to Bush Head, nearly 3 miles south of Guinlo.

The western shore of the bay southward of Damao Island is indented by bays, all of which are shallow.

Doubtful danger.—In an old manuscript chart which was seen at Taytay there is a rock named Coloma laid down nearly in the center of the bay. It was searched for unsuccessfully, and the people of Pancol and Guinlo denied having any knowledge of its existence. The Spanish chart shows this rock in a position 3⅔ miles 109° (108° mag.) from the north end of Damao Island. The northern extremities of Malaoton and Durangan Islands in line will keep a vessel northward of this position.

Tides.—It is high water, full and change, at Pancol, at 9^h 40^m. Springs rise 5 feet.

Directions.—There is no difficulty in a steam vessel proceeding to the head of Malampaya Sound. In making the entrance from westward, Notch Islet, off Diente Point, shows conspicuously. White Round Islet will be seen, and on closer approach Entrance and Largon Rocks become visible. The best course is between these rocks and White Round Islet, the depths in the neighborhood of which average about 30 fathoms. In a sailing vessel with a southerly wind, Largon Rocks should be kept aboard to fetch through Blockade Strait and to prevent being set over upon the northern shore by shifts of wind from the high land about Chinongab. Having passed Parmidiaran Point, proceed northward of White Rock in the next bay. The reef awash off the point under Lookout Hill having 13 fathoms close-to may be passed at a convenient distance, then steer for the anchorage in Pirate Bay, unless intending to proceed farther in.

A sailing vessel entering the strait with a northeast wind should pass on either side of White Round Islet and conform to the same directions, only keeping on the Tuluran side, but not too close, or the vessel may get becalmed under the high land.

The passage through the second strait into the inner sound is westward of Tacbolo and Passage Islands, keeping toward Durangan Island to avoid Cansea Rock, which does not always show.

At 5 miles northward of Tuluran Island is Custodio Point, the extremity of a promontory which forms the western shore of Bacuit (Bakit) Bay. At Pagauanen Point, just southward of it, is a wedge-shaped hill 466 feet in height. The coast between these points and Tuluran is of bold, rocky aspect, with several landslips appearing as vertical, reddish-looking stripes down the face. The southern part is indented by two bays adjoining each other, the southernmost of

which, **Port Cataaba,** ½ mile wide at the entrance, extends 2½ miles in a southeast direction and is shallow, but affords good anchorage for small vessels in 6 to 7 fathoms. Rocks front Signal Head, the western entrance point, to a distance of 300 yards. The northernmost bay is about 1 mile in length in a northeast direction, with 4 fathoms near its head and rocks projecting 400 yards from the south shore.

WATER.—At 1 mile northward of the bay in Calver Cove a good supply of fresh water may be found.

Saddle and **Camago Islands** front the above bays and are the northernmost of the chain of islets and rocks in the northern entrance of Endeavor Strait. Saddle Island, the outermost, is in appearance what the name implies. A reef with one rock bare lies 81° (80° mag.) 300 yards from the north end, and rocks lie off its west face. Almost adjoining southward is Camago, a precipitous, rocky island with several rocks awash and shoal water extending ⅓ mile southward toward Needle Rocks and Anato Island.

Tolerable shelter from southwest winds will be found eastward of Camago and Saddle Islands in 16 to 17 fathoms, stiff mud bottom, care being taken to avoid the reef northeastward of the latter.

Tent Islet, surrounded by rocks awash, with a reef 600 yards northward of it, lies 1¼ miles from the coast at the same distance northward of Saddle Island, with 15 to 23 fathoms between.

It is recommended not to pass inside of Tent Islet as the ground is evidently foul and broken water has been reported.

Rugged limestone group.—From Custodio Point a remarkable group of rugged islands of limestone formation extends 8 miles in a north-northwest direction. The sides of these islands present bare, perpendicular cliffs of every variety of tint, with numerous stalactitic caves in which edible birds' nests are sought. The summits terminate in small clusters of needle peaks, and wherever it is possible for vegetation to take root they are luxuriantly clothed with foilage, of which the pandanus predominates. These, contrasting strongly with the dark-colored rock and white sandy bays in some of the secluded nooks, impart to the group scenery of a peculiarly picturesque nature. The bases of all the islands are worn by the action of the sea water, undermining in some parts the perpendicular upward of 15 and 20 feet, thus rendering it almost impossible, except here and there where a slip or disruption occurs, to land on any part of them.

All the islands are safe to approach, having generally upward of 20 to 30 fathoms close to the cliffs. In their vicinity the depths vary from 20 to 30 and 40 fathoms, stiff mud bottom.

Guntao Islands.—North and South Guntao Islands, the southwesternmost of the group, situated about 4 miles westward of Custodio Point, are 400 yards apart, and the passage between is blocked by coral. **North Guntao** is of reddish-brown aspect, 1 mile in length and 300 yards wide, with a conical summit. Rocks above water extend 200 yards from the northwest point, and off the southern point of the island there are some high rocks.

South Guntao, the broader and higher of the two, has a sloping summit, the south point of the island terminating in a narrow, rocky cliff.

Destacado Rocks, showing like two boats, lie 252° (251° mag.), 1½ miles from the opening between the Guntao Islands, and on this

bearing Bold Point, the south point of Matinloc Island, appears in the passage. The depths near these rocks are 18 to 20 fathoms.

Guintungauan Island, situated rather more than 1 mile westward of Custodio Point, is narrow, appearing like a square block when seen in a north and south direction.

Jip Rocks, lying ½ mile northeastward of Guintungauan Island, are of limestone, 95 feet high, and cleft in two.

Tapiutan, the outer island of the Rugged Group, is 7 miles from the shore. It is over 2½ miles in length, north and south, the highest part, which is round-topped, being 1,415 feet in height A low neck separates this from another round hill to the northward, 670 feet high, the northwestern extremity of which terminates in an isthmus head, with a precipitous fall to seaward. The shore of the island is bold all around.

Matinloc Island, eastward of Tapiutan, and separated from it by a channel 400 yards wide with 20 fathoms of water, is an island formed by a very narrow ridge of limestone. This island is about 4½ miles in length, in a north and south direction, and almost separated in three places by deep gaps. The **Horn**, 1,250 feet in height, rises nearly in the center of the island, and when viewed in a northerly or southerly direction assumes the appearance of its name, forming a conspicuous and readily recognizable feature on making the coast. There is a sandy bay immediately under the Horn on the east side of the island.

Inambuyod Island, lying on the northeast side of and parallel to Matinloc, is separated from it by a deep channel 1 mile wide. This island is similar in feature to Matinloc, but smaller. Two islets, **Cliff** and **Crown**, lie, respectively, 300 and 1,800 yards from its northern extremity, with 17 to 20 fathoms between them. There is also a remarkable rock lying ¼ mile off its southeastern face, named the **Mushroom**, from its shape.

Tambalanan is a small islet shown about 1 mile northward of the north end of Inambuyod Island, and may be identical with Crown Islet.

Miniloc Island lies eastward of the southern end of Matinloc, the channel between them having a width of 1¼ miles and a depth of upward of 25 fathoms. Miniloc is a remarkably high, rugged island, 3½ miles in circumference, with several precipitous crags, the coast nearly all around being broken up into cliffy heads and on the south side picturesque bays. On the northwest face are two high, rocky islets.

Paglugaban, Entalula, and Pangulasian Islands.—On the southern side of Miniloc Island, nearly connected with it by a smaller island which occupies the passage, is Paglugaban, also of limestone formation and precipitous. Between the latter island and Custodio Point are two islands—Entalula, similar in character to the above, and Pangulasian, of entirely different feature.

Pangulasian Island has a double peak, and slopes gradually toward the southeast point, where there is a sandy tongue from which a reef projects in a southwesterly direction, contracting the channel between the island and the Custodio shore, off which latter is **Flat Rock**, to 600 yards in width, with depths of 14 to 16 fathoms.

On the eastern face, 600 yards from Pangulasian Island, is Popolcan, a limestone islet 310 feet in height.

Bacuit Bay, formed partly on the west by the islands just described, is 9 miles in length and 3½ miles wide between the mainland and Miniloc Island and a limestone peninsula southward, the highest part of which, Coast Hill, attains an elevation of 1,000 feet. The eastern shore trends nearly north and south and is overlooked by a high range. This range, on which there are some curiously shaped peaks, traverses the island, commencing on the west side of Palawan at Cauayan Island, embracing both shores of Bacuit Bay and terminating on the east coast at Negra Point and the islands fronting Taytay Bay.

Bacuit Bay has general depths of 17 to 20 fathoms, mud bottom, to abreast of Lagen Island, 2 miles from its head, from whence it shoals gradually to about 2 fathoms close to the shore reef.

It affords shelter from southerly winds, and under Lagen there is probably shelter from northerly winds, but that portion has not been closely sounded.

There are several islands in the bay, all of which are similar in feature and character to the group outside. Its shores are generally fringed with coral, extending from 200 to 800 yards. With one exception there appear to be no dangers in the bay but what are visible.

Inabuyatan Island, the northernmost island on the eastern shore of the bay, is a conspicuous object on entering, being 1,130 feet in height and somewhat resembling an elephant on his haunches. It lies off a bay almost blocked up by reefs.

Malpacao Island, a remarkable ridge of limestone, with a high bowlder detached from it, assuming the form of a double island, lies nearly 1 mile southeastward of Inabuyatan.

Lagen Island, the southernmost and largest of the three islands on the eastern side, is 1,140 feet in height, of irregular form, 1¾ miles in length, and present a bold, cliffy shore, in places upward of 400 feet in height, with several sandy bays.

Midway between the southern extremity of Lagen Island and Long Point, at the head of the bay, is a coral patch nearly awash, lying ¾ mile from the shore. There is another midway between it and the shore northeastward.

Comocutuan and **Dibuluan Islands** lie on the western side of the bay. The former is a small, precipitous island, 298 feet in height, and between it and the shore abreast, distant upward of 1 mile, a spit projects 600 yards from an islet with a white rock close-to. **Dibuluan Island** lies southwestward of Lagen. About midway between are three rocky islets, the easternmost of which shows like a ninepin on entering the bay. The other two are almost connected by reefs.

Manlalec is a small settlement situated a short distance up a rivulet in the bay abreast of Malpacao Island on the eastern shore.

Tides.—It is high water, full and change, in Bacuit Bay at 10^h. Springs rise about 6 feet. Little or no current has been observed in the bay.

Directions.—The best known channel for vessels proceeding to Bacuit Bay, if coming from southward, is between Entalula and Paglugaban Islands. It is 1,200 yards wide and has a depth of 25 fathoms in the fairway.

The best anchorage in the southwest monsoon for a sailing vessel is in 17 or 18 fathoms, stiff mud bottom, about 1 mile southeastward of

Comocutuan Island, off the first limestone head westward, but as neither fresh water nor supplies are to be had readily, there is little inducement, except it be shoaler water, for vessels to go farther up; and should the wind, blowing strong, veer westward, they would probably experience some difficulty in getting out of the bay against the heavy swell which invariably accompanies it.

Cadlao Island, about 2,000 feet in height, lies about 6 miles northward of Custodio Point, the western extremity of Bacuit Bay, and is separated from the coast by a channel barely 600 yards wide, in which there are 17 to 19 fathoms close to the points.

Cadlao is 3¾ miles in length in a north-northwest and opposite direction, with an average breadth of about ½ mile. Its features are remarkable, and it forms the most conspicuous object when making the northern end of Palawan from westward.

The table-land rises in the center of the island, eastward of which, and separated from it by a deep gorge, are two peaks of nearly equal elevation named the **East** and **West Loggerheads.** Some of the coast cliffs overhang to a considerable extent.

There is a bay on the north side of the island close under the table top, with an island in it named Mitre, and on the southwest face 800 yards from the shore is Imbalaba Island, the channel between having 11 fathoms of water.

The chart shows a 2¾-fathom patch nearly 1 mile southward of Cadlao Island, and also a patch of the same depth 1½ miles easterly from Miniloc Island.

Anchorage.—Shelter in northeast winds may be found eastward of Imbalaba Island, south of the table top, in 16 to 20 fathoms, stiff blue-mud bottom. Good shelter from southwest winds is to be had on the north side of Cadlao, off Mitre Islet, in 17 fathoms, stiff mud bottom; or, if desirable, in from 9 to 12 fathoms either abreast of Abrupt Head, the northeasternmost point of Cadlao, or at Santiago Islet, 1 mile farther southward and close off the east face of that island.

Cauayan and **Cavern Islands.**—North of Cadlao and separated from it by a channel about ½ mile wide, in which is a peaked islet, is Cauayan Island, 827 feet in height and 1¼ miles in length. It is of similar formation to the neighboring islands, but has a more even summit.

On the northwest face of Cauayan Island, and distant ¼ mile from it, is Cavern Island, the outer one of the group. It is 350 feet high, and when viewed in an east or west direction has a tall pillar rock rent from the north end. A reef awash extends 200 yards from the south point, and there is also a detached rock about 30 feet in height off the east side.

Tides.—It is high water, full and change, at Cavern Island at 9^h 30^m. Springs rise (one observation only) 5½ feet.

Bacuit (chart 4346).—Cadlao and the islands just described form the western side of a deep bay, at the head of which is the village of Bacuit. This bay is about ½ mile in extent, but the depths are less than 3 fathoms nearly out to the western headland. Within the 3-fathom curve are several reefs nearly awash. Craft of about 7 feet draft will probably be able to reach the head of the bay, where there is shelter from southerly winds off the town in about 2 fathoms.

SUPPLIES.—Goats, pigs, fowls, and vegetables are obtainable in small quantities and water from a stream at the eastern end of the beach but not with any degree of facility.

From Bacuit the coast trends in a northerly direction for 8 miles to Crawford Point. A central range, the continuation of that over Bacuit Bay, overlooks both coasts of Palawan, and in the parallel of Cadlao Island, where it attains its greatest elevation, is a high table top, the northwestern and southeastern shoulders of which are 1¼ miles apart and are, respectively, 2,055 and 2,230 feet in height. There is a sharp peak, 1,630 feet in height, southward, and several hills of less elevation bordering the coast, the features of which are entirely different from those of the limestone formation, and this nowhere is so evident as at the back of Bacuit village, where a sudden transition occurs.

East Peak, attaining a height of 1,890 feet, lies 4½ miles northeastward of the high table top, but is not generally visible from the west side until some distance offshore. It, however, forms a conspicuous object when northward and eastward of Palawan.

Emmit Island, small and wooded, 170 feet high, with two pillar rocks at the north extremity, lies 400 yards from a point midway between Bacuit and Crawford Point.

The coast northward, on which there is a sugar-loaf hill, is bold to approach, having 6 fathoms close to the shore, but that southward is fronted with coral.

Two rocky islets lie close northward of Crawford Point from which a sandy beach extends 1½ miles in a northerly direction to a headland, 1 mile eastward of which is Pasco Inlet, with depths of 2 and 3 fathoms.

Gemelos Islets.—Nearly 1 mile northward of Crawford Point are the Gemelos or Twins, two rock islets. They both lie on the same reef, which surrounds them to a distance of ¼ mile.

Lalutaya Island lies 3 miles northward of Crawford Point and is separated from the shore by a channel 1¼ miles wide with depths of 9 fathoms, sand bottom. The island is 1¼ miles in length, and 407 feet high, and, except on the eastern side, where fronting two small sand bays, some coral extends 400 yards, is bold to approach.

Diapila Island is on the north side of Base Bay, which lies close northward of Pasco Inlet. It is 1 mile from the shore, with a safe channel between.

Calitan Island, 256 feet high, lies 2 miles northward of Diapila and ½ mile westward of the northern extremity of Palawan. There is a sharp double rock between it and the shore.

On the south side of an indentation on the coast between these islands is North Hill, 965 feet high.

SULU SEA.

The space included between the Sulu Archipelago to the south and Mindoro to the north and having Panay, Negros, and Mindanao on the east and Palawan on the west is known by the name of the Sulu Sea. Although of great depth, over 2,000 fathoms in places, this sea, which is connected with the China and Celebes Seas and also with the Pacific by San Bernardino and Surigao Straits, has

a minimum deep-sea temperature of 50.5° F., reached invariably at 400 fathoms. As this temperature in the China Sea is at the depth of 200 fathoms, in the Celebes Sea at 180 fathoms, and in the Pacific at 230 fathoms, it may be inferred that the Sulu Sea is prevented from freely interchanging its waters with those seas by ridges which do not exceed those depths.

WINDS.—In the Sulu Sea easterly winds with fine weather prevail in October and the northeast monsoon is not established before November. In January and February it blows hardest, but not with the force of the China Sea, and it is felt strongest before the openings between Panay and Negros, and Negros and Mindanao. At the end of May southwest winds begin to blow, and in a month become established, to terminate in October, bringing with them a season made up of rain squalls and tempests, which take place principally in July and August. In September a heavy mist hangs about the coast of Mindanao.

Typhoons occasionally pass across the northern part of the Sulu Sea, but are usually of small diameter. The Philippine Weather Bureau has an observer at Cuyo, who is notified of typhoons approaching these waters. Ships with radio stations may get in communication with him through the radio station at Cuyo.

During July and August, squalls and southwest winds of the outer zones of typhoons affect this area. During these months there are frequently periods of fine, clear weather with southerly and southeasterly breezes. The bad spells are frequently preceded by fine weather with shifts of wind to the north and northwest, with a gradual drop of the barometer. Northwest winds have generally been followed within a few days by bad weather. This does not apply to Mindoro Straits, where northwest winds are frequent. During September and October, considerable fine weather prevails. The northeast monsoon makes itself manifest during November and gradually increases in strength. It lasts until about the end of April. Its force has not been seen to exceed that of fresh breezes. During May and June, the winds are irregular, fine, clear weather prevailing. The foregoing applies particularly to the offshore area. Near Panay, the Calamianes, and Palawan, during what is termed the southwest monsoon, considerable rain falls.

In the Sulu Sea the east or northeast monsoon is not a fresh, steady breeze but is often variable. Near Mindanao the northerly winds never blow fresh, and light changeable winds frequently displace them for several days. This often occurs at the end of January, and it is considered that the same winds prevail from the Sulu Archipelago to Manila.

CURRENTS.—During the northeast monsoon the surface drift is with the wind, about ¾ mile per hour. In the southern part of the sea there is generally a northwest or westerly current in the neaps between Jolo and Basilan and in the tracks thence to Balabac Strait. In March and April the current sets mostly eastward among the Sulu Islands, but it sets westward at the same time in the openings of the Philippine Islands to the north of Mindanao. Along the Panay coast there is a constant northerly current which varies but little in strength with the change of tide. In the vicinity of Seco Island and Batbatan, this current changes its direction to westward

and then southwestward through the Cuyo Islands, thus forming a great eddy. Observations of currents during the southwest monsoon are too scanty to afford reliable information. In general, however, the current is much weaker and changes with the ebb and flow of the tides.

TIDAL CURRENTS.—Two tidal streams enter the Sulu Sea and passages between the Philippines from opposite directions—one from the China Sea through the western opening, the other from the Pacific through the eastern straits, San Bernardino, Surigao, and Basilan. These streams meet in the many channels between the southern islands.

The stream from the China Sea enters that sea from the Pacific by the wide opening between Formosa and Luzon, and passes from north to south along the western shores of Luzon and Palawn and through the Verde Island Passage, Mindoro Strait, Linapacan, and Balabac Straits.

The Verde Island stream after passing south along the coast of Luzon, and, deflecting some of its waters into Manila Bay, continues along the coast as far as Puñas Point, where it branches. One stream runs northeast around Tayabas Bay and north and east of Marinduque through Mompog Pass, reunites with the other branch which passes southeast along the Mindoro coast as far as Dumali Point, and then eastward, south of Marinduque as far as the Bondoc Peninsula, where it meets the flood stream from the Pacific, which has passed through San Bernardino Strait. The northern part of the Verde Island stream, which follows round Balayan and Batangas Bays, reunites with the principal current near Verde Island, producing violent tide rips and eddies in that part of the channel between Malabrigo and Escarceo Points.

The flood that enters Mindoro Straits follows the coast of Mindoro, setting southeast as far as Nasog Point, Panay, part of it continuing round the coast of Mindoro northward of Dumali Point, where it meets the stream through Verde Island Passage. The rest of the stream divides at the northwest point of Panay Island. One branch flows along the north coast of Panay past Bulacaue Point and the Gigantes Islands to Bulalaqui Point, the north point of Cebu, where it turns southward and meets the stream from the Pacific through Surigao Strait, about 6 miles south of the Camotes Islands; it also flows through Iloilo and Tañon Straits, in both of them meeting the flow which has entered from southward on the parallels of the north end of Negros and of Tajao Point, Cebu, respectively.

The other branch turning to the south from the northwest point of Panay, and being joined midway by the stream setting eastward from the Cuyo Islands or Linapacan Strait, continues coasting Panay and Guimaras Island into Iloilo Strait until it meets the other branch described above.

Between the Calamianes and the north end of Palawan the flood stream sets southeast and the ebb northwest.

The flood stream entering by Balabac Strait turning north-northeast along the coast of Palawan spreads itself like a fan over the Sulu and Mindoro Seas from northeast to east, forming the current from west to east felt between the Cuyo Islands and Panay, and also that which sets to the south of the Cagayanes, where it is said

to meet the stream from Surigao Point approximately in the meridian of the Cagayanes.

In the Sibutu Passage the flood stream sets northward and westward; and also in the Sulu Archipelago the flood stream sets generally in the same direction, but takes many local directions among the islands, where it also appears to be influenced by the monsoon currents.

Through Basilan Strait the flood stream makes westward and passes up the west coast of Mindanao northward until it meets the flood stream from Surigao Strait about midway on the coast.

The time of high water of the wave that enters from the China Sea seems to be from 10 to 12 hours and that which comes from the Pacific through the eastern and northern straits from 6 to 7 hours.

CAGAYAN ISLANDS.

The Cagayan Islands are situated on the southern part of an extensive reef, very steep-to, the depth of water at 200 yards distance being over 100 fathoms. The islands consist mostly of low, even hills, the highest point, 205 feet near the western shore of Cagayan, being only 10 or 15 feet higher than the surrounding area. They are all wooded with low trees and brush; cultivation is carried on in the open spaces where the rocky nature of the surface gives way to a few inches of soil, maize being the principal crop, but nothing is being raised for export.

Cagayan Island, the largest of the group, is long and narrow with a smooth ridge extending nearly its entire length. The western shore is a rocky bluff from 150 to 200 feet high with a short stretch of sand beach near the middle of the island, where the bluff recedes about 100 yards to the eastward. At the southern end of this beach is the only place on the west shore where an ascent to the top of the ridge is feasible. The bulff is undercut to a depth of about 4 feet at the water line, and a similar scar is noticed 40 or 50 feet higher up the face of the rocks, indicating a sudden uplifting of the island at some past period; a coral reef, bare in spots, extends the entire length of the island. The slope on the eastern side of the island is more gradual, and the shore is very irregular with a number of small islands and rocks on the reefs close inshore. **Cagayancillo** has a population of about 3,000. It has a church and school, and the ruins of an old fort are located on the bluff eastward of the town.

Calalong Island is composed of a group of low, rounded hills with a steep, rocky bluff on the southern shore. It is separated from Cagayan Island by a narrow channel that dries at low water. The best anchorage, only partly protected by the barrier reef, is southward of this island. The best approach is from the eastward, and the following ranges were used by the surveying party: Bring the south tangent of Calalong Island on the north tangent of the islet just east of Cabuaya Island (which appears to be a part of Cabuaya from that direction) on a course 276° (275° mag.). Almost immediately after the bottom becomes visible, or when the southwest point of Dondonay Island is abeam, the south tangent of Cabuaya Island will be in range with a peculiar round tuft on the skyline of Cagayan Island bearing 272½° (271° mag.), hold this range until a group of prominent white-barked trees on the southeast side of

Calalong Island are abeam, head for the south point of Cagayan and anchor 50 yards farther on in 5 to 6 fathoms, sand bottom. A vessel drawing not over 12 feet can enter or leave this anchorage at any stage of the tide; the ranges are easy to pick up, and the whiteness of the bottom exaggerates the dangers. It is, however, exposed to the southeast, and southeast storms set home with great force; especial care should be taken not to be caught there by a southeast storm at night, when it would be almost impossible to get to sea or to move farther westward for more protection. The approach to this anchorage from southward was seldom used on account of frequent rain squalls obscuring the ranges.

Dondonay Island is long and narrow with a low ridge running its entire length; nearly the entire shore line is bluff and rocky with only a few small stretches of beach. The island is covered with brush and scrub trees with only a few small cleared places. A coral reef runs along the entire eastern shore. The channel between Dondonay and Calalong is possible for a vessel drawing 12 feet, but the area inside is so filled with coral heads that it is of no practical use.

Tanusa and **Volata Islands** are separated from the north end of Cagayan Island and each other by narrow, foul channels impassable for anything but small boats. Tanusa has the same general appearance as Cagayan, but Volata is rather flat. **Anuling** and **Lañgisan Islands** are bare rocks, the latter 80 feet high. These and the many smaller rocks are undercut by the sea.

Manucan Island is flat and sandy, covered with a thin brush and some coconut trees. It is completely surrounded by a coral reef, which bares at low water. An automatic acetylene light showing one white flash every 5 seconds, visible from a distance of 14 miles, is exhibited from a black steel frame tower erected in the center of the island. **Boombong Island** the northeasterly one of the Cagayan Islands, is low and sandy.

Calusa Island lies 10 miles westward of the south end of Cagayan Island. The water between the two is very deep. The island is flat, sandy, and covered with brush and coconut trees. A group of nipa houses, situated on the south side of the island, are occupied by natives from Cagayancillo during the farming season, but there are no permanent residents. A coral reef surrounds the entire island.

Nicholson Banks.—The southern end of these banks is about 3 miles eastward from Boombong. They extend northerly for 8 miles, with a maximum breadth of 2 miles. The soundings on them are 3 to 7 fathoms, with frequent intervals of 30 to 50 fathoms.

Sultana Banks.—The southern end of these banks is 12 miles 8° (7° mag.) from Boombong and they extend northerly for 6 miles. The northern end is in latitude 10° 02′ N., and longitude 121° 23′ E.; the greatest width is less than 1 mile and the soundings on the ridge vary from 2½ to 11 fathoms. Both Nicholson and Sultana Banks are very steep on their western sides, having no bottom at 100 fathoms at less than ½ mile distance, but sloping gradually eastward, the 100-fathom curve being at a distance of 6 miles from the shallow ridge.

Between the shallow part at the north end of Nicholson Banks and the south end of Sultana Banks, a distance of 3 miles, the soundings are 16 to 25 fathoms. The tops of the trees of Cagayan Island just dip below the horizon at this position.

Cavili and **Arena Islands** are two coral islands situated about 30 miles southwesterly from Cagayan Island. They extend, with their outlying reefs, 8½ miles in a northeast by east and opposite direction, with a deep channel 2 miles wide between them. They are low, the elevation of the ground being only about 5 feet, and to the tops of the trees 100 and 60 feet, respectively. The reef on which Arena is situated has several detached sand cays southward and westward of the island. Both reefs are steep-to on all sides and navigators should be cautious when in their vicinity.

TUBBATAHA REEFS

are two dangerous reefs separated by a deep channel about 5 miles wide. The northeastern reef is about 10 miles long in a northeast and opposite direction. **North Islet, Central Islet,** and a number of small black rocks are the only objects that appear above high water. At low water a large number of detached sand cays or ridges, each about 100 yards long and 10 to 20 yards wide, can be seen along the entire length of the reef. North Islet is covered with grass and some guano.

The southwestern of the Tubbataha Reefs is about 4½ miles long north and south, with several black rocks and sand cays visible at high water. **South Islet** is made up of loose white sand about 5 feet above high water. The Tubbataha light, an unwatched lighted beacon, is located on this Islet. Both reefs are steep-to. An automatic acetylene light, showing one white flash every 10 seconds, visible within a radius of 14 miles, is exhibited, 65 feet above high water, from a black steel-framed tower on South Islet, Tubbataha Reefs.

Rubi Reef.—The British S. S. *Rubi* reported passing on December 29, 1901, a small reef, on which the sea was breaking, situated approximately in latitude 9° 27′ N., longitude 120° 04′ E. This reef was looked for in vain by the Coast Survey steamer *Pathfinder* in 1919.

Jessie Beazley Reef, lying in latitude 9° 02′ 11″ N., longitude 119° 48′ 40″ E., is a small hill of broken coral about 6 feet high, devoid of vegetation, on a reef extending about 700 yards in northwest and opposite direction and about 150 yards wide. At low water the reef bares over a considerable area. A few birds were seen. The reef is readily picked up by day at a distance of 3 to 5 miles, but can not be seen at night. The original position assigned to this reef by the master of the *Jessie Beazley* is still retained on the chart. It is shown in latitude 9° 06′ N., longitude 120° 04′ E., and marked doubtful.

Nicholson Shoal is shown on the charts as being in latitude 8° 51′ N., longitude 119° 29′ 30″ E.; position doubtful. This vicinity has been passed over several times and it is doubtful if any danger exists in this place.

Rosalia Reef.—The Spanish schooner *Rosalia* was reported in 1867 to have been lost on an unknown reef for which the position assigned was in latitude 8° 53′ N., longitude 119° 06′ E. This reef was unsuccessfully searched for in 1891, the area sounded over extending from latitude 8° 48′ to 9° 00′ N. and from longitude 118° 54′ to 119°

11′ E. Ten positive soundings, varying from 1,115 to 1,154 fathoms, were obtained within these limits. The search was made under favorable conditions of weather and there was sufficient swell to make a danger apparent, but there was no indication of shoal water in the area examined. As this sea has been very imperfectly examined this danger may, however, yet be found elsewhere. The Spanish charts formerly showed also an islet, Cumi Cumian, in latitude 8° 50′ N., longitude 119° 00′ E.; position doubtful. This islet does not appear on recent charts.

Antibeg Shoal.—The British S. S. *Cape Antibeg* reported passing on August 5, 1907, an uncharted shoal, on which the sea was breaking, situated approximately in latitude 8° 28′ N., longitude 120° 20′ E.

Quesada or **South Tubbataha.**—This reef was supposed to exist in latitude 8° 04′ N. and longitude 119° 50′ E. H. M. S. *Nassau* tried for soundings there, finding no bottom with 180 fathoms; 6 miles 283° (282° mag.) of this position at noon, with good observations, bottom was obtained in 1,878 fathoms, pale yellow sand. As the observations were made on a clear day and a good lookout kept from the masthead there is no doubt this shoal has been misplaced on the charts.

Basterra or **Maeander Reef** lies in latitude 8° 06′ 30″ N., longitude 119° 17′ 35″ E. It is a low sand cay surrounded by a coral reef nearly 900 meters in diameter and is apparently steep-to.

Bancoran Island, lying in latitude 7° 57′ 30″ N., longitude 118° 40′ 13″ E., is nearly ¼ mile in diameter, flat, and heavily wooded. The center tree of the island is about 100 feet high and stands up clear of the surrounding trees. A reef extends off its north side for a distance of about ¼ mile. The reef and island are steep-to. The island can be picked up on a clear day at a distance of 15 miles. The island is a good landmark for vessels crossing the Sulu Sea from Jolo or Zamboanga for Clarendon Bay, Balabac, or from Puerto Princesa for Cagayan Sulu, and Sandakan.

San Miguel Islands consist of four islets lying about 40 miles northward from Cagayan Sulu.

Bancauan Islet is the largest, being about ¾ mile long; about 400 yards from the northeast point it is nearly divided by the sea. The northern point rises to a peak 123 feet high. Bancauan is connected with a small coral islet lying ¾ mile northward by a reef extending from the north and west sides, with sand cays and large bowlders on it. The islet is steep-to southeast.

Manuc Manucan, the larger of the two southwest islets of the group, is thinly wooded and the tops of the trees are 32 feet above the sea. It is situated about 5 miles 248° (247° mag.) from Bancauan and is connected by a reef with a small coral islet lying ½ mile southward. From this small islet, which is 20 feet high, the reef extends to the north and north-northwest for nearly 1½ miles, with large lumps of coral showing at low water. There is no safe anchorage round any of these islands. In the progress of the survey anchorage was taken up southward of Manuc Manucan in 6 fathoms, with 70 fathoms over the stern.

Coral Reef.—There is a patch of 2¼ fathoms situated 2¼ miles 315° (314° mag.) from Manuc Manucan, which is considered to be connected with it by shoal ground, and therefore to be avoided.

West Bank is 4 miles westward of Manuc Manucan and extends about north-northwest and in the opposite direction for 3¾ miles. The least water found was 6½ fathoms, near the south end.

Southwest Bank.—The eastern extremity of the extensive bank lies 220° (219° mag.), distant 6 miles from Manuc Manucan; from this position the bank extends westward 3¼ miles and thence northwest 5 miles, the general direction being east-southeast and west-northwest, about 8 miles. The least water, 9 fathoms, was found on its south and east extremities. The bottom is even, generally coral and sand, and may be clearly seen in 13 to 17 fathoms. Anchorage with good holding ground may be had on this bank. From the eastern edge of the bank the summit of Cagayan Sulu can be seen in clear weather, bearing 167° (166° mag.) distant 28 miles.

Java Reef.—This dangerous reef, with only 2½ fathoms over it, lies about 5 miles 26° (25° mag.) from the peak of Bancauan. The 5-fathom limit around this reef extends 1⅓ miles in a north-northeast and south-southwest direction. In daylight it may be passed fairly close, as the discolored water is marked and there are strong tide rips around the shoal ground. A good channel exists on either side of this reef. A good clearing mark, if working on its parallel to the north and east, is not to open the small islet north of Bancauan westward of that island.

Valparaiso Shoal is stated to be about 2 miles in extent with apparently shoaler water southwestward. Soundings of 6 and 7 fathoms were obtained, the bottom of coral being plainly seen at the time. Its approximate position is 7 or 8 miles northwest of Bancauan Islet, in latitude 7° 52′ N., longitude 118° 27′ E.

The British S. S. *Shantung*, drawing 19 feet, reported touching on or in the vicinity of Valparaiso Shoal. The depth on this shoal is therefore assumed to be about 3 fathoms instead of 6 fathoms, as formerly shown on the charts.

Memnon Shoal is reported as lying about 25 miles northward of Cagayan Sulu. It consists of coral with patches of sand and has an estimated width of about 1 mile. The least depth found was 6 fathoms, but it appeared shoaler in other places. The approximate position is in latitude 7° 28′ N., longitude 118° 25′ E. In a further examination of this shoal the least depth found was 8 fathoms, and it is considered probable that no danger exists in the locality. Heavy tide rips marked the northeastern edge of the shoal and rendered it apparent; otherwise it did not show distinctly.

Viola Reef, a coral patch having only 4 feet at low-water spring tides, and on which the Spanish vessel *Viola* struck and remained several hours, is reported as lying in latitude 7° 50′ N. and longitude 117° 40′ 50″ E. This reef has been searched for without success. A danger, position doubtful, is now shown on the chart 4 miles north of it.

Moyune Shoal is 1¼ miles in extent east and west and ¾ mile wide. The shoalest area is in the southeastern part with a least known depth of 3¼ fathoms lying in latitude 8° 02′ 18″ N., longitude 118° 07′ 30″ E.

Uncharted shoals have been reported by the U. S. S. *Don Juan de Austria*, as follows:

A small shoal, probably 2 or 3 fathoms, in latitude 7° 36′ N., longitude 118° 08′ E.

A small shoal, probably 2 or 3 fathoms, in latitude 7° 39′ N., longitude 118° 11′ E.

These shoals lie in a northeast and southwest direction, apparently about 4 miles apart. They were sighted from the masthead and the ship was slowed and ran about midway between them, heading 135° (134° mag.). No bottom was found at 25 fathoms.

A shoal, apparently about 1 mile in diameter, in latitude 7° 34′ N., longitude 118° 22′ E. This shoal could not be seen from the masthead until the ship was almost on it. The engine was stopped and backed full speed and the vessel ran into 4 fathoms before headway was stopped. Shoal water was seen ahead near the middle of the shoal. Seven fathoms were obtained near the edge, which was abrupt. No bottom at 25 fathoms was found just off it. This shoal is covered with very large bowlders, some of which appear to come almost to the surface.

The positions of these shoals were obtained by longitude sights, meridian altitude, and bearings of Bancauan, Manuc Manucan, and Cagayan Sulu Islands.

Along the line indicated by soundings 1,285 and 1,326 fathoms in about longitude 118° 50′ E. the water appeared to be welling up from the bottom, or like an overfall, and a peculiar effect of refraction was very noticeable just above the surface. This may have been a very strong tide rip, though the dead reckoning showed no strong currents encountered. It probably marked the edge of the deep.

CAGAYAN SULU ISLANDS

are situated in the southwestern part of the Sulu Sea and include the island of Cagayan Sulu, the two Muligi Islands southwestward of it, with Keenapusan, Pomelikan, Bintut, Bisu Bohan, Bohan, Mandah, and Lapunlapun northward. Cagayan Sulu alone is inhabited, the smaller islands being only resorted to for temporary purpose, such as turtle catching.

Cagayan Sulu, the largest of the group, extends about 8 miles in an east and west direction and about 5 miles north and south, and (with the exception of the northwest and southeast points, which are steep-to) is fringed by a coral reef extending in some places nearly ¾ mile from shore. This reef bares in patches at low water, with channels for canoes or rafts between the edges of the reefs and the coast of the island. In the interior of the island are ranges of hills attaining a height of 1,105 feet, on the east part of the island sloping gradually to the sea. It is thinly populated. The soil and climate are favorable to vegetation, but the natives are indolent and depend chiefly for their subsistence on fish and rice imported from Palawan and Borneo, for which they exchange coconuts, oil, and mats.

Jurata is a small village on the south coast of the island on the eastern side of the entrance to Lake Jurata. There are small horses and bullocks on the island, and the latter, with a few fowl, constitute the live stock, for which exorbitant prices are demanded.

Water may be obtained at half tide from a spring at the landing place near the southwest anchorage and at the watering place inside the crater lake on the south side of the island.

ANCHORAGE.—The best anchorage during the northeast monsoon is off the west end of the island with Tavotavo Point bearing 353°

(352° mag.), distant about 1⅓ miles, and a remarkable tree on the southwest point, bearing 117° (116° mag.), distant about 1⅓ miles, in 9 to 12 fathoms, sand and coral bottom. During this monsoon a swell occasionally sets round Tavotavo Point, causing a rolling motion and interrupting communication with the shore, the sea breaking along the entire edge of the reef. At this season there is also anchorage on the south side of the island off the middle remarkable crater lake in 10 fathoms.

Anchorage (chart 4348) may also be found on the north side of the island in 18 fathoms, with Lapunlapun Island bearing 58° (57° mag.) and Kamutayan Point 193° (192° mag.). Bulingis Point, on line with the center of summit of a 926-foot peak, east side of the island bearing 111° (110° mag.), is the range for this anchorage. Temporary anchorage for communicating with the north side of the island may be taken up east of Lapunlapun Island, but it is not good.

Keenapusan Island, the northernmost of the Cagayan Sulu Group, is a little more than ½ mile in extent and 311 feet high. It is surrounded by a coral reef which, on the south side, extends about 600 yards. To the north and east the water is deep, but on the south and west sides the 20-fathom line of soundings extends nearly 2 miles.

Fair anchorage may be found on the southwest side of the island in from 7 to 10 fathoms, coral and sand bottom, with Keenapusan summit 41° (40° mag.) and Pomelikan summit 153° (152° mag.).

Northeast Bank, the 10-fathom limit of which includes a circular space of about 1 mile in diameter, with 4 fathoms on its shoalest part, lies 58° (57° mag.) about 3½ miles from Keenapusan. The shoal is not steep-to, the soundings decreasing regularly from 20 fathoms to 5, forming a fair anchorage or stopping place on either edge of the shoal. Tavotavo Point, in line with the west point of Bohan 203° (202° mag.), clears it eastward, and Pomelikan, kept just open of Tavotavo Point, clears it westward.

Northwest Bank, the southern 4-fathom patch of which is 311° (310° mag.) 3½ miles from Keenapusan, runs in a northwest and southeast direction and is 1 mile long and about ⅓ mile broad. It is of the same character as Northeast Bank, but is more steep-to and vessels should not anchor on it. The west point of Bohan, in line with the west point Pomelikan 162° (161° mag.), clears it eastward, and the west point of Pomelikan, in line with the west end of Mandah 145° (144° mag.) clears it westward.

Pomelikan is a small islet, about ¼ mile in extent and 180 feet high, situated 2¾ miles southward of Keenapusan Island. It is surrounded by a reef which extends ⅓ mile southwestward and about the same distance eastward, inclosing a large rock on the eastern edge of the reef.

Bintut is an islet lying 1 mile 304° (303° mag.) from Bohan and appears to be a vast block of dark sandstone. **Bisu Bintut** is a rock on the east side of Bintut. The channel between Bisu Bintut and Bisu Bohan is clear. There is also a good channel between Pomelikan and Bintut, but the latter island should be kept aboard, as the reef off Pomelikan extends some 600 yards southward and westward.

Bohan and **Mandah** are two small islands, connected by a reef which dries at low water, lying 2½ miles northward from Cagayan Sulu. They are both thickly wooded, and Mandah, the eastern one,

has a sharp peak rising to a height of 283 feet. Mandah is steep-to except where the reef which connects it with Bohan joins it on the western side. Bohan is surrounded by a reef which extends nearly ½ mile from the western side and terminates in a rock, Bisu Bohan, 66 feet high.

Bank.—A bank about ½ mile in diameter with a least depth of 9 fathoms on it and 22 fathoms close around has been reported to be situated with the highest peak of Cagayan Sulu, bearing 120° (119° mag.) distant about 30 miles.

Muligi Islands.—These two islands are 410 and 232 feet above the sea, the southern, higher, and larger island being about ½ mile long north and south and ⅓ mile broad. They lie 8 miles southward from Tavotavo Point, with a clear channel 5 miles wide between them and Cagayan Sulu. A reef extends 400 yards northeast of the southern Muligi Island, narrowing the channel considerably. The channel between the islands, though clear, should not be attempted. These islands are uninhabited, but the natives resort to them to fish.

Shoals southwestward from Muligi Islands.—A shoal about 1 mile long in a northeast and opposite direction and about 600 yards wide, covered by a least known depth of 5 fathoms, exists in latitude 6° 50′ 45″ N., longitude 118° 10′ 15″ E. About 1½ miles southwestward of this shoal, and separated from it by deep water, is another 5-fathom shoal of similar size and shape.

A shoal, extending about 1¼ miles in a northeast and opposite direction and 600 yards wide, with a least known depth of 4½ fathoms, exists in latitude 6° 44′ N., longitude 118° 11′ E.

A shoal, covered by a least known depth of 2¼ fathoms, exists in approximate latitude 6° 43′ N., longitude 118° 08½′ E. Another shoal, covered with a least known depth of 2½ fathoms, lies 1½ miles southwestward from the 2¼-fathom shoal.

Muligi Patches consist of a number of coral shoals and banks extending about 7 miles east and west, upon which the depths ascertained were 5 to 10 fathoms. The easternmost of these patches, with a depth of 8 fathoms, lies 20 miles 275° (274° mag.) from the southern Muligi Island. There may be less water on some of these patches, and numerous reefs are reported to lie westward.

Willcox Bank is a small coral bank situated near the middle of the channel between the Muligi Islands and the southeast point of Cagayan Sulu. The least water obtained was 6¾ fathoms, although the bottom was plainly visible at the time. There are 23 fathoms a short distance northward and 55 fathoms within 1½ miles southward of the bank. From the shoal the southern Muligi Island bears 239° (238° mag.) and Tavotavo Point 331° (330° mag.) distant 7 miles.

Mambahenauhan Islet, lying in latiture 6° 33′ 30″ N., longitude 118° 31′ 30″ E., is 145 feet high, of brown rock with brushwood and small trees on the summit.

Coral Shoal.—A coral patch of 3 fathoms has been reported as lying 31 miles southeastward of Cagayan Sulu, in latitude 6° 38′ N., longitude 118° 57′ 30″ E.

MINDANAO.

Mindanao is the second island in point of size in the Philippines, having an area of about 36,904 square statute miles and a length of general shore line of about 1,383 miles. It has a very irregular shape, the coast line being indented with deep bays and inlets. The large bays, Iligan on the north and Illana on the south, nearly sever the island in two, the isthmus between them being only about 7½ miles wide at the narrowest part, at the head of Panguil Bay. The island is mountainous and drained principally by two large rivers, the Agusan, which rises not far from Davao Gulf and flows northerly into Butuan Bay on the north coast, and the Mindanao River, which drains an extensive plain with several large lakes and rivers and enters Illana Bay through an extensive delta near Bongo Island. The volcano of Mount Apo, situated westward from Davao Gulf, rises to a height of 9,610 feet and is probably the highest point on the island and in the archipelago. The whole island, being less than 10° from the Equator, has a hot and humid climate, more equable than Luzon. It is under the influence of the monsoons of the northern hemisphere, but is largely below the typhoon region. It has all the products of the other islands of the archipelago. About half the population is classed as non-Christian.

The island is divided into eight Provinces, two of which, Misamis and Surigao, have the usual provincial form of government; the others, Agusan, Bukidnon, Lanao, Zamboanga, Cotabato, and Davao, have a special form of government, with the principal officials appointed by the Governor General.

Mindanao is connected with the general telegraph system of the islands by cable and radio. Zamboanga is the largest commercial port, but only small quantities of general supplies are available. It is connected with Manila and other ports of the Philippine Islands by several lines of steamers, while the north and east coasts of the island are served by steamers out of Iloilo and Cebu.

NORTH COAST OF MINDANAO.

Winds and Currents.—Both monsoons blow with strength on this part of the coast, and, together with the tidal currents from the strait of Surigao, raise a chopping sea. During the southwest monsoon the land breezes are regular; they blow from sunset to morning and shift sometimes to southeast and east-southeast, but during collas the wind remains steady at southwest. Colla is the name given in the Philippines to a southwest gale that blows occasionally during the months from July to October, with violent squalls and much rain.

During the northeast monsoon the land breezes are not regular, but still they are experienced when the monsoon is established, and the winds vary from north to northeast and east-northeast. The coast is very exposed at that season.

In navigating under sail, in either monsoon, the coast of Mindanao should be approached in order to profit by the land breezes; but care must be taken to guard against the violent squalls that come off the mountains.

Between Surigao Strait and Camiguin Island there is a constant current to the west in both monsoons, varying in strength according to wind and tide. The flood stream entering through Surigao Strait passes southwest on both sides of Camiguin Island with considerable velocity, but loses its strength as it enters Macajalar Bay; with spring tides it flows with an estimated velocity of 2 to 3 knots. South of Bohol the currents follow the direction of the prevailing monsoon. Near the coast and in the great bays the currents are influenced by the discharge from the rivers.

Bilaa Point, the northern extremity of Mindanao, is the termination of the range of mountains that traverses the east coast from north to south; the point itself is of dark rock, clean and fringed by a narrow steep-to reef.

Bilaa Shoal, composed of sand and dark coral heads and covered by a least depth of 2 fathoms, lies ¾ mile northward from Bilaa Point, from which it is separated by a deep channel over ½ mile wide; vessels using this channel should pass between ¼ and ½ mile from the shore. The position of the shoal is usually indicated by tide rips. During the southwest monsoon, anchorage can be found on the slope of this shoal, sheltered from the tide streams.

Madilao Point, about 4 miles southwestward from Bilaa Point, is 270 feet high, clean and steep-to, and composed of dark rock. It forms with Bilaa Point a deep bay which extends about 1 mile southeastward and affords anchorage sheltered from northeast to southwest through east but necessarily close in because of the great depth of water.

From Madilao Point the coast trends southward for 46 miles to the mouth of the Agusan River. From Madilao Point to Mount Tubay it consists of the western slope of two mountain ranges and is high, bold, clean, and steep-to, and there are no off-lying dangers. **Mount Tubay**, at the southern end of this section of the coast is a prominent hill which rises to a height of 1,468 feet.

Butuan Bay, about 20 miles wide at the entrance between Tubay and Diuata Points, extends 10 miles southward and is deep and clear. The eastern shore from Mount Tubay to the mouth of the Agusan River, in the southeast angle of the bay, is low, densely wooded, and fringed by a sandy beach, off which shoal water with very deep water at its edge extends to a distance of ½ to ¾ mile. The southern shore of the bay, between the Agusan River and the town of Nasipit, 10 miles westward, is low and wooded to the sandy beach. Scattered houses and clearings exist on this stretch of coast, and the shore line is intersected by small, unimportant streams. Shoal water does not extend more than ½ mile from the shore between these two points. From Nasipit to Diuata Point, about 10 miles northwestward, the shore is fringed by a reef which varies in width from less than ¼ to ½ mile.

Tubay and Cabadbaran, lying about 1 and 3½ miles, respectively, southward from Mount Tubay, are the only towns on the east shore of the bay. They are small and of little commercial importance and

are only occasionally visited by coasting vessels. The Tubay is a swift-running stream with very little water on its bar at low water. It is understood that natives pole canoes up it to Lake Mainit, and also that there is an inland passage for canoes between the Tubay and Agusan Rivers. There is no anchorage off the river mouth, but vessels occasionally anchor in from 12 to 15 fathoms about 7/8 mile 347° (345° mag.) from the town and 3/8 mile from shore. The bar of the Cabadbaran River bares at low water, and there is no anchorage off it. Anchorage can be found southward of a sand spit which extends westward from the south bank of the river. From abreast of this anchorage there is a good road leading to the town of Cabadbaran. There is a fair road between Cabadbaran and the mouth of the Agusan River.

AGUSAN RIVER

(chart 4647), which discharges into the southeast angle of Butuan Bay, is the second largest river in the island of Mindanao. Its mouth is divided into two channels by **Pontod Island**, a small sandy cay with a settlement and a coconut grove on its southern end. The bar of the northern entrance, blocked by stones sunk there for the purpose, has a depth of only 3 feet and is not used for navigation. The western entrance has a width of about 150 yards at the narrowest part, and 9 or 10 feet may usually be carried over the bar at low water and 12 to 14 feet at ordinary high water. There is no good anchorage outside of the entrance, the water being very deep and the bar steep-to. Good anchorage for small vessels which do not intend to ascend the river may be found at the mouth of the **Baug River**, which enters the Agusan just inside the bar. The rainy season begins in December and lasts about four months. The river during these months is very high and filled with floating débris, most of which can be avoided by anchoring under the lee of a point.

A white monument at the village of Baug, situated at the confluence of the Agusan and Baug Rivers, is said to mark the spot where Magellan celebrated the first mass in the Philippines. This monument forms a good landmark.

Range Lights.—Two fixed red lights, which should be visible from a distance of 7 miles, are exhibited from concrete beacons erected one on the southern end of Baug Island and the other on the eastern bank of the Baug River. The lights in range bearing 94° (92° mag.) mark the best water across the bar. The beacons are surmounted by white triangular daymarks with black vertical stripes through their centers.

The channel is also generally marked by stakes maintained by the pilots, who move them in case the bar shifts during heavy freshets.

Pilots.—The pilot station is at the south end of Pontod Island, and strangers are advised to employ them.

Directions.—Vessels entering the Agusan should bring the range marks on and steer for them, keeping a good lookout for shoal water on either side. There is a hard gravel shoal extending about 1/4 mile southward from the south side of Pontod Island. When within about 1/8 mile of the front range mark the vessel should be hauled southward and the eastern side of the channel favored until the mouth of the Baug River is passed, after which the usual rules for river navigation should be followed.

Butuan, the capital of Agusan Province, lies on the west bank of the Agusan River, about 5 miles from the sea. From the bar to the town, depths of from 2½ to 5 fathoms may be carried. The current in the river is strong and the water off the town is fresh at all stages of the tide. Butuan carries on a considerable trade in hemp and copra, principally with Cebu. There is a small bamboo wharf alongside of which vessels may lie by using offshore moorings. Vessels should anchor below the wharf, as the river higher up is contracted by a shoal making off from the west bank.

Nasipit Harbor (chart 4647) is formed by an opening between bluff rock headlands about ⅜ mile apart and extends about 1 mile southward. The village of Nasipit lies on the bluff forming the eastern entrance point. A large quantity of copra is produced here, and the coconut groves with the bluffs forming the entrance are good landmarks for making the harbor. The outer harbor is an excellent one for moderate-sized vessels, having depths of from 6 to 9 fathoms over an anchorage area about ¾ mile long by about 300 yards wide. The inner harbor is contracted by shoal water and is practicable only for small craft. Both entrance points to the outer harbor are fringed by reefs which show plainly on a clear day. The reef on the eastern side continues much farther in than that on the western side. A light showing one white flash every 5 seconds, visible 15 miles, is exhibited from a concrete beacon erected on the bluff on the western shore of the harbor about ½ mile from the entrance.

Directions.—Steer a 215° (213° mag.) course for the light, when the northwest point at the entrance bears 325° (323° mag.), change course to 180° (178° mag.) and continue to an anchorage in midchannel southward of the light.

The reef on the western side of the entrance to Nasipit Harbor extends about ¼ mile northeastward from the western entrance point, then curves around to the westward, with a point extending northward for about ⅜ mile, and then follows the coast about ½ mile out for about 3 miles, when it narrows to less than ¼ mile and extends to and around Diuata Point into Gingoog Bay.

Diuata Point, the western entrance point to Butuan Bay, is low, densely wooded, and rises gradually to a height of 1,165 feet at a distance of about 3 miles inland. The coast is formed of coral with coral sand beaches and is fringed by a very narrow, steep-to reef, which widens to 150 yards westward of the point.

Gingoog Bay, between Diuata and Sipaca Points, is 20 miles wide at the entrance and extends about 13 miles southward. The shores of the bay are fringed with very narrow, steep-to coral reefs, the center of the bay is deep and clear, and there are no off-lying dangers with the exception of a small 1½-fathom shoal off the town of Gingoog and a 4-fathom shoal off Talisayan, which will be described in their proper order.

About 5 miles southward from Diuata Point is situated the village of Linugos, directly in front of which there is a break in the shore reef about ¼ mile wide, which affords good anchorage in 7 fathoms, sand and mud bottom, well protected from northeast winds.

Odiongan is a small village situated at the mouth of the Odiongan River, which discharges into the southeast angle of the bay about 10 miles south of Linugos. A small shelf of coral and sand, with ir-

regular depths of from 3 to 7 fathoms, northward of the eastern side of the entrance to the river affords excellent anchorage for small vessels.

Gingoog is a small village lying on the shore about 4 miles westward from Odiongan. Good anchorage in 15 fathoms, sand bottom, may be found about ¼ mile from shore directly in front of it.

A small coral shoal covered by a least depth of 1½ fathoms exists about 1 mile northwestward from Gingoog and ¾ mile from shore. There is a deep channel about ½ mile wide between this shoal and the shore reef.

From Gingoog to Sipaca Point, 17 miles northwestward, the shores are fringed by a steep-to coral reef. A short distance back from the shore heavily wooded mountains rise to heights of over 3,000 feet. Occasional villages and coconut groves exist on this stretch of coast.

Talisayan, the principal town in Gingoog Bay, lies about 1 mile southeastward from the summit of Sipaca Point. Anchorage, exposed to northeast winds, may be found close to the shore reef northward from the town in 20 fathoms.

A detached coral shoal covered by a least depth of 4 fathoms lies ¼ mile from shore on the bearings: Conspicuous iron-roofed building near the beach, Talisayan, 237° (235° mag.) and the right tangent to Sipaca Point 321° (319° mag.). It is reported in Talisayan that vessels occasionally anchor on this shoal. There is a deep, clear channel about ¼ mile wide between it and the shore reef.

Sipaca Point, the western entrance point to Gingoog Bay, is a bold conical hill rising from the water's edge to a height of 875 feet; from a distance it appears as an island. It is connected with the mainland by a mangrove swamp, through which there is reported to be a channel passable by canoes at high water.

From Sipaca Point the coast trends west-southwestward with a curve northward for about 6 miles to Bagacay Point. This section of the coast is fringed by a steep-to coral reef, which attains its greatest width off the town of Bagacay, where it is over ½ mile wide, most of which is bare at low water.

Canauayor Anchorage (chart 4639) lies southward from the small islet, Canauayor, which is situated 1¾ miles westward from Sipaca Point and about ¼ mile from shore. **Canauayor Islet** is 110 feet high and is connected with the mainland southeastward by a coral reef which is nearly bare at low water. Westward from the islet and close to it there is a break in the reef leading to an anchorage for small craft in 8 to 9 fathoms, about 300 yards northward from an iron-roofed warehouse in the western part of the village of **Balinguan.**

Camiguin Island, lying 5 miles from the coast of Mindanao, is oval in shape, 12 miles long northwest and southeast, and 8 miles wide. It is extremely mountainous and steep, the highest peak of Mount Mambajao, in the middle of the island, rising to a height of 5,620 feet. The town of Catarman, on the northwest coast, was destroyed by a volcanic eruption in 1871. The entire island, excepting high up on the mountain slopes, is under cultivation, mainly with hemp and coconuts; above heights of 1,500 feet the mountains are heavily wooded. The shores, excepting around **Catarman Point** and a few detached bluffs, are low and sandy, and fringed with narrow steep-to

coral reefs. **Mambajao, Mahinog, Sagay, Bonbon,** and **Agoho** are the principal towns. Indifferent anchorage, according to the season, can be found off these towns, but necessarily very close in because of the great depth of water. The principal exports are hemp and copra.

Medano Islet is a sand cay lying about 1 mile northwestward from Agoho on the northwest side of the island. It is about 400 yards in extent, stands about 6 feet above high water, and has a few bushes on it. It is surrounded by a coral reef which, on the eastern side, extends to a distance of about ½ mile. The channel between it and Camiguin is deep and clear and is generally used by coasting steamers.

Jigdup Reef is a circular coral reef about ½ mile in diameter and covered by a least depth of ¾ fathom, lying 3 miles from the northeast coast of Camiguin on the bearings: Mambajao Light 265° (263° mag.), distant 4 miles, and Bantigui Island 155° (153° mag.), distant 5¾ miles.

Bantigui Islet, lying 2 miles from the east coast of Camiguin, is small, low, wooded, and sandy. Coral reefs extend ⅔ mile from its north and east sides, while to the southward the bottom drops off rapidly to a depth of 55 fathoms.

Bulias Shoal is a small 4¼-fathom coral patch lying 1½ miles northward from Bantigui Islet.

Mambajao (chart 4639), the principal town on the island, is situated on the north coast. A wide reef fringes the shore in front of the town. A stone jetty about 200 yards long, accessible only to small boats, extends northward to a break is the reef. A fixed red light, visible 7 miles from all points of approach by water, is exhibited 32 feet above high water from a white pole near the end of the pier. Vessels may anchor in 18 fathoms, sandy bottom, with the end of the pier bearing 204° (202° mag.) distant about ¼ mile. Small vessels may anchor closer in, with the pier on the same bearing, in 11 fathoms, with Medano Islet just open of a small single tree on the extremity of the point westward from Mambajao.

Mahinog is a small town situated on the east coast of the island about 7½ miles southeastward from Mambajao; it contains a large white stone church, which may be seen from a distance of 10 miles. Anchorage may be found off Mahinog in 15 fathoms, sandy bottom. A break in the shore reef about 1½ miles southward of Mahinog is used as a landing by vessels of the Agusan Coconut Co.

Sagay is a small town situated about 3 miles northwestward from **Farol Point,** the southern extremity of the island. Anchorage, protected only during the northeast monsoon, may be found in 12 fathoms, sand bottom, with the north gable of the church bearing 2° (0° mag.).

From Bagacay Point the coast trends southward with a curve eastward for 12 miles to **Banbayan Point** at the northern entrance to Balingasag Bay. This section of the coast is fringed by a narrow steep-to coral reef, and there are no detached dangers with the exception of a small coral reef covered by a least depth of 2½ fathoms lying ¼ mile from shore about 7 miles southward from Bagacay Point. From this reef the church in the village of Salay bears 140° (138° mag.) distant about ½ mile; there is a narrow deep channel between this reef and the shore.

Constancia Reef, about ¼ mile in extent and covered by a least depth of ¼ fathom, lies about ⅜ mile westward from Banbayan

Point; there is a deep channel about 350 yards wide between it and the reef fringing Banbayan Point. From the center of Constancia Reef the church at Balingasag, which is very prominent, bears 152° (150° mag.) and the tangent to Gorda Point bears 190° (188° mag.); there are no nearer landmarks.

Balingasag Bay, between Banbayan and Gorda Points, is 4½ miles wide at the entrance and extends 1½ miles eastward. The town of Balingasag, the largest and most prominent in this vicinity, lies on the eastern shore of the bay. The usual anchorage is in front of the town, 400 yards from shore, in 9 fathoms, sand bottom. Better-protected anchorage in the southwest monsoon will be found near the head of the bay in 12 fathoms, mud bottom, with Balingasag Church bearing 5° (3° mag.) and the right tangent to Gorda Point 265° (263° mag.).

Gorda Point is clean and steep-to; it is steep and wooded, has a flat crown, and forms a very prominent landmark from any part of Macajalar Bay.

Macajalar Bay is 16 miles wide at the entrance between Gorda and Sulauan Points and extends about 12 miles southeastward. The eastern shore is the higher and is formed of sand beaches separated by low, rocky points. The head of the bay is fringed by narrow coral reefs, and about 1 mile inland grass-covered hills rise to heights of over 1,500 feet. The western shore of the bay is low and fringed by steep-to coral reefs. A coral reef, partly bare at low water, extends ¾ mile northward from **Malugan Point,** and between this point and Sulauan Point there are five small detached reefs, none of which are ½ mile from shore. The middle of the bay is deep and clear and contains no detached dangers with the exception of Alutaya Reef.

Alutaya Reef, situated 3½ miles 240° (238° mag.) from Gorda Point, is of oval form, having a greatest diameter of ⅔ mile. At low water the center uncovers, leaving bare a bank of sand and rocks. The channel between it and the shore is about 2½ miles wide, and there is a depth of over 100 fathoms in it.

Cabulig Bay, about 4 miles southward from Gorda Point, offers anchorage sheltered during the northeast monsoon, but necessarily very close in because of the great depth of water. The village of Jasaan, at the head of the bay, contains a very conspicuous church.

Tagoloan is a small town situated 1½ miles from the mouth of the river of the same name, which discharges 5½ miles south of Cabulig Bay. There is very little water on the bar at the mouth of the river, and the water outside of the bar is too deep to afford anchorage.

Cagayan River (chart 4639), which discharges into the head of Macajalar Bay, has 1½ fathoms of water on its bar at low water, but the depth and direction of the channel across it are constantly changing with the freshets of the rainy season; shoal water extends about ⅜ mile from the river mouth. At the time the survey was made the course across the bar was about 168° (166° mag.) and was marked by stakes. Launches drawing about 7 feet can enter the river at high water and proceed to the town of Cagayan, a distance of about 2 miles, above which it is not navigable, being filled with rocks.

Macabalan Point, about ¾ mile southeastward from the river mouth, is low and sandy and marked by a few native houses and coco-

nut trees. It is steep-to on its eastern side, but on the northern side shoal water extends to a distance of nearly ½ mile. The cable from Iligan lands on Macabalan Point.

A fixed red light is exhibited 58 feet above high water from a white steel-framed structure on the north side of Macabalan Point. A red second-class nun buoy in 3 fathoms, about 600 yards northward from the lighthouse, marks the eastern edge of shoal water northward from Macabalan Point.

WHARF.—About 600 yards southward from Cagayan Light there is a small wharf, a few warehouses, and some native houses. This is the landing place for the town of Cagayan, capital of Misamis Province, situated on the Cagayan River about 1½ miles southwestward, with which it is connected by a good road. Vessels not intending to go to the wharf can find anchorage in 18 to 30 fathoms with the wharf bearing 328° (326° mag.).

Sulauan Point, the western entrance point to Macajalar Bay, is low and wooded. Its shore line consists of low coral cliffs alternating with sandy stretches. It is fringed by a coral reef to a distance of less than ½ mile, part of which bares at low water.

From Sulauan Point the coast trends southwestward for 11 miles to Initao Point, thence south-southwestward for about 20 miles to the town of Iligan, at the head of Iligan Bay. This section of the coast is fringed by a narrow steep-to coral reef with very deep water at its edge.

ILIGAN BAY,

between Initao Point eastward and Polo Point westward, is a great arm of the sea, about 33 miles wide and 23 miles deep. Its eastern and southern shores are in general safe and steep-to. The western side is fringed by reefs which at some points extend to a distance of 1½ miles.

Maputi Point, about 4 miles southward from Initao Point, is broad and rugged. Immediately northward from it the coast recedes, forming Initao Bay, where there is anchorage for small vessels in 3 fathoms in front of the village of Initao.

Quinalang Cove (chart 4639) is a small indentation in the coast 3 miles northward from the town of Iligan, where anchorage, sheltered from the northeast monsoon, may be found in 20 to 25 fathoms about ⅛ mile from the edge of the shore reef. Good water may be obtained from the Mandulog River, which discharges eastward from Quinalang Point, the south point of the cove.

The town of **Iligan** is situated in the southeast angle of the bay on the bank of the river of the same name. There is a stone mole immediately northward from the mouth of the river, on both sides of which are reefs which bare at low water. The river is small and unimportant, having only about 3 feet on its bar at low water. The cable from Cagayan lands on the north side of the mole. The anchorage of Iligan is very bad because of the great depth of water close to the reefs.

Camp Overton is a military post situated about 2 miles southwestward from Iligan. There is a wooden wharf over 1,000 feet long, with 28 feet of water at its end, built out from a break in the reef. In going alongside this wharf it is recommended that great caution

be observed, as rocks are reported to exist a short distance from either side of it. The cable from Misamis lands about ⅜ mile eastward from the wharf.

DIRECTIONS.—Vessels bound for Camp Overton should bring the end of the wharf to bear 154° (152° mag.) and steer for it, anchoring in 28 or 30 fathoms of water with sufficient swinging room to clear the buoys and wharf.

Anchorage, protected during the southwest monsoon, may be found at Camp Overton, but necessarily very close in because of the great depth of water. Both Overton and Iligan Anchorages are bad and at times during the northeast monsoon are untenable; at such times vessels seek shelter in Quinalang Cove.

From Camp Overton the coast trends westerly with a slight curve southward for about 11 miles to Binuni Point and is intersected by an unusual number of small rivers. The **Agus River**, which discharges about 1½ miles westward from Overton, is the outlet of Lake Lanao. It is a rapid-flowing river, descending about 2,200 feet in a distance of about 21 miles, has a depth of 4 feet on the bar at low water, and is somewhat deeper for a short distance up. From Overton to the Agus River the coral reef which fringes the shore extends to a distance of about ¼ mile; thence to the mouth of the Ridapon River, about 4 miles westward, there is very little reef. Near the Ridapon River the fringing coral begins again and continues to Binuni Point with a general width of nearly ½ mile. Along this stretch of coast heavily wooded hills rise a short distance inland.

Binuni Point is low and wooded and surrounded by a fringing coral reef to a distance of about ⅓ mile. From here the coast trends southward and westward toward Port Misamis.

Port Misamis (chart 4640), including Panguil Bay, is a long, narrow inlet extending in a southwest direction for about 22 miles. It is 9 miles wide at the entrance between Binuni and Loculan Points and narrows until, about 12 miles from the entrance, it is less than 1 mile wide; from this point it spreads out, forming a large shoal basin known as Panguil Bay. The shores of the port are low and covered with mangroves, but northward from Misamis town there is an extended sandy shore, and immediately southward, on the opposite coast, there are high hills. A number of reefs and shoals render the approach to Port Misamis somewhat dangerous and the entrance should be cautiously approached.

Narvaez Shoal, the outer danger on the south side of the eastern approach to Port Misamis, is a small patch of coral, covered by a least depth of 1¾ fathoms lying 1½ miles from the southeast shore of the port. From its northern edge the southern tangent to the fort at Misamis bears 244° (242° mag.) distant nearly 5 miles.

Kulasihan Shoals, with 1½ fathoms least water over them, lie southward from Narvaez Shoal and about ¾ mile from shore.

Panguilinan Shoals are two small patches covered by 1¾ fathoms least water, lying about 1½ miles southwestward from Narvaez Shoal. From the northern patch the south tangent to Misamis fort bears 252° (250° mag.) distant 3⅝ miles.

Pasil Shoal is a long, narrow shoal extending nearly 3 miles in a northeast direction from Palalagoya Point, on the south side of the port. It has depths varying from ¼ to 3 fathoms over it, and from

the northern edge of the 3-fathom curve the south tangent to the fort at Misamis bears 262° (260° mag.), distant 2 miles. The northern extremity of Pasil Shoal is marked by a black second-class can buoy moored in 5 fathoms of water.

Kolambugan Bay lies eastward of Pasil Shoals and affords good anchorage in 4 to 5 fathoms of water. The Kolambugan Lumber Co. has a wharf at Migcaniguing Point. Lighted range beacons have been erected on the point. The beacons in range bearing 194° (192° mag.) lead between the shoals at the entrance to Port Misamis to the anchorage off the wharf.

Loculan Shoals, lying ½ to 1¼ miles from shore, about midway between Opol and Loculan Points, are shoals of sand and rock, parts of which bare at low water. Near the southwestern part of the shoals a small sand cay bares at extreme low water. Trunks of large trees, stranded by the currents, may often be seen upon the shoals. From their southeastern edge the fort at Misamis bears 225° (223° mag.), distant 3⅜ miles. There are three shoal spots covered by from ½ to 2 fathoms lying southward and eastward from Loculan Shoals, between which and the main shoals there is a narrow, deep channel. These patches are marked by a red second-class nun buoy moored in 2½ fathoms of water, coral bottom.

Shoal water extends nearly 1 mile eastward and northeastward from the fort, and ¼ mile beyond this there is a shoal spot with from 2½ to 3 fathoms of water on it. The southeastern edge of the above-described shoal spot is marked by a red second-class nun buoy moored in 4 fathoms of water, hard sand bottom. Loculan Point, just closing in by the land northward from Opol Point, clears the eastern edge of the above-described 2½ fathom patch, and the east end of Solaton Island, in the narrows between Port Misamis and Panguil Bay, bearing 227° (225° mag.), clears the above shoal and the shoal ground eastward from the fort.

The town of **Misamis** lies on the northern shore of the port, 1¾ miles southwestward from Opol Point. The fort is situated about ¼ mile southeastward from the town, on Misamis Point, and is very prominent. Good anchorage may be found southward and westward from the fort according to draft. A good berth for a large vessel is in 4½ fathoms, with the fort bearing 36° (34° mag.), distant ¼ mile; small vessels may anchor farther northward, about 200 yards southward from the wharf. The cable from Iligan lands near the east corner of the fort.

Directions.—There are two channels that lead into Port Misamis, of which the eastern channel is the wider and better and is the one generally used. Vessels from the eastward should bring the fort to bear 240° (238° mag.) when at least 5 miles distant and steer for it; this course should give the red buoy off the Loculan Shoals and the black buoy off the northern extremity of Pasil Shoal each a berth of about ⅜ mile. It has been reported that with certain lights it is difficult to pick up the fort at this distance; if this should be the case it would be advisable to keep at least 2 miles off the southern shore until the fort or the red buoy off Loculan Shoal is made out. When Pasil Shoal buoy is abeam and Loculan Point bears 347° (345° mag.) the course should be altered to 211° (209° mag.); when the fort bears 254° (252° mag.) and Loculan Point bears 356° (354°

mag.) the course should be altered to 230° (228° mag.), giving the red buoy marking the shoal water eastward from the fort a berth of about 250 yards, and when the fort is abeam the vessel may be hauled in for the anchorage.

Vessels entering by the northern channel should pass about 3/8 mile eastward from Loculan Point and steer 183° (181° mag.), keeping a good lookout for the shoals on either side. This course should take a vessel about 250 yards from Loculan Shoals; there is usually a stake marking the western limit of the shoals, but its presence must not be relied on. When the fort bears 254° (252° mag.) the course should be changed to 230° (228° mag), giving red buoy No. 4 a berth of about 250 yards and the previous directions followed.

Loculan Point, situated about 4 miles north-northeastward from Misamis, is low and sandy. The village of Loculan lies immediately back of the point on the river of the same name; it is small and nearly concealed by trees. Anchorage may be found eastward from the point in 6 fathoms, fine sandy bottom.

Near the shore on the west side of Iligan Bay the land is low, flat, and swampy and interspersed with low-lying alluvial and sandy areas. At a distance of from 1 to 2 miles back from the shore line the foothills begin to rise gradually to the mountain range running parallel to the shore. The foothills for a distance of from 6 to 10 miles from the shore are cultivated, about one-half the area being cleared; on the uncleared portion there are many large trees. The mountains are much broken and heavily wooded. The valleys are precipitous and the peaks seemingly very steep. The shore is generally fringed with coral, which in some places extends to a distance of 1½ miles.

Balicaocao Point, situated 1½ miles northward from Loculan Point, is a rounded sandy point fringed with coconut trees. There are several detached reefs off this point and it should be given a berth of at least 1 mile.

From Balicaocao Point the coast trends northward with a curve westward for 6 miles to Tabu Point, forming a large bay with a low-lying shore line of sand and mangroves fringed in most places by coral. The villages of **Tudela**, **Nacavan**, and **Sinonoc** lie on the shores of this bay.

A chain of reefs, parts of which bare at low water, begins about ½ mile northeastward from Balicaocao Point and extends northward to within 1 mile of Tabu Point. The outer edges of these reefs, which are steep-to, lie over 1½ miles from shore. Between these reefs and the land there is an expanse of water where anchorage, well sheltered from the sea during the northeast monsoon, may be found in depths of from 3 to 20 fathoms, mud and sand bottom.

Access to this anchorage may be had through channels between the reef lying eastward of it or from the northward, care being taken to avoid a 1½-fathom patch lying in the middle of the northern entrance, 1 mile 188° (186° mag.) from Tabu Point.

Tabu Point, situated about 7½ miles northward from Loculan Point, is a low, sharp, sandy point bordered by coconut trees. It is very steep-to, a depth of 4 fathoms being found within 50 yards of it.

Jimenez (chart 4639) lies 1½ miles northwestward from Tabu Point and about 1 mile back from the shore. It may be recognized

by a prominent white stone church having a square tower and hemispherical dome. The church stands at the head of the main street of the town and shows through the trees when well offshore. The landing place is at the termination of the main street leading to the town, northward of a black iron warehouse. The Palilan River, with very little water on its bar at low water, discharges about 3/8 mile northward of the landing place. The shore in this vicinity is faced by a number of reefs, parts of which are awash at low water and are usually well defined and easy to pick up. Between these reefs and the shore there is good but contracted anchorage. Between the reefs there are a number of channels leading to the anchorage, but the southern one is the one generally used. There are no aids to navigation, and a stranger entering for the first time should exercise great caution and keep a good lookout for the reefs on either side.

Direction.—To approach the anchorage off Jimenez by the southern channel, when about 1 mile of Tabu Point, bring the church to bear 304° (302° mag.) and steer for it; when Tabu Point bears 340° (338° mag.) haul northward and pass 100 to 150 yards eastward from the point; having passed Tabu Point haul a little westerly and anchor off the prolongation of the main street from town in 4 to 6 fathoms, 300 or 400 yards from shore.

This anchorage may also be approached from the northeastward, but this channel is seldom used. In case it is desired to enter by this channel bring the church to bear 236° (234° mag.) and steer for it; when Tabu Point bears 161° (159° mag.) it should be steered for and anchorage taken up as previously directed.

From Tabu Point the coast trends in a general 348° (346° mag.) direction for 6½ miles to Balaring Point. The first 2½ miles of this section are faced by detached reefs to a distance of about 1 mile; thence to Balaring Point the reefs which fringe the shore do not extend to a distnace of over ½ mile and there are no off-lying dangers.

Mapaan Point, about 3½ miles northward from Tabu Point, is a low, sandy point covered with coconut trees and fringed by reefs to a distance of about ½ mile.

Aloran lies about 4 miles northward from Jimenez and 1 mile back from the shore and is not visible from seaward. The landing place is marked by an iron-roofed warehouse and several nipa shacks.

Anchorage for communicating with Aloran may be found in about 16 fathoms off the edge of the shore reef with the warehouse bearing 249° (247° mag.) distant about 3/8 mile.

Balaring Point is a round sandy point bordered with mangroves and nipa, with a strip of coconut trees about 100 yards from the shore, and is fringed by reefs to a distance of about ¼ mile.

From Balaring Point the coast trends northwestward for 3 miles to Simio Point. **San Vicente** lies about 1½ miles southwestward from Simio Point and 3/4 mile inland; it is not visible from seaward, being entirely concealed by trees. Anchorage for San Vicente may be found in 4 fathoms about 3/8 mile southward from some houses on the beach just northward of the mouth of the San Vicente River.

Simio Point is a low, sandy point covered with coconut trees and fringed by reefs to a distance of nearly ¼ mile.

Oroquieta, the largest and most important town on the shore of Iligan Bay, lies about 1 mile northwestward from Simio Point, on

the left bank and at the mouth of the Oroquieta River. It is easily recognized by a large warehouse, visible from a long distance northward, and also by the church which stands close to the beach and is unusually ornamental. The Oroquieta River has about 1½ feet of water on its bar at low water. Oroquieta, as well as Jimenez, maintains regular steam communication with Cebu.

Anchorage, protected from southerly and westerly winds, with good holding ground, may be found about ¼ mile from shore in 12 fathoms, muddy bottom, with the church bearing 227° (225° mag.). This anchorage should be approached cautiously as the bank is very steep. At times during the northeast monsoon this anchorage becomes untenable and small steamers find anchorage in **Loboc Cove**, about 1 mile northwestward from Oroquieta. This anchorage is very contracted and vessels are obliged to moor fore and aft, but it affords shelter in all but the heaviest weather.

Paypayan Bay, between Napolo and Layaban Points, 2 and 2½ miles northwestward from Oroquieta, is fringed by a wide reef, leaving anchorage space at the entrance, southwestward from Layaban Point, nearly ¼ mile in extent with a depth of 3½ fathoms in the middle.

Layaban Point is a low, sandy point bordered with coconut trees, which grow so closely together that the point has the appearance of a high bluff when seen from a distance. The reef which fringes Paypayan Bay surrounds Layaban Point, continues northward to Silanga Island, and has a general width of about ½ mile.

Silanga Island is a small island covered with trees about 60 feet high, lying on the reef close to the shore about 2¼ miles northward from Layaban Point. The reef which surrounds Silanga Island extends to a distance of about ⅜ mile eastward from the island.

From Silanga Island the coast trends northwestward, then northward, and then eastward to Polo Point, which bears 21° (19° mag.) distant nearly 3 mile from Silanga Island, forming **Polo Bay**. This large bay is almost filled by reefs, in which there are two breaks, where sheltered anchorage may be found. There are no aids to navigation and in the absence of local knowledge a stranger should not attempt to enter them except at low water, when the edges of the reefs can be made out. The better anchorage of the two among the reefs of Polo Bay is about 1 mile southward from the lighthouse on Polo Point.

Capayas Islet is a very small islet composed of coral rock, lying 1¼ miles 156° (154° mag.) from Polo Point Lighthouse. It is about 100 yards long, east and west, and 50 yards wide and has bushes about 5 feet high on it. In 1906 it had two native houses on it and the greater part of the islet was cultivated with tobacco.

Polo Point, the northeastern extremity of the land in this vicinity, is low and the land is flat for some distance back of it, being a mangrove swamp with a high-water passage to Inamucan Bay through it for small boats. Polo Point is fringed by a very narrow steep-to reef, and depths of over 50 fathoms are found at less than ½ mile from it. A fixed red light is exhibited 60 feet above high water from a white steel-framed structure on Polo Point. A small concrete dwelling stands at the base and to the east of the tower.

Iligan Reef is a dangerous reef about 600 yards in diameter, composed of coral and white sand and covered by a least depth of 1½ fathoms lying 7¾ miles 64° (62° mag.) from Polo Point Lighthouse.

Inamucan Bay (chart 4639), situated 1½ miles westward from Polo Point, is the harbor for Plaridel, standing on the coast about 1 mile northwest from it. It is small and affords good protection in southwest weather and fair shelter in northeast weather because of the reefs extending from both entrance points; these reefs reduce the navigable channel to a width of 300 yards, and in entering a good lookout must be kept for them. The anchorage space is very limited, being less than ¼ mile in diameter.

DIRECTIONS.—To enter, a vessel should steer in on a 182° (180° mag.) course to give Baubaon Point, the eastern entrance point, a berth of about 300 yards; when the buildings on the western shore bear 260° (258° mag.), steer 250° (248° mag.) and anchor about 300 yards eastward from the end of the road leading to Plaridel, in 10 fathoms, soft muddy bottom.

Plaridel is a small town about 3 miles westward from Polo Point; it is well marked by prominent buildings. During the southwest monsoon anchorage may be found in 10 fathoms about ½ mile from shore with the bell tower of the church bearing 182° (180° mag.). In approaching this anchorage care must be taken to avoid the Langaran and Usucan Shoals, both of which lie about ⅝ mile from shore; the former lies about 1½ miles northwestward from the town and is covered by a least depth of 1½ fathoms; the latter lies about ⅝ mile north-northeastward from the town and is covered by a least depth of 2 fathoms.

From Plaridel the coast trends west-northwestward for 8 miles to Bulato Point at the eastern entrance to Murcielagos Bay. Near the middle of this section of the coast there is a large bight about 2½ miles long and 1 mile deep, which is nearly blocked with reef, leaving a small boat passage which is used occasionally as a landing place for Baliangao, 2 miles distant, with which it is connected by a good road. Between this bight and Murcielagos Bay the shore is fringed by a very narrow steep-to coral reef.

Murcielagos Bay (chart 4641), between Bulato Point and Silla Point, about 6 miles westward, the coast recedes southward for about 3 miles, forming a large bay nearly blocked by reefs and islets, among which there are narrow channels, where a small vessel could find sheltered anchorage. **Baliangao**, on the bay of the same name in the eastern part of Murcielagos Bay, is the principal port in this vicinity. There are no aids to navigation and in the absence of prominent marks it is impossible to give directions for Baliangao, the approach to which is very complicated.

Silla Point is surrounded by a reef less than ¼ mile wide. The point may be recognized by Mount Silla, which rises to a height of 960 feet immediately behind it. Mount Silla is almost bare rock, very sharp and shaped like a thumb. It, with the adjacent hills, when viewed from the northeastward, takes the shape of a saddle.

From Silla Point the coast trends southwestward for about 2 miles and thence west-northwestward for 6 miles to Tagolo Point and is composed of low, even, mushroomed coral cliffs. The head of the bight westward from Silla Point is fringed by a wide coral

reef, leaving a passage to the village of Cavite, which is situated on the western shore.

Tagolo Point, the northern entrance point to Dapitan Bay, is the most northern point of land in this vicinity. It is about 100 feet high and is surrounded by a narrow steep-to reef. About 1 mile southeastward from the point the land rises to a height of 920 feet and is heavily wooded. The tidal currents are very strong off Tagolo Point; the flood sets eastward and the ebb westward. An occulting white light is exhibited 109 feet above high water from the top of a white concrete house on Tagolo Point.

Silino Island, lying 8 miles 16° (14° mag.) from Tagolo Point, is about ½ mile in extent, low, flat, and wooded, with sandy shore. It is fringed with a narrow steep-to reef, which on the west side extends a distance of about ¼ mile.

Aligbay Island, lying 9 miles 277½° (275½° mag.) from Tagolo Point, is about ½ mile in extent, low and wooded, and from its northwest side a steep-to coral reef extends to a distance of about ¼ mile.

Challenger Reef, lying 2 miles 160° (158° mag.) from Aligbay Island, is composed of coral and is covered by a least depth of 3½ fathoms; it is about ¾ mile in diameter within the 10-fathom curve.

Don Reef, composed of coral and covered by a least depth of 2 fathoms, lies on the bearing Tagolo Point 50° (48° mag.) and Botogan Point 103° (101° mag.). Within the 10-fathom curve it is about ⅜ mile long northwest and southeast and about one-half that in width; the shoal part is very small compared with the rest of the reef.

DAPITAN BAY

(chart 4639). From Tagolo Point the coast trends southward for about 1½ miles to Tubud Point, thence southeastward and northwestward to Botogan Point, situated 3¾ miles southward from Tubud Point, forming Dapitan Bay. The depth at the entrance is 28 fathoms, decreasing gradually to the beach at the head of the bay. Good anchorage may be found in any part of it, sheltered from all except northwesterly winds. **Tubud Point** is formed by a prominent isolated hill; it is fringed by reefs about ¼ mile wide, which extend northward to Tagolo Point. **Liuay Rock** is a flat rock about 50 yards in diameter, partly awash at high water, lying about 600 yards westward from Tubud Point. A small coral reef with a least depth of 4 feet lies 400 yards 208° (206° mag.) from the small islet off Estacion Point. Depths of over 3 fathoms are found between the reef and the point. The Dapitan River, discharging into the head of the bay, has very little water on its bar at low water; at high water and with a smooth sea small lighters can cross.

The town of **Dapitan** is situated about ⅜ mile from the beach, southward from the mouth of the river. It contains a very conspicuous church, with two pyramidal spires and an iron roof.

The usual anchorage is about ⅜ to ½ mile from shore in 3½ fathoms, muddy bottom, with the church, which is very prominent, bearing 92° (90° mag.). Good anchorage may also be found in 7 fathoms about ⅜ mile southward from the small islet off Estacion Point, with the river mouth bearing 92° (90° mag.).

TIDES.—The high-water interval is 10^h 25^m. Springs rise about 4 feet.

Port Talaguilong is a snug little port in the northern part of Dapitan Bay. The entrance, situated 1½ miles southeastward from Tubud Point, is about 300 yards wide, with a depth of 4½ fathoms in the middle. Immediately inside the entrance there is an anchorage space about ⅜ mile in extent, in which the least depth is 4¾ fathoms; northeastward from the small island in the western part of the port there is another good anchorage basin about 300 yards in extent.

From Botogan Point, at the western entrance to Dapitan Bay, the coast trends west-southwestward 1½ miles to Sicayac Point, and then southward 8 miles and westward 14 miles to Blanca Point, forming a large bay. **Botogan Point** is fringed by a narrow reef; **Sicayac Point** is fringed by rocks, always visible, which extend about 350 yards westward, beyond which shoal water extends to a distance of about 250 yards. The great bay between Sicayac and Blanca Points is deep and free from danger.

Dipolog, the largest town in this vicinity, is situated on the south side of the mouth of the river of the same name, slightly back from the beach, about 2½ miles southward from Sicayac Point. The water in front of the town shoals gradually, the 5-fathom curve being found at a distance of ⅜ mile from shore. Anchorage may be found anywhere westward from the town according to draft. The Dipolog River has very little water on its bar, but may be entered by a pulling boat at high water. There is a good road leading from Dipolog to Dapitan.

Sicayac, on the point of the same name, and **Lubungan**, **Langatian**, and **Dohinog**, westward from Dipolog, are small and unimportant. Off Lubungan and Langatian it is necessary to anchor very close in because of the great depth of water.

Blanca Point, one of the remarkable features of the coast is a perpendicular cliff of white clay about 50 feet high. It forms a long horizontal table-land covered with grass, but with no trees on it. During the rainy season a stream of good water falls from this headland. The vicinity of the point is shoal; at a distance of about 400 yards there is a depth of only 2 fathoms. Between Blanca Point and Dohinog, about 8 miles eastward, shoal water extends to a considerable distance, the 5-fathom curve being generally found about ½ mile from shore. The land in the interior in this vicinity is mountainous and there are many small peaks and ridges which are heavily wooded.

Dauit Point, about 4 miles southwest from Blanca Point, is clear and steep-to and can be recognized by a small hill in the form of an obelisk.

Tabonan Point, about 5 miles southward of Dauit Point, is high, rocky, and very steep, with a flat top. There is an anchorage in the bay between this point and Dauit Point.

Dauigan Point rises abruptly from the water's edge for about 150 feet to the tops of the trees that cover the point. The point itself below the tree line appears as a yellow bank or slide. Conical hills, varying in heights from 600 to 850 feet, lie 2 to 3 miles inland, and detached rocks and breakers extend 400 yards northwest of the point, on which the sea breaks heavily during the northeast monsoon. Southward of Dauigan Point into Sindangan Bay a coral reef 200 to 300 yards wide fringes the shore, with mangrove bushes growing well outside the high-water line. The east and southeast shore of

Sindangan Bay is composed of a low sand beach, while a cobblestone beach, with unimportant rocky points, makes up the shore of the bay from the Pian River westward to Pilandog Point.

Pilandog Point is a high cobblestone beach projecting about ½ mile from the general trend of the coast. The point is heavily wooded and, with its background of cogon, appears dark and more prominent from seaward than it really is. High cobblestone beaches, clay banks 15 to 30 feet high, and small rocky ledges make up the shore from Pilandog Point to Talisay Point. This coast is heavily wooded to the high-water line. Talisay Point, though faced by a vertical cliff, is not prominent from seaward. Bare rocks and breakers extend about 300 yards north of it. Westward of Talisay Point is an easy sand beach, with sparsely-wooded country back of it.

Sindangan Point consists of undercut cliffs and rocks, 20 to 50 feet high, with deep water close to shore on its east side. Shoal water extends about 300 yards from its north and west sides. The point itself is flat on top and heavily wooded, and when seen from northward appears to slope gradually to a 2,150-foot peak; from the south and west this slope appears broken by a series of hills which rise step by step to the high land inland.

Sindangan Bay, between Dauigan Point and Sindangan Point, affords indifferent anchorage. The best protection may be had in the eastern part of the bay near the town of Sindangan. Bring the tribunal to bear 78° (76° mag.) and anchor ½ to 1 mile from shore in 3½ to 8 fathoms of water, mud bottom. The southeast corner of the bay is very deep, a depth of 100 fathoms being found less than ½ mile offshore. Dauigan Point, Pilandog Point, and Sindangan Point serve as landmarks for navigating in the vicinity of Sindangan Bay.

Quipit Point is low, flat, and sandy, with shoal water off it. The bay to the eastward, into which the river Quipit flows, is shoal, with soundings of 6 fathoms at 1 mile from the coast. The surrounding land is low.

Murcielagos Islets, lying about 3 miles northward of Quipit Point, are two islets on an oval reef about 1 mile long east and west. The soundings around its edge are 4½ to 9 fathoms. The islets are low and the eastern and larger one is about 600 yards in length east and west. Anchorage may be had southeast of this islet in 7 fathoms, sand bottom. The channel between the islands and Quipit Point is clear and safe, with a depth of 18 fathoms in the middle of it.

Westward of Quipit the coast is low and bordered by sand beaches separated by rocky headlands and cut into by several small rivers. Anchorage may be had at 1 mile from the shore in 7 fathoms, fine sand bottom.

Gorda and **Coronado Points** are both high and steep, but Gorda Point, which lies 4 miles northeast of Coronada Point, is much the higher, and is liable to be mistaken by vessels coming from the southward for the western extremity of the land.

WEST COAST OF MINDANAO.

From Coronado Point the coast is clean and steep-to as far as Balangonan, which lies 15 miles 210° (208° mag.) from Coronado Point. **Coronado Bay,** south of the point of the same name, is sheltered from all except west and southwest winds and offers anchorage in

9 to 13 fathoms, sand bottom. In the angle northward, where a small river empties, the depth is 2¾ to 4 fathoms.

Balangonan Point is composed of dark, ferruginous rock, low and very steep-to. **Balangonan Bay**, eastward of it, is more sheltered than Coronada Bay, but its shores are very steep, so that it is necessary to anchor very close to shore. At 1 mile northward of the north point of this bay there is a small islet, clean and steep.

Port Santa Maria (chart 4644), a well-sheltered port, is situated immediately south of Balangonan Point. It is about ¼ mile wide at the entrance and extends nearly 1 mile southeast and contains two basins fit for small vessels. In the middle of the port the depth is 15 fathoms and a little less near the shore. A narrow reef fringes the shore and extends 200 yards from the western shore at the entrance of the western basin. There is also a reef making out northward of the point which projects from the south shore and forms the division between the two basins. The shores are low and covered with forests. The anchorage area is small, that in the western basin being only about 300 yards in diameter and in the eastern basin about 700 yards. Water can be obtained from a small stream in the eastern end of the port.

Dulunguin Point, southwest of Port Santa Maria, is rocky and of no great height, and is steep-to. It resembles Balangonan Point, and, coming from the southward, may be taken for it. At 600 yards from the coast, between this point and Port Santa Maria, there are four detached rocks, clean-to.

Sicogon Bay, between Dulunguin and Sicogon Points, is 9 miles wide, clean, deep, and bordered by a white sand beach, where two rivers discharge. There are some rocks lying near the shore in the middle of the bay. The depth ¼ mile from the shore is 5 to 6 fathoms, sand bottom.

Sicogon Point is rocky, clean, and steep-to.

Panabutan Bay (chart 4644) is situated between Panabutan Point, 1½ miles southeastward from Sicogon Point, and Siraguay Point. It is over 1 mile wide at the entrance and extends about the same distance eastward. A recent report states that the island shown on the chart off Panabutan Point does not exist and that the point is clean at a distance of 100 yards, and also that the northern part of the bay is not correctly charted. The Panabutan and Siraguay Rivers are shallow; water can be obtained here.

Cauit Bay, situated 3 miles southward of Panabutan Bay, is semicircular and about ¾ mile in diameter. There are small, steep reefs on both sides of the entrance and the shore of the bay is sandy. Near the south shore there is an islet about 200 yards in extent, clean and steep on the eastern side and fringed by a reef on the others. In the bay there is good anchorage in 5 to 9 fathoms, sand bottom, under shelter of the islet.

Cauit Point, southward of Cauit Bay, is high and steep; the sea slope is composed of red earth and the summit is rounded and covered with trees.

Between Cauit Point and Bototindoc Point, 9 miles southward, the coast is clean and steep and forms little bays between the intermediate points, **Pincan** and **Nanga**, which points are high, rugged, and steep. There is a small islet northward of Nanga Point, close to the shore.

Bototindoc Point is high, clean, and steep, with a flat top. At 130 yards from it there is a small pointed rock. Between this point and Nanga Point there is anchorage near the shore in 3 to 8 fathoms.

Sibuco Bay (chart 4644), situated between Bototindoc Point and Buril Point, 6 miles southward, penetrates 3 miles eastward. It is free from danger, with steep shores, bordered by a long sand beach with a small river at each end, where boats can enter and obtain water even at low tide. The depth in the bay is not less than 27 fathoms, except very close to the beach, where 11 fathoms are found. The anchorage is a good one, but a sea sets in with westerly winds. The town is 2 miles inland.

Southward of Sibuco Bay the coast is high, clean, and steep, and bordered by sand beaches interrupted by rocky cliffs as far as Batalampon Point, the western point of Mindanao. From here to Zamboanga the coast curves gradually round southward and eastward and is low, covered with trees and bordered with steep sand beaches with a depth of 14 fathoms at 200 yards distance. Coasters going from Zamboanga when the wind and tide are against them land their crews and track their vessels to Caldera Point.

Batalampon Point is of even height and steep, with a flat crown. **Alimpaya Point**, about 1 mile northward from it, is flat and sandy; **San Ramon** and **Caldera Points** are sandy beaches; all these points, as also the rounded coast they define, are clean and steep-to.

The tidal streams, which at springs reach a velocity of 5 knots an hour, set toward Caldera Point with great force.

SOUTH COAST OF MINDANAO.

Caldera Bay and port lie to the eastward of the sandy point of that name at the southwest end of Mindanao. There is anchorage in the bay in a depth of 6 to 8 fathoms, sand bottom. The inner port of Caldera can only hold four or five vessels of 6 feet draft; the entrance channel to it is but 70 yards wide and 2 fathoms deep. A supply of coal belonging to the Philippine Government is kept here; it is in charge of the collector of customs, Zamboanga.

From Caldera Point the coast trends east-southeasterly for 7 miles to the town of Zamboanga. It consists of sand beaches with some rocky bluffs and is low, steep, and wooded. Vessels can anchor, if necessary, off the town of San Mateo, 4 miles eastward of Caldera Point, on a bank of sand in 15 to 8 fathoms of water, but elsewhere along this coast the bottom is foul and uneven.

Basilan Strait, open from west to east, separates the southwest end of Mindanao from Basilan Island; it is 8½ miles wide and 24 miles long. The Santa Cruz Islands and Bank, situated on the Mindanao side, divide the strait into two channels, both equally navigable. The northern channel, although the narrower, is generally preferred by sailing vessels, as it offers the advantage of an anchorage on the coast of Mindanao in case of a calm, thus avoiding being carried away by the current.

ZAMBOANGA.

The principal town on Mindanao and the capital of the Province of Zamboanga, situated on the southwest extremity of the island facing Basilan Strait, is a small town of growing importance. It is a port of entry and maintains regular steam communication with the

ports of Mindanao and other ports of the Philippines; it is an occasional port of call for steamers from Hongkong, Australia, Celebes, Singapore, etc. There is a long wooden wharf with an L, at the end of which there is a depth of 18 feet at low water. Caution must be used by vessels approaching this wharf because of the strong and irregular currents around it. A fixed red light, visible 9 miles, is exhibited from an iron frame with a small cabin at its base at the outer end of the wharf. Water for boiler purposes can be obtained from a pipe on the wharf. A moderate supply of distilled water, coal, and stores are obtainable. Harbor improvements are in course of construction.

There is a radio station at Zamboanga, call letters WVW. The skeleton steel tower is a conspicuous object from the sea, standing about 2½ miles west-northwestward from the town.

Dry Dock.—Just inside of the mouth of the Hondo River, which discharges about ⅜ mile eastward from the fort at Zamboanga, there is a dry dock belonging to the United States Army. This dock will accommodate small vessels of 130 feet length and 8 feet draft. The river mouth is shoal and the dock can only be approached by vessels of the above draft at high water.

The anchorage off Zamboanga is not good; the narrow bank that forms it is very steep, and outside of depth of 12 fathoms the bottom is hard and uneven and many vessels have lost their anchors here. Vessels anchor anywhere in front of the town, not going inside of 10 fathoms, as the water shoals rapidly. This anchorage is much exposed to gales from west and southwest. A heavy sea sets in with these gales and is increased when the flood stream sets against the wind. Vessels have been wrecked here by sudden and heavy southwest gales, their chains having parted or their anchors dragged. On the first appearance of a southwest gale, sailing vessels slip from Zamboanga and if possible run inside Tictauan Island, where there is anchorage in Masinloc Anchorage in 7 to 10 fathoms, mud bottom, good holding ground. The approach of these storms is generally foretold by the coast of Basilan being hidden by masses of flying clouds, and the Sangboy Islands, to the westward, being lost to view; and if at the same time it should be cloudy, dark, and threatening to the northwest bad weather is certain, the wind generally beginning to blow from the northwest and backing until it settles from the southwest. The cause appears to be a typhoon passing northward. During the northeast monsoon the road is sheltered and the water smooth.

Tides and Tidal Currents.—At Zamboanga there are generally two tides in the lunar day; but at equinoctial quarterings, and when the moon has high declination, there is but one tide. The mean time of high water is $6^h\ 32^m$ after the moon's meridian passage, and the mean height of the higher high waters is 3.2 feet above the plane of reference. The same phenomenon is observed here as in the China Sea, viz, the highest tides follow the moon's superior transit when she has southern declination and the inferior transit when she has northern declination. Directions for computing the times of high water are given on the chart and they may also be found in the tide tables published annually by the Coast and Geodetic Survey.

In Basilan Strait the tidal streams follow the direction of the channel, and near the islands and shoals they follow the edge of the reefs. The flood stream sets westward and the ebb eastward with a velocity of 2 to 3 knots at neaps and 5 to 6 knots at springs. The streams have been observed, however, to set in the reverse way in the months of November and December, and sometimes to set in the same direction for 24 hours, generally from west to east, although there have been two high tides and two low tides the same day. With these exceptional cases the turn of the stream at Zamboanga takes place with slight differences at the hours of high and low water.

The turn of the tide takes place later in the strait than at Zamboanga. The change begins first on the coast of Mindanao, then in the strait, and last on the coast of Basilan.

WINDS.—In the vicinity of Zamboanga the winds which prevail during the different months of the year are in January from east and northeast, with clear weather; in February, March, and April the same winds, with occasional breezes from the northwest of short duration. In May and June it blows from the southeast and is variable, but in June there are squalls, and at the end of the month fresh breezes from the southwest. In July, August, and September it blows from the southwest with more or less force and much rain and foul weather; when a gale occurs it generally does not last more than three or four days. In November and December it blows from the north and northeast and then the monsoon becomes steady. Throughout the year, when the seasonal wind is not strong, the land breeze blows during the night, sometimes freshly.

Santa Cruz Bank is a coral bank, the northern edge of which is 1½ miles distant from the coast of Mindanao. It extends 8 miles in a direction parallel with the coast and has a general width of 2 miles. There is a channel with not less than 8 fathoms crossing the middle of the bank diagonally in a northwest and southeast direction. The shoalest water, 1 foot to 4 fathoms, is distributed in patches along the outline of the bank. There is a dangerous spot, covered by 1 foot of water, 2¾ miles westward from the middle of Great Santa Cruz Island on the continuation of a line drawn from halfway between the fort and the cemetery at Zamboanga and the eastern end of Little Santa Cruz Island.

Little Santa Cruz Island is a small, low, flat, wooded island lying on the northern edge of the bank, about 2 miles southwestward from Zamboanga. It is ¾ mile long east and west and ⅛ mile wide; each end is prolonged by a reef which dries at extreme low water to a distance of ½ mile. Shoal water of 2 fathoms' depth extends from the western reef to a distance of 1½ miles from the land.

An occulting white light, visible 13 miles over the entire horizon except where obscured by Great Santa Cruz Island, is exhibited 64 feet above high water from a white framed structure near the middle of Little Santa Cruz Island.

Great Santa Cruz Island lies on the eastern end of the bank southeastward from the smaller island from which it is separated by a channel 6 to 8 fathoms deep. This island is 1⅓ miles long in a northwest and opposite direction and nearly 1 mile wide; low, flat, and wooded and fringed by a narrow reef with 6 and 8 fathoms at its edge.

President Shoal, with depths of from 2½ to 4¾ fathoms, extends from ¾ mile 218° (216° mag.) to 1 mile 142° (140° mag.) from the eastern end of Great Santa Cruz Island.

Two shoal patches of 2 and 2½ fathoms lie, respectively, 0° (358° mag.) and 40° (38° mag.) ¾ mile from the eastern end of Great Santa Cruz Island. There is also a detached patch of 4¾ fathoms lying 111° (109° mag.) distant 1½ miles from the same point.

Clearing marks.—The southwest tangent of Mindanao, bearing 332° (330° mag.), clears the western part of Santa Cruz Bank, and the light on the wharf at Zamboanga, bearing 90° (88° mag.), clears the northern part of the bank. The north tangent to Little Santa Cruz Island, bearing 285° (283° mag.), clears the shoal patches north and northeast of Great Santa Cruz Island, and Zamboanga Light, bearing 330° (328° mag.), clears the detached 4¾-fathom patch east-southeastward from Great Santa Cruz Island.

Luzon Reef lies on the bearings: Fort at Zamboanga 5° (3° mag.) and the north end of Lanhil Island 91½° (89½° mag.). It is covered by a least depth of 3½ fathoms, is very small, and is surrounded by deep water.

From Zamboanga the coast trends east-southeasterly for about 2 miles to Mariqui Point and thence east-northeasterly for 4 miles to the mouth of the Masinloc River. This section of the coast is low and composed of mangroves and is fringed with a narrow reef that bares at low water. Shoal water extends southeastward and eastward from Mariqui Point, a depth of 4¼ fathoms being found about ½ mile southeast of it. From the mouth of the Masinloc River to the northern entrance of Masinloc anchorage the coast is low, bordered with mangroves, and fringed with reefs. About 2 miles northward from the river mouth the shore reef begins to widen and gradually attains a width of about ½ mile.

Masinloc River, discharging into Masinloc Anchorage, has a least depth of 2¼ fathoms on its bar at low water, but is very narrow and of little commercial importance. The town of Masinloc lies on the south side at the mouth of the river.

Tictauan Island, lying with its western end 1¾ miles east-southeastward from Mariqui Point, is about 2 miles long in an east-northeast and opposite direction and ¾ mile wide. Tictauan is low and entirely covered with mangroves, with the exception of a narrow strip of sand beach at the west end and a larger strip at the east end, where there are a few coconut trees and a small native village. At this end of the island there is a wide reef, partly bare at low water, beyond which shoal water with 2 fathoms at its end extends about ¾ mile from the land. Shoal water also extends westward and southward from the island, and it is recommended that these sides be given a berth of about ½ mile.

Tictauan Channel, between Mindanao and Tictauan Islands, is ⅝ mile wide at the narrowest part, 10 to 14 fathoms deep, and affords good anchorage if required.

Tictauan Shoal, about 400 yards long in a north-northwest and opposite direction and 150 yards wide within the 5-fathom curve, exists in the middle of Tictauan Channel. It is composed of sand and coral, covered by a least depth of 3 fathoms, and generally marked by tide rips. The wider and better channel lies northwest

of it. The southwest point of Tictauan Island bearing 203° (201° mag.) leads westward, and the north tangent to the same island bearing 94° (92° mag.) leads northward from this shoal.

Sacol Island, forming the eastern side of Masinloc Anchorage, is 7 miles long in a northeast and southwest direction and about 2 miles wide. The western part is low and consists mostly of mangrove swamps. In the eastern part there are three prominent hills, the middle and highest of which, known as Sacol Hill, rises to a height of 781 feet. The northwestern side, facing Masinloc Anchorage, is clean and steep-to; the northern and eastern sides are fringed with narrow, steep-to reefs, and the southern side is fringed with coral, outside of which foul ground extends to a considerable distance.

Panhapuyan Island is a small mangrove-covered island lying close to the southwest end of Sacol Island; shoal water, with 5 fathoms at its edge, extends ⅜ mile southwest from it.

Stretching out northeastward for a distance of nearly 2 miles from the eastern end of Tictauan Island there are a number of shoal patches covered by depths of from 2¼ to 3 fathoms. The channel between these shoals and Panhapuyan Island, while practicable, is not recommended for a stranger.

Masinloc Anchorage is the name given to the channel between Mindanao and Sacol Islands. From the entrance to Tictauan Channel, which may be considered a prolongation of Masinloc Anchorage, it is about 8 miles to the shoals obstructing the northern end. It is over ½ mile wide at the narrowest part and from 7 to 14 fathoms deep. Good anchorage may be found anywhere in this strait in from 6 to 12 fathoms, completely sheltered from wind and sea, and vessels take refuge here in the southwest monsoon. The flood tide sets southwestward and the ebb northeastward at the same hours as at Zamboanga.

In the northern entrance to Masinloc Anchorage there are a number of shoals which divide it into two channels, both of which are about ½ mile wide. The western channel has a least depth of 5½ fathoms and the eastern one a least depth of 6½ fathoms.

A small shoal covered by a least depth of ½ fathom lies ¾ mile northward from the north coast of Sacol Island on the bearings: West tangent to Sacol Island 224° (222° mag.), and the northeast part of Sacol Island 100° (98° mag.).

Roldan Rock is a small rock covered by a least depth of ¾ fathom lying 2⅛ miles from the north part of Sacol Island. It is surrounded by deep water and is situated on the bearings: Sacol Hill 201° (99° mag.) and the summit of Tulnalutan Island 129° (127° mag.).

Tulnalutan Island is a small island less than 1 mile in extent, clean and steep-to, with a central hill rising to a height of 269 feet. It is situated 3½ miles eastward of the east point of Sacol Island.

Sinonog Island, lying 2½ miles eastward from Sacol Island and 2 miles southwestward from Tulnalutan, is small and low except on its eastern side, where there is a cliff 100 feet high; it is surrounded by a reef which extends ⅓ mile east-northeastward with 9 to 17 fathoms at its edge.

A very small shoal of black and white sand, covered by a least depth of 4½ fathoms, exists about 1½ miles 101° (99° mag.), from Sinonog Island.

Malanipa Island lies on the northern side of the eastern end of Basilan Strait 3½ miles southward of the east end of Sacol Island. It is 1¾ miles long, northwest and southeast, wooded, and has a greatest elevation of 294 feet. **Little Malanipa**, a small, wooded islet, lies close to its eastern coast. From the west side of Malanipa a bank of fine sand, covered by depths of 4 to 9 fathoms, extends 4¾ miles westward. It is ½ mile wide near Malanipa, tapering to the western end, where a depth of 6¼ fathoms is found 1¾ miles east-southeastward of the east end of Tictauan Island.

Coco Island lies 4½ miles from the northeast coast of Basilan Island. It is about 1 mile long northwest and southeast, ½ mile wide, 489 feet high at the northwest end, and thickly wooded. The shore reef surrounding it is steep-to at a distance of 400 yards. **Little Coco Island**, of moderate height, round topped, and covered with vegetation, lies 600 yards northwestward of Coco Island; between the two there is a navigable channel 400 yards wide with depths of 3¾ to 6 fathoms, bottom sand and stones.

Sibago Island lies 7½ miles eastward of Coco Island and about the same distance northeastward from Matanal Point, the eastern extremity of Basilan Island. It is 1½ miles long in a north-northwest and opposite direction, ¾ mile wide, and covered with vegetation. It contains two distinct and prominent hills, the northern one of which is the higher. A group flashing light, visible all around the horizon from a distance of 20 miles, is exhibited at a height of 661 feet above high water, from a white steel frame structure, with black lantern erected on the highest part of the peak. The shores are low, and stretching off from the southeast side for more than ½ mile is a bank of clean sand, with depths of 5, 11, and 16 fathoms, increasing rapidly to 50 and 55 fathoms.

Lanhil Island, lying 1½ miles northwestward of Sibago, is 1¼ miles long in an east-northeast and opposite direction, 558 feet in height at the southern part, and covered with forests. The shore is low, and the reef which surrounds the island dries out ¼ mile eastward, forming a little bay southward of it. Sibago and Lanhil, seen from certain directions, appear as one saddle-shaped island; there are no outlying dangers and the channel between them is clear, having a depth of 17 fathoms, sand and stone bottom.

SIBUGUEY BAY.

From the northern entrance to Masinloc Anchorage the coast trends in a general north-northeasterly direction for about 50 miles, and then, after curving around to the eastward for about 10 miles, trends southward for about 30 miles to Lutangan Islet, off the southern extremity of Olutanga Island, forming Sibuguey Bay. This extensive bay is about 30 miles long in a north and south direction and varies in width from 33 miles abreast of Olutanga Island to 16 miles at Buluan Island.

SHOALS IN THE ENTRANCE.—In the entrance to Sibuguey Bay, about midway between Sacol and Olutanga Islands, eight distinct detached shoals have been located. Three-Fathom Shoal, shown on some charts as a 2½-fathom shoal lying 12 or 13 miles in an east-northeast direction from Tulnalutan Island, was not found in the position

usually assigned it; possibly it is one of the southern shoals of those located. The eight above-mentioned shoals are all of coral and white coral sand formation and are surrounded by deep water. In a favorable light they can usually be picked up by the color of the water; but this must not be relied on, for often the coral heads on which the least water is found are dark colored and do not show up as well as the sand of the deeper water. The positions of the shoals are fixed by the bearings of the nearest prominent landmarks that can be readily identified from the shoals, a list and description of which are as follows:

Mount Sibuguey, on the eastern side of the bay, is usually visible from all the shoals.

Sharp Peak is the highest peak on the ridge westward from Tunganan Bay. The peak is 8½ miles, 351° (349° mag.) from Mount Taguite, near the southern extremity of the ridge, and there is another peak southward from it at a lower elevation. No confusion need arise as to which is the peak to which the bearings are taken unless the ridge is in the clouds, in which case only the lower peak will be seen.

Mount Taguite is the only high hill near the coast in its vicinity. It is entirely wooded and has steep symmetrical slopes, with a smoothly rounded dome-shaped top.

Sacol Hill is the highest of the three hills on the northeastern part of Sacol Island.

Tulnalutan Island has already been described; its summit is visible from the nearer shoals.

A shoal, covered by a least depth of 4 fathoms, lies on the bearings:

Mount Taguite	284° (282° mag.).
Sharp Peak	302° (300° mag.).
Mount Sibuguey	28° (26° mag.).

A shoal, covered by a least depth of 4¾ fathoms, lies on the bearings:

Mount Taguite	289° (287° mag.).
Sharp Peak	305° (303° mag.).
Mount Sibuguey	25° (23° mag.).
Sacol Hill	240° (238° mag.).

A shoal, covered by a least depth of 2¾ fathoms, lies on the bearings:

Mount Taguite	295° (293° mag.).
Sharp Peak	311° (309° mag.).
Sacol Hill	242° (240° mag.).

A shoal, covered by a least depth of 4 fathoms, lies on the bearings:

Mount Taguite	300° (298° mag.).
Sharp Peak	317° (315° mag.).
Sacol Hill	234° (232° mag.).

A shoal, covered by a least depth of 2 fathoms, lies on the bearings:

Mount Taguite	315° (313° mag.).
Tulnalutan Island	227° (225° mag.).
Sacol Hill	240° (238° mag.).

A shoal, covered by a least depth of 6 fathoms over an area of 300 yards, lies 2½ miles eastward of the last-described shoal.

A shoal with several shoal spots 200 to 300 yards apart and covered by a least depth of 2½ fathoms lies on the bearings:

Mount Taguite	305° (303° mag.).
Malanipa Island	234° (232° mag.).
Tulnalutan Island	243° (241° mag.).
Sacol Hill	249° (247° mag.).

A shoal, covered by a least depth of 3 fathoms, lies on the bearings:

Mount Taguite	301° (299° mag.).
Malanipa Island	242° (240° mag.).
Sacol Hill	255° (253° mag.).

Angosto Shoal, covered by a least depth of 1½ fathoms, is a shoal of coral and sand ⅓ mile in extent, lying about 4 miles 75° (73° mag.) from Tulnalutan Island. From this shoal Sacol Hill and the north end of Tulnalutan Island are in range, and Matanal Point, Basilan Island, is in range with the western end of Lanhil Island.

From the northern entrance to Masinloc Anchorage the coast trends in a general north-northeast direction for 25 miles to Vitali Point. This stretch of coast is very irregular, being indented by small bays, most of which are foul and of no importance to navigation. It is cut into by a number of small streams, none of which are navigable, and there are a number of small unimportant villages scattered along the shore.

It is fringed in places by coral reefs and faced by a number of small islands, most of which are clear on their seaward sides. This section of the coast can be safely navigated by keeping 1 mile outside of the islands and outlying points.

Malasugat Point, about 5 miles north-northeastward from the northern entrance to Masinloc Anchorage, is low, wooded, and fringed by a narrow reef. Malasugat Bay, a slight indentation in the coast southwestward from the point of the same name, is nearly blocked by reefs. There is a small, dangerous 1-fathom patch lying about 1½ miles southward from Malasugat Point and about 1 mile from shore.

Panubigan Islands are a group of some 20 small islands and rocks lying off the coast between Malasugat Point and Lawigan Point, 5¾ miles northward. None of them are over 2 miles from shore. They are generally high and well wooded and do not require any detailed description. Sheltered anchorage may be found among them as will be seen by consultng the chart.

A small shoal, covered by a least depth of 4¾ fathoms and surrounded by deep water, exists on the bearings: Mount Taguite 284° (282° mag.) and Sacol Hill 216° (214° mag.).

From Lawigan the coast trends northward to Bluff Point and is indented by a number of small, unimportant bays mostly blocked by coral.

Mount Taguite is a prominent hill rising abruptly from sea level to a height of 1,400 feet and is situated about ½ mile from the water's edge and 1 mile 326° (324° mag.) from Bluff Point. It is entirely wooded and has steep symmetrical slopes with a smoothly rounded dome-shaped top. It is the only high hill near the coast in this vicinity.

From Bluff Point the coast trends northward for 3½ miles and then southeastward in a very irregular line for over 2 miles, forming

Taguite Bay. This bay is 5 miles wide between Bluff and Taguite Points and extends about the same distance northward. **Taguite Island,** lying nearly in the middle of the bay, is a wooded island about ½ mile in extent, which rises to a height of 217 feet. The bay is shoal and of no value to navigation.

Vitali Point is situated about 6½ miles northeastward from Taguite Point. This stretch of coast is heavily wooded from the shore line or inner edge of the mangrove as far as can be seen except near Vitali Point; here the low foothills are covered with rank grass. All the hills as far back as can be seen are heavily wooded to their summits. This section of the coast is fringed by a narrow coral reef. About 1½ miles southwestward from Vitali Point there is a small, low, wooded islet lying on the shore reef close to the shore. A rock awash, surrounded by deep water, lies 160° (158° mag.) distant ⅝ mile from Vitali Point.

Tigbaon Islands are a group of five islands and one rock lying eastward and southeastward from Vitali Point. They include **Tigburacao,** the **Gatusan Islands** (2), **White Rock, Bacungan,** and **Lampinigan Islands.** Tigburacao, the most southeastern of the group, is a low, flat, heavily wooded island lying about 3⅝ miles 134° (132° mag.) from Vitali Point. It is fringed by a narrow reef, widest on the western part. It is about 300 yards long east and west and 150 yards wide. Southeastward, about 100 yards from this island, are two large pinnacle rocks, the higher of which rises to a height of 40 feet. These rocks are very prominent and can be seen from a considerable distance. When seen from the eastward they appear as one. White Rock.—Over ½ mile 248° (246° mag.) from Tigburacao Island there is a white rock, bare at all stages of the tide. It stands on a small coral reef which is surrounded by deep water. Gatusan Islands, two in number, lie about 2 miles 155° (153° mag.) from Vitali Point. Both are small, about 300 yards long north and south, less than one-half that in width, wooded, and fringed with rocks. The northern island is less than 50 feet high, while the southern rises to a height of 117 feet. **Bacungan Island,** the largest of the group, lies 2 miles eastward from Vitali Point. It is about 450 yards long northeast and southwest and nearly 300 yards wide. The shores are fairly bold, and the land rises sharply from sea level to a height of 211 feet. There is a large umbrella-shaped tree remaining standing on the summit than can be seen from a considerable distance. About ⅜ mile 236° (234° mag.) from Bacungan Island there is a rock awash. The channel between the island and rock is deep and clear. Lampinigan Island lies a little over ½ mile 60° (58° mag.) from Vitali Point. It is nearly round, about 200 yards in extent, heavily wooded, and rises to a height of 192 feet. On the south and east sides are rocks, bare at low water, to a distance of 50 or 60 yards. The channel between Vitali Point and this island has a least depth of 2¾ fathoms. Lampinigan, seen from the southward, appears like a cone with a steep slope on the eastern side and a gradual rise on the western. There is a small shoal, covered by a least depth of 2¼ fathoms, lying nearly ¾ mile 92° (90° mag.) from Lampinigan Island.

From Vitali Point the coast trends sharply westward, then northward and eastward to Linguisan Point, forming Tunganan Bay. Near the coast are numerous hills with heights of from 100 to 200

feet, separated by deep, winding valleys. Back of these hills the land rises in a series of hills to the mountains well back in the interior.

Tunganan Bay is a nearly semicircular indentation between Vitali and Linguisan Points. It is about 7 miles wide at the entrance and extends some 3 miles westward. The depths decrease gradually toward the western shore, where there are extensive mud flats. Nearly the whole bay has a mud bottom, but in the few places where the depth is over 10 fathoms the bottom is sandy. There is good anchorage in 10 fathoms, mud bottom, anywhere in Tunganan Bay, on a line northward from Basan Reef, except at the northern part, where the depths are slightly greater.

Cabog and **Camugan**, two small wooded islands, but little over 50 feet in elevation, and a very small wooded islet 20 feet high lie on the same reef about 1½ miles northwestward from Vitali Point.

Basan Reef, a dangerous detached coral reef, nearly ½ mile in extent, lies 348° (346° mag.), distant 2 miles from Vitali Point. This reef, part of which bares at half tide, is the only danger on the southern side of the entrance to Tunganan Bay. On the two highest parts of this reef banks of white sand have formed and are visible from a considerable distance except at extreme high water. The north and east sides of the reef are steep-to and may be approached with safety, but the south and west sides are foul. The water deepens rapidly east and south of Basan Reef.

Tigbucay Bay is a small bay extending about 1 mile in a northeast direction from the northern part of Tunganan Bay. The southern part is apparently deep and clear, but the northern part is shoal. It is of comparatively little importance, lying as it does immediately westward from the fine harbor of Port Banga.

Bangaan Island lies between Tigbucay and Linguisan Points, the western and eastern entrance points to Port Banga. It is about ⅝ mile long in a northeast and southwest direction and has a greatest width of ¼ mile. It is sparsely wooded on the slopes, grassy on the highland, and rises to a height of 160 feet. Its shores are clean and steep-to on the northern side but foul on the southeastern and lower part of the western sides. From a point 90 yards off the northeastern point a line of rocks extends southwestward to a little below the southwest point of the island, from which point a rocky ledge extends about ⅜ mile in a southwest direction. The southwest point of the island should be given a good berth, as the water shoals rapidly, and at high water the above-mentioned rocks are not visible.

A fixed red light is exhibited 104 feet above high water from a white-framed structure on the eastern extremity of Bangaan Island.

On the northwest point of Bangaan Island there is a wharf 150 feet long, 30 feet wide, with a depth of 22 feet at its end at low water. This wharf and the sawmill to which it belongs are prominent objects, but are not visible from seaward. Fresh water is available during the rainy season only; i. e., from April to January.

Port Banga (chart 4653), opening from the northern part of Tunganan Bay, is 2 miles wide at the entrance and extends about 4 miles northeastward. It affords good anchorage, perfectly protected from all winds, for vessels of any size. Bangaan Island divides the entrance into two good channels. The port is navigable for a distance of 2 miles from the entrance for all classes of vessels and for very

small vessel nearly to its head. Lampinigan Island is a small heavily wooded island lying off the northwest side of the port, 1½ miles above Bangaan Island and about ¼ mile from the shore. Along the northwest shore of the port, northwestward of a line running 45° (43° mag.) and 225° (223° mag.) from the east side of Lampinigan Island, there is a foul ground with bare coral patches northeastward from the island and coral extending to a short distance off the points southwestward from it. On the southeast side of the port there is a small detached coral patch covered by a least depth of 3 feet at low water. It bears 155° (153° mag.) distant about ½ mile from Lampinigan Island and about ¼ mile from shore; otherwise the southeast shore of the port is clear nearly up to the beach except about Linguisan Point.

Linguisan Point, the eastern entrance point to Port Banga, is low and wooded. Surrounding the point and eastward from it along the south side of the peninsula, which forms the eastern side of the port, there is a coral shelf, partly bare at low water, extending to a distance of over ¼ mile. The extreme eastern limit of this shelf extends a little farther out and is marked by rocks showing above high water. Small shoal patches of 4 and 4½ fathoms exist 670 and 875 yards, respectively, from Linguisan Point in a line with the point and the north side of Bangaan Island.

A small dangerous detached reef surrounded by deep water lies 1 mile southeastward from the southeast point of the peninsula between Port Banga and Sibuguey Bay, westward of a line tangent to the coast when Buluan Island is just closed in by it, and from its southern edge the northeast point of Bangaan Island bears 283° (281° mag.) distant 2⅜ miles. The reef is composed of numerous coral heads, some of which bare at extreme low water.

Directions.—To enter Port Banga by the western channel, stand westward, giving the southwest point of the island a berth of at least ½ mile. When the channel is well open and Lampinigan Island begins to be shut in by the point on the west side of the port, head up the channel with the above point a little open on the starboard bow, favoring the western shore. Avoid the northwest point of Bangaan Island, and when clear of this, haul northeastward and proceed up the middle of the port, anchoring anywhere between Bangaan Island and a line drawn eastward from Lampinigan Island in 11 to 7 fathoms, muddy bottom.

To enter by the east channel, bring the northeast point of Bangaan Island to bear 295° (293° mag.) before Buluan Island is shut in by the land and steer for the point; when drawing up to it haul off to give it a berth of from 200 to 300 yards, and when the west channel begins to open haul up northeastward for the middle of the port and anchor as previously recommended.

From Linguisan Point the coast trends eastward for 1 mile and then northeastward for 5¾ miles to Bagolibud Point, at the entrance to Busan Bay, forming a peninsula between Port Banga and Sibuguey Bay. The shore line is well defined by numerous cliffy points with sandy beaches in the indentations between them. The southern part of the peninsula is covered with cogon grass and a few scattered trees. On the northern part are low, wooded hills, the northeasternmost one of which rises to a height of 183 feet and forms

the summit of Bagolibud Point. This stretch of coast is fringed by a narrow strip of coral, and there are no detached dangers with the exception of a ½-fathom patch about 1¼ miles southward from Bagolibud Point.

Panabulan Islet, situated 3 miles southwestward from Bagolibud Point, is very small and is surrounded by a reef which connects it with the land about 300 yards distant.

Loclabuan Bay is a small bay about 1½ miles southwestward from Bagolibud Point, which is about ½ mile in extent. On the northern side of this bay there is a prominent heavily wooded hill, which rises to a height of 244 feet and is the greatest elevation in this vicinity.

A small shoal covered by a least depth of ½ fathom lies about 1¼ miles 187° (185° mag.) from Bagolibud Point off the entrance to Loclabuan Bay.

Bagolibud Point, the southern entrance to Busan Bay, is a heavily wooded narrow neck of land extending in a northeast direction. Foul ground extends to a distance of ¼ mile eastward from the point and the north side is fringed by a reef and lined with mangroves. Nearly ⅛ mile northward from the point are the **Tatal Rocks**, a cluster of rocks 10 to 13 feet high, which are connected with the land by a reef bare at low water. These rocks are very conspicuous when seen from seaward.

Padugan Islet lies on the outer edge of the shore reef, which bares at low water. It is situated about 300 yards from shore, is very small, and rises to a height of 20 feet. Padugan Islet and the rocks just described mark the limit of the dangers northward from Bagolibud Point.

Busan Bay.—From Bagolibud Point the coast trends westward for 4½ miles and then, turning sharply, trends northeastward for 9 miles to Laboyoan Point, which bears 10° (8° mag.) distant 7 miles from Bagolibud Point, forming Busan Bay. Among the natural features in the immediate interior Tupilac Hill is the most conspicuous; it lies 1¾ miles back from the coast and 265° (263° mag.) from the summit of Buluan Island. It is a cone-shaped grassy hill, which rises to a height of 517 feet, and, having a wooded background, can be seen from a considerable distance seaward. Three grassy hills of less importance are situated southwestward from Tupilac and numerous low hills with grassy slopes lie around the southwest shore of Busan Bay. These hills are separated from the higher, more prominent distant hills in the interior by a valley leading inland in a westerly direction from Calug Point. A similar valley extends from the southern shore of Busan Bay to Port Banga. Anchorage with good holding ground may be found anywhere in Busan Bay.

Lalim Point, about 1¼ miles westward from Padugan Islet, is fringed by coral reefs which extend ¼ mile northward from it. The southwest corner of Busan Bay is entirely closed by coral reefs awash at low water; between the eastern limits of these reefs and Lalim Point there is good anchorage in 6 to 7 fathoms, muddy bottom.

Sadnc Islet is merely a clump of mangroves growing on the reef in the southwest part of the bay, about 300 yards from shore.

Diligan Island, lying about 1¼ miles northwestward from Bagolibud Point, is low and heavily wooded. It is about ¼ mile long east and west, half that in width, and is fringed by a narrow steep-to

coral reef. Diligan Island may be rounded in safety at a distance of ¼ mile.

Calug Point, about 2 miles northward from Diligan Island, is a low, narrow point extending in an easterly direction. A coral reef, all but the outer extremity of which is awash at low water, projects about ½ mile southward from the point. Northward from the point the shore is fringed by coral except in the bight on the north side of the point and again in the bight westward from Buluan Island.

Laboyoan Point, forming the northeastern limit of Busan Bay, is merely a mangrove point and by its position defines the mouths of the Gango and Looc Rivers, both of which are small and unimportant. From the end of the point mangroves extend about 1 mile in a northwest direction. It is surrounded by coral reefs which extend to a distance of over ½ mile.

Mount Silingin, situated from 4 to 5 miles northwestward from Laboyoan Point, is a conspicuous landmark from all parts of Sibuguey Bay. It has three prominent peaks and a lesser one rising from its northern shoulder. **Quipit Peak** (2,842 feet), the central and highest, and **Matanog Peak** (2,431 feet) have been accurately located and are readily identified unless obscured by clouds or rain.

Buluan Island, the largest and most prominent island in the northern part of Sibuguey Bay, is about ½ mile long in a northwest and southeast direction and rises in the southeast part to a sharp, heavily-wooded peak 324 feet high. It is situated 6⅝ miles 20° (18° mag.) from Bagolibud Point and about ⅞ mile southwestward from Laboyoan Point, from which it is separated by a navigable channel ¼ mile wide and 8 to 10 fathoms deep in the middle. The eastern, southern, and southwestern sides of the island are fringed with coral, bare at low water, and ⅛ mile southeastward from the island are rocks awash at high water. Deep water is found close to the reefs on all sides except the southeastern, which should be given a berth of at least ¼ mile.

Southward from the eastern edge of the reef which extends southeastward from Laboyoan Point there is a detached shoal covered by a least depth of 3¼ fathoms. It lies with its eastern edge about ⅜ mile westward from Buluan Island.

From Laboyoan Point the coast trends northeastward with a curve northwestward to Madiaop Point. Buluan River discharges about 1⅓ miles north-northeastward from Laboyoan Point; the village of the same name lies on the south side of the mouth. The village of Caparan lies on a low islet in the midst of mangroves about 3 miles 31° (29° mag.) from Laboyoan Point. A white sand beach outlines the south side of the islet.

Madiaop Point projects in a southeast direction and is fringed by a narrow belt of mangroves which are protected by numerous rocks awash at low water.

Saro Point, situated 1½ miles east-northeastward from Madiaop Point, is outlined by low cliffs. This point marks the eastern limits of the low, irregular, grass-covered hills which extend in a southwest direction toward Madiaop Point.

Bacalan Point, about 1⅓ miles east-northeastward from Saro Point, extends about ½ mile in a southeast direction. The southern extremity of the point is composed of low cliffs while a gravel beach

outlines the eastern part. The point is slightly over 10 feet high, covered with a thick growth of light timber and brushwood and is in reality an island, being connected with the mainland by an extensive mangrove swamp.

Between Bacalan Point and Taynabo Point, 3¼ miles 83° (81° mag.) from it, the shore recedes northward for about 1 mile, forming a large bay, the upper half of which is composed of mud flats bare at low water. The head of this bay is lined with mangroves and there are several small streams emptying into it. There are no villages on the shore of this bay.

Coba Islet is a very small wooded islet which rises to a height of 30 feet about 400 yards from the shore at the head of the bay. It is an islet at high water only, being surrounded by mud flats at low water. The southern side is composed of cliffs about 20 feet high, giving it a rugged appearance when seen from the southward.

Taynabo Point is the most prominent point at the head of Sibuguey Bay. Cliffs about 15 feet high outline the southern and eastern side while the southeastern side is a curved, sandy beach. The southern part is heavily wooded; the eastern part is covered with grass and brush and rises to a height of 165 feet. The point is connected with the mainland by a narrow neck of mangroves similar to Bacalan Point.

Between Taynabo Point and Ticauan Point, about 4½ miles east by south from it, there is a bay somewhat larger than the bay westward from Taynabo Point. Tando and Banco Points project southward from the head of this bay and divide it into three smaller bays. Both of these points are fringed with coral, but the bays are comparatively clean. Villages lie on the shores of the two eastern bays.

A small reef, less than ¼ mile in extent, covered by a least depth of ¼ fathom and surrounded by deep water, lies in the entrance of the bay on the bearings: Taynabo Point 277° (275° mag.) and Banco Point 51° (49° mag.). There is a clear channel ⅝ mile wide and 9 fathoms deep in the middle between this reef and the reef fringing the 15-foot rock southward from Tando Point.

Tando Point, about 1⅔ miles northeastward from Taynabo Point, terminates in low cliffs about 10 feet high. It is covered with brushwood, and at a short distance from its extremity rises to a height of 211 feet. Numerous rocks, awash at low water, lie off the south end of the point. About 400 yards southward from the point there is an irregularly shaped rock about 15 feet high.

About 1⅓ miles northwestward from Tando Point is situated one of the most conspicuous hills at the head of Sibuguey Bay. This hill is heavily wooded, detached from the higher hills of the interior, and has two similar-shaped peaks. The southwestern peak is 696 feet high, the northeastern 656 feet.

Banco Point, situated nearly 1 mile in an east-southeast direction from Tando Point, is outlined on its southwest and south sides by cliffs about 10 feet high. It terminates at the southern extremity in a sharp point surrounded by a number of rocks awash at low water. The point is heavily wooded, rises to a height of over 100 feet on the southwest side, and slopes down gradually northeastward. Mangrove swamps northward and northeastward from the point separate it entirely from the mainland.

About ¾ mile in an east-northeast direction from Banco Point is the summit of a slightly conical-shaped grassy hill, which rises to a height of 271 feet and whose grassy slopes form the most prominent natural feature at the head of Sibuguey Bay.

Ticauan Point, situated about 4½ miles east by south from Taynabo Point, is the most pronounced point in the vicinity of the northeast part of Sibuguey Bay; it extends in a southwest direction to a distance of about ½ mile. With the exception of two small inconspicuous areas of dry land, the entire point is composed of mangroves.

From Ticauan Point the coast trends eastward for 3 miles and then generally southward for 29 miles to Lutangan Islet, the eastern entrance point to Sibuguey Bay. Mangrove swamps extend along this section of the coast and completely obscure the shore line except at Patan Point, where the mangrove belt is very narrow; at Lambayogan Point; at one point in Taba Bay, off the village of Bagalamatan; and at Seboto Point. At the three latter points the shore is rocky or sandy and free from mangroves. Extensive mud flats, bare at low water, front the coast between Ticauan and Patan Points, and deep water is usually found close to the outer edge of them. An exception to this rule is found, however, just eastward from Ticauan Point, where the bare area is less than ½ mile wide while the 3-fathom curve is over 2 miles from shore. Between Ticauan and Patan Points the coast is free from danger and may be safely navigated by keeping 1 mile from shore except at the shoal area, which makes off to a distance of 3 miles off the mouth of the Siay River.

Mount Sibuguey, situated 1⅔ miles east-northeastward from Patan Point, is the most conspicuous and easily identified landmark on the eastern shore of Sibuguey Bay. It consists of one prominent peak 1,050 feet high and several peaks of lesser elevation stretching to the eastward of it.

Siay River, the largest and only river of any importance in this region, discharges into the northeast corner of Sibuguey Bay. A clear but narrow and tortuous channel, having a least depth of 8 feet at low water, winds through the mud flats of the bay to the mouth of the river. The river has been ascended to a distance of 3 miles by steam launch and no obstructions found.

Cabut Island, forming the western side of the mouth of the river, is connected with the mainland southward from it at low water and is so nearly like the mainland that it is not recognized as an island when seen from the bay.

Directions.—The following directions for entering Siay River are given by the party engaged in making the survey but implicit confidence should not be placed in them as changes are liable to take place on the bar and the position of the nipa hut referred to.

To enter the river bring the nipa hut at the mouth of the Ley River, over 1 mile northward from Cabut Island, to bear 41° (39° mag.) and steer for it; when within ½ mile of the hut change course to 90° (88° mag.) and when the eastern side of the mouth of the Ley River bears 0° (358° mag.) enter the Siay, keeping well over to the north bank, where the best water will be found until well into the river. Shoal water extends some distance from the eastern side of Cabut Island; this may be avoided by hugging the eastern bank.

Pamandian River, which discharges into the bay about 1⅓ miles southward from Cabut Island, has 5 feet of water on the bar at low water and considerably more inside.

Sibuguey River, which discharges about 3 miles northward from Patan Point, is nearly dry at the mouth at low water. This river leads to the coal deposits back of Mount Sibuguey that were worked to some extent in the past and are now being developed by the National Coal Co.

There is a small patch of coral, bare at low water, ⅓ mile from shore, at the edge of the mud flat at the mouth of the Tongcolasian River, a small stream discharging 1¼ miles southward from the Sibuguey River.

Patan Point, situated 10 miles south-southeastward from Ticauan Point forms the northern entrance to Taba Bay. The detached hill forming this point rises to a height of 244 feet about ⅜ mile eastward from its extremity. The low, heavily wooded area eastward from this hill is approximately 25 feet above sea level. The southern slope of the eastern extremity of the hill is covered with cogon grass, while the remaining portions are heavily wooded. The western extremity of the point is fringed by a narrow coral reef; low cliffs define the south side of the point.

Taba Bay (chart 4651).—From Patan Point the coast trends southeastward and southward for 5 miles and westward and northward to Cabog Point, situated 2¾ miles south by east from Patan Point, forming Taba Bay. The Cabog Islands, two small mangrove-covered islets, lie close together on a reef, part of which bares at low water. This reef extends northward from the islets to within ½ mile of Patan Point. The inclosed basin, 4 miles long with an average clear width of ¾ mile, forms the best sheltered anchorage on the east side of Sibuguey Bay. It is comparatively easy to enter at any stage of the tide and at low water the edges of the dangers are clearly defined. Coral fringes the western extremity of Patan Point to a distance of ⅛ mile and there are two small detached coral reefs, one ⅞ mile southeastward from the point and the other 1⅝ miles in the same direction and about ¼ mile from the shore; beyond these shoals the best water is found on the western side of the bay. These two detached reefs, as well as the coral fringing Pata Point, can usually be readily made out by the color of the water over them. The shores of the bay are generally lined with mangroves and the fringing reefs are very narrow. The head of the bay is shoal, and in the southeast corner are mud flats, bare at low water. A number of small unimportant streams flow into the bay. **Payao** lies on the north shore of Taba Bay eastward of Patan Point. **Bagalamatan** is situated about 2 miles southeastward from Patan Point. The point on which this village is situated is outlined by low cliffs and rises to a height of 35 feet about ⅛ mile inland. **Suong Island** is a small mangrove islet at the head of the bay; it can not be distinguished as an islet when entering.

Directions.—To enter Taba Bay, pass Patan Point on a 137° (135° mag.) course, giving the point a berth of about ¼ mile; when the eastern side of the Cabog Islands bears 180° (178° mag.), alter the course to 160° (158° mag.) and anchor according to draft.

Southward of the entrance to Taba Bay nearly to Lutangan Point the coast is foul and should be avoided by all but small craft. There are good anchorages along this coast where good shelter from all winds except those from the southwest may be had, but these anchorages are not easy to approach because of the many offshore reefs,

often not seen until close aboard, and the absence of natural objects ashore suitable for ranges or bearings. No directions for clearing these dangers other than are apparent from an inspection of the chart can be given.

About 5 miles southwestward from Patan Point there is a coral reef of which the area awash at low water is about 1 mile long north and south and 3/8 mile wide. On the northern part of this reef is a mound of white coral sand nearly 1/8 mile in diameter, which is usually awash at high water; its shape and position change with every storm. Deep water surroundes the reef on all sides, but the bright sand pile not only gives ample warning of the danger but affords a fair landmark for navigating this coast.

Labatan Hill, a heavily wooded dome-shaped hill, 440 feet high (the tops of the trees are 150 feet higher), is situated near the coast about midway between Cabog Point and Talaid Point at the entrance to Locsico Bay. It is the only elevation southward from Mount Sibuguey and for this reason is readily recognized from any part of the bay.

Pandalusan Island is a small partly wooded island situated 9 5/8 miles southwestward from Patan Point. It is irregular in shape, about 300 yards in extent, and rises to a height of 72 feet near the southeast point. A coral reef, awash at low water, extends 1/5 mile southwestward from the island, while another, not quite awash, extends about the same distance to the eastward. A narrow bank, with a 2-fathom reef at its eastern extremity, projects 1 1/2 miles eastward from the island.

Northwest Rock, about 2 miles 302° (300° mag.) from Pandalusan Island, is a small coral reef about 1/4 mile in extent, which is awash at low water. It is not easily picked up, and vessels should keep well over toward Pandalusan Island and not attempt to pass westward of this reef.

About 4 1/2 miles 188° (186° mag.) from Pandalusan Island there is a shoal nearly 1 mile in extent, covered by a least depth of 5 fathoms. This shoal has been picked up at a distance of over 1 mile by the color of the water.

East Circe Shoal lies about 10 1/4 miles 179° (177° mag.) from Pandalusan Island and is covered by a least depth of 2 3/4 fathoms. On the north side of the shoal the water deepens rapidly, but southward the depths increase gradually and depths of 16 fathoms are found 1 mile southward from the shoalest spot.

West Circe Shoal lies about 10 miles 199° (197° mag.) from Pandalusan Island and 3 1/2 miles 282° (280° mag.) from East Circe Shoal, and has a least depth of 3 fathoms on one rock near the center of the shoal. Lutangan Point, bearing 90° (88° mag.), will carry a vessel well southward of both Circe Shoals.

From Cabog Point the coast trends southward for 4 1/2 miles to Talaid Point. This section of the coast is lined with mangroves and fringed by reefs which extend to a distance of 1 mile in some places. Beyond this reef are a number of small detached reefs whose position will be best understood by reference to the chart.

Talaid Point, forming the western side of Locsico Bay, extends about 1 1/2 miles in a southwest direction. The entire point is fringed by a narrow belt of mangrove, within which the land is low and

heavily wooded. The point is surrounded by a reef which extends nearly 1 mile in a southwest direction.

Locsico Bay is about 2½ miles wide at the entrance between Talaid Point and the islet marking the western entrance to Canalizo Strait and extends about 2 miles northeastward. Its entire shore line is lined with mangroves and fringed with coral reefs. **Topocan Point** is a small mangrove-covered point extending southward from the head of the bay. This point and the long reef extending southward from it divide the bay into two arms, neither of which are of any value except to very small vessels. The main part of the bay is further obstructed by a number of small detached coral reefs, parts of which bare at low water. In the absence of any natural or artificial aids to navigation it is impossible to give any directions for this bay.

Olutanga Island lies immediately southward from the peninsula forming the eastern side of the head of Sibuguey Bay. It is separated from the mainland by a broad, irregularly shaped body of water extending from the eastward along the northern part of the island, and by Canalizo Strait, a narrow, tortuous channel which connects that body of water with Sibuguey Bay. Olutanga Island is of very irregular shape and has a greatest length north and south of 9 miles and is 11 miles wide at the widest part. The western coast is fairly regular; the southeastern and northern ends are cut into by deep bays. The entire island is low and flat, generally fringed with mangroves and heavily wooded in the interior. The only part of the island which rises above the general level is in the vicinity of Cangan Point, on the southeast side of the island, where there is a small area estimated to have an elevation of slightly less than 100 feet.

The western entrance to **Canalizo Strait** is marked by a small mangrove islet lying on the north side of the entrance about ⅛ mile from shore. This islet is situated 2½ miles 140° (138° mag.) from Talaid Point. The strait is a narrow and extremely foul channel navigable for launches only. It is about 2 miles long and from ⅛ to ¼ mile wide. At low water 7 feet can be carried through the strait, but the western entrance is only 100 yards wide between coral heads and is rather difficult to find.

From the entrance to Canalizo Strait the coast trends in a general south by west direction for 4½ miles to Deal Point and is fringed by a comparatively narrow belt of mangrove which is intersected by a number of small streams. The shore reef is nearly ½ mile wide and there are a number of detached reefs which bare at low water lying nearly 2 miles from shore.

Lipari Island, situated about 2¾ miles southward from Canalizo Strait, is a small mangrove island lying less than ½ mile from the shore. It is surrounded by a wide reef and when viewed from the westward appears to be part of the main island.

Deal Point, a low heavily wooded point fringed with a narrow belt of mangroves, is the most conspicuous point on the west coast of Olutanga Island.

From Deal Point the coast curves around in a general south-southeast direction for 4½ miles to Seboto Point, the southern extremity of Olutanga Island. Seboto Point is outlined by a curved, white sandy beach and is entirely covered with heavy timber. The shore reef widens in the vicinity of Seboto Point, where it extends

southward, partly baring at low water, for a distance of nearly 1½ miles, and eastward surrounding Lutangan and Silagui Islands. Vessels passing southward of Olutanga Island should give Seboto Point a berth of at least 2½ miles.

Lutangan Islet, lying immediately southeastward from the southern extremity of Olutanga Island, with which it is nearly connected by a mangrove swamp, forms the southeastern entrance point to Sibuguey Bay. It is about ¾ mile in extent, low and heavily wooded. Its southeastern side is composed of low cliffs and a sand beach; the remaining sides are fringed with mangroves. Its eastern extremity is clean and steep-to; on all other sides it is surrounded by reefs, partly baring at low water.

Silagui Island is a small, low island, covered with light timber, lying on the same reef as Lutangan Island and about 200 yards northward from it. Its southern and eastern sides are composed of low, brown cliffs. There is a small rocky islet covered with bushes rising to a height of 20 feet lying about 60 yards eastward from Silagui Island. The reef on which Silagui Island lies extends ⅛ mile eastward and over ½ mile northward from it. There is a small detached coral patch, baring at low water, lying about ¼ mile northeastward from the bushy islet previously mentioned. Good anchorage for a small vessel may be found in a pocket in the reef about ½ mile northwestward from Silagui Island, where there is a clear anchorage space of over ¼ mile in extent with a depth of 8 fathoms over a muddy bottom.

From Seboto Point the coast trends in a general east-northeast direction for about 10 miles to Taguisian Point, the eastern extremity of Olutanga Island and the southern entrance point of Port Sibulan. Between these two points there are two fairly prominent points, **Cangan** and **Sarva**, between and on either side of which are distinct indentations in the shore line. The first two indentations are less prominent than the third and apparently have no names. The third, between Sarva and Taguisian Points, is known as **Pongca Bay**. This bay is about 1 mile wide and extends about 3 miles northwestward; it is practically closed by reefs and affords no anchorage. All of this section of the coast is fringed by wide reefs, which bare at low water.

Arayat Shoal, covered by a least depth of 3¼ fathoms, is about 1 mile long east and west and ½ mile wide. From the center of the shoal Lutangan Point bears 272° (270° mag.) distant 7½ miles, and Taguisian Point bears 2° (0° mag.) distant 6 miles.

In the area bounded by Lutangan Island, Taguisian Point, and Arayat Shoal there are a number of shoal spots whose position will be best understood by reference to the chart. They are covered by depths of from 4 to 6 fathoms. When directly over them the bottom can be seen distinctly, and they are readily picked up from a distance by the discolored water.

PORT SIBULAN

(chart 4652) includes the central and largest part of the water area between Mindanao and Olutanga Island. It is about 6 miles wide at the entrance between Taguisian and Lapat Points and extends 8 miles northwestward. From the head of the port, the large bay,

Tantanang, extends northward into Mindanao and Tumalung Bay southward into Olutanga; there are also a number of smaller bays indenting the shores of Port Sibulan. The best water in Port Sibulan, between the entrance and the mouths of Tantanang and Tumalung Bays, is in the southwest part of the port, where the shore may be approached to a distance of ¾ mile at any place, and usually much closer.

Middle Reef, lying in the entrance to Port Sibulan, is a large detached reef covered by a least depth of 1½ fathoms. This reef has a length of about 2¼ miles in a northwest and southeast direction and a greatest width of ¾ mile within the 5-fathom curve. The least depth, 1½ fathoms over a small rocky patch, is situated on the bearings: Tangent to the west side of Letayen Island 349° (347° mag.), tangent to north side of Sibulan Island 287° (285° mag.), and Taguisian Point 175° (173° mag.). Depths of 2½ fathoms are found to a distance of ¼ mile westward and ⅛ mile southward from the 1½-fathom rock. The remainder of the reef is covered by depths of from 3 to 5 fathoms over coral and sand bottom.

Sibulan Reef is a reef covered by a least depth of 2¾ fathoms, lying about ⅞ mile 10° (8° mag.) from Sibulan Island; this reef is about ¼ mile long northwest and southeast and ⅛ mile wide. These are the only detached dangers near the recommended track into Port Sibulan.

Taguisian Point, the eastern extremity of Olutanga Island, is a long, narrow neck of land projecting in a southeast direction. It is low, heavily wooded, about 3 miles long, and varies in width from 1½ miles to ⅕ mile. Narrow belts of mangroves fringe its northeastern and southwestern sides. Cliffs, having a greatest height of 40 feet and a white sand beach, mark the southeast extremity of the point. The large trees, which cover the point, grow up to the very edge of the cliffs and present a definite and abrupt profile when seen in a northeast or southwest direction. The cliffs do not show up well when seen from offshore, being largely covered with overhanging bushes. The point is fringed by coral to a distance of ⅜ mile with good water at a distance of ¾ mile.

Coayan Bay, situated between Comot and Cambulong Points, about 2¼ and 3¼ miles, respectively, northwestward from Taguisian Point, has not been sounded out. Both of the entrance points are low and heavily wooded and fringed with mangroves. The entrance to the inner and western extremity of the bay is marked by two small detached rocky islets. The northeastern and larger of these two islets is covered with brush and rises to a height of 30 feet; the southwestern islet is also covered with brush and is 15 feet high.

The reef surrounding Cambulong Point has a depth of only 1 fathom at a distance of ⅜ mile eastward from the point. The 5-fathom curve is about ¾ mile from the shore at this point, outside of which the water deepens rapidly. From Cambulong Point the coast trends in a general northwest direction for 3½ miles to Sumangul Point, the northern extremity of Olutanga Island.

Sibulan Island, situated 5 miles northwestward from Taguisian Point and slightly less than 2 miles 110° (108° mag.) from Sumangul Point, is a small, heavily wooded island with steep rocky sides. It rises to a height of 65 feet and forms an excellent landmark for vessels bound into Port Sibulan. There is no channel between it and

Olutanga Island. Good water is found northeastward from the island, but at a distance of ¼ mile northwestward the bottom is foul, and slightly less than ½ mile in that direction there is a rock covered by ½ fathom, with fair depths on all sides.

Sibulan River discharges about ⅓ mile southwestward from Sibulan Island; the western side of its mouth is defined by rugged cliffs, while a low point outlined by a curved sandy beach marks the eastern side.

Sumangul Point, one of the most important points in Port Sibulan, is situated about 7 miles northwestward from Taguisian Point. It is very conspicuous when seen from the eastward and can be readily identified from off the entrance. It terminates in a narrow neck of land about 100 yards wide, which projects about 350 yards in a northwest direction. The point is wooded and rises to a height of 54 feet. A low saddle, rising only slightly above sea level, extends entirely across the point about 350 yards from its northwest extremity; this depression is very plain when seen from an easterly or westerly direction.

Taledom Rock, situated about ½ mile 48° (46° mag.) from Sumangul Point, is a lone dark rock, with bushes on the top, which rises to a height of 31 feet. From an east or west direction the rock shows up well, but not when seen from northward. At low water a sand spit bares to a distance of 200 yards north and west from the rock. Shoal water (less than 1 fathom) extends nearly ¼ mile northward from the rock, with the 5-fathom curve ¼ mile farther to the northward.

Tumalung Bay, the entrance to which lies between Sumangul Point, Olutanga, and Marek Point, Mindanao, is the largest indentation in Port Sibulan. It is nearly 2 miles wide at the entrance and extends about 5 miles southward. Its bottom is very irregular and there are numerous detached patches of coral and sand throughout the northern part of the bay. The southern half of the bay shoals gradually to within about 1 mile from the head, where there are extensive mud flats, bare at low water. The entire shore line is fringed with mangroves. Good anchorages in 5 to 10 fathoms are found on the eastern side of the bay southwestward from Sumangul Point. Water may be easily obtained from a small stream about ¾ mile southward from Sumangul Point. At high water a boat can be filled directly from a bamboo pipe line over the high-water shore line; at low water a boat can get within 50 yards of the pipe.

Lapinigan Islands, two in number, are situated in the western side of Tumalung Bay and mark the northern side of the entrance to Canalizo Strait. They are low, heavily wooded, and almost entirely surrounded by mangroves. Cliffs of an average height of 30 feet outline the northeast extremity of the eastern and larger island. On the smaller island two 15-foot cliffs at the northern extremity are the only points showing clear of the mangroves. Irregular bottom with shoal water in places extends a long way eastward of the islands, and they should not be approached on that side within a distance of 1 mile.

Marek Point, situated 1⅞ miles 310° (308° mag.) from Sumangul Point, is about 330 yards wide and projects ¾ mile southward, forming a small bay westward from it, into which the Modoc River discharges. The western side of the point is fringed with mangroves,

while its southern extremity is composed of a sand beach and low, perforated, rocky cliffs. On the eastern side of the point there is a reddish-brown eroded bank which rises to a height of 65 feet; part of this bank is bare and forms one of the prominent landmarks of Port Sibulan and is visible from the entrance to the port.

Saong Bay, between Marek and Tantanang Points, is about 2 miles wide and extends about 1½ miles westward. Mangroves and coral fringe the shores and project well off the southern entrance point. The Panagan River discharges into the head of the bay, and a small strip of sandy beach situated northward from the mouth of the river may be seen from the entrance to the bay.

Tantanang Bay, extending northward into Mindanao from Port Sibulan, is nearly 3 miles wide at the entrance between Tantanang and Kaladis Points and extends over 2 miles northward. This bay shoals gradually from its mouth to its head, affording good sheltered anchorage in any desired depth. Between Tantanang Point and the northeast corner of the bay the entire shore line, with one exception, is fringed with mangroves. From the northeast corner of the bay to Kaladis Point there are no points or indentations of any prominence. What small points there are are low, heavily wooded, and composed of low, reddish-brown cliffs, and every indentation is fringed with a narrow belt of mangroves.

Tantanang Point is a low, densely wooded point terminating in low cliffs about 15 feet high. A pile of rocks, bare at half tide, lies 200 yards 116° (114° mag.) from Tantanang Point. About ¾ mile 10° (8° mag.) from Tantanang Point there is a low cliff about 10 feet high showing clear of the mangroves. This cliff itself is not important, but the small point which it forms is covered with large trees, the prominence of which is increased by the growth of smaller trees on either side. A pile of rocks, awash at high water, lies about 330 yards 73° (71° mag.) from the above-described cliffs.

Kaladis Point is composed of a low, red cliff about 15 feet high. Although not very prominent, this point is, nevertheless, the most prominent point on the northern side of Port Sibulan above Tegolting Point. **Chinkang** (Naganaga) lies about ¾ mile northward of Kaladis Point. It is the location of a sawmill and wharf.

From Kaladis Point the coast trends southeastward for 2¼ miles to Tegolting Point. This section of the coast is composed of mangroves, low cliffs, and sandy beach. It is fringed by a reef, narrow at the northwest end and gradually widening to a distance of ½ mile from the coast at Tegolting Point.

At a distance of 1 mile southward from Kaladis Point and the same distance westward from the shore is the northern end of **Pandan Reef**, a large detached coral reef that is nearly bare at low water. This reef is of irregular shape, about 1¼ miles long north and south, nearly ½ mile wide in places, and separated from the shore reef by a very narrow channel with a least depth of 5 fathoms in it. Two mounds of white sand, covered at half tide, surmount this reef and greatly assist the eye in locating it. Kaladis Point, bearing 18° (16° mag.), clears the western side of this reef, and the north point of Letayen Island, bearing 92° (90° mag.), clears the south side.

Tegolting Point is the second point on the northeast side of the entrance to Port Sibulan and forms the western side of Balangan Bay. It is heavily wooded and rises to a height of 126 feet about ¾ mile

northwestward from its southern extremity. The western and southwestern sides are composed of a sand beach and low cliffs, while the eastern side is fringed with mangroves, at the southern end of which there is a prominent reddish-brown cliff about 40 feet high. This point is surrounded by shoal water to a distance of ½ mile.

Balangan Bay, between Tegolting and Lapat Points, is nearly 2 miles wide at the entrance and extends 1¼ miles northward. The head of the bay northward of the parallel of Tegolting Point is shoal. This bay affords anchorage sheltered from all winds except those from south and southeast. The entrance is from the southeastward between the reefs which surround Letayen Island and Lapat Point. This channel has a least depth of 10 fathoms in the middle and is free from danger. Good anchorage will be found in 8 fathoms, muddy bottom, about ½ mile northeastward from the middle of Letayen Island. There is also a narrow channel from the westward between the northwest point of Letayen Island and the reefs which extend from Tegolting Point about two-thirds of the way to the islands.

Letayen Island, situated in the entrance to Balangan Bay, ⅝ mile southeastward from Tegolting Point, is the largest and most important island in Port Sibulan. It is ¾ mile long northwest and southeast, ¼ mile wide, heavily wooded, and surrounded by reefs which extend to a distance of 1⅜ miles in a southeast direction.

A 3-fathom sounding is shown on the chart 1⅛ miles 222° (220° mag.) from the northwest point of Letayen Island. Depths of 3½ to 5 fathoms are shown about ⅜ mile northwestward from the 3-fathom patch.

Lapat Point, situated between the entrances to Balangan and Dumanquilas Bays, is low, heavily wooded, and fringed with a narrow belt of mangroves. Low cliffs of an average height of 20 feet outline a small part of the southern extremity of the point. Lapat Point is surrounded by reefs which extend about 1 mile southward and 2 miles eastward from it.

Directions.—Vessels entering Port Sibulan should round Taguisian Point at a distance of not less than 1 mile and steer 309° (307° mag.) to clear Sibulan Island by a distance of from ¼ to ⅜ mile, and when Taguisian Point bears 180° (178° mag.) the dome-shaped hill, Labatan, should appear between Sibulan Island and the northern coast of Olutanga. This course will carry a vessel over the southern end of Middle Reef in 3½ to 5 fathoms of water and nearly midway between Sibulan Island and Sibulan Reef. If bound to Tantanang Bay, the course may be changed to 340° (338° mag.) when Sibulan Island bears 180° (178° mag.) and the vessel proceed to an anchorage in any desired depth.

To enter the anchorage in Tumalung Bay, the 309° (307° mag.) course should be continued until Sumangul Point bears 180° (178° mag.), when the course should be changed to 216° (214° mag.), and when Sumangul Point bears 90° (88° mag.) change again to 196° (194° mag.) and proceed cautiously, as the water is always muddy and the dangers can not be seen.

DUMANQUILAS BAY

(chart 4651) is about 11 miles wide at the entrance between Lapat Point westward and Dumanquilas Point eastward and extends about

14 miles northward. It affords good shelter and holding ground among the islands and in the bays that it incloses. The general depth is from 8 to 16 fathoms, with 5 fathoms near the shore. The bottom in the vicinity of Lapat Point is rocky and irregular, and this side of the entrance should be avoided. The best channel in the bay will be found by keeping within a mile of the points on the eastern side.

Arayat Shoal has already been described. A shoal covered by a least depth of 6 fathoms lies about 3 miles eastward from Arayat Shoal. **Liscum Bank**, covered by a least depth of 8 fathoms, lies on the bearings: Lutangan Point 272° (270° mag.) and Taguisian Point 318° (316° mag.). A shoal covered by a least depth of 3½ fathoms lies about 6½ miles southeastward from Taguisian Point on the bearings: Cambulong Point 308° (306° mag.) and Lutangan Point 255° (253° mag.). **Breeches Shoal** is a large, rocky, coral shoal, extending about 1½ miles in a northeast and opposite direction, lying about 8 miles southward from Triton Island. The least depth on this shoal is 5 fathoms. From the eastern edge of this shoal the highest part of Dumanquilas Point bears 16° (14° mag.). A small rocky shoal, covered by a depth of 4¼ fathoms, lies 5 miles 164° (162° mag.) from Triton Island. A small shoal, covered by a depth of 5 fathoms, lies 5 miles 183° (181° mag.) from Triton Island, and two small shoals, covered by 3 fathoms, lie 6¼ miles 196° (194° mag.) and 4 miles 225° (223° mag.), respectively, from the same point. **Acha Rock** is a small circular patch of coral and sand, steep-to and covered by 2¾ fathoms of water. From the center of the patch Dumanquilas Point bears 87° (85° mag.) distant 5½ miles and Triton Island 68° (66° mag.) distant 3½ miles. There is considerable foul ground between Acha Rock and Lapat Point.

Muda, Dacula, and **Paya** are three small islands lying on the western side of the bay. They are clean and steep-to on their eastern sides.

Piratas Rocks are a group of rocks lying 1 mile eastward of Dacula, the middle island, and nearly 2 miles westward of a line drawn between Igat and Carabuca Points. They are steep-to and always visible except at extremely high tides.

Cherif Islands are three small islands, clean and steep-to, lying 2 miles northeastward of Dacula Island and dividing the channel into two passages. The two larger islands rise to a height of 220 and 100 feet, respectively.

Malangas has been selected as the shipping point for the coal mines of the Sibuguey district. The National Coal Co. has a temporary wharf with 25 feet of water at its end and is now building a permanent coal wharf and railway to connect it with the mines.

Dayana Island, lying 2½ miles northward of the largest Cherif Island, is small and clean.

A shoal, 200 yards long in a northeast and opposite direction and covered by a least depth of 1⅓ fathoms, lies about ½ mile 337½° (335½° mag.) from the largest Cherif Island. A shoal, covered by a least depth of 1¾ fathoms, lies about midway between Dayana Island and Igat Point; from it the northwest point of the largest Cherif Island is in line with the highest point of Dacula Island and Putili Islet is in range with the south side of Dayana Point. A shoal, about ½ mile in extent, covered by a least depth of 1½ fathoms, lies about 1 mile southeastward of Putili Islet. The channel between Igat Island and this shoal is 1¼ miles wide and has depths of 15 and

17 fathoms. A large shoal of white sand, which uncovers at low-water springs, lies in the middle of the bay southward of Igat Island.

Fatima Islands are two small islands lying close together on the southern edge of the bank which fills the head of the bay. They are clean and steep-to on the southern side. The bank northward of them nearly dries at low water. The Cumalarang River, practicable for small craft at high water, discharges 1½ miles northward of Fatima Islands.

Cabo or **Gatas Island** is a small round island lying close to the shore southeastward of Fatima Islands.

Igat Bay, a large inlet on the eastern side of Dumanquilas Bay, is 3½ miles wide at the entrance between Dayana and Igat Points and extends 5 miles southeastward, forming a safe and commodious harbor. **Putili Islet**, lying in the middle of the entrance, is very small and steep-to; the shoal lying southeastward of Putili Island has already been described.

Igat Island, 735 feet in height, forming the southwest side of Igat Bay, is separated from the mainland by a narrow channel near the eastern part of which there is a good watering place. **Igat Point**, the western extremity of Igat Island, is clean and steep-to. The bay formed by the south side of Igat Island and the mainland is 2½ miles wide at the entrance, between Igat and Carabuca Points, and extends 1½ miles eastward. It is clear with the exception of the shoal previously described.

The coast between Carabuca Point and Dumanquilas Point, 7 miles southeastward, consists of low hills covered with high trees. **Carabuca Point**, 2½ miles southward of Igat Point; **Buca Point**, 1¼ miles southward of Carabuca Point; and **Labucan Point**, 1¾ miles southeastward of Buca Point, are clean and steep-to, and may be passed within ½ mile. Between Labucan Point and Dumanquilas Point, 4½ miles southeastward, the coast line recedes eastward, forming a bay which is foul toward the head.

Triton Island, situated about midway between Labucan and Dumanquilas Points and ½ mile outside of a line drawn between them, is a small, rocky, wooded island which rises to a height of 158 feet. It is steep on the south side but sloping on the northern side; it is surrounded by a reef, narrow on the southwest side and wider on the northeast side.

Dumanquilas Point is the southern extremity of a high, bold promontory forming the eastern entrance point to Dumanquilas Bay. It is clean on the southern side but is fringed on the western side by a reef gradually widening on the shores of the bay northward.

Mount Botetian, the summit of the promontory which terminates at its southern part in Dumanquilas Point, is 735 feet high and being practically detached from the remaining high land is very prominent; it is visible from seaward under ordinary conditions from a distance of over 20 miles. From a distance it appears as an island but is connected with the mainland by an isthmus of low land 1¼ miles wide.

Directions for Dumanquilas Bay.—Vessels bound into Dumanquilas Bay should approach Dumanquilas Point with Mount Botetian bearing between 0° (358° mag.) and 320° (318° mag.). If bound for Malangas, give Dumanquilas Point and Triton Island a berth of about 1 mile and head for Muda Island on a 325° (323°

mag.) course; pass ¼ mile eastward of Muda, Dacula, and Paya Islands, continuing northward until the wharf at Malangas bears 295° (293° mag.), when it may be steered for.

If bound for Margosatubig, give Dumanquilas Point, Triton Island, Labucan, and Buca Points a berth of about 1 mile and Carabuca and Igat Points and the north side of Igat Island a berth of about ½ mile and anchor according to draft close to the old stone pier on the south side of Igat Bay. There is a small shoal extending about 300 yards eastward from the point northwestward from the pier; elsewhere deep water can be carried close to the beach and the bottom is even and muddy with good holding ground. This anchorage is perfectly landlocked and one of the best in Mindanao. Soundings on the above-described track decrease from 35 fathoms off Dumanquilas Point to 9 fathoms ½ mile westward from Igat Point, increase to 17 fathoms off the northeast side of Igat Island and then decrease gradually toward the head of the bay.

Margosatubig is a small settlement close to the stone pier previously mentioned. Fort Margosatubig, an old Spanish fort, is situated about ¼ mile southwestward from the pier. A wooden extension to the pier, practicable for vessels of 10 feet draft at any stage of the tide, has been constructed; vessels approaching this wharf should not go over 50 feet westward of it because of shoal water. A fixed red light, which should be seen immediately after rounding Igat Island, is maintained by the military authorities on the roof of the shed on the pier.

About 400 yards eastward from the above-mentioned stone pier there is a wooden wharf about 200 feet long with a depth of 18 feet at its end. This wharf belongs to a sawmill, and the larger class of coastwise vessels go to it to load lumber.

Maligay Bay (chart 4652), lying between Dumanquilas Point and Baganian Peninsula, is about 5 miles wide at the entrance and extends some 3½ miles northward. The entire shore line is fringed by a reef bare at low water and varying in width from ⅛ to 1¼ miles. A shoal bight about 1 mile in extent, blocked with mud flats, makes off in an easterly direction from the head of the bay. The shores of the western part of Maligay Bay are rocky, interspersed with mangroves, while the entire northeastern and eastern shores are fringed with mangroves excepting for a stretch of 1 mile at the base of Mount Panaga.

Mount Panaga, situated on the eastern shore of Maligay Bay, rises to a height of 515 feet, is covered with cogon grass, and presents a green appearance when seen from the sea.

In the eastern half of the entrance to Maligay Bay there are a number of dangerous rocky patches covered by a least depth of 2 fathoms. In case a vessel is bound into Maligay Bay she should bring the middle of Maculay Island to bear 0° (358° mag.) and steer for it to avoid these reefs.

Maculay Island is a small,, rocky, wooded island, 293 feet high, lying on the shore reef close to the land in the northwestern part of the bay. It is ½ mile long in a northwest and opposite direction and ¼ mile wide. Good anchorage, well protected, may be found in from 20 to 25 fathoms northeastward from Maculay Island; this is the only sheltered anchorage to be found in Maligay Bay during the southwest monsoon.

Lunqui Islet is a small, rocky, wooded islet, 284 feet high, lying on the shore reef in the northern part of the bay. It is 600 yards long east and west and 250 yards wide.

Baganian Peninsula, situated between Dumanquilas and Illana Bays, extends about 13 miles in a southeast direction and has a general width of about 5 miles. It is traversed throughout its length by a range of hills, the highest of which is Mount Flecha. The base of the peninsula between Maligay Bay and Port Sambulauan is low and only about 2 miles wide. **Mount Flecha,** situated about 4 miles northward from the south end of the peninsula, is extremely flat-topped, heavily wooded, rises to a height of 1,126 feet, and is visible from a long distance seaward.

The west coast of Baganian Peninsula is fringed by a steep-to coral reef, bare at low water, varying in width from 1 mile at the northern part to 200 yards in the vicinity of Flecha Point. Between Maligay Bay and a small bay which makes into the coast about 2½ miles northwestward from Flecha Point the coast is fringed with mangroves; thence to Flecha Point the shore is a rocky ledge about 15 feet high, broken by stretches of sand beach.

Flecha Point, the southern extremity of the peninsula, terminates in a rocky ledge about 15 feet high, back of which the land rises gradually to Mount Flecha. The point is heavily wooded and very prominent. There is an anchorage westward from Mount Flecha in about 20 fathoms. Anchorage may also be had on the sandy flat which extends nearly 1 mile off Flecha Point in 10 to 20 fathoms, but in strong winds a heavy sea sets around the point.

Paniquian Island, lying 5 miles 280° (278° mag.) from Flecha Point and about 2 miles from shore, is low, sandy, and sparsely wooded with high trees. It is surrounded by reefs, partly baring at low water, which on the southern side extend to a distance of about ¾ mile. This reef shows green, and its edges drop off almost perpendicularly to depths of over 100 fathoms. About ¼ mile 160° (158° mag.) from the island is a hemispherically shaped clump of trees, about 50 feet high, growing on the reef, which from its shape and color is more easily picked up from seaward than the trees on the island. The channel between Paniquian Island and Baganian Peninsula is deep and clear.

Tambulian Point, the southeastern extremity of Baganian Peninsula, situated about 4 miles 74° (72° mag.) from Flecha Point, is low and wooded and not very prominent unless viewed from a northeast or opposite direction. The Baganian River, a small unimportant stream, discharges through the mangroves at the head of the bight between Flecha and Tambulian Points.

ILLANA BAY

is included between Tambulian Point and Tapian Point, distant 39 miles 110° (108° mag.). It is separated from Panguil Bay, on the northern side of Mindanao, by an isthmus 7½ miles wide. The tidal currents in Illana Bay run with considerable velocity, especially the ebb, near and eastward of Flecha Point. Vessels bound from Zamboanga to Malabang and Cotabato will often find on nearing the eastern side of the bay that they have been set appreciably southward. Near Flecha Point the currents run with great velocity and

cause a heavy sea when there is any wind. Due allowance must always be made for the tidal currents, and great care exercised in coasting in this vicinity, especially in the night time.

The eastern coast of Baganian Peninsula from Tambulian Point northward is more irregular than the western. The land along this coast line rises gradually toward Mount Flecha and is densely wooded and sparsely inhabited. It is fringed by a coral reef, bare at low water, which northward from Limbug Cove gradually widens until Gasacan Point is reached, where it extends to a distance of over 1 mile. There are no large rivers along this section of the coast, the Bubuday, which discharges about 1½ miles southward from Gasacan Point, being the largest. There are no off-lying dangers in this vicinity, with the exception of Rios Rock, and the eastern side of Baganian Peninsula may be safely navigated at a distance of 1 mile.

Tambatan Point, situated about 3½ miles northward from Tambulian Point, is low and not prominent unless seen in a northerly or southerly direction.

Limbug Cove (chart 4652), about 3½ miles northwestward from Tambatan Point, is about ⅝ mile in extent. It is fringed by reefs, and reefs extend from both entrance points, narrowing the channel to a width of about 250 yards. The cove is fringed by reefs, leaving an anchorage area about ⅜ mile in diameter and 10 fathoms deep. About 1,200 yards southeastward from the entrance to the channel there is a bare bluff, which shows white in the sunlight and forms a good landmark for picking up the cove.

Rios Rock is a dangerous reef about ¾ mile in extent and covered by a least depth of 1 fathom. It is situated 5 miles 99° (97° mag.) from the northeastern Bacauayan Hill and the same distance 5° (3° mag.) from Tambatan Point. Tambulian Point, just closed in behind Tambatan Point, will clear the western side of Rios Rock, and the eastern tangent to the land northward, bearing 0° (358° mag.), leads well eastward of it.

Port Sambulauan (chart 4652), situated about 7½ miles northwestward from Tambatan Point, is of little importance, being merely a narrow tortuous break in the reefs. The entrance between Gasacan and Pisan Points is 1¼ miles wide, but reefs from both sides reduce the navigable channel to a width of ⅜ mile. The port is fringed on all sides with reefs, on which there are rocks and coral heads, bare at low water, and there are dangerous detached patches in the channel. The water is generally dirty yellow and the dangers are difficult to locate except at low water. The tidal streams follow the channel, producing strong currents and eddies at its mouth. From the middle of the entrance channel Sambulauan Hill bears 306° (304° mag.), but as the reefs overlap no courses can be steered. Contracted anchorage may be found near the head of the port in 4 to 5 fathoms, muddy bottom, but no directions can be given, and in the absence of any aids to navigation this is an extremely dangerous place to navigate.

Gasacan Point, the southern entrance point to Port Sambulauan, is low and fringed with reefs which extend nearly 1½ miles eastward from it. At a distance of ½ and ¾ mile southward and southwestward from the point are situated the **Bacayauan Hills**, which form prominent landmarks for the entrance to Port Sambulauan. The

northeastern hill is 405 feet high and well wooded; the southwestern hill is 360 feet high, bare, and covered with grass.

Sambulauan Hill, lying about ½ mile northwestward from the head of Port Sambulauan, is about 300 feet high and covered with grass. It is much lower than the mountains behind it, which attain altitudes of almost 2,000 feet, but, owing to the fact that it is covered with cogon grass, it stands out prominently, especially on a clear day.

The town of Dinas, situated about 2 miles northward from the head of Port Sambulauan, on the Dinas River, which discharges on the western side of Pisan Island, is not visible from the sea. It has a population of about 2,000, several Chinese stores, and a market.

Pisan Island, forming the northeastern side of Port Sambulauan, is low, unimportant, and ill defined, consisting mainly of mangroves. It is irregular in shape, about 3 miles long northwest and southeast and has a general width of 1 mile. It is separated from the mainland by the Dinas and Panaldan Rivers.

Pisan Point, the southern extremity of Pisan Island, consists of mangroves and is surrounded by reefs, baring at low water, which extend to a distance of 1½ miles southeastward and 2½ miles eastward from it.

Malubug Bay, included between Pisan Point and Malubug Point, 6½ miles northeastward from it, is nearly blocked with reefs, the greater part of which are awash at low water, leaving narrow channels between them. The entire shore line is composed of mangroves, back of which the land rises gradually to the mountains. Two large rivers, the Panaldan and Tuludan, discharge into Malubug Bay; their delta forms a network of small streams through the mangroves. Two small villages, Calipapa and Dansalan, lie on the shore of the bay.

In addition to the reefs blocking Malubug Bay, there are a number of detached reefs covered by a least depth of 2 fathoms lying in the entrance to the bay. They lie in a northeast and southwest direction on a line between the reef extending eastward from Pisan Point and Sagarayan Island. The channel between their northeast extremity and Sagarayan Island is nearly ¾ mile wide, deep and clear. The middle of Sagarayan Island kept bearing nothing eastward of 2° (0° mag.) will clear all dangers in the approach to Malubug Bay.

Sagarayan Island, lying about 1 mile southward from Malubug Point, at the northeastern entrance to Malubug Bay, is a small prominent well-wooded island about ¾ mile in extent. It rises to a height of 375 feet in the southwestern part and is surrounded by reefs which partly bare at low water. There is no channel between it and the mainland. Good protected anchorage may be found about ¼ mile westward from the western extremity of Sagarayan Island in 16 fathoms, muddy bottom. This is the best anchorage in this vicinity.

Ticala Islets are three small, wooded islets lying between Malubug Point and Sagarayan Island. The two southern islets lie on the same reef as Sagarayan Island and immediately northward from it. The western of these two rises to a height of 185 feet and the eastern one to a height of 170 feet; the northern islet lies on the shore reef surrounding Malubug Point and rises to a height of 120 feet.

A small coral reef about ¼ mile in extent, covered by a least depth of 4½ fathoms and surrounded by deep water, lies about ¾ mile eastward from the southeastern Ticala Islet on the bearings:

Southeast tangent to Sagarayan Island 232° (230° mag.) and the northern Ticala Islet 300° (298° mag.).

From Malubug Point the coast trends northerly and then northwesterly for 7½ miles to Dupulisan Point. This section of the coast is bold and rises very rapidly to heights of from 1,400 to 1,600 feet. The shore line is rather irregular, being indented by a number of small coves, at the heads of which small streams discharge through the mangroves; all of these coves are blocked by reefs and are of no value of navigation. The small villages of Dinapan, Culacion, Tagalo, and Nupulan lie on this stretch of coast. The points Pangpang, Tucabadoc, Quiramat, and Tagalo are poorly defined, and from all positions offshore the coast appears very rounded. All the points are fringed by reefs to a short distance.

Tagalo Point, the northeastern extremity of the land in this vicinity, is a bold, round headland, which rises to a height of 800 feet at a distance of ¾ mile inland; it is fringed by a very narrow reef and can be passed in safety at a distance of ½ mile.

About 2½ miles northeastward from Sagarayan Island is the southern extremity of a large reef which extends nearly 1 mile in a north and south direction and is about ⅜ mile wide. This reef is covered by a least depth of 2 fathoms and its presence is plainly marked by discolored water. There is a channel nearly 1 mile wide between it and the shore reef. The southeast tangent to Sagarayan Island bearing 225° (223° mag.) and the tangent to the land northward bearing 348° (346° mag.) clears the southeastern and eastern sides, respectively, of this reef.

About 1 mile northward and 1½ miles northeastward from the above-described reef and 1½ and 2 miles eastward from Tucabadoc Point are two small rocky patches covered by 4½ and 5½ fathoms, respectively. The southeast tangent to Sagarayan Island bearing 215° (213° mag.) and the tangent to the land northward bearing 332° (330° mag.) clears the eastern side of these reefs. The channel between these reefs and the land is 1 mile wide, deep, and clear.

At a distance of 1⅝ and 2⅝ miles eastward from Tagalo Point are the **Tagalo Reefs**, two in number. They consist of two small rocky patches each covered by a least depth of 2¼ fathoms with a deep channel between them. The western reef lies on the bearings: Dupulisan Point 302° (300° mag.) and summit of Sagarayan Island 204° (202° mag.). The eastern reef lies on the bearings: Dupulisan Point 296° (294° mag.) and summit of Sagarayan Island 210° (208° mag.). The channel between them and Tagalo Point is deep and clear.

Pagadian Bay (chart 4652), situated in the northwestern part of Illana Bay, is about 9 miles wide between Tagalo and Calibon Points, extends about 5 miles northwestward, and includes the anchorages of Dupulisan and Pagadian. The land on the western side of Pagadian Bay rises gradually toward the mountains, while the land on the northern side is low and flat. Near the middle of the entrance is the southeastern limit of the **Boca Reefs**, a chain of reefs which extend nearly to the shore about 4 miles northwestward. Parts of these reefs are always awash, parts awash at low water, and the remainder covered by very little water. There are several channels between these reefs and there is also a channel between them and the shore

northwestward, but the better channel into Dupulisan and Pagadian Anchorages is between them and Tagalo Point. The southeastern limit of these dangers lies on the bearings: Dupulisan Point 273° (271° mag.) and Calibon Point 45° (43° mag.).

Dupulisan Point, about 3 miles northwestward from Tagalo Point, is about 40 feet high, covered with cogon grass and stands out clear from the wooded background which rises to a height of over 700 feet at a distance of less than 1 mile inland. It is fringed by a narrow steep-to coral reef.

Dupulisan Anchorage, immediately westward from Dupulisan Point, is nearly 1½ miles wide at the entrance and extends about 1 mile southwestward. The shores of the bight are fringed with coral, but the middle is clear and good anchorage may be found in 15 fathoms, muddy bottom.

Pagadian Anchorage, northward from Dupulisan Anchorage, is fringed with reefs, and in the northern part there are several reefs awash at low water. The remainder is clear and affords a large area of good anchorage in any desired depth. The village of Balangasan lies on the shore at the northwestern part of the anchorage and the village of Pagadian lies between the mouths of the Pagadian and Talapacan Rivers on the eastern shore.

About ⅝ mile 70° (68° mag.) from the northern entrance point to Dupulisan Anchorage there is a small reef covered by a least depth of ½ fathom.

Dumagui Islet is a small wooded islet 190 feet high lying close to the shore on the western side of the entrance to Pagadian Anchorage. It may be safely passed on its eastern side at a distance of ¼ mile. **Lampaqui Islet** is a small, low, flat, wooded islet lying on the shore reef at the head of the anchorage. Good anchorage may be found midway between Dumagui and Lampaqui Islets in 14 fathoms, mud bottom, or in the same depth between Lampaqui Islet and Pagadian. In approaching the latter anchorage care should be taken to avoid the foul ground lying about ½ mile southeastward from Lampaqui Islet.

Suanbato Point, on the eastern side of Pagadian Anchorage, is low and flat, covered with mangroves and fringed by reefs which extend over ½ mile southward. This point is not readily made out from the southward but shows up well when seen from the westward or eastward.

From Suanbato Point to Calibon Point the coast trends 80° (78° mag.) with a curve northward for about 8 miles, and is low and fringed with mangroves. From Suanbato Point to within 1½ miles of Tucuran River, reefs extend to a distance of about ½ mile; here the reefs terminate and the remaining stretch of coast is very steep-to. The valley between Calibon Point and the eastern shore of Pagadian Anchorage is drained by a number of rivers and is the richest and best cultivated tract of country on the shores of Illana Bay. Marum, Muricay, Maliang, Balaniug, Tanagun, Labangan, Giel, Bayon, and Tucuran are small villages lying on the shores of this section of the coast.

Tucuran, at the mouth of the river of the same name, consists of three houses and some old barracks on the hill. The governor's house is near the blockhouse on the beach. Anchorage may be had,

300 or 400 yards from shore, in 20 fathoms, muddy bottom, by standing in with the blockhouse near the beach bearing 355° (353° mag.). This anchorage should be approached cautiously, as the water shoals suddenly. The sea in this vicinity is much discolored at times by muddy water from the river.

Calibon Point, situated about 1 mile eastward from the mouth of the Tucuran River, is fringed by a narrow very steep-to coral reef, The land back of the point rises rapidly to heights of over 1,000 feet, which are covered with cogon grass and small timber. This ridge is the only mountain of this description on the north shore of the bay and is easily distinguished as far as Flecha Point by its green appearance.

Dugolaan Point, about 6 miles eastward from Calibon Point, is surmounted by a hill 335 feet high and is clean and steep-to. The greater part of the shore line between Calibon and Dugolaan Points consists of mangrove swamps with flat heavily wooded land behind them. Coral reefs, which partly bare at low water, fringe this section of the coast to a distance of ⅜ of a mile in some places.

A chain of dangerous detached reefs, covered in places by as little as 1½ fathoms of water, begins at the shore reef about 2 miles eastward from Calibon Point and extends in a southeast direction for about 7 miles to within a little over a mile from Semaruga Point. These reefs are steep-to on their seaward sides. Channels between the reefs are frequent and under favorable conditions it is an easy matter to pass inside of them.

There is no anchorage westward from Dugolaan Point inside the reefs, as in most cases they join the shore reef, but good clear anchorage may be found eastward from Dugolaan Point, in Caromata Bay, in about 20 fathoms, muddy bottom.

Caromata Bay, between Dugolaan Point and Semaruga Point, 5 miles southeastward from it, is clear with the exception of a coral patch covered with a least depth of 2 fathoms lying about ½ mile from shore with Semaruga Point bearing 165° (163° mag.) distant 2 miles. Elsewhere the water shoals gradually toward the shore, affording anchorage in any desired depth. **Dato Rock** is a large rock awash, lying about 1 mile northward from Semaruga Point and 300 yards from shore.

Semaruga Point, the eastern entrance point to Caromata Bay, is a small well-wooded promontory, 130 feet high, connected with the mainland by a low isthmus. It is clean and steep-to.

Sigayan Bay, lying between a point about ⅝ mile eastward from Semaruga Point and Sigayan Point, is about 2 miles wide and extends 1 mile northeastward. The shores of Sigayan Bay rise gradually to an elevation of 100 feet and then abruptly to a ridge about 1,000 feet in elevation. Sigayan Bay is deep and clear, and anchorage, well protected from northerly winds, may be found near its head in 20 fathoms, sandy bottom.

Sigayan Point, the southeastern entrance point to Sigayan Bay, is over 100 feet high, well wooded, clean, and steep-to.

About ½ mile southward from Sigayan Point there is a reef covered by a least depth of 3¾ fathoms with a deep channel between it and the point.

From Sigayan Point the coast trends 107° (105° mag.) with a curve northward for 13 miles to Lapitan Point and is clean and

fairly steep-to. It consists of a number of small, bold points with small bays between them. There are a number of small villages scattered along this section of the coast, but no ports of any importance. Viewed from seaward the land appears very mountainous, but none of the peaks are very prominent except Mount Iniaoan, situated about 9 miles northward from Magapu Point. **Mount Iniaoan** is fairly conical in shape, well wooded, and easily distinguishable and attains an elevation of 5,204 feet.

Selungan Point, situated about 2½ miles eastward from Sigayan Point, is steep and rocky and rises to a height of 370 feet at a distance of ⅓ mile inland. The shore between Sigayan and Selungan Points is mostly sand beach, back of which there is a large valley, partly cultivated but mostly grown up with cogon grass and scragly trees.

Magapu Point, lying about 5 miles eastward from Selungan Point, consists of three small steep-to headlands and is very abrupt, rising to a height of 1,094 feet at a distance of 650 yards inland. This is a very prominent headland and forms a good landmark. The shore between Selungan and Magapu Points is alternately sandy and rocky. There are no rivers of any size between these two points. About ½ mile westward from Magapu Point there is a small rocky islet about 75 yards in extent, round in shape, 44 feet high, and topped by a few trees.

Subuan River is a small stream discharging about 1½ miles eastward from Magapu Point. It is about 50 yards wide at its mouth and has about 1 foot of water on its bar at low water. This river drains a large flat valley between Magapu and Lapitan Points, which is cultivated to quite an extent and inhabited by Moros. Between Magapu Point and Tuca Bay the coast line is regular, almost straight, and the beach is sand.

Tuca Bay, lying just northwestward from Lapitan Point, is small, being only about ½ mile in extent. The head of this bay is fringed with mangroves, and reefs make out from both sides. The small village of Tuca stands on the bluff adjacent to the eastern side of the bay.

In most places along the coast between Sigayan and Lapitan Points the water is too deep for anchorage, the depths increasing rapidly from 2 fathoms. Anchorage may be found close in, in 20 fathoms of water, off the Subuan River and also westward from Magapu Point. Good anchorage may be found from 1 to 2 miles westward from Selungan Point. The flood tide runs northwestward, parallel with the coast, and the ebb tide in the opposite direction.

Lapitan Point is rather low and flat and mostly covered with cogon grass. The shore is rocky with low rocky bluffs. Immediately back of the point the land rises to an elevation of 400 feet and then slopes gradually back to the mountains, which have a general elevation of about 2,500 feet. The small village of Damitan lies on the right bank of a small stream of the same name between Lapitan Point and Port Baras; from here a valley extends some distance inland.

From Lapitan Point to Port Baras, about 2 miles eastward, the shore is irregular and is composed of alternate sandy beaches and low, rocky points, behind which it is somewhat hilly and covered with grass and trees.

Port Baras (chart 4652) is about ¾ mile in extent; the middle of the bay is deep but the head and eastern part are shoal. About 3 miles back from Port Baras are high, heavily wooded hills, between which and the shore the land is low and wooded.

Ibus Island is a small island covered with coconut trees and bushes forming the eastern entrance point to Port Baras. It is 115 feet high to the tops of the trees; the southern part is high with a rocky shore, while the northern part is low with a sandy beach. Shoal water exists between the island and the mainland.

From Port Baras the coast trends southeasterly for about 3 miles to the mouth of the Mataling River and is low and sandy and cut into by a number of small streams. It is lined with trees and bushes and for some 3 miles inland is low. The Mataling River is nearly dry at its mouth at low water.

Malabang lies on the Malabang River, which discharges about ½ mile southeastward from the mouth of the Mataling. It is about ¾ mile from the beach, is very small, and owes its slight importance to the fact that it was formerly a military post. There is a poor sandy road from the beach to the town. The river is only navigable by small pulling boats. The telegraph cable to Parang starts from a cable box on the beach 880 yards southeastward from the northern blockhouse and is laid southwestward for 2 miles; thence southeastward. The Bureau of Posts also has a radio station at Malabang.

LANDMARKS.—Good landmarks in this vicinity are the Dos Hermanos Peaks, the fort at Malabang and two white blockhouses. The **Dos Hermanos Peaks** are two round-topped peaks connected by a saddle lying about 6 miles northeastward from the mouth of the Malabang River. These peaks lie about ¾ mile apart in a northwesterly and southeasterly direction and rise to heights of 2,671 and 2,707 feet, the southeastern one being slightly the higher. The fort at Malabang is prominent and shows up well from seaward. The northern blockhouse, a white stone tower, is situated about 160 yards from the beach, on the right bank of the Malabang River; the northern blockhouse and fort when in line bear 47° (45° mag.). The southern blockhouse lies about ½ mile southeastward from the northern and about 440 yards from the beach. The only danger northward of the usual approach to Malabang is a small shoal patch covered by a least depth 3¼ fathoms lying 2½ miles 269° (267° mag.) from the southern blockhouse.

The usual anchorage for Malabang is in 12 or 15 fathoms, about 600 or 800 yards southwestward from the northern blockhouse.

DANGERS IN THE APPROACH.—**Buford Reef**, covered by a least depth of 2 fathoms, is over ½ mile long northwest and southeast and ½ mile wide within the 10-fathom curve. From the center of the reef the southern blockhouse bears 22° (20° mag.) distant 5 miles and Tugapangan Point 132° (130° mag.). There is a detached patch, covered by a least depth of 3½ fathoms, lying about ⅝ mile 9° (7° mag.) from Buford Reef.

Pinatayan Shoal is about ½ mile long east and west, of irregular shape, and covered by a least depth of 1½ fathoms. From the center of the shoal the southern blockhouse bears 349° (347° mag.) and Barrel Rock, off Matimus Point, 105° (103° mag.) distant 2½ miles. The eastern edge of Pinatayan Shoal is marked by a red and black

horizontally striped buoy. The channel between Pinatayan Shoal and Matimus Point is 2 miles wide, clear and deep.

A small dangerous shoal nearly ¼ mile in extent, covered by a least depth of 1¾ fathoms, exists 2⅜ miles 188° (186° mag.) from the southern blockhouse and nearly 1½ miles from the shore. The extreme western edge of this shoal is marked by a red and black horizontally striped buoy. There is a small detached patch of 5½ fathoms lying nearly ¼ mile northeastward from the 1¾-fathom shoal. There is a good channel ¾ mile in width between the 1¾-fathom shoal and the shore reefs.

From the mouth of the Malabang River the coast trends southeasterly for about 9 miles to Tetian Bay and is mostly sand, lined with trees and bushes. It is fringed by a steep-to reef, which in some places extends to a distance of over ½ mile. About 3 miles southeast of the Malabang River is a rocky point with a few outlying rocks bare at low water; on the southeast side of the point are a few coconut trees. Southeast of this point is the mouth of the Lalabuan River, nearly bare at low water. Lalabuan, consisting of a few native houses, lies on the right bank.

Salauang Point is low and sandy and covered with trees and fringed by reefs to a distance of ½ mile. The Balabagan River empties about 1½ miles southeastward from Salauang Point. The land for about 3 miles inland is low and wooded; back of this, in the interior, are high mountain peaks attaining an elevation of about 4,000 feet.

Tetian Bay, about 1 mile in extent, affords good anchorage, especially in the northern part. The northern shore is low and sandy, while the eastern shore is composed of alternate sandy beaches and rocky points. The Matimus River, with a village of the same name at its mouth, discharges near the head of the bay; its mouth is nearly bare at low water.

Matimus Point, 8½ miles south-southeastward from Malabang, is 322 feet high and wooded and the shores are rocky with low rocky bluffs fringed by a narrow reef.

Barrel Rock, the largest of three rocks lying about 100 yards from Matimus Point, is 24 feet high and very steep; a lone tree stands on top of it. These rocks form the western entrance point to Tetian Bay and may be passed in safety at a distance of 250 yards.

At a distance of ¼ and ½ mile from the shore, about 1 mile southward from the 322-foot hill on Matimus Point, are two shoal spots covered by ¼ and 4 fathoms, respectively.

Lalabugan Bay, between Matimus and Tugapangan Points, is about 1½ miles wide and extends about 1 mile eastward. In the northeast and southeast parts of the bay are two small bights, the southeastern being somewhat the larger. At the heads of these bights are sand beaches and a few houses. Between the bights and northward from them the land is high, and covered with grass and trees. The shore is somewhat rocky and fringed by a coral reef. The southern shore of the bay is composed of alternate sand beaches and rocky points. The water of the bay is deep; the bay is open westward and does not afford any good anchorage.

Tugapangan Point, about 4½ miles southeastward from Matimus Point, is clean and steep-to, and may be rounded at a distance of ¼ mile. It is 350 feet high, rocky, with low rocky bluffs, and covered with grass and trees.

Bongo Island, off the entrance to Polloc Harbor, is nearly 6 miles long northeast and southwest, from 1 to 1½ miles wide, and heavily wooded throughout. The northern part is low, but toward the southern end it rises to a height of about 300 feet. It is fringed by reefs which on the northeast, north, and the northwest sides extend to a distance of ½ mile. On the northwest side of the island foul ground extends 1½ miles beyond the edge of the shore reef, and this side of the island should be given a wide berth. There are several small islands lying 50 to 200 yards from the southeast side of the island. The channel between the reef extending from the northeast point of the island and Tugapangan Point is 4 miles wide and free from danger. **Limbayan Island** is a small island lying on the edge of the reef about 150 yards from the south end of Bongo Island; it is 28 feet high and forms a prominent landmark when seen from an east or west direction.

A small coral shoal, covered by a least depth of 3¼ fathoms and surrounded by deep water, exists about 3 miles northwestward from Bongo Island on the bearings: North end of Bongo Island 82½° (80½° mag.) and south end of same island 148° (146° mag.).

A small coral shoal, covered by a least depth of 4 fathoms and surrounded by deep water, exists about 4 miles northwestward from Bongo Island on the bearings: North end of Bongo Island 83° (81° mag.) and south end of same island 139° (137° mag.).

Directions between Malabang and ports southward.—Vessels leaving the anchorage at Malabang should steer out southwestward until Tugapangan Point is well open of Matimus Point, bearing about 143° (141° mag.). From this position steer for Matimus Point, passing westward of the buoy on the 1¾-fathom patch and eastward of the buoy on Pinatayan Shoal. When drawing up toward Matimus Point haul off to give it a berth of about ½ mile in passing and then steer to give Tugapangan an equal berth.

Polloc Harbor (chart 4654), between Tugapangan Point northward and Marigabato (Red Rock) Point southward, is an excellent harbor, well sheltered, with an easy entrance, but with a considerable depth of water. It is open westward, but it is protected from winds from that quarter by Bongo Island. On the north side it contains the bays of Quidamak and Sugut, and on the south side a wider bay, in which are the anchorages of Polloc and Parang. A steep coral reef fringes the shore; on the north side it is very narrow; on the south side it extends 400 to 700 yards from the shore, and south of Sugut Bay it projects nearly 2 miles to the southwest. The depth at the entrance is over 40 fathoms; within it ranges from 15 to 25 fathoms and alongside the fringing reef about 5 fathoms. There is a small detached hill at the head of the bay, which serves as a good mark for vessels bound for Parang.

Parang lies on the side of the hill on the eastern shore of the harbor, 150 to 200 feet above the sea, and is very prominent. From the foot of the hill an old stone mole with wooden extension extends in a southwest direction. Vessels of moderate size can be berthed across the end of the wharf, where there is said to be a depth of 26 feet at low water. There is good anchorage for large vessels about ¼ mile from the end of the wharf in 14 or 15 fathoms of water. The telegraph cable from Malabang lands in a small cove on the north side

of the mole. The town is also connected with Cotabato by road and trail. A fixed red light, which should be visible from a distance of 7 miles, is exhibited from a white wooden-framed structure erected on a hill about 400 yards 103° (101° mag.) from the end of the wharf.

Polloc Island is a small, irregular-shaped island on the south side of Polloc Harbor. It is separated from the mainland by a narrow channel called Sampinitan Creek, having less than 2 feet of water in it at low water. The northern and eastern sides of the island are fringed with reefs and shoals and should be given a berth of not less than ⅜ mile. **Marigabato** or Red Rock Point is clean and steep-to on all except the northern side, where a rocky ledge, uncovering at low water, extends to nearly 200 yards.

Polloc is a small town lying on the eastern side of the island. A long stone mole extends off from the northern part of the town. There is an iron-framed beacon bearing 80° (78° mag.), distant about 300 yards from the end of the mole, from which a light was formerly exhibited. On the south side of the mole, at the inner end, there is a small dry dock said to have a depth of 6 to 7 feet over the sill.

Anchorage for large vessels may be found on a prolongation of the line of the mole and about ⅜ mile from the end of the mole in 17 fathoms, muddy bottom. Small vessels can anchor farther to the southward and westward, not going much inside of 14 fathoms, as the banks on the south side of the harbor are very steep.

There is anchorage in 8 fathoms on the eastern side of Quidamak Bay. Sugut Bay is half filled by a reef. There is a village on its western side.

Winds in Polloc Harbor.—During the first months of the year, when the wind is well established from the northeast, there are often squalls in the afternoon from the north, accompanied with much lightning, wind, and rain. Before the squall begins the wind blows from the northwest and west, and after it is over the land breeze sets in until the following morning. During the southwest monsoon the wind freshens after midday and varies from the southwest to west and northwest; rain falls in abundance and heavy thunderstorms occur.

Tides.—There are two tides in the day, with some rare exceptions, which take place in the quarters of the equinoxes when the moon is at her greatest declination. The mean establishment is 6^h 16^m. Springs rise 7 feet, neaps 4½ feet. The tidal stream turns at high and low water in Polloc Harbor and at all the ports on the coast between Zamboanga and Polloc. On the coast, with a rising tide, the stream sets north, northwest, and west according to the local configuration. At Polloc Harbor, with rising tide, the stream sets eastward on the shore and follows the bend of coast southward and westward; the ebb stream sets in the reverse direction.

From Marigabato Point, the western extremity of Polloc Island, the coast trends southerly with a slight curve eastward for about 5 miles to Panalisan Point, the northern entrance point to the Cotabato entrance to the Mindanao River. This stretch of coast is low, intersected by a number of small streams and fringed by a reef which in some places extends to a distance of ¾ mile.

Anchorage for vessels desiring to communicate with Cotabato may be found on the edge of the reef northwestward from Panalisan Point; this anchorage is not to be recommended for large vessels. In

attempting to anchor here several vessels have got ashore and it should be approached with great caution unless the mariner is familiar with the locality. The best anchorage will be found nearly 1 mile from shore, in 5 to 20 fathoms, muddy bottom, with Mount Cabalata open westward of Timaco Hill bearing 199° (197° mag.) and the south end of Bongo Island bearing 277° (275° mag.). A black can buoy has been placed as a guide to this anchorage in 4 fathoms, muddy bottom, with the lighted beacon at the mouth of the river bearing 170° (168° mag.), distant about 1 mile. The recommended anchorage is northwestward from the position of this buoy. The beacon is a white steel-framed structure on a concrete base on the southern point of the Cotabato entrance to the Mindanao River, from which there is exhibited, at an elevation of 25 feet above high water, an automatic acetylene light showing one white flash every 5 seconds.

Mindanao River (charts 4654 and 4655), the largest river in the island of Mindanao, discharges 5 to 10 miles southward from Polloc by two large and several small mouths. It is navigable by the northern entrance by small seagoing vessels for 5 miles, to the town of Cotabato and for vessels of 3½ feet draft for 60 miles farther. It flows through a beautiful, fertile valley, about 30 miles in width, which scarcely shows any change of level. The course of the river lies northwesterly for 45 miles between its mouth and Liguasan Marsh, out of which it seems to flow; from the other side of the marsh the direction of the river is south-southwest from its source in the Sugot Mountains. At 21 miles from its mouth the river divides into two arms, which enter the sea about 4½ miles apart and between them form a great delta. These branches communicate by a number of small channels. The northern arm is the wider and deeper and is navigable for small steamers. The southern arm is narrow and has a depth of only ½ fathom on its bar at low water. Near the mouths of the Mindanao and sometimes well out to sea are found numerous small floating islands composed of grass and floating débris of all kinds, and logs and trunks of trees of considerable size are frequently seen. The river currents are felt well offshore, and at times discolored water extends to Bongo Island and Polloc Harbor. The bars at the entrances are subject to change during freshets.

Timaco Hill, lying close to the shore, between the main entrances to the river, is the summit of a rounded heavily wooded island. It rises to a height of 603 feet and is very conspicuous, being surrounded by low land. Its western point is very rocky and rugged with low rocky cliffs 50 feet high. Several rocks lie off its northern and western shores. Between the Cotabato entrance to the river and Timaco, shoal water extends to a distance of 1 mile from the coast.

Mount Cabalata, another excellent landmark, is situated about 4¾ miles southward from Timaco Hill and 1½ miles back from the shore. It is a sugar-loaf-shaped mountain, which rises to a height of 2,325 feet; its slopes are covered with grass. From here an elevated range of volcanic mountains, dominated by the central peak, Dilafungan, extends some 70 miles southeastward, nearly parallel to the river.

Cotabato (chart 4654) is a small town lying on the south bank of the northern arm of the Mindanao River about 5 miles from the sea. The river in front of the town is narrow, and because of the strong current there is considerable difficulty in turning with an ebb tide. There is a small wharf that can accommodate any vessel that can cross the bar. Cotabato Hill is a small conspicuous hill rising from level ground to a height of 185 feet, about ½ mile southward from the wharf.

DIRECTIONS.—Vessels bound for Cotabato should bring the light at the entrance to the river to bear about 154° (152° mag.) and steer for it; when nearly up to it they should haul eastward and favor the southern shore until abreast of the low mangrove covered islet about ¾ mile eastward from the light; from here a 30° (28° mag.) course will carry the best water across the bar, about 7 feet. After crossing the bar the usual rules for river navigation should be followed.

SOUTH ENTRANCE.—The south entrance to the Mindanao River is situated about 1½ miles southwestward from Timaco Hill, between Gardoqui and Bulusan Points. It is very shoal and used only by small native craft. Shoal water extends to a distance of over ½ mile westward of a line drawn between the entrance points. There are no aids to navigation. Tamontaca, 5 miles up the river from the entrance, has a well-planned location but only a few houses. It is connected with Cotabato by a good dirt road.

From Bulusan Point the coast trends south by west for 1½ miles to Linek and is low, generally fringed with mangroves and cut into by several small streams. The land eastward is low and covered with coconut trees and bushes. This stretch of coast is faced by a reef to a distance of about ½ mile with deep water at its edge. Linek, situated near the beach, consists only of nipa houses and is rather small. From here the coast trends in a west-southwest direction for about 5½ miles to Tapian Point and in places is fringed by a narrow steep-to coral reef awash at low water. The land back from the beach for ¼ mile and in some places nearly 1 mile is low and covered with bushes, coconut trees, and grass. Back of this, a range of hills, which attains elevations of 1,600 and 1,700 feet, extends in a northeasterly and opposite direction.

Tapian Point is low for about ½ mile back from the shore, sandy, and wooded. It is fringed by a reef to a distance of about 300 yards.

Tapian Reef, covered by a least depth of 2½ fathoms, lies less than 1 mile northwestward from Tapian Point. It is about ⅛ mile in extent within the 10-fathom curve, and between it and the shore reef around Tapian Point there is a deep channel over ½ mile wide.

From Tapian Point the coast trends southwest and south for 20 miles to Quidapil Point. The land adjacent to this stretch of coast is broken and mountainous, there being only small areas of lowland at the mouths of the Kinomick and Landassan Rivers and at the head of Resa Bay. **Mount Binaca**, 3,350 feet high, is the highest mountain in the coastal ridge. Its summit is wooded, but its sides are covered with cogon, bushes, and clumps of trees. The coastal mountains in general are covered with cogon and bushes, while the shore line is fringed with trees overhanging the beach of rock, sand, or gravel. The country is sparsely inhabited by Tirurayes and Moros, who raise some hemp as well as corn, sweet potatoes, and hill rice during the

rainy season. The Matabal River and the Lapacon River can be entered by whaleboat at half tide, but the channels frequently change during the rainy season.

Mount Blik, 4,021 feet high, is near the northern end of the higher inland range of mountains and forms an excellent landmark for approaching this coast. Northward of this mountain lies the broad valley of the Mindanao River, and southward the land between Mount Blik and the mountain southeastward of Port Lebak appears comparatively low. The latter is frequently cloud-capped.

A continuous northerly current of small strength is felt offshore, with a reverse current close inshore along the reef line. The water deepens abruptly, the 50-fathom curve being usually less than ½ mile from shore. A sand and bowlder reef, about 350 yards in diameter and having a depth of 2 fathoms of water over it, lies about ¾ mile 215° (213° mag.) from Logung Point. All the other dangers to navigation are less than ½ mile offshore, and all of them are steep-to from seaward. **Manangula Point** and **Tenotungan Point** are low. Between the latter point and the 3-fathom shoal ⅞ mile northward small vessels can anchor in an open anchorage in 10 to 12 fathoms of water, sand bottom, opposite a short stretch of sand beach. **Logung Point** and **Tagata Point** are fairly prominent, the former having a grass-covered knoll 320 feet high.

Resa Bay lies between Tagata Point and Liess Point, 2 miles southward. The Lassak River and the Lapacon River empty into the head of the bay. Four sand and rock shoals, each about 125 yards in diameter, having depths of 3, 5, 8, and 3¾ fathoms of water over them, lie off the mouth of the Lassak River, the outer one lying ½ mile offshore. The best anchorage is about ½ mile northward of the mouth of the Lapacon River in 17 to 23 fathoms of water, sand bottom. It is open to westward and only tenable in fair weather.

Quidapil Point is a prominent landmark, appearing as an island when first seen from northward or southward. It is formed by a narrow ridge, 350 feet high, covered with grass and bushes. The shore is steep and rocky with large loose rocks and coral reef exposed at low water. **Mount Corobong**, 2½ miles back from the point, is a prominent cogon-covered peak, 2,350 feet high.

Linao Point is rocky with large loose rocks on the coral reef exposed at low tide. **Sadam Bay**, northward of the point, is almost entirely bordered by coral and mangrove. There is, however, a break in the reef on the western side of the bay, where small boats can find a good landing in rough weather.

Huidobro Reef lies 2 miles 240° (238° mag.) from Linao Point, is ⅓ mile long north and south, about 300 yards wide, and has a general depth of 4 to 5 fathoms with one bowlder near the center, having a least known depth of 3¼ fathoms of water. The outer rim is composed of live coral with dead coral and white sand spots inside. It is readily visible from a safe distance. A wide, deep channel lies between it and Linao Point.

Linao Bay is open to southwest. The three reefs near the head of the bay are each about 250 yards in diameter with depths of 1¼, 2, and 1 fathoms of water on them. The shore of the bay is sand and hard mud, with bushes and trees at the high-water line. The best anchorage is off Mati behind the 1-fathom reef in the northern part

of the bay in 7 to 11 fathoms of water. In heavy southwest weather the seas roll in and render even this anchorage uncomfortable. **Mati** is the name given by the Moros to the small collection of houses at the head of the bay. **Tran** is a small town on Kalingmomo Point at the mouth of the Tran Grande River. This river can be entered at any stage of the tide by small boats.

Between Linao Bay and Port Lebak the country is low and flat, the coastal mountains being from 3 to 4 miles back from the shore. The entire country is wooded; the rivers are small and of no importance. This coast is clean and there are no dangers to navigation. A rocky reef, about 100 yards in diameter, with two bowlders awash at low tide, lies ¼ mile off the rocky point 1 mile north of Lebak Point. A clear deep channel, about 200 yards wide, exists between the reef and the shore. **Lebak Point** is high and rocky, rising to an elevation of 340 feet ½ mile back from the point.

Port Lebak (chart 4653) affords the best protected anchorage in this part of Mindanao. It is easy of access and the water shoals gradually from 45 fathoms at the entrance to 12 fathoms, mud bottom, ½ mile from its head, where there is ample swinging room for good-sized vessels. This anchorage is open to the west, but protected anchorage may be had in 16 to 18 fathoms eastward of Tubotubo Island, and northeast of Lebak Island in 14 to 16 fathoms, mud bottom. **Lebak Island** is a small rock islet, 37 feet high, lying near the outer edge of the reef extending from Lebak Point. **Tubotubo Island**, 110 feet high, lies on the south side of Port Lebak. It is connected with the shore by a reef that bares at half tide. The reef extends about 200 yards northward of the island. The shores of Port Lebak are mangrove, fronted by a coral reef 100 to 300 yards wide. Talamasig and Lebak are two small settlements, the latter the location of a sawmill exporting considerable lumber.

Between Port Lebak and Tuna Bay, 10 miles southward, the coast is much indented and the land rises steeply from the shore and is heavily wooded. The only low land lies northward of Sangay Point along the valley of the Sangay River, which leads to the coastal mountains.

Mount Syniop, 1,730 feet high, is the most prominent peak near shore. It is conical in shape near the summit and is heavily wooded. All these mountains merge into the higher mountains in the interior.

Donauang Shoals is the name applied to a series of 7 shoals extending for 4 miles in a northwest and southeast direction along this coast. The northern and outer shoal lies 2 miles 282° (280° mag.) from Nara Point. It is about 380 yards in diameter and has a least known depth of 4¼ fathoms, sand and coral. A clear, deep channel separates this shoal from the two shoals lying about 1 mile west of Pitas Point, and a clear channel ½ mile wide separates this latter shoal from the group of four shoals lying over 1 mile north of Donauang Island. All the reefs are steep-to on all sides, and a deep passage ⅔ mile wide lies between the reefs and the mainland.

Basiauang Bay (chart 4653) lies between Basiauang Point and Donauang Island. Its great depth makes anchoring difficult, though small boats and launches can find some protection on either the north or south side of the bay. **Donauang Island** is about 300 feet high, thickly wooded, and makes a good landmark for vessels ap-

proaching from either north or south. It is surrounded by a reef 200 yards wide on the south and west sides, reaching out 380 yards on the north. A deep channel, 220 yards wide, separates it from the mainland. This channel is used by coasting steamers going to Port Lebak. Vessels not calling at these ports should keep about 5 miles offshore, thus avoiding all the dangers described above.

Tuna Bay (chart 4653) is open to southward and a heavy swell is felt at the anchorage during the southwest monsoon. Moderate-sized vessels can anchor near the head of the bay in 18 to 20 fathoms, mud bottom, protected from all except southerly weather. **Tuna Point**, the western entrance point, is a prominent rocky point with a narrow rocky shelf, on which there are several rocks awash at high tide. The western shore of the bay is bordered by a coral reef of varying width, the widest part being marked by a small island, 20 feet high, which is connected to the mainland by a mangrove swamp. The eastern shore is mainly sand beach with a few patches of rock and gravel.

From Tuna Bay the coast trends southeast and east-southeast for 75 miles to Sarangani Bay. High, heavily wooded mountains extend along the coast, their summits being from 2 to 4 miles back from the shore. Two cone-shaped peaks north of Bacud Point are very prominent when seen from west or southeast. The water deepens rapidly, the 100-fathom curve being less than 2 miles offshore. Following the general direction of the coast line a vessel can safely coast at a distance of 5 miles, the outer danger being less than 3 miles offshore. A continuous current of ½ to 1 knot sets to the southeastward with a current in the opposite direction close inshore.

Taytayen Island, 7 miles southeast of Tuna Bay, lies close to the shore, the channel between it and the shore having barely enough water to float a rowboat at low tide. It is 120 feet high, with small trees growing on top. The west side is clean and steep-to, but rocks bare 200 yards southward.

From Taytayen Island to Balonga, 2 miles eastward of Pola Point, a chain of reefs lies from ½ to 2 miles offshore. They lie on the edge of the bank near the 100-fathom curve, having depth of 4¼ fathoms to bare at half tide and are steep-to on all sides. A shoal, with a least depth of 3¾ fathoms of water, lies 1½ miles southward of Cadis Point and ¾ mile offshore. **Canipan Reef**, a large shoal area with a 1-fathom patch near its southern end, lies 1 mile westward of this reef, the channel between them having a depth of 32 fathoms.

Palimban Point is low and rounding. **Pola Point** is 460 feet high with a conspicuous rocky bluff. The point shows up prominent when seen from westward and southeastward. Anchorage in 9 to 10 fathoms, mud bottom, may be had off the town of Balonga and in the channel between the reefs and the shore in 15 to 20 fathoms of water. The channels between the reefs and between the reefs and the shore are deep and clear, but the reefs are hard to pick up, on account of the discolored water from the rivers in the vicinity. A moderate current, little affected by tide or weather, sets northwestward along the shore, but offshore the strong southeasterly current setting toward Sarangani Strait is encountered.

Maculi Point is low and rounding, the Craan River emptying near the end of the point. The shore from the Balonga River to Pinol

Point is composed of sand and gravel and is wooded to the high-water line. A convenient anchorage may be had 2 miles eastward of the Craan River mouth in 14 to 20 fathoms of water ¼ mile offshore. From Pinol Point to the next point southeastward the shore is bordered by an uneven coral reef 150 yards wide, and the land rises steeply from the water's edge. **Pinol Point** is a point 220 feet high, with a prominent yellow cliff 70 feet high. This point is easily identified, though not so prominent as Pola Point.

Pagang Point, 9 miles southeastward from Pinol Point, is a sharp, rocky point 70 feet high. Its sea face is a vertical rock face, undercut by the sea; its land side drops off rapidly to the level of the beach. The foreshore along this stretch of coast is low and flat, with numerous unimportant rivers emptying into the sea. Some of the rivers can be entered by whaleboats at half tide, and fresh water can be obtained at low water, or a short distance upstream from their mouths.

Bacud Point (called Kiamba by the natives) is fronted by a reef about 200 yards wide, on the outer edge of which lies a rock 26 feet high. The point itself is made up of cliffs 40 feet high, rising to a rather flat-topped peak 760 feet high. The cone-shaped peaks, 1,700 and 1,810 feet high, lying northward of the point, are prominent from seaward and readily picked up when seen clear of the higher mountains in the interior.

Bacud Reef lies 4 miles southeast of Bacud Point and 2¾ miles offshore. From the reef the 1,810-foot cone peak over the eastern edge of the flat-topped peak on Bacud Point bears 337° (335° mag.). It is about 550 yards long by 380 yards wide within the 10-fathom curve, rising out of a depth of about 100 fathoms. The shoalest water is 1 fathom on a distinct cone covered by broken shell and coral, with flat rocks on the deeper parts of the reef. No warning of its existence is given until actually over it. This constitutes the only offshore danger in the vicinity. Two rocks, each having a depth of 5 fathoms, rising out of 30 fathoms, lie about ½ mile off the mouth of the Keybatis River, but are practically out of the route of coastwise navigation.

Clin consists of half a dozen houses at the mouth of the Clin River. A palm grove extends eastward along the shore for a few hundred yards. A number of houses were noticed scattered over the coastal plain, which seems to be very productive. Rice, corn, camotes, hemp, and coconuts are the principal products. Most of the country is heavily wooded. Many of the rivers can be entered at half tide by small boats, but are of no particular commercial importance.

Bual Point is clean outside the shore reef, which extends about 200 yards offshore. The point is low and wooded. **Matil Point** consists of coral rock and sand. It is low and flat, and the tree line is about 100 yards back from the point. The present survey stops about 1 mile westward of Matil Point.

There is a reef 2 miles long and 1 mile wide, covered by 5 fathoms, lying about 3½ miles 240° (238° mag.) from Bulaluan Point. A report states that there are a number of dangerous reefs between Bulaluan Point and this 5-fathom reef, on which the least sounding obtained was 1¾ fathoms.

has a width of about 6 miles between Bulaluan and Sumban Points. Its sides are very steep and the water is deep. Anchorage may be found in the bights of its coast line, but very close in, and with a line out to the shore to prevent the anchor from slipping into deep water. The chart shows a coral reef extending 1 mile out, surrounding Bulaluan Point and bordering the western and northern shores of the bay.

Mutul anchorage is in the northwest angle of the bay, in 15 fathoms, with moorings to the shore. Good water can be obtained from Mutul River.

Mount Matutum, situated 32 miles northward from Bulaluan Point, the western entrance point to Sarangani Bay, rises to a height of 7,554 feet and forms a very prominent landmark.

Canalasan Cove (chart 4653), though steep, is the best anchorage in Sarangani Bay during the southwest monsoon. It is situated east of Sumban Point, before the town of Glan. Anchorage may be had in 11 to 13 fathoms with a hawser to the shore, but it is not advisable to anchor before the mouth of the Glan River, which flows into the eastern part of the cove. The town of Glan stands on the left bank of the river, near its mouth.

Sumban Point is high and steep, with but little vegetation upon it. It is surrounded by a reef extending 500 yards west and north.

The southern peninsula of Mindanao, between Sarangani Bay and the Gulf of Davao, is high and has several prominent peaks upon it. The southern hill, 1,670 feet high, and in reality round, looks somewhat like a pyramid when seen on an east-southeast or west-northwest bearing. There is a saddle peak, 3,600 feet high, 5 miles north-northeast of this round-topped hill; and 9 miles north-northeast of this saddle peak there is a high range, the highest peak of which, 4,520 feet, has a conical top when viewed from southward.

From Sumban Point to Tinaca Point, the southern extremity of the peninsula, the coast is generally clean, except near Bluff Point, where the reef extends out nearly 1 mile. **Tucapanga Point** is rocky, high, and steep. A reef follows the coast from it around the south end of the peninsula as far as Butulan Cove. There is a shoal, covered by 4¼ fathoms, shown on the Spanish chart about midway between Sumban and Tucapanga Points 2 miles offshore.

Batulaque Cove, between Pampat and Tinaca Points, is about ⅝ mile wide and ½ mile deep. The shores are fringed by a reef which considerably reduces the anchorage space. Small vessels find good shelter here in the northeast monsoon in 3½ to 7 fathoms.

Tinaca Point, the southern extremity of Mindanao, consists of two headlands connected by a semicircular beach. The whole gives the idea of a volcanic crater at an angle of 45°, half above and half below water. It is clean and steep-to southward and may be passed at 100 yards distance. An automatic acetylene light, showing one white flash every 3 seconds, visible 15 miles, is exhibited, 140 feet above high water, from a white concrete beacon erected on Tinaca Point. Southeastward of the point there is a large shoal of sand and rock, covered by 5½ fathoms.

Balangunan Cove, about 2 miles northeasterly from Tinaca Point, affords very indifferent anchorage, being exposed to the sea.

Malavinuan Cove, about 1 mile eastward from Balangunan Cove, is similar in size and shape to Batulaque Cove and affords sheltered anchorage in the northeast monsoon in 12 to 16 fathoms.

Gual Point, the most southeasterly part of the peninsula, is low and sloping, with a little reef off it. **Camalian Cove**, immediately north of Gual Point, offers a deep, bad anchorage. Camalian Point, on the northern side of the cove of the same name, is foul, as is the coast from here to Silacay Point, which forms the southern entrance to Butulan Cove, 2 miles northeasterly from Camalian Cove.

Butulan Cove is situated northward of Silacay Point; it is semicircular in form, nearly 1 mile wide and ½ mile deep. It offers temporary anchorage out of the swell of the sea, but exposed to the sea that sets in from cross tides. The depth is great, with 14 fathoms almost touching the shore and 10 fathoms at the mouth of the river.

The coast northward is clean and sloping and almost straight to Banos Point, which is 72 feet high and peaked. From here it runs about 13° (11° mag.) to Calian Point, which is broad and rather prominent. There is good anchorage off Calian Point, either north or south of it.

Tides.—It is high water, full and change, at Tinaca Point at 7 hours. Springs rise 6 feet. The flood stream sets westward and the ebb eastward between Tinaca Point and the Sarangani Islands. On the coast northward and eastward it is said that the flood stream sets northward and the ebb southward, the latter being less violent than the flood; also that northward of Calian Point the tide streams are weaker. Strong tide races and violent eddies are prevalent off Banos Point.

SARANGANI ISLANDS

consist of two islands and a sand cay, situated 7 miles from the south point of Mindanao. The Islands, Sarangani and Balut, are separated by a deep channel 1¾ miles wide, reduced by reefs on both sides to a navigable passage ¾ mile wide. In this channel the tidal streams acquire great velocity, the flood stream setting north and the ebb south. A shoal covered by 7 fathoms lies nearly in mid-channel.

Balut Island, the westernmost of the two, is the larger, higher, and better cultivated. In the center is a volcano, from which smoke sometimes issues, having an elevation of 2,775 feet; seen from the northwest it appears between two peaks. Near the southwest point there is another volcano and in the southeast part a hill 1,083 feet high. The north and east coasts are bordered by a reef, which in some places extends out over 1 mile, while on the south and west sides the fringing reef does not extend out to any distance. Off the southwest point is a rock 40 feet high. **Lajan Point**, the northeast point of the island, is low and covered by mangroves. About 1½ miles southward of the point there is anchorage in 13 fathoms, sheltered from the southwest, but exposed to the seas from the northeast. This is the only anchorage in the island. There is a hot spring here, covered at high water.

Sarangani Island is composed of small undulating hills, 490 to 820 feet in height, covered with vegetation. There are three well-sheltered inlets on the west coast; the east coast is very foul. **Port**

Patuco (chart 4653), close to the northern end of the island, offers sheltered anchorage for small vessels in 8 fathoms; the stern should be secured to the shore. The entrance may be recognized by a cliff of red earth a little northward of it. The channel is narrowed by reefs on both sides. **Tiain Point**, situated 1 mile southwest from the entrance to Port Patuco, may be recognized by white lime stains upon it. It can be approached with safety. There is a detached patch with 27 feet over it, lying 352° (350° mag.), distant ½ mile from Tiain Point and westward of the entrance to Port Patuco. **Port Tumanao** (chart 4653), situated 1 mile south of Tiain Point, has 25 fathoms at the entrance, diminishing to 9 fathoms in the eastern part of the port. Good anchorage for small vessels may be found in 15 fathoms about ¼ mile from the head of the port. This place was formerly a Spanish military post. The northern entrance, which is bordered by a reef to ¼ mile, may be recognized by a conspicuous white mark in the rocky bluff. Water can be obtained from a small rivulet in the southeast part of the port. **Port Bolay** (chart 4653), situated 1¾ miles southward of Port Tumanao, is small and only fit for very small craft. Neither wood nor water can be obtained here.

Olanivan Island is a small flat cay, about ¼ mile across, lying 1 mile northward of the north end of Sarangani Island. It is about 60 feet high and has trees upon it. It is surrounded by a coral reef with 7 fathoms off its southwest edge. Between this reef and that fringing the north point of Sarangani Island there is a narrow channel which appears navigable.

DAVAO GULF

has its entrance between Calian Point westward and Cape San Agustin eastward, some 30 miles apart, and extends about 70 miles northward. Samal and Talicud Islands largely occupy the northern part of the gulf. The waters of the middle of the gulf are deep and clear. The shoals which fringe the western shores do not extend to a distance of over 1½ miles, while in the eastern part of the gulf, between **Arena** Point and Sigaboy Island, there are a number of dangerous detached shoals and reefs lying from 3 to 4 miles from the coast and much foul ground at a lesser distance.

From Calian Point the coast trends in a general north-northwest direction for about 25 miles to Tubalan Head. **Talugutan, Lais, Malita,** and **Lacaron** lie on this stretch of coast, nearly all of which is still unsurveyed. Very little is known in regard to it, but from Lais northward it is reported to be mostly sand with mangroves in places and clean with the exception of the points that send off reefs. The survey at the present time terminates at a perpendicular bluff about 40 feet high, about 1½ miles southward from Tubalan Head, between which two points there is a fine sand beach with a few isolated rocks at the low-water line.

Lais, Malita, and Lacaron are ports of call for the mail steamers. There are small wharves at Lais and Malita. The bottom is reported foul southward from the wharf at Lais and the recommended anchorage is northeastward of the wharf. At Malita the bottom is foul northward of the wharf and vessels should anchor southeastward of this wharf. There is a radio station of the Bureau of Posts at Malita.

Tubalan Head, forming the eastern side of the port of the same name, is a prominent landmark, being a gently rounded hill which rises to a height of 558 feet; the isthmus connecting the hill with the mainland is low, giving it the appearance of an island when seen from a distance.

The northeastern and eastern sides of the headland are clean and steep-to, and there are no outlying dangers. Off the northwestern part of the headland, the reef extends to a distance of about 300 yards.

The coast from Tubalan Head trends in a general west-northwest direction for about 13 miles to Colapsin Point at the entrance to Malalag Bay, and is by far the most indented section of the coast line in Davao Gulf. The numerous points present no headlands of importance except Tubalan Head. From 1 to 3 miles inland are numerous and usually sharp peaks 600 to 1,400 feet high. Several miles farther inland and usually separated by pronounced valleys are peaks ranging in height from 1,600 to probably 4,000 feet; these interior peaks are generally covered with clouds. The whole system presents no definite ranges or formation but a more or less jumbled and confused mass, which makes it difficult to select particular peaks. The whole area is heavily wooded, but with timber of no great value.

Port Tubalan is over ¾ mile wide at the entrance between the northwest extremity of Tubalan Head and Botak Point. The middle of the bay is deep, and the shores are fringed with coral. Basol Islet is a steep rocky bluff with a few bushes on top lying on the reef in the southeastern part of the bay.

The best anchorages in Port Tubalan are in the western corner of the bay, about ¼ mile from shore, in 20 or 22 fathoms, muddy bottom, and in the southeast corner in 22 to 24 fathoms, muddy bottom, with Basol Islet bearing 115° (113° mag.) distant about ¼ mile.

Botak Point, the northern entrance point to Port Tubalan, is 361 feet high and slopes quickly to a rocky bluff, 40 feet high, at the extremity. The sides of the point are fringed by narrow reefs, but the end is clean and steep-to.

Between Botak Point and Sigarin Point, 2¼ miles west-northwestward, there are two indentations formed by Minaban and Babak Points which are of no particular value to navigation. They contain no obstructions except the fringing shore reefs.

Sigarin Point, the southeastern entrance point to Basiauan Bay, comes down in a gentle slope notched by five hills lying close to the gulf side and ends in a bluff about 80 feet high. Sigarin Point is fringed by a coral reef with foul ground beyond it to a distance of nearly ¼ mile.

Basiauan Bay is 2¼ miles wide at the entrance between Sigarin and Sibalatan Points and extends 1¾ miles southwestward. The middle of the bay is deep and clear, but the shores are fringed by reefs which extend to a distance of ¼ mile in some places. The town of Basiauan lies at the head of the bay.

The best anchorage in this vicinity is found at the head of Basiauan Bay, northeastward from the town, in 14 to 16 fathoms, muddy bottom, sheltered from all winds except those from north to north-northeast. The reef from Tambalan Point, which extends to a distance of nearly ¼ mile, is bare at low water, but the reefs on both

sides of the anchorage have about 1 foot of water on them at low water and show mostly of a dark brown color. The approach to the anchorage is free from danger with the exception of the shore reefs.

Sibalatan Point, the northwestern entrance point to Basiauan Bay, is not prominent from up or down the gulf, but is easily recognized from northeastward, the point ending in a ridge over 200 feet high that terminates in a curving embankment pointing southward. The point is fringed with a coral reef with foul ground outside of it, which extends to a distance of about ¼ mile.

A small shoal, covered by a least depth of 2 fathoms, lies nearly 1¼ miles northeastward from Kabalantia Point on the bearings: Sibalatan Point 163° (161° mag.) and Kulungan Point 300° (298° mag.).

Kulungan Point, situated nearly 3½ miles 321° (319° mag.) from Sibalatan Point, is easily recognized by a sharp tongue of bare, rocky, yellow bluff running several hundred yards northward down to the water edge. The point is fringed with coral, but may be rounded in safety at a distance of ¼ mile.

Between Sibalatan and Kulungan Points there is a wide bay, divided into two smaller bays by Kabalantia Point. **Monkiaua Bay** is the eastern bay and **Kulungan Bay** the western. The center of Monkiaua Bay is clear, but the shores are fringed with coral. Kulungan Bay is foul, containing a number of shoals, some of which are awash at low water. All of the shoals lie inside of a line drawn from Sibalatan Point to Kulungan Point; and as this bay is of no value to navigation, it is not necessary to describe them.

From Kulungan Point to Colapsin Point, about 4 miles northwestward, the shore is bold and rocky, with stretches of sand beach and a fringe of coral 30 to 350 yards wide. **Cliff Point**, situated nearly midway between the two above-mentioned points, is 390 feet high and is clean and steep-to.

Colapsin Point, the northeastern extremity of the peninsula, forming the northern side of Malalag Bay, rises to a height of 265 feet, is well wooded and fringed by a narrow coral reef, which extends to a distance of about 350 yards.

There is a small coral shoal covered by a least known depth of 3½ fathoms lying ⅝ mile from Colapsin Point on the bearings: Colapsin Point 207° (205° mag.) and Mount Piapi 271° (269° mag.). This shoal should be avoided, as there may be coral heads on it with less water.

Mount Piapi is a lone heavily wooded hill, 640 feet high, lying close to the beach, about 3 miles 282° (280° mag.) from Colapsin Point. It forms a good landmark, being distinguishable from a considerable distance.

Piapi Reef is a coral reef which bares about 1 foot at low water, lying about 1⅛ miles 78° (76° mag.) from the point at the foot of the eastern slope of Mount Piapi, and there is a small detached 1½-fathom patch about ⅛ mile eastward of Piapi Reef.

Malalag Bay (chart 4649), situated in the southwest part of the gulf, is about 4 miles long southeast and northwest and 1 mile wide. The eastern entrance point, situated about ½ mile west-southwestward from Colapsin Point, rises to a height of 189 feet and is surrounded by a coral reef, the western extremity of which lies about ⅜ mile 240° (238° mag.) from the point. The western shore of the

entrance is fringed by mangroves, beyond which shoal water extends to a distance of from ½ to ¾ mile, leaving a channel 1 mile wide into the bay. The entrance is clear and deep with the exception of Bolton Reef, a small reef which lies in the middle of the channel.

Malalag Bay is surrounded by high hills, and on the west side and also at the head of the bay are extensive mangrove swamps. The western part of the bay is shoal, and there is considerable shoal ground at the head of the bay, the western edge of which is marked by an islet 60 feet high.

Bolton Reef is a small reef covered by a least depth of ½ fathom. It lies in the middle of the entrance and divides it into two channels, of which the western one is the wider and better. It is very small in extent and is surrounded by deep water. From the position of least depth Mount Piapi bears 299° (297° mag.) and Colapsin Point 74° (72° mag.). Bolton Reef is marked by a concrete beacon which stands in 11 feet of water and rises to a height of 17 feet above the sea.

The town of **Bolton** lies on the south shore of the bay; it is small and of little commercial importance. The usual anchorage in 10 fathoms, about ¼ mile northward from the town, is bad in northerly winds, which have a long sweep down the gulf, and even with southerly winds there is some sea here. About 1 mile eastward from the town, just around a bluff rocky point, is a fine sand beach which for a short distance has no coral off it and deep water close-to. Ships of any size can anchor close in here. A fixed red light, visible 7 miles, is exhibited 32 feet above high water from a white pole on the eastern side of the mouth of the Malalag River. Immediately under the lantern there is a large white triangular daymark that can be seen from outside the reefs at the entrance to the bay.

Directions.—Vessels entering Malalag Bay should bring the light to bear 193° (191° mag.) and steer for it. This course should carry a vessel about ¼ mile eastward of the reefs off Mount Piapi and ⅛ mile westward from the beacon on Bolton Reef. Having passed the latter reef, there are no other dangers.

Anchorage in 10 fathoms, muddy bottom, will be found in front of Bolton about ¼ mile from shore or eastward of the rocky point previously described. Vessels entering for shelter will find good protected anchorage between the islet near the head of the bay and the north shore in about 20 fathoms.

From Mount Piapi the coast trends 17° (15° mag.) with a curve westward for 14¼ miles to Malusi Point, thence 41° (39° mag.) with a curve northwestward for 15 miles to the mouth of the Davao River. The land in the immediate vicinity of the shore is low, but rises rapidly to a mountain range culminating in Mount Apo. This section of the coast is heavily wooded and intersected by a number of small streams, none of which are navigable by steam launches. At low water they are difficult to enter even with a pulling boat. The shores are fringed with reefs, and in some places there are detached reefs lying about 1 to 1½ miles from the coast. The anchorages are poor and in many cases rendered difficult of access by the off-lying reefs.

Umbakanan River discharges about 1½ miles northward from Mount Piapi. Between these two points the shore is low, flat, and

heavily wooded inland, with a hill here and there, and a flat sandy beach overlying coral with an indefinite shore line and mangroves. These sandy flats extend to a distance of about ½ mile to the limits of the coral reefs and are nearly bare at low water Padada River, emptying 1½ miles northward from the Umbakanan, is the largest river in this vicinity. A town of the same name lies on the left bank of the river about ½ mile inland. On the shore reef about midway between the mouths of the Umbakanan and Padada Rivers there is a clump of mangroves which form an island at low water. They are about 400 yards from the shore and form a prominent landmark.

From the mouth of the Padada River the coast trends northward with a curve westward for about 4 miles to Digos Point. This section of the coast is fronted by a fine sand beach fringed with coral, nowhere exceeding ¼ mile in width. The Digos and Bulatakay Rivers discharge about 1 and 2¾ miles, respectively, south-southwestward from Digos Point.

Digos Point is low, flat, and wooded, fringed with mangroves, and surrounded by a steep-to coral reef, which bares at low water to a distance of nearly ¼ mile. Digos Point is fairly prominent when seen from northward or southward. The channel between the point and the reefs lying eastward from it is about ⅛ mile wide and has a depth of from 7 to 13 fathoms.

Digos, which is a small town of little importance, lies on the north bank of the river of the same name about ½ mile inland. A large iron warehouse, situated on the beach about ¼ mile southward from the mouth of the Digos River, forms a good landmark, being visible from a long distance offshore.

Digos Islet is a white coral sand cay about 2 feet above high water, on which there are a few bushes growing. It stands on a reef about 1 mile southward from Digos Point and about 700 yards eastward from Digos warehouse. The reef on which this islet stands, part of which bares at low water, extends about 300 yards eastward from the islet.

About 1¼ miles southward from Digos warehouse and ⅜ mile from shore there is a small detached shoal covered by a least depth of 3 fathoms.

Anchorage may be found southward from Digos Islet with the warehouse bearing 317° (315° mag.), distant ¼ mile, in 12 or 15 fathoms, or northward from the same islet with the warehouse bearing 249° (247° mag.), distant about ⅜ mile, in 11 or 12 fathoms. Small vessels may anchor between the islet and the warehouse.

Digos Reefs are a number of reefs lying northeastward, eastward, and southeastward from Digos Point. Parts of them bare at low water, but the area baring is very small compared with the total extent of the reefs. A north and south line passing 1½ miles eastward from Digos Point will lead well clear of them. There is a narrow, deep channel between the shore reefs and Digos Reefs and several channels between the reefs, but in the absence of local knowledge and any aids, navigation must be conducted with caution. **Digos Outer Reef,** the southeastern danger in this vicinity, is awash at high water. From the center of the reef Digos Point bears 341° (339° mag.) and Digos Warehouse 302° (300° mag.). This reef is

steep-to on the eastern and southern side, but on the western side foul ground extends to a distance of nearly ½ mile.

Directions for Digos.—There is a good, deep channel between Digos Outer Reef and the next reef northward, but in the absence of any aids to navigation strangers are advised not to attempt it but to pass southward and westward of Digos Outer Reef. When the warehouse at Digos bears 332° (330° mag.) distant 1½ miles or Digos Point bears 2° (0° mag.) distant 2 miles, either of them may be steered for. These courses will carry a vessel well clear of the foul ground extending westward from Digos Outer Reef. If intending to anchor northward from Digos Islet it should not be rounded too closely, because of the reef extending eastward from it. If intending to anchor southward from the islet it should be brought to bear 0° (358° mag.) and steered for until the warehouse bears 317° (315° mag.), when the warehouse should be steered for and anchorage taken up as previously recommended. Should Digos Outer Reef be visible, vessels from the northward may pass northward of it by bringing the warehouse at Digos open of Digos Islet on a 285° (283° mag.) bearing and steering for it. This course will carry a vessel through a channel about 400 yards wide and 11 to 23 fathoms deep.

Tagabuli Bay, the southern entrance to which is 2¼ miles northward from Digos Point, is not readily made out from seaward, the shore line being all mangroves. It extends about ⅞ mile northwestward and has a general width of about ¼ mile. The head and sides of the port are fringed with coral, which bares at extreme low water. Anchorage, protected from winds, except those from east-southeast, may be found in the middle of the bay in 16 to 20 fathoms, muddy bottom, where there is a width of about 400 yards between the edges of the reefs.

Santa Cruz Point, lying 2½ miles northeastward from Tagabuli Bay, is low and wooded. The shore between these two points is fronted by reefs covered with white coral sand, which can be seen from a considerable distance. A fixed red light, visible 7 miles, is shown at a height of 28 feet above the sea from a white framed structure on the south side of Santa Cruz Point.

About 1½ miles northward from Santa Cruz Point are two conspicuous patches of cogon grass extending in a horizontal line at an elevation of from 600 to 800 feet, and about 3 miles west-northwest from Santa Cruz, at an elevation of 1,200 to 1,500 feet, there is another patch of cogon grass. These patches can be seen from a considerable distance and form good landmarks, especially for vessels bound into Santa Cruz.

Santa Cruz is a small town lying on the point of the same name. It is obscured from seaward by trees. Vessels usually anchor about 300 or 400 yards southeastward from the light in 7 to 20 fathoms of water. Better-protected anchorage may be found in a cove about 1 mile northeastward from Santa Cruz in 17 or 18 fathoms, muddy bottom, back of a reef which bares at half tide. This anchorage is protected from all except strong southeast winds.

Mount Apo, situated about 13 miles 317° (315° mag.) from Santa Cruz Point, rises to an elevation of 9,610 feet and appears as a peak with steep slopes and a rounded summit. There is reported to be a small crater in the summit. On the south side and about 1,000 feet

below the summit a part of what was evidently once a crater seems to have been blown away. There are several fissures from which sulphur steam was constantly issuing at the time of the survey. Mount Apo and the surrounding peaks were constantly enveloped in clouds from March to June.

From Santa Cruz Point the coast trends northeastward for about 3 miles to Malusi Point, forming a bay the shores of which are fringed with coral. There is very little lowland encircling this bay and the land in the interior rises rapidly to heights of 2,500 feet within 1 mile from the shore. Facing this bay there are a number of reefs between which and the shore anchorage may be found.

Malusi Point is low and rounding and not very prominent.

Two small shoals, covered by depths of 4¾ and 3¼ fathoms, lie nearly ¾ mile 169° (167° mag.) and 191° (189° mag.), respectively, from Malusi Point, on a bank about ½ mile long in an east and west direction, inside the 10-fathom curve. There is deep water between this bank and the point.

Between Malusi Point and Tagulaya Point, 3¾ miles northeastward, the shores are solid except for a little mangrove near Astorga.

Astorga is situated about 2 miles northeastward from Malusi Point. Along this mangrove-covered section and for ¼ mile on either side of it there is a fringe of broken coral thrown up by the sea, but the remainder of the low-water area is fine sand beach, 10 to 20 yards wide, which is extensively traveled as a road. All the interior in this vicinity is heavily wooded and the mountain sides are furrowed by deep valleys.

In the bay on which Astorga is situated there are a number of detached shoals, and a little more than ½ mile outside of a line drawn between Malusi and Tagulaya Points there is a broken chain of shoals covered by depths of from 1 to 4 fathoms. The shoals begin about 1½ miles southwestward from Tagulaya Point and extend for a distance of about 2 miles in the same direction. They are composed of sand and coral and are generally visible.

Tagulaya Point is low and wooded and fringed by a narrow gravel beach.

At a distance of 1½ miles 25° (23° mag.) from Tagulaya Point, and ¾ mile from shore, there is a small shoal covered by a least depth of 4 fathoms and surrounded by deep water.

From Tagulaya Point to the mouth of the Siraoan River, 4 miles northward, the shore is wooded to a broad sandy beach. **Daron** lies on the shore about 1 mile northward and may be recognized by a large, prominent, greenish-white house with a galvanized-iron roof which is visible from a distance of 8 to 10 miles. The **Siraoan River** has 5 or 6 feet of water on its bar at low water but is not navigable for a ship's launch for more than ½ mile. Siraoan is very small, having not more than 200 people in it.

Daliaon, situated at the mouth of the river of the same name, about 1½ miles northeastward from Siraoan, is the most prominent settlement in this vicinity. It has a church, several stores, and a few good wooden houses. A fixed red light is maintained by the municipality.

The usual anchorage is in 7 to 10 fathoms with the light bearing 283° (281° mag.).

Daliaon Reefs are two coral reefs which extend over 1 mile in a north and south direction. The northern reef, which begins about ½ mile southward from Daliaon, is partly bare at low water; on the

southern reef there is a rock awash at low water near the northern end and the remainder is covered with very little water. Between these reefs and the shore there is a deep channel about 150 yards wide at the narrowest place.

There is a small detached shoal covered by a least depth of 4¾ fathoms lying nearly ¼ mile northward from the north end of Daliaon Reef and over ¼ mile from the beach.

From Daliaon the coast trends northeast, east, and southeast to Dumalag Point, forming a large bay which is deep and clear. **Lipadas, Dumuy,** and **Matina** lie on the shores of this bay. There are a number of small unimportant streams entering the bay. The land is low, level, heavily wooded, and covered with jungle to the water's edge. The shore is generally fringed with sandy beaches and there is very little coral.

Dumalag Point is the most conspicuous point in this vicinity, projecting as it does nearly 1 mile from the general shore line. It is mostly low and well wooded. **Dumalag Island,** forming the southern end of Dumalag Point, is about ⅓ mile long and separated from the rest of the point by an opening only passable by small boats. The southern extremity of the island is fringed by coral, which bares to a distance of about 200 yards.

About ⅝ mile 160° (158° mag.) from the southern extremity of Dumalag Island there is a small shoal covered by a least depth of 5¼ fathoms, and about ⅓ mile 107° (105° mag.) from the same point there is another small shoal of 4 fathoms. With the exception of the above-described shoals, Dumalag Point may be rounded in safety at a distance of ¼ mile.

From Dumalag Point the coast trends northeastward for about 3 miles to the mouth of the Davao River and is low and swampy and bordered by a sandy beach. Shoal water extends to a distance of about ¼ mile, beyond which the water deepens very rapidly.

Davao River has a depth of only 2 or 3 feet on its bar at low water and the channel changes frequently in freshets. In 1907 the channel was along the south shore and was marked by stakes. The sandy point at the south side of the entrance was being rapidly cut away and was being deposited mainly on the north side and forming a large flat of lodged tree trunks and minor drifts.

Davao is a small town of rising importance situated on the north bank of the Davao River, close to its mouth. It is the principal shipping point for this region and maintains regular steam communication with Manila and other ports of the Archipelago. The bureau of posts has a radio station at Davao. The anchorage off Davao is very bad, the water being deep close to the bar at the mouth of the river.

An iron frame, on which a red light was formerly exhibited, has been left standing on the northern side of the entrance to form a leading mark for the anchorage. Vessels desiring to anchor off the mouth of the river should bring this beacon to bear 0° (358° mag.) and stand in slowly for it, anchoring as soon as 17 fathoms, mud and sand bottom, is obtained. This is the only place where a vessel can anchor and have sufficient swinging room to clear the bank.

About 1 mile northeastward from the mouth of the river there is a wharf about 800 feet long by 20 feet wide, with a depth of from 20 to 28 feet at the end. The main part of the wharf runs about east

and west, and at the end there is an L 150 by 30 feet projecting southward. Between the wharf and the town there is a good road.

A fixed red light, which should be visible from a distance of 7 miles, is exhibited from a wooden-framed structure at the southern end of the L. Vessels from the southward should not bring this light to bear northward of 332° (330° mag.) when in its immediate vicinity.

From the northern entrance point to the Davao River the coast trends in a general northeasterly direction for 4½ miles to Lanang Point. The country immediately back from it is low and heavily wooded. All of this stretch of coast is sandy and has broad sand flats exposed at low water, the outer edges of which are steep-to. Along the last 2 miles the underlying coral is exposed at low water along the outer edge of the sand flat and there is a rocky detached shoal, with as little as 2 fathoms over it in places, lying nearly ½ mile from the nearest point of the beach.

Samal Island lies near the head of the gulf and close to the western shore, from which it is separated by Pakiputan Strait. It is about 18 miles long between Bassa Point at the northern end and Paet Point at the southern and has a greatest width of about 8 miles between Linao and East Points, the western and eastern extremities of the island. It is rough, hilly, and well wooded. The highest hills are in the eastern part of the island, and the greatest elevation is about 1,700 feet near the east coast and about 3 miles southward from East Point. It is very sparsely inhabited, no villages being found on the east coast and very few on the west. There are a few small streams, and these are found only on the western side of the island. The eastern coast of the island is clean and steep-to; on the western side, near the middle of the island, shore reefs extend to a distance of about ½ mile and there are also several detached shoals in this vicinity none of which are over 1½ miles from shore. The principal cultivation on the island is between Bassa and East Points, where there are some hemp plantations worked by the natives. The only good anchorage off Samal is in from 9 to 12 fathoms, muddy bottom, in the bay between Pohun Point and the mouth of the Binulin River; here shelter may be found from northeast winds. The fishing village of Peñaplata is situated at the head of this bay.

Malipano Anchorage, on the west side of Samal Island, is well protected from wind and sea by Malipano Islet and its surrounding rocks and reefs. It is of no commercial importance and is very small and difficult of access, the entrance having a width of only about 100 yards between the 3-fathom curves; there are also a number of sunken reefs in the approach.

Directions.—To enter this anchorage bring the northern part of Malipano Islet to bear 90° (88° mag.) and steer for it; when within ½ mile of the rocky islet of the northwest point of Malipano Islet, steer for it and round the north side of Malipano Islet at a distance of about 180 yards and continue around the eastern point; anchor in about 13 fathoms, muddy bottom, when the eastern point bears 304° (302° mag.) and the northwest side of Talicud Island is just open of the small islet off the south end of Malipano Islet.

The **Cruz Islands,** two in number, lie off the northern coast of Samal Island, with a deep channel nearly 1 mile wide between the south end of Big Cruz and Samal Islands. Both are small and heavily wooded.

Big Cruz Island is about 1 mile long in a north-northwest and opposite direction and 45 to 220 yards wide. On the north end is a knoll 80 feet high; the southern end has an elevation of about 90 feet, but here it is mainly cliffs, much underworn by the sea. The shore line in some places is fringed by a narrow coral reef.

Little Cruz Island lies nearly ¾ mile north-northwestward from Big Cruz Island. It is about 700 yards long north and south and has an average width of 110 yards. Near the northern part it rises to a height of 42 feet. The western side is sand beach; from the northern point reefs, partly bare at low water, extend to a distance of about ¼ mile northward; the eastern side is fringed by a reef, narrow at the northern end and widening to 160 yards at the southern end.

In the channel between the two islands there is a small coral patch, bare at low water, and much broken ground. The best water in this channel, 4½ to 7½ fathoms, is immediately southward of this patch. The greater part of this channel is foul and there seems to be no necessity for using it.

About 1 mile northward from Little Cruz Island there is a shoal composed of coral rocks and sand. This shoal, which is covered by a least depth of 2 fathoms, is about ¼ mile in extent and surrounded by deep water. Nearly ¼ mile northward from this shoal there is another small shoal with about 6 fathoms of water over it.

Talicud Island lies westward from the south end of Samal Island, from which it is separated by a deep navigable channel about ¾ mile wide. It is reported to lack fresh water and to be uninhabited. It is of oval shape, about 4 miles long in a northwest and southeast direction, and 2 miles wide. It is fringed by a narrow coral reef which, on the north side, extends to a distance of about ½ mile. The only detached danger in the vicinity of Talicud Island is a shoal covered by a least depth of 2¼ fathoms lying ½ mile 249° (247° mag.) from the southern point of the island and about ⅓ mile from the shore. The island is heavily wooded and rises, in a position northward of the center, to a height of 475 feet.

Pakiputan Strait, west of the northern part of Samal Island and separating it from the main coast, is ½ mile wide and 19 fathoms deep in the narrowest part. It should not be taken by a sailing vessel unless the wind is free and strong enough to enable her to stem the current, which has at times a velocity of 2½ knots. The flood tide sets northward and the ebb southward. The strait is too narrow to work in and there are several dangers in the approaches.

The only danger in the southern approach is the rocky detached shoal previously mentioned as lying off the main coast. It is covered by a least depth of 2 fathoms and lies 2 miles 56° (54° mag.) from the northern entrance point to the Davao River and ½ mile from the shore.

The dangers in the northern approach are a small detached reef covered by a least depth of 1¼ fathoms, lying a little over ¼ mile from the main coast; Arboles Island and its surrounding reefs; and a large reef about 1 mile southward from Arboles Island. **Arboles Island,** the most prominent landmark in the strait, is the sand and broken coral-covered summit of a coral reef about 1 mile long north and south by ⅛ mile wide, upon which three or four mangrove trees are growing which show very prominently and furnish a good range for navigating the strait when approaching from the southward.

The island is entirely covered at high water. The reef surrounding the island is covered with bright coral sand and shows up well even where there is 2 or 3 fathoms of water. There is a narrow channel, having depths of from 7 to 9 fathoms, between Arboles and Samal Islands, but nothing would be gained by using it. The most dangerous shoal in the northern part of the strait lies about 1½ miles 188° (186° mag.) from the mangroves on Arboles Island and almost ½ mile from the Samal shore. This shoal has several heads with very little water over them, and near the middle of it are two small areas in which numerous coral heads uncover at the lowest tides.

Arboles Island, kept just open off Linao Point, clears the shoal in the southern approach, and Arboles Island, in range with Bassa Point, clears the dangerous shoal southward from Arboles Island.

The best anchorage in the strait, with both northerly and southerly winds, is about 1 mile northeastward from Linao Point, where the water is moderately deep close in to the narrow fringing reef.

Directions.—To enter Pakiputan Strait from the southward bring Arboles Island almost tangent to Linao Point and hold this range until about ½ mile from the latter; then follow along the Samal shore until Arboles Island is in range with Bassa Point; hold this range until Linao Point bears 196° (194° mag.) and then steer northward, passing about ½ mile westward from Arboles Island. When Bassa Point is abeam, the course may be set for any part of the head of the gulf, the only known off-lying danger northward of the parallel of Bassa Point being the previously described shoal northward from Little Cruz Island.

From Lanang Point the coast trends in a general northeast direction with a curve northward for about 18 miles to the mouth of the Hijo River, thence southward with a curve westward for 14 miles to Pangasinan Point. There is no good anchorage in this part of the gulf, the shores being fringed by mud flats, bare at low water, shoals, and patches of coral, all of which are too steep-to to afford anchorage with swinging room. There are no known off-lying dangers with the exception of the small shoal about 1 mile northward from Little Cruz Island, and the head of the gulf may be safely navigated at a distance of 1 mile. The general appearance of the coast is low and flat, with heavy timber and jungle growth to the water's edge. The country is a low alluvial plain which extends northward as far as the eye can reach, forming a broad valley, 30 to 40 miles wide. Westward, this valley rises to a range which at the southern end culminates in Mount Apo and eastward to the range along the eastern coast of Mindanao, in which the Agusan River rises. This stretch of coast is intersected by a number of rivers, none of which are of any importance to navigation. The Tagum and Hijo Rivers are the largest, the others being mere drainage streams.

The following is a detailed description of the shores and waters of the head of the gulf between Pakiputan Strait and Pangasinan Point on the eastern shore of the gulf.

The Bunauan River, which discharges about 7 miles northward from Lanang Point, and the Lasang, which discharges 2 miles northeastward from the Bunauan, have formed points at their mouths, the delta of the Lasang being much the larger. The Tuganay and Tagum Rivers empty about 12½ miles northeastward from Lanang

Point. This section of the coast line is practically all mangrove, a part of the distance tending to more or less solid beach, but it all overflows at very high tides. There is an exception to this in the broad bight northward from the mouth of the Lasang River, where for 2 miles the shore line is straight and solid with banks from 2 to 5 feet high and with a narrow fringe of sand beach. The land back from the beach seems drier than elsewhere along this shore. From 1 mile southward of the Bunauan River to the broad coral point 2 miles southwestward from the Tagum River, a distance of about 7 miles, the shore is bordered by a mud flat which bares at low water to a distance of from 150 to 600 yards. From the coral point above mentioned to the mouth of the Tagum River there is a broad sand beach 300 to 550 yards wide at low water.

Midway in the bight between the Bunauan and Lasang Rivers is a coral reef, ¾ mile long and ⅛ mile wide, which is awash at the lowest tides. It lies about 300 yards from the shore and has mud inshore from it.

There is a fringe of coral over 200 yards wide at the broad mangrove-covered point 2 miles southwestward from the Tagum River. About ½ mile northeastward from this point there is a circular shoal about 300 yards in diameter and 700 yards from shore which bares at extreme low water. This is practically the only danger in this vicinity.

Excepting the Tuganay and Tagum, the rivers in general are small and unimportant. The Bunauan and Lasang afford entrance and navigation several miles for launches drawing 2 to 3 feet. They have shifting bars at their mouths, and the channels are hard to find.

The **Tagum River** is the best known and most important river in the gulf. It has about 6 feet of water on its bar at low water, deeper water inside, and is reported to be navigable for 25 miles. For the first 10 miles it has a uniform width of about 60 yards. The Tuganay empties about 200 yards westward of the Tagum, so that at high water they present a far different appearance from that at low. Between the two openings is a broad point of land that shifts with the channels. Large quantities of driftwood are constantly being brought down. With a flood tide there is a little current, but with a falling tide it runs with a velocity of from 2 to 4 knots. The banks of both rivers are 2 to 4 feet high, generally solid and heavily wooded upstream. The bars of both rivers drop off suddenly into deep water. A poor anchorage may be found off the bar of the Tagum River in 15 to 20 fathoms, muddy bottom. It is reported that the bottom in this vicinity is quicksand, and that vessels have lost their anchors here.

From the mouth of the Tagum River to Mansaca Point, 3 miles northeastward, the shore line for the first mile is mud flats, bare at low water; the remainder is a broad sand beach. Mansaca Point is low and heavily wooded and may be easily recognized by an immense dome-shaped tree, which rises high above the jungle and is visible from a long distance.

From Mansaca Point to the mouth of the Madaum River 2 miles northeastward and thence 1½ miles eastward to the mouth of the Hijo River the shore line is solid sand beach 150 to 600 yards wide at low water. The Madaum and Hijo Rivers are the only ones of any consequence in this vicinity; the others are small streams not over

10 or 20 feet wide. The Madaum has 3 feet of water on the bar at low water and 12 feet inside. While apparently it is a river of importance, it is hardly more than a slough. On the eastern side of its mouth is a small coral point covered with mangroves.

The **Hijo River** is unimportant; it is shallow both at its mouth and inside. A small launch can ascend to a distance of about ½ mile, but no farther. From Hijo River and down the eastern shore of the head of the gulf to Mugnuga Bay, a distance of about 12 miles, there is along the coast a low expanse of land from ¼ mile wide at the northern end to 3 or 4 miles wide at Mugnuga Bay. This low land rises rapidly in foothills and ranges to nearly 2,000 feet; then numerous valleys and east of that are ranges and peaks that go up to about 4,000 feet. The land is all heavily wooded to the water's edge.

Pandasan Island, lying about 4 miles southward from the Hijo River and close to the shore, presents the same features as the main land and is hard to distinguish from a distance. It is less than ¼ mile in extent, fringed with coral and separated from the main land by a narrow channel blocked at the northern end. This channel has a width of about 100 yards and depths of from 3 to 5 fathoms and forms an excellent harbor of refuge for small craft. The entrance, from the southward, has depths of 10 and 12 feet over muddy bottom.

From the Hijo River to Pandasan Island the shore line is nearly all mangroves with here and there a little solid beach. With the exception of about 1 mile of muddy shore in the extreme corner of the gulf, there is a fringe of coral 100 to 300 yards wide.

Copia Island lies southwestward from Pandasan, from which it is separated by a channel about ¾ mile wide. It is about 1 mile long north and south and ⅓ mile wide. It is about ⅓ mile from shore and is low and well wooded on the outside. Nearly ½ mile 170° (168° mag.) from the south end of Copia Island and ⅜ mile from shore is a small round shoal covered by a least depth of 3¾ fathoms.

A fair anchorage, sheltered from winds from northeast to southeast, in 12 to 15 fathoms, muddy bottom, may be found ½ mile northward from Pandasan Island and ⅓ mile from shore.

Good anchorage for small vessel may be found inshore of Copia Island by rounding the island at a distance of about 300 yards and anchoring in midchannel in 6 to 9 fathoms abreast of the middle of the eastern side of the island. The bottom in the channel between Pandasan and Copia Islands is foul and should not be attempted by a stranger.

There is good anchorage for all classes of vessels with shelter from winds from north-northwest to east-southeast southward of Copia Island with sufficient swinging room to clear the 3¾-fathom shoal previously mentioned.

The shore line from Pandasan Island to Gill Point, 2 miles southward, and for 1 mile beyond Gill Point is solid and steep-to with only a very narrow fringe of beach, that around Copia Island being coral. The beach at Gill Point is white tide-washed coral and gravel and is very narrow. From 1 mile southward of Gill Point to 3 miles south of the same the shore is bordered by mangroves full of coral points and heads, with several deep channels leading into the mangroves. The shore reefs in some places extend to a distance of 600 yards. From the southern limit of the mangroves to Mugnuga Bay the shore is steep-to coral beach. **Mugnuga Bay** is only a slight indentation

in the coast. From here to Pangasinan Point, 2½ miles southeastward, the shore is sand beach and presents no unusual features. The country around the head of the gulf is very sparsely populated and only five small settlements of about a dozen houses each are found. They are called Madaum, near the river of the same name, Copia on Copia Island, Mampissin, and Tugnanang on the mainland opposite, and Mugnuga on Mugnuga Bay. The site of the village of Hijo has only three or four shacks.

From Pangasinan Point the coast trends in a general south-southeast direction for 54 miles to Cape San Agustin. Between Pangasinan and Piso Points the coast is a low, flat, heavily wooded plain extending inland several miles to foothills that rise rapidly into ranges and peaks of about 4,000 feet elevation. Near Piso Point the high land comes out to the shore again, the first peak of the range here having an altitude of 2,720 feet. At this point the plain disappears, the hills rising right from the water. The high mountains extending from the head of the gulf are interrupted in the vicinity of Piso Point and their places are taken by a rather flat section of country that extends eastward to the Pacific coast. This valley is by no means open, but, on the contrary, is broken up by hills from 500 to 2,000 feet high, which, however, appear low in comparison with the mountains of 4,000 to 6,000 feet elevation northward and the equally high, if not higher, peaks that lie between this valley and Cape San Agustin, reaching their greatest elevation about 23 miles northward from the extremity of the cape. The rivers which discharge on this section of the coast are small and of little value to navigation. The few villages are small and unimportant. Vessels can find anchorage nearly anywhere along the coast in fine weather, but nowhere can shelter be obtained from southwest winds.

Pangasinan Point is low, heavily wooded, and fringed with a coral and sand beach.

About 4 miles southeastward from Pangasinan Point there are a number of reefs which are bare at low water, but being inside of the general direction of the shore line they are not dangerous to navigation, provided a vessel keeps at a distance of ½ mile from shore.

Piso Point, about 6 miles southeastward from Pangasinan Point, stands out boldly, the hill forming the point rising to a height of 775 feet at a distance of less than ⅜ mile from the water. Part of the shore of the point is rocky and has a fringing reef 60 to 100 yards wide and the remainder is mangroves with mud exposed to a distance of 50 or 60 yards at low water.

Between Piso Point and Arena Point, about 7½ miles southward, the coast curves eastward, forming **Mapanga Bay.** This bay appears to be deeper than it really is, the effect being due to the mangroves which form the shore line for 3 or 4 miles. The mouth of the Piso River, which discharges about 4 miles southeastward from Piso Point, is not prominent, but can be recognized by a small reef near it, which bares at low water. It is nearly closed by a bar and can only be entered by pulling boats. The Mapanga River, which enters the sea about ½ mile southward from the Piso River, is a salt slough with a fine sandy bottom; it can be entered by a ship's launch at high water. The Kabatan River, which discharges about 2¼ miles southward from the Piso River, is similar to the Mapanga, but is smaller and only 2 or 3 feet deep; the mouth is not prominent.

Mount Galintan, situated about 6 miles east-southeastward from the mouth of the Piso River, is a symmetrical cone-shaped peak which rises to a height of 1,710 feet; being nearly always free from clouds, it forms a prominent landmark. Back from Mount Galintan the country is rolling and higher.

There are a number of reefs in Mapanga Bay, of which three are awash at half tide, and others which are covered with depths of from ¼ to 5 fathoms.

Mapanga Reef, lying about 2 miles 160° (158° mag.) from Piso Point, is partly bare at low water; this reef, within the 5-fathom curve, is about ½ mile in extent. About ½ mile southwestward from the part which bares there is a small spot covered by 2¾ fathoms.

Piso Reef is a small reef which bares at low water, lying about 1½ miles 187° (185° mag.) from Mapanga Reef and about the same distance westward from the northern entrance point to the Piso River.

Between Mapanga and Piso Reefs and the shore there are a number of small, dangerous reefs, whose positions will be best understood by reference to the chart. They consist of coral and white sand and show up well when the light is favorable. Piso Point, bearing 2° (0° mag.), will clear the western side of all dangers in this vicinity.

Arena Point is low, flat and rounding, and heavily wooded. From both north and south it appears as a sharp point extending far out from the general coast line. It is bordered by a fine sand beach and is clean and steep-to, a depth of 10 fathoms being found at a distance of 250 yards from its western extremity. The Lupon River, an unimportant slough, follows the beach for about 1 mile in a northerly direction and enters the sea about 1¼ miles southward from Arena Point.

From Arena Point the coast trends southeastward for 4½ miles to Sumlug Point and is low and heavily wooded. This stretch of coast line is straight and bordered by a fine sand beach. Between these two points shoal water extends in some places to a distance of ⅜ mile.

Sumlug Point is prominent partly because of a dry sand bar off the mouth of the Sumlug River, which discharges through the point. There are a number of native houses standing on the beach, which are of assistance in recognizing the point.

About 1½ miles 255° (253° mag.) from Sumlug Point there is a small detached reef covered by a least depth of ½ fathom. From here to the parallel of Sigaboy Island, about 13 miles southward, there is a chain of dangerous detached reefs, some of which bare at low tide and others which are covered with very little water. The two outlying reefs, Talisay and Burias, will be described; the positions of the others will be best understood by reference to the chart. In the area between these reefs and the land there are a number of small, dangerous, detached shoal patches, and the waters of this vicinity must be navigated with caution.

Between Sigaboy Island and Cape San Agustin there are no known dangers more than 1 mile from shore and this section of coast can be safely navigated at a distance of 1½ to 2 miles.

From Sumlug Point the coast trends eastward and then southward to Bato Point, forming **Cuabo Bay**, which is about 4 miles wide at the entrance and extends about 1½ miles northeastward. **Cuabo** is situated at the mouth of the Cuabo River, about 2½ miles eastward from Sumlug Point. It is small and unimportant; its site is marked by a few coconut trees. There are a number of small detached shoals in the center of Cuabo Bay, which are covered by very little water.

Bato Point, situated about 4 miles southeastward from Sumlug Point, is the abrupt end of a ridge about 400 feet high and 1½ miles long in a northeast and opposite direction. The western edge of this ridge comes steeply down to the beach.

From Bato Point the coast trends southward with a curve eastward for about 3 miles to Bitaugan Point, and for 1 mile southward from Bato Point is fringed with coral to a distance of about ⅓ mile, thence tapering to the coast about ⅝ mile northward from Bitaugan Point.

The extremity of **Bitaugan Point** is low and usually shows a bar of shingle, nearly covered at high water, at the mouth of the Bitaugan River, which discharges through the point. Less than ½ mile back from the point the land attains an elevation of 400 feet. The Bitaugan River carries a depth of from 3 to 4 feet for only about ¼ mile and then changes to a shallow mountain stream falling over bowlders and containing good fresh water.

From Bitaugan Point the coast trends southward and eastward for about 1½ miles to the northern entrance point of Talisay Bay. This stretch of coast shows mostly as mangroves, behind which there is a sandy beach. Midway between the above two points there is a narrow strip of cogon grass, which extends directly inland for nearly 3 miles and is notable for its smooth, level appearance, the country on either side being very rough.

Talisay Bay is about 1½ miles wide at the entrance and extends about ½ mile eastward. The shores of this bay are fringed with coral to a distance of about ¼ mile, and the land around the bay is low and swampy and thickly covered with jungle growth. On the north side of the bay, about ⅓ mile back from the beach, there is a very prominent hill—covered with cogon grass—which rises to a height of 393 feet.

Talisay Reef, partly bare at low water, lies about 3¾ miles westward from the summit of the 393-foot hill previously described as lying northward from Talisay Bay and 3 miles from the shore. It is nearly 1 mile long in a north and south direction, ⅛ mile wide, and is surrounded by deep water.

About ½ mile south-southeastward from Talisay Reef there is a cluster of rocks surrounded by a small reef, which bares at low water.

Burias Reef is situated 2 miles southward from Talisay Reef and nearly 4 miles 255° (253° mag.) from Duas Point, the southern entrance point to Talisay Bay. Near its northern part there is a shifting heap of white coral sand about 2 feet high and from 4 to 20 yards in diameter; the remainder of the reef is nearly bare at low water and shows a number of scattered coral heads. Within the 10-fathom curve this reef is about ½ mile long in a northeast and opposite direction, ⅛ mile wide, and surrounded by deep water.

The remainder of the reefs in this vicinity are covered by ¼ fathom or more, and, being composed of coral and white sand, are easily picked up when the light is favorable.

Duas Point, the southern entrance point to Talisay Bay, is prominent, being bare vertical cliffs 50 to 100 feet high, the slope being toward the point. About ½ mile southeastward from the point and about ¼ mile from shore there is a hill about 800 feet high, on the south side of which there is a valley separating it from a more prominent hill, 910 feet high, situated over ½ mile southward from the first-mentioned hill.

From Duas Point the coast trends southward for about 2 miles to the northern entrance point to Baksal Cove. The shore line for the first ¾ mile southward from Duas Point is rocky and the remainder is sandy. From Duas Point to the mouth of the Uañgon Creek, 1½ miles southward, there is very little reef fringing the shore, but it begins southward from the creek, widens to a distance of about 350 yards at the entrance to Baksal Cove, and then narrows in to the coast at the head of the cove. Part of the reef between Uañgon Creek and Baksal Cove bares at low water and about ½ mile southward from the creek there are some mangroves growing near the outer edge of it. There are a number of detached shoals lying ½ and ¾ mile from this stretch of coast. La Union or Uañgon, as it is called by the natives, lies on the beach near the mouth of the creek of the same name. When the survey was made it had a population of about 50, most of whom were Filipinos.

Baksal Cove is a semicircular cove about 1½ miles wide at the entrance and about ½ mile deep. The northern entrance point, southward from the mouth of the Mabua River, is fringed with a narrow reef upon which there are mangroves growing.

At a distance of less than ¼ mile from shore, at the head of Baksal Cove, there is a small rock awash and there are several detached reefs in the middle of the cove covered by depths of from 1½ to 2 fathoms. Off the entrance to the cove there is a chain of small detached reefs extending for a distance of about 1 mile in a north and south direction.

Bais Point, southward from Baksal Cove, is a low, rounding point, showing mainly as mangrove, though there are very few mangroves on it. The mouth of the Timbo River, on the northern part of the point, is fairly prominent, the beach being higher there. Between the Timbo River and the western extremity of the point the timber gives way to cogon grass in places, affording pasturage for a large number of cattle.

Sigaboy, situated on the western extremity of Bais Point, had a population of 383 in 1908, when the survey was made. It is the most important village on the eastern shore of Davao Gulf and contains a church of more than ordinarily durable construction, age, and size.

From Bais Point the coast trends in a general 165° (163° mag.) direction for about 3½ miles to Borot Cove. This section of the coast is fringed by a narrow reef and faced by a chain of detached reefs lying from ¼ to ½ mile from shore.

Sigaboy Island, situated nearly 1½ miles southward from Sigaboy Village and about ⅜ mile from the shore, is a small island about ¼ mile long east and west and less than ⅛ mile wide. It is rocky, has steep cliffs, and has two round grass-covered hills on it, the eastern

and higher one rising to a height of 250 feet. There is a blunt pinnacle about 150 feet high at the western end and a sandy point extends 60 to 100 yards from the eastern end. The navigable channel between it and the main has a width of about 400 yards and a depth of 6½ fathoms in the middle. Sigaboy Island shows up well only from the northward. From other directions it is projected against the background of hills and mountains and does not show except in a favorable light.

Borot Cove is about ⅜ mile wide at the entrance between Borot and Salun Points, the northern and southern entrance points, and extends nearly ½ mile northeastward. It is readily identified, the approaches on either hand being steep, rocky bluffs. Both entrance points and the head of the cove are fringed with reefs, leaving a contracted anchorage space about 400 yards in extent in the northern part of the cove. **Monserrat,** consisting of some 15 houses scattered among the coconut trees, lies at the head of the cove.

Borot Reef, the center of which lies about ½ mile westward from Borot Point, is a circular reef about ¼ mile in diameter and covered with very little water; near its southern edge there are rocks awash.

From Borot Cove the coast trends southward for 3½ miles to Padada Point, thence southward and eastward for 4½ miles to Batikual Point, the southern entrance point to Nangan Bay. The bluff at Lilisan Point, about 1 mile southward from Borot Cove, is steep and about 100 feet high; it stands out prominently. From this point southward to Nangan Bay the beach is sandy and presents no features of note. This section of the coast is fringed in some places by a narrow reef and faced by a number of small detached reefs, none of which, however, are more than 1 mile from shore.

Padada Point is low, flat, and rounding, but from both north and south appears as a distinct point. **Magdug** lies on the beach about 1 mile northward from the point and **Luzon** about 1½ miles southward from it.

In the rough country along this part of the coast there are no peaks of much importance except **Mount Bilbogan.** It lies 1 mile east-southeastward from Lilisan Point and is a landmark that is recognizable for miles, especially from north or south. Seen from either of these directions its summit appears as a serrated ridge of three small peaks. Seen from the west it appears as a sharp peak, from which, a little below the summit, protrudes a sharp thumb when one comes abreast of it and a few miles offshore. The peak attains a greatest elevation of 2,450 feet, is pyramidal in form, and wonderfully regular in outline. Situated less than 1 mile from the shore line, towering above the hills around it, its isolation from the high inland peaks makes it an object of reference for the whole eastern part of the gulf. It is rarely in clouds even when the peaks inland are heavily covered.

Batikual Point is low and wooded and fringed by a reef which bares to a distance of ¼ mile. **Tiblauan** (Ascencion) is situated at the mouth of Tiblauan Creek, about 1 mile northwestward from the point.

Nangan Bay, southward from Batikual Point, is ¾ mile wide at the entrance between Batikual and Kagan Points and extends about ⅓ mile inland. The shores are low and wooded and in the northern part are fringed with reefs.

Anchorage, protected from all winds except those from south and west, may be found in Nangan Bay in 22 to 28 fathoms, muddy bottom, about 300 or 400 yards from the shore.

From Kagan Point the coast trends in a general 162° (160° mag.) direction, with a deep curve eastward for 4 miles to Kaganuhan Point, forming Abag and Tagabili Bays. The shore line is regular and smooth, with a sandy beach and narrow fringing reef, and can be safely approached to a distance of ¼ mile. The small and unimportant villages of Nazaret or Sirup and Kulaguhan are situated on this stretch of coast, ½ and 3 miles, respectively, southeastward from Kagan Point.

Anchorage, sheltered from southerly and easterly winds, may be found in Tagabili Bay, northward from Kaganuhan Point, in 23 or 24 fathoms, muddy bottom, about 300 yards from shore, with the extremity of the point bearing 238° (236° mag.).

Kaganuhan Point is prominent from both north and south, mainly because of six hills that rise in an ascending series from the point; when viewed from southward, only four hills are visible. The extremity of the point is low and flat and fringed by a reef and foul ground to a distance of about 600 yards. This point should be given a berth of at least ½ mile in passing.

From Kaganuhan Point the coast trends in a general 155° (153° mag.) direction with a curve eastward for 8 miles to Cape San Agustin. Along this stretch of coast the foothills come down to the shore line which, as a result, is more or less broken up. The bluffs and ledges are composed of fossil coral, and as such are very difficult to travel over. In this vicinity there are very few sand beaches and the shore is fringed in some places by coral reefs which extend to a distance of ¼ mile.

Tagbanao Cove, situated about 2 miles southeastward from Kaganuhan Point, is a secluded bight, **Tagbanao Point,** on the south side of the entrance, being rather high and shutting out the view to the southward. Good anchorage may be found in the middle of Tagbanao Cove in 18 or 20 fathoms, muddy bottom.

Pundaguitan Anchorage, on the south side of Lakga Point, about ½ mile southward from Tagbanao Cove, may be recognized by the cogon grass growing on the steep hillside on the north side of a small valley, in which two or three native houses are located. A fine sand beach shows up prominently here.

Kanikian Point, about 2 miles southward from Lakga Point, is low and wooded and terminates in a cliff about 15 feet high. It is fringed by a reef to a distance of about 300 yards.

Lavigan Anchorage (chart 4653), on the north side of Lima Point, nearly 2 miles northward from the extremity of Cape San Agustin, is simply a break in the reef and too small to afford anchorage for anything larger than a small launch.

Lima Point and **Talisay Point**, the latter about midway between Lima Point and the cape, are both fairly conspicuous.

Cape San Agustin is the southern extremity of the long peninsula which forms the eastern side of Davao Gulf. The entire promontory is mountainous; the northern part is cut into by deep valleys, but the southern part, for 5 miles northward from the extremity of the cape, is a continuous backbone of hills running down the middle

of the long narrow strip which terminates in the cape. These hills decrease gradually in height from 1,120 feet, 5 miles northward from the cape, to a rocky bluff 15 to 20 feet high at its extremity. The Pacific side of the cape, to a distance of about 2 miles northward, is a succession of sandy beaches separated by rocky bluffs, which, however, are passable on foot at any stage of the tide.

A rock, 18 feet high, fringed by a reef which connects it with the land, rises about 20 yards southward from the cape; when seen from an east or west direction it is very prominent.

About ¼ mile south-southwestward from Cape San Agustin is the northern edge of **San Agustin Reef**, a large dangerous reef nearly ¾ mile long in a south-southwesterly and opposite direction and over ¼ mile wide. This reef, which is covered by depths of from 1½ to 5 fathoms, breaks heavily at times. There is a good channel between it and the cape, which may be found by steering on a 115° (113° mag.) or opposite course to give the 18-foot rock off the pitch of the cape a berth of about 300 yards. This channel is only a little more than 200 yards wide and should be used with caution because of the strong and irregular currents which are experienced in this vicinity.

SURIGAO STRAIT.

Surigao Strait, the only passage for large vessels from the Pacific to the interior waters of the Archipelago, with the exception of San Bernardino Strait, is famous for having been traversed by Magellan when he crossed the Pacific and discovered the Philippine Islands in 1521. This strait is less frequented by sailing vessels than that of San Bernardino, which is more to windward in the northeast monsoon. It is, however, more direct and safer than that strait, but it obliges sailing vessels that take it, if they are bound for Manila, to work up the west coasts of Negros and Panay and the east coast of Mindoro. It is of advantage to vessels going to the southern Philippines or to the Sulu Sea and is sometimes used by steamers from Australia that wish to escape the full force of the northeast monsoon. The northern entrance is between Suluan and Dinagat Islands; the southern entrance between the south end of Panaon Island and Bilaa Point, the northern extremity of Mindanao Island. Surigao Strait is deep and safe and the shores of the islands that border it are steep-to.

Hinatuan Passage.—The Hinatuan or Eastern Passage, as it is sometimes called, connects the Pacific with the southern part of Surigao Strait. The western end is narrow and tortuous and the tidal currents run with great velocity. It is used by steamers trading to the east coast of Mindanao and occasionally by sailing vessels. A description of this passage will be given in its proper order.

WINDS IN SURIGAO STRAIT.—At the mouth of the strait the northeast monsoon begins toward the end of September and blows throughout October and November; in December northeast winds alternate with northerly gales. In January winds blow from northeast to east-northeast, accompanied by heavy rain. In February and March easterly winds prevail. In April, May, and June the prevailing wind is southeast, with occasional gales called collas from the south. In July, August, and September collas from the southwest are frequent.

The northeast winds, though strong, cease during the night; but winds from southeast, south, and southwest continue to blow. It generally rains with north-northeast and east-northeast winds. The rains cease and the weather clears with east winds and more so with southeast winds. With southwest winds it remains clear, unless a gale arises, which sometimes brings rain. In general there is no very bad weather in this part of the Archipelago, unless a typhoon should occur. The season of the year when a typhoon might occur is from the end of October to the beginning of January. They begin to blow from the northwest and finish from the southeast, having passed through northeast or southwest; when they haul through northeast they blow stronger and more rain falls. Typhoons are, however, of very rare occurrence in this locality, there being no record of any having been experienced for many years, and the best authorities say that they never pass south of latitude 9°.

ISLANDS NORTHEASTWARD FROM MINDANAO.

SULUAN ISLAND,

at the northern entrance of the strait, has already been described in Part I, but as it is a prominent landmark for vessels entering Surigao Strait the description is repeated here. It lies 10 miles southeastward from Sungi Point, Samar, and 26 miles northeastward from the north point of Dinagat Island. Situated as it is—to windward during the northeast monsoon, at the entrance to Surigao Strait and being conspicuous—it is a good point to make for when approaching the strait from the Pacific. It is over 2 miles long northwest and southeast and 1 mile wide. Near the northwest point are two hills, 178 and 204 feet high, respectively, and the eastern side is formed by a high coral ridge which attains a greatest elevation of 410 feet. This ridge has the same characteristic features as the long ridges from Matarinao Bay to Sungi Point. The southwestern half of the island is a low plain covered with coconut groves. From the northwest point a reef, partly bare at low water, extends ¾ mile in a southwest direction and a similar reef, not so prominent, extends from the village of Granadas to the southern point of the island and has a general width of ½ mile. The coast on the north and east sides of the island are free from dangers and a vessel may approach it with safety to a distance of ½ mile. There are eight small islets, ranging in height from 7 to 163 feet, lying close to the main island, with which they are all, with the exception of the southern two, connected by reefs. Granadas lies on the western shore. A light, showing every 10 seconds a group of two white flashes, separated by an interval of 2½ seconds, and followed by an interval of 7½ seconds, visible 28 miles, is exhibited 438 feet above high water from a cylindrical concrete tower 37 feet high on the summit of Suluan Island, about ½ mile northward from the southeastern point. The keeper's dwelling, of concrete, stands at the foot of the tower.

The only partly sheltered anchorage is off the southwest coast in 6 or 7 fathoms, sandy bottom, about ½ mile southward of the 204-foot hill on the northwest point and the same distance westward from the village. This anchorage is protected from winds from northwest through north and east to southeast. The best and about only landing is on the shore line inside of the above-mentioned anchorage.

DINAGAT ISLAND,

forming the east side of Surigao Strait, is, including the smaller islands lying close to its south end, about 40 miles long north and south and has a greatest width of 10 miles. Its west coast is very irregular in outline, being indented by deep bays and faced by numerous islands, which afford good sheltered anchorages, while the east coast is more regular and contains few good harbors. A chain of mountains extends along the east coast, the highest of which, **Mount Redondo**, 3,066 feet in elevation, is situated 7 miles from the north end. Through the middle of the island extends a rather wide valley traversed by low ridges and hills, and on the west side there is another ridge rather flat in general and especially so at its highest part, which is about one-half as high as that on the east coast. There are no rivers of importance in the western part; on the east coast there are two large inlets, into which a number of rivers discharge, which are navigable for small vessels. Dinagat is generally wooded; there is probably little heavy timber except in the valleys, the growth on the higher slopes being mostly small and scraggly. The island is sparsely populated and contains no ports of commercial importance. The principal exports are hemp and copra.

Desolation Point, the northern extremity of Dinagat Island, is a low, rocky, and rounding point; it is bold and can be passed close-to. The land back from the point rises rapidly and attains an elevation of 1,420 feet at a distance of 1½ miles inland.

Kanamong, Kanpintak, and **Panamauan Points**, situated 1½, 2½, and 3 miles, respectively, southwestward from Desolation Point, are not prominent. They are low, composed of dark rock, heavily wooded, and are clean and steep-to. In the bays between these points are white sand beaches with coconut trees, a little cultivation, and occasionally two or three native houses.

Babatnon Point, about 1½ miles southward from Panamauan Point, is low and wooded. It forms the western side of Panamauan Bay, which is small and nearly blocked by reefs. Partially sheltered anchorage for small craft may be found here. **Looc Bay**, between Babatnon and Berrugosa Points, is 3½ miles wide at the entrance and extends about 2 miles southward. Its shores are fringed by a narrow steep-to reef, and there are no detached dangers with the exception of a small reef, bare at low water springs, lying about 300 yards northward from the village of Loreto. **Loreto** and **Santiago** are small settlements at the head of the bay; small steamers from Cebu occasionally call here.

Puyo Island, lying about ½ mile from the eastern shore of Looc Bay, is about ½ mile in extent, 120 feet high, and partly wooded. From a distance it is not readily distinguished from the land behind it. Fair anchorage may be found between Puyo Island and the land, but rather exposed to northerly winds.

Kayasa Islets (Twin Islets) are two small rocky wooded islets, 115 and 120 feet high, respectively, lying about 2¼ miles west-northwestward from Babatnon Point. They lie about ⅓ mile apart in a north-northwest and opposite direction. There is a small rocky shoal, covered by a least depth of 1 fathom, lying a good ¼ mile northwestward from the northern islet and a rock awash lies about

⅛ mile westward from the southern islet. The tides run with great velocity in the vicinity of the Kayasa Islets and they should be given a good berth.

Hibuson Island, lying about 4 miles northwestward from Berrugosa Point, is about 3 miles long northwest and southeast and 1½ miles wide. It is well wooded and rises to a ridge near the center, 620 feet high. Its shores are fairly clean and steep-to and there are no off-lying dangers. The town of Hibuson lies at the head of Tinaga Cove, a small bay on the east side of the island. Anchorage may be found in front of Hibuson in 20 fathoms, protected from all except easterly winds.

Little Hibuson Island, lying close to the southwestern part of Hibuson Island, of which it appears to be a part, and Hibuson Island are practically one island, being connected at their extremities by reefs with a deep basin between them. The channel between them is merely a mangrove-lined slough, which can be used only by small craft. The northern entrance is narrow and has many large bowlders in it, covered by 3 and 4 feet of water. Possibly 2 fathoms could be carried in when the light is good by avoiding the bowlders. The southern entrance is also almost blocked by bowlders, but can be entered at high water when the sea is smooth.

Berrugosa Point, about 600 feet in height, is the northern end of a large peninsula between Looc and Tubajon Bays. This peninsula, composed mostly of hills about 600 feet high and covered with a thick scraggy growth, presents a coxcomb appearance when viewed from the westward.

Tubajon Bay, between Berrugosa and Esconchada Points, is about 4 miles wide at the entrance and extends 2 miles southeastward. Its shores are clean and steep-to. **Tubajon** and **Santa Cruz** lie at the head of the bay. **Lisub Cove,** a small indentation in the eastern shore of Tubajon Bay, 2 miles south of Berrugosa Point, is small and the entrance is narrow and foul and could only be used by small craft drawing not more than 6 feet of water. For boats and small launches it affords perfect shelter from all winds.

Esconchada Point is a steep, broad, partly wooded bluff over 250 feet high, fronted by a narrow steep-to rocky beach. A large part of the central portion of the bluff has a steep rocky face of a dark reddish color, clear of timber, and presents a prominent appearance when viewed from offshore. The tide rips off Esconchada Point are marked and heavy, especially with the flood tide.

From Esconchada Point the coast trends southward for 5 miles to Tamoyauas Point and is broken by four bays.

Pagbabangnan Cove is a small indentation in the shore line about 2 miles southward of Esconchada Point. It is very small and has a coral reef extending entirely across its entrance, which can only be crossed by a pulling boat at high water. Small craft can enter this cove at high water unless the sea is very choppy outside.

Layauan Bay, immediately southward from Pagbabangnan Cove, from which it is separated by Tambungan Point, is about ⅖ mile wide at the entrance and extends about 1 mile eastward; from the north side of the bay, near its head, there is an arm extending about ½ mile northward. Layauan Bay has a rocky shore all around, hidden by a narrow fringe of mangrove and faced by coral reefs to a distance of

50 to 100 yards. A depth of from 32 to 14 fathoms can be carried from the entrance to a point southward of the sand spit on the west side of the entrance to the north arm of the bay eastward from this point; the bay is foul and filled with reefs. A channel 150 yards wide leads up the middle of the north arm carrying a depth of 10 fathoms, mud bottom, for about ¼ mile beyond the entrance. In entering the north arm the sand spit on the west side should be passed close-to, it being steep and clear while reefs make well off the point on the eastern side. Layauan Bay is a great resort for fishermen, some coming even from Leyte.

Anchorage, protected from all except westerly winds, may be found in the middle of Layauan Bay in 16 fathoms; small vessels may enter the north arm, where they will find landlocked anchorage in 10 fathoms.

Little Layauan Bay, a small unimportant bay, lies immediately south from Layauan Bay, from which it is separated by a steep, rocky bluff, which is prominent and bold. This bay is fringed by coral reefs which extend about 50 yards from the northern shore and 160 yards from the southern shore. The best water is in the northern part of the bay. The point at the south side of the entrance to Little Layauan Bay is a steep, cultivated ridge about 80 feet high.

Libjo Bay lies between Tamoyauas Point, which is high and gently rounding with rocky ledges at its foot and heavily wooded, and Pelotes Point. It is 2½ miles wide at the entrance and extends the same distance southeastward. The shores of the bay are fringed with reefs; the center is deep and clear. The town of Libjo lies back of a cobblestone and sand beach at the head of the bay.

Anchorage, fairly protected from all winds, may be found in 17 fathoms ¼ mile northwestward from Libjo.

Pelotes Rocks lie about ⅞ mile northward from Pelotes Point. They are two in number but appear to be four or five, the larger having four separate summits. The southern summit of the larger rock is 120 feet high; the western rock is about 25 feet high. They lie on a bank about ¼ mile in extent surrounded by deep water. They are steep-to and covered with a thick growth of small trees.

Pelotes Point is the termination of Tabunan Peninsula, a wooded peninsula, 590 feet high, which extends about 2 miles northwestward from the coast. Pelotes Point is rocky, steep, and bold. About ¼ mile northeastward from it there is a steep rock, 58 feet high, with a tuft of bushes on its top. The isthmus connecting Tabunan Peninsula with the mainland is about ¾ mile wide and 100 feet high.

Tabunan, an unimportant fishing settlement, lies on the western side of Tabunan Peninsula, about ¾ mile southward from Pelotes Point.

At Pelotes Point begins a series of groups of islets and inlets that extends southward along the coast for a distance of 10 miles. The mainland itself is so broken into small haycock-shaped hills that resemble the islands that the number of the latter appears to be almost innumerable.

Tabunan Islets are a group of 11 small islets and four or five smaller rocks lying about ½ mile southward from Pelotes Point and extending about the same distance from the shore. They range in height from 50 to 210 feet and are all very steep and covered with light shrubbery. They are divided into two groups; the outer group of

four are surrounded by deep water and are separated from the others by a narrow 23-fathom channel. The inner group all lie on the same reef and there is a channel between them and the peninsula passable by boats at high water.

Binaliu Rocks, two in number, lie 7/8 mile west-southwestward from Pelotes Point. The largest one is about 120 feet long, 13 feet high, and flat topped; the other one is a pointed rock, 9 feet high, lying about 50 feet eastward from the larger. They are of limestone formation, much underworn by wave action, and the sea breaks over them in moderately heavy weather.

Dayhangan Bay, between the south side of Tabunan Peninsula and Tagabaka Point, presents no special features; the village of Dayhagan lies on the north shore.

Tagabaka Cove lies between the point of the same name and a long conspicuous point which extends 3/4 mile northward and is composed of limestone hillocks resembling the numerous islands outside. There are a number of islets in the cove, the largest of which lies across the entrance. The channels at either end of this islet are foul, and only about 6 feet can be carried into the cove at high water.

A small shoal covered by a least depth of 1 3/4 fathoms exists about 1/3 mile north-northwestward from the entrance point to Tagabaka Cove, and a shoal covered by a least depth of 3 fathoms and surrounded by deep water exists midway between the same point and Kanihaan Island.

Kanihaan Island, the farthest off-lying island in this vicinity, is situated about 3 miles southwestward from Tabunan Peninsula and 2 1/2 miles from shore. It is about 1/2 mile long in a north-northeast and opposite direction and 1/4 mile wide, covered with cogon grass and coconut trees, and rises to a height of 167 feet; foul ground extends about 400 yards north and south from it.

A small, dangerous reef, covered by a least depth of 1 fathom and surrounded by deep water, exists about 3/8 mile westward from Kanihaan Island. The currents in this vicinity run with great velocity, causing heavy tide rips and overfalls, and this reef is hard to pick up.

Currents.—During the survey in this vicinity currents were experienced running southward off the points of Dinagat and around Kanihaan Island. When they did set northward there was, as a rule, little strength to them, while, on the other hand, those setting southward ran with great velocity around the north end of Kanihaan Island and the reef to the westward.

Kayabangan Island, situated about 3/4 mile southwestward from the western entrance point to Tagabaka Cove, is small, rocky, wooded, and 220 feet high. The territory included within the group of islets, rocks, and reefs between Kayabangan Island and the shore is foul, and no vessels should venture into this area except under the most favorable seeing conditions.

Lipata lies back of a sandy beach about 1 mile south-southeastward from Kayabangan Island. There is no good anchorage in the vicinity of Lipata. It is best approached northward from a small islet lying 3/8 mile northwest from it. When nearing the village care must be given to the fringing reef, which bares at low water and extends 1/8 mile from the shore. Lipata can be approached from the westward by rounding the north end of Kanhanusa Island at a distance

of 100 yards and giving the islet eastward from it a berth of about 200 yards. This will clear the reef, which extends about 400 yards southward from the islet lying northwestward from Lipata. The entrance to the cove southward of Lipata is blocked by a coral reef which can only be crossed by pulling boats at high water.

Kanhanusa Island is a small irregularly shaped island, 325 feet high, lying 1 mile south-southwest from Kayabangan Island; **Tamburay Island** lies immediately southward from it.

Kanhanusa Passage, between Kanhanusa and Tamburay Islands and the land, is navigable by coasting vessels. A coral sand reef about 50 by 200 yards in extent, which bares at low water, lies in the middle of the passage. There is deep water on both sides of this reef, and it can be left on either hand in passing. Care must also be exercised to avoid the fringing reef making off 100 yards from the point on the mainland just north of the channel reef and another making off 100 yards from the islet near the northern end of Kanhanusa Island.

Kayitan Bay, at the main entrance between Tamburay Island and Tungo Point, is about ¼ mile wide and extends nearly 1½ miles east-southeastward. **Dungoan Cove,** the entrance to which is blocked by a coral reef bare at low water, is an irregularly shaped body of water making off from the south side of Kayitan Bay.

A fairly good anchorage may be found in 21 fathoms, mud bottom, about 400 yards eastward from the entrance to the eastern arm of Kayitan Bay. Care must be taken to avoid a coral head, covered by a least depth of ½ fathom, lying in the middle of the arm ⅜ mile east of the entrance. The north shore of the arm west from the coral head is fringed by a reef about 50 yards wide, while the south shore is practically clear.

San Roque is a small village about 2 miles southward from Tungo Point on the north side of San Roque Channel. Back from this village there is a 340-foot hill, which from northwest and southeast shows as a perfect cone and stands up very sharply.

San Roque Channel (chart 4638), between Dinagat and Kotkot Islands, is narrowed by fringing reefs on either side to a navigable width of about 100 yards. In the middle of the channel, abreast of the village, there is a depth of about 5 fathoms, from which point the depths gradually increase north and south. A short distance eastward from the village the channel widens, forming a basin about 300 by 400 yards in extent, where good anchorage may be found in from 22 to 25 fathoms. The north shore of this basin has two reefs extending some 220 yards from shore. The channel southward from this basin narrows and is almost closed by reefs, leaving a 9-fathom channel about 50 yards wide through the reef 80 yards eastward from **Rabo Rock,** the 22-foot rock west of Kakub Point.

Kotkot Island, forming the southwest side of San Roque Channel, is nearly 1 mile long northtwest and southeast, dark and thickly wooded, and rises near the north end to a height of 170 feet. It is fringed by reefs which from the ends extend to a distance of about ¼ mile. On the reef, extending from the southeast end, are situated Kasundalo Islet and several smaller islets and rocks.

Hagakhak Island, lying about ½ mile southward from Kotkot Island, from which it is separated by a deep, narrow channel, is wooded and 140 feet high.

Tinao Islet is situated about 400 yards northwestward from the north end of Hagakhak Island. It is the outer one of a number of islets and rocks northwestward from Hagakhak; on its western end are two peculiar rocky columns, some 30 feet high.

Little Hagakhak Island, situated about ¼ mile southwestward from Hagakhak Island, is 110 feet high, wooded, and very prominent. It is small, composed of dark, smooth rocks having high cliffs on its northeast and southwest faces, and is clean and steep-to. From a steep bluff at its southeast extremity a bare rocky ledge, about 7 feet above high water, extends for 120 yards, and close to the end of this ledge, on top of it, a cluster of large bowlders, steep on the sides and underworn around their bases, lie scattered. The highest of these bowlders is 40 feet high and has a few scrubby bushes on it.

Kakub Point is a long point which terminates in a little hill 50 feet high and forms part of the eastern side of San Roque Channel. The shore line from Kakub extends ⅝ mile northward and thence 2¼ miles southward to Kanhatid Point, forming eastward from Kakub Point and the Kanhatid Islands a narrow, deep, unnamed bay the shores of which are practically a wall of coral from 10 to 30 feet high.

Extending southward from Kakub Point for a distance of over ¾ mile is a long reef, on which are situated the **Kanhatid Islets,** a number of small, partly wooded, rocky, and uninviting looking islets.

About ¼ mile southwestward from the southern Kanhatid Islet, in the fairway to the southern approach to San Roque Channel, the **Twin Islets,** two small islets each about 60 feet high, lie on a reef surrounded by deep water. They may be left on either hand at a distance of 200 yards when approaching or leaving San Roque Channel.

Kabun Cove is a small indentation about 1 mile northward from Kanhatid Point. It is of no value to navigation, being nearly filled by an island the ends of which are connected with the shore by reefs.

Kanhatid Point, forming the western side of Babas Cove, has a small islet off its extremity, about 50 feet high, the southern and eastern sides of which are clean and steep-to.

Babas Cove, lying immediately eastward from Kanhatid Point, is ¾ mile long north and south, ⅛ mile wide, and very deep. It affords anchorage for launches and small craft, a mid-channel course carrying a least depth of 17 fathoms to its head.

Kambagio Point, the northwestern entrance point to Melgar Bay, is rocky and steep and is formed by the base of a little conical grass-covered hill about 200 feet high; it appears prominent from west and southwest. An extensive reef, bare at low-water springs, extends ⅜ mile southeastward from the eastern side of Kambagio Point, affording protection to the anchorage off Melgar from southwest winds.

Melgar Bay is 3½ miles wide at the entrance between Kambagio and Kansadok Points and extends 1½ miles northeastward. It is encircled by high hills lying about 2 miles back from the coast and is bordered with but little foreshore. About 2 miles northward from the head of the bay these hills reach over 1,000 feet in elevation and stand out prominently. Northeast from the bay is a rather broken series of ridges that culminate in Mount Tristan, on the eastern side of Dinagat.

Melgar is a small town lying eastward from Kambagio Point. It is built with one street on the beach and the other on the hillside.

From Kambagio Point the coast trends northeastward for about 2 miles and thence east-southeastward for about the same distance to Bilabid Point. This section of the coast is rocky around the points and in the bights. It is fringed with coral, which at one point extends to a distance of nearly ½ mile.

About ¼ mile south-southeast from Tamchagan Point, the first point northeastward from Kambagio Point, there is a reef composed of coral bowlders and covered by a least depth of 1 fathom. It is about 200 yards long northwest and southeast, 100 yards wide, steep-to on all sides, and usually shows plainly.

Sibukauan Island, lying midway between Bilabid and Mahangin Points, 2 miles eastward from Kambagio Point, and in the entrance to three large inlets, known as Panikian, Tagabaka, and Tagbabui Coves, is of horseshoe shape with the convex side toward Bilabid Point. It is bold, over 100 feet high, heavily wooded, and easily recognized. Sibukauan is joined to Bilabid Point by a reef showing coral heads at low water. Its south side is fringed by a narrow steep-to reef, and between this reef and Mahangin Point there is a deep, clear channel about 400 yards wide.

Panikian, Tagabaka, and **Tagbabui Coves** are large irregularly shaped inlets having a common entrance between Sibukauan Island and Mahangin Point; they do not require any detailed description. They afford perfectly sheltered anchorage for moderate-size vessels. The only dangers requiring special mention are the reefs off the eastern points of Sibukauan Island, which are rather extensive and show coral heads at low-water springs.

Mahangin Point, the southern entrance point to the above-mentioned coves, has a black rock beach and is bold and steep-to. The land rises rapidly from the point and attains a height of 430 feet at a distance of about ½ mile inland.

Kanayut Point, lying about ¾ mile southwestward from Mahangin Point, has no beach, but instead a cliff face, about 30 feet high, which shows well from all parts of Melgar Bay. The peninsula terminating in Mahangin and Kanayut Points is well wooded, 490 feet high, and very prominent.

Kambay Cove is ¾ mile wide at the entrance between Kanayut and Kansadok Points and extends about the same distance southeastward. It affords fair anchorage, although the depths are rather great.

Kansadok Point, the southeastern entrance point to Melgar Bay, is low, rocky, and steep-to, and the land behind is steep and wooded.

Unib Island is situated about 2 miles southward from Kambagio Point in the entrance to Melgar Bay. It is roughly triangular in shape and about ¾ mile in extent. It is very rugged, heavily wooded, and rises in the center to a height of 650 feet. Its shores are generally clean and steep-to.

Sibanoc Island lies immediately southwestward from Unib Island, from which it is separated by a deep channel. It is about 2 miles long north and south, narrow, and rises to a height of 448 feet. It is the best-cultivated island in this vicinity and supports quite a population. The village of Rizal lies on the most eastern point.

Baong Rocks are a cluster of rocks covering an area about 400 yards long east and west and 220 yards wide, situated westward from the

southern part of Sibanoc Island, from which they are separated by a deep channel about 600 yards wide. The largest rock is of a dark color, about 10 by 15 feet in extent, and stands about 3 feet above the highest tides.

About 150 yards west of this rock there is a rocky cluster uncovering at half tide, and about the same distance east-southeastward there is another cluster covered by 1 foot at low water; between these dangers, depths of from 1 to 5 fathoms are found. With southwest and west winds the sea breaks heavily over these rocks and shoals.

Viray Islet is a small islet lying about ¾ mile southward from Unib Island; it is about ¼ mile long north and south and very narrow. It is low in the middle and higher at the ends, the southern end being the higher (80 feet) and more wooded. It is surrounded by reefs, which from the northeastern side extend to a distance of nearly ½ mile and are partly bare at low water.

Likoko Islet is a very small islet lying ¼ mile from the east part of Sibanoc Island; it is rocky and has a cluster of coconut trees on it. Eastward from Likoko and separated from it by a channel 120 yards wide is a large reef which bares in places at low-water springs. There is a narrow deep channel between this reef and the reef surrounding Viray Islet and also between Likoko and Sibanoc Island.

Kalavera Point, about ¾ mile southwestward from Kansadok Point, is surrounded by a rocky ledge with shoal water outside of it extending to a distance of about ¼ mile. It is 50 feet high and the one street of the village of Odok runs up over the hill.

Matingbi Cove, at its entrance between Kamagong Point, situated ½ mile south of Kalavera Point and Kanhinaud Point, is about 1¼ miles wide and extends about 1 mile eastward; it is of no importance.

Puyo Islet is a small islet lying in the middle of Matingbi Cove, which is barely distinguishable from the land behind it.

Kanhinaud Point is the western extremity of a long peninsula lying between Matingbi and Masiub Coves. It is bordered by mangroves and fringed by a reef which bares at low water. This peninsula is very prominent, partly because of the scattered cultivated areas and partly because of the sharp hills with clumps of trees on them. A large clump of trees on a 390-foot hill near the middle of the peninsula can easily be recognized from Little Hagakhak Island.

Tagbayakao Islet is a small cone-shaped rock, 102 feet high, with bushes on top and mangroves on its inshore side, lying nearly 1½ miles southeastward from Kanhinaud Point. It is connected with the peninsula northward by a reef, partly bare at low water, and foul ground extends ¼ mile southwestward from it.

Masiub Cove is about 1 mile wide at the entrance between Tagbayakao Islet and Masiub Point and extends north and then east for a distance of nearly 2 miles. It contains much foul ground and is of little value to navigation.

Dinagat Point, situated ⅞ mile southward from Masiub Point, terminates in a promontory, 156 feet high, on the northern slope of which is situated the town of Dinagat.

Dinagat (chart 4638) is a small town, consisting of two churches, tribunal, several Chinese stores, a schoolhouse painted white with an iron roof, and 70 or 80 nipa houses. The schoolhouse and church stand on high ground and are conspicuous from seaward. At the

back of the town is a perfectly sheltered pier, with 5 feet at its end, where small native craft and ship's launches may dock.

Capaquian Island, lying across the entrance to Masiub and Dinagat Coves, is about 2 miles long, northwest and southeast, and narrow. The southwest side is mostly black, rocky ledges; the northeast side is bordered by mangroves and fringed by a steep-to reef. It is well wooded and rises in the northwest part to a height of 260 feet.

A reef, part of which is awash, lies ½ to ¾ mile southeastward from the south end of Capaquian Island.

Dakit Rock, lying about ⅜ mile from the west side of Capaquian Island, is about 25 yards in extent, flat on top, stands about 4 feet above high water, and is conspicuous. Southward from Dakit Rock there are three shoals lying close together, the western and most dangerous being covered by only 4 feet of water. Over the larger part of these shoals there is a depth of from 2 to 3 fathoms, the 4-foot spot being found on top of a bowlder at the northwest extremity of the western shoal.

Cabilan Islets are two small islets lying on the same reef nearly 1 mile south of Capaquian Island. The western and eastern islets are 138 feet high, respectively. The reef surrounding them is generally less than 200 yards wide and is steep-to.

A small detached reef, covered by ¼ fathom, lies about ⅜ mile east-southeastward from the eastern Cabilan Islet.

From Dinagat Point to the northern entrance to Gabo Channel, a distance of 4¼ miles, the coast trends southeasterly and forms the northern side of Awasan Bay. From this section of the coast, reefs with very little water over them extend to a distance of about ¾ mile. From the entrance to Gabo Channel the coast trends westward along the northern shores of Awasan, Hanigad, and Sibale Islands, forming the southern shore of Awasan Bay, which is fringed by reefs about ½ mile wide. Between Awasan and Hanigad Island there is an unimportant bay filled with reefs and shoals. The head of this bay is connected with Kantiasay Bay, between Hanigad and Nonoc Islands, also of no importance, being blocked at the southern entrance by bowlders. Awasan Bay is about 40 fathoms deep at the entrance and shoals gradually toward the head.

Sugbuhan Island is a small island covered with trees and grass lying close to the shore at the head of Awasan Bay. It is broken up into several small hills, which show conspicuous red bluffs to the southwestward; east from these bluffs is a sand beach with a small village on it, the remainder of the shore line being mangroves.

Tagboabo Islet, small and covered with trees and bamboo, lies immediately southeastward from Sugbuhan Island and marks the northern entrance to Gabo Channel.

Awasan Island, lying close to the south end of Dinagat Island, from which it is separated by Gabo Channel, is 2½ miles long in a north-northeast and opposite direction, 1¼ miles wide, well wooded, and mountainous, rising near the south end to a height of 560 feet. Its shores are all mangrove except at the northwest point, where there is a short sand beach and the only house on the island. Its south side is separated from Nonoc Island by a shoal mangrove-bordered channel which connects Kantiasay Bay with Gabo Channel.

Hanigad Island, lying westward from Awasan and Nonoc Islands, is nearly 4 miles long in a north-northeast and opposite direction,

and has an average width of 1 mile. Hanigad Island is mountainous, the eastern half heavily wooded, the southwest part lightly covered with trees, bushes, some grass, and scattering dead trees, with patches of red soil showing. The shore line is mostly mangroves, but there are conspicuous sand beaches and coconut groves on the western side and near the village of Hanigad. On the north end the fringe of mangrove is very narrow with bushes and high land immediately back from them. There are many scattered rocks lying from 10 to 50 yards from the north shore, and foul ground extends nearly ¾ mile northward from Hanigad Island.

Sibale Island lies westward from Hanigad Island, from which it is separated by a short, narrow, mangrove-fringed channel 10 to 15 yards wide. Sibale and Hanigad Islands are connected both at the north and south ends by reefs and are separated by Kantiasay Bay, a large, foul basin. The little village of Saragossa stands on the north end of Sibale Island. Sibale rises in the southern part to a sharp wooded summit 510 feet high. The rest of the island is fairly well cultivated for hemp, coconuts, bananas, and sweet potatoes. This island is noticeably greener than the others and is well settled; considerable hemp and copra are exported. The shore line is mostly rocky near the points, with sand beaches in the bays.

A small reef, covered by a least depth of 2½ fathoms, lies ⅝ mile 278° (276° mag.) from the north end of Sibale Island.

Hikdop Island, lying westward from Sibale Island, is about 4 miles long northwest and southeast and 1 mile wide. It is rugged and high, its extreme elevation being 994 feet to the tops of the trees. The northern part presents a very broken skyline and is generally covered with coconut trees, grass, and scattered patches of hemp; the southern part is more regular and mostly wooded. The southwest shore is rocky, with small sand beaches at the heads of the coves. The island is generally fringed by a narrow steep-to reef, which from its southeast point extends to a distance of about ½ mile, with a least depth of 3½ fathoms over black coral heads. There are several villages, of which Buenavista, lying on the southwest side, is the most important. The channel between Hikdop and Sibale Islands has a least width of 1 mile and can be safely navigated by keeping in the middle.

Oñate Rock is a small coral reef showing several black rocks, one of which is awash at high water, lying about 1 mile from the south side of Hikdop Island on the bearings: South tangent to Hikdop Island 98° (96° mag.) and west tangent to same island 4° (2° mag.).

Beelzebub Reef, covered by a least depth of 2½ fathoms, lies about ½ mile westward from Oñate Rock, with a narrow, deep channel between them.

Danaon Island, lying about ¾ mile west-northwestward from the north end of Hikdop Island, is a small regularly shaped island about ½ mile in extent. The east side is low, flat, and sandy, with a white coral sand beach at the village of Danaon; this part is covered with coconut trees. The remainder of the island is high, rocky, and wooded, being 152 feet high to the tree tops. It is clean and steep-to on the east side, but the rest of its shores are fringed by a wide reef to a distance of about ⅜ mile, which is covered with bowlders. There is a rock 4 feet high standing on a detached coral reef nearly ½ mile northesatward from Danaon Island.

Sumilon Island, the most western island northeastward from Mindanao, is situated 5½ miles northward from Bilaa Point and about 3½ miles westward from the north end of Hikdop Island. It is about ½ mile in extent, covered with coconut trees and grass, and 157 feet high to the tree tops. From its southeastern part a long sand spit makes off and surrounds two conspicuous rocks lying about ¼ mile from shore. The more southerly of these rocks is covered with bushes; the other is bare.

Satan Rock, lying nearly 1¼ miles east-northeastward from Sumilon Island, is small and steep and terminates above the surface in a conical-shaped black rock. It may be passed fairly close on either side.

Nonoc Island, lying off the south end of Dinagat Island, from which it is separated by Gabo Channel, is of very irregular shape, 6½ miles long east and west and about 4 miles wide. Its sea faces are generally steep and clear. It is all mountainous; its highest summit, **Mount Conico**, situated in the western part, reaches an elevation of 1,100 feet. It is composed of a series of parallel ridges trending roughly northwest and southeast. Those at the west and east ends are heavily wooded, but in between, especially bordering on Gabo Channel, are several ridges nearly bare of vegetation with a bright red soil exposed, over which are scattered a few dead trees. Along the south side of the island, at the base of Mount Conico's southeasterly slope, are several unusually green grassy hills.

Gabo Channel is the narrow deep channel between Port Gabo and Awasan Bay. It has a least width of 150 yards and a least depth of 7 fathoms. The shores of the channel are bordered with mangroves and fringed by steep-to coral reefs. In entering from the northward care must be taken to avoid the shoals to the westward of the channel, which is formed by reefs on either side for about 1 mile before entering the channel proper between the islands; these shoals can be passed close to on either side. Gabo Channel is not practicable for anything except small craft which make the passage with the tide.

Currents. Low water at the Awasan Bay end of Gabo Channel comes at about the same time as high water at the Port Gabo end, and as a consequence there are violent and swift tidal currents with dangerous rips and whirls near all the points. The tim.s of slack water do not correspond with high and low waters by two and three hours.

Port Gabo, at the southern end of Gabo Channel, lies between Dinagat and Nonoc Islands. It is well protected, being sheltered by high land on three sides. The port, which is easily made out from seaward, is nearly 1 mile wide at the entrance and has a great depth of water. It extends 1¼ miles westward and then forms an elbow southward, turning into Gabo Channel. **Gabo Island** is a small wooded island, 98 feet high, near the entrance to Gabo Channel. It is surrounded by a reef which connects it with Nonoc Island and also extends about ⅛ mile northward from it. Good, protected anchorage may be found in the northern part of the port, less than ¼ mile from shore, in about 15 fathoms.

Doot Islet, about 1 mile in extent, lies close to the southwest side of of Nonoc Island, from which it is separaed by a narrow mangrove-bordered channel. The southern half of the islet is covered with mangroves, while the northern half is high, showing three conspicu-

ous, grassy, wooded hills, the highest of which is 190 feet. A reef extends off the west shore of Doot, reaching almost to the village of Nonoc, where it terminates in several rocks above water. There is a deep channel between these rocks and the villages, and small vessels could find an anchorage just inside of them. The southwest shore of Doot Islet forms one side of the channel between it and Rasa Islet; this channel is deep and clear, but its use is not recommended because of the heavy tide rips, whirlpools, and strong current in it. There is scarcely any slack water in this channel, the current changing from flood to ebb very quickly.

Rasa Islet is a small islet lying on an extensive steep-to reef, part of which bares at low water, about 600 yards south of Doot Islet. It is composed mainly of mangroves, a little sand beach on the northeast shore, and a small hill about 25 feet high in the middle. The reef on which the islet lies extends about ¾ mile on the northwest side around to the southwest and southeast sides, where it narrows to about ¼ mile. The northeast shore of the islet is steep-to and forms the south side of the channel between it and Doot Islet.

A fixed red light is exhibited 10 feet above high water from a concrete pedestal on the extreme edge of the reef, 450 yards southward from Rasa Islet.

From Port Gabo the coast trends in a general northerly direction for 37 miles to Desolation Point, at the northern extremity of the island, and is bold and mountainous and of desolate and forbidding character. The spurs from the mountains approach the shore and end in steep cliffs and bluffs. The shores are fringed with reefs varying in width from a few yards to over ¼ mile. It can be safely navigated by keeping outside a line drawn 1 mile eastward from the salient points, care being taken to avoid the dangerous area eastward from Peñascales Point, which will be described in its proper order. This coast is exposed to the full force of the waves from the Pacific and there are few places where a landing can be safely effected in bad weather. Owing to the lack of harbors, the strong currents, and numerous offshore dangers these waters are seldom visited by shipping.

Mount Gabo is the summit of a bold promontory extending from the south end of Dinagat. It is connected with the rest of the island at a point about 5 miles from the south end by an isthmus a little over 1 mile wide and not much over 100 feet high. Mount Gabo appears as a rather flat-topped ridge sloping gently toward the north and dropping abruptly at the south. The summit, 1,752 feet in height, is densely wooded with low scrub, while the lower slopes are covered with small timber. The shore line of the peninsula, which is surmounted by Mount Gabo, is mostly rocky ledges with sand beaches in the bights and is fringed by a narrow steep-to coral reef.

Kagdyanao Bay, about 1 mile in extent and nearly blocked by reefs, lies at the foot of the northern slope of Mount Gabo. Fairly sheltered anchorage for small vessels may be found off the village of Kagdyanao, in 12 fathoms, in a pocket in the reef about ¼ mile in diameter. From the village of Kagdyanao, which is small and unimportant, there is a trail across the island to the head of Awasan Bay.

Tabuk Island is a small tree and grass covered island, 148 feet high, lying on the northern side of the entrance to Kagdyanao Bay. It lies on the shore reef, which extends ⅜ mile eastward from it.

Sayao Island, lying over 3/8 mile northeastward from Tabuk Island, is a small, lightly wooded island, 127 feet high. Its southwest point is clear and steep-to, leaving a deep boat passage, 200 yards wide, between it and the reef surrounding Tabuk Island. The remainder of Sayao Island is fringed by reefs, which extend 1/4 mile northeastward from it, and surround Dakit Rock, a conspicuous rock, 18 feet high, which lies on the extreme edge of the reef.

Lahi Bay lies immediately northward from Kagdyanao Bay. Its shores are fringed by wide reefs and it is of little value to navigation.

Mangli Bay, about 5 1/2 miles northward from Dakit Rock, is very small, almost blocked by reefs, and only available for small, native craft during the southwest monsoon.

Peñascales Point, the most eastern point of Dinagat northward from Gabo Peninsula, is situated 7 miles northward from Dakit Rock. It is surrounded by a considerable reef, which extends about 1/4 mile eastward, and is steep-to. On this reef there is a small group of large black rocks, the highest of which is 22 feet; these rocks show up well from north and south.

Eastward from a north and south line, passing 2 miles eastward from Peñascales Point, is an area of foul ground, about 9 miles long north and south and 7 miles wide east and west, in which are found numerous detached reefs covered by depths of from 3 1/2 to 7 fathoms. The location of these reefs and the limits of the area of foul ground will be best understood by reference to the chart.

Peninsula Point, about 6 miles northward from Peñascales Point, is formed by a round peninsula, about 1 mile in diameter. It is densely wooded, 528 feet high, and rather flat on top, but drops off steeply on the eastern side. It is fringed with reefs, which, from the northeast side, extend to a distance of nearly 1/2 mile. About 1/2 mile from its southeast point there is a detached patch covered by a least depth of 4 1/2 fathoms.

Gaas Bay, lying northward from Peninsula Point, is about 1 1/2 miles wide at its entrance, and extends about 1 mile westward. The middle of the bay is deep, but the shores are fringed with reefs, which at the head of the bay extend to a distance of 3/8 mile.

Gaas Inlet (chart 4638) is a deep winding waterway extending from Gaas Bay in a general southwesterly direction for about 3 miles and terminating in a large, comparatively shallow basin, about 2 miles long and over 1/2 mile wide. The inlet has an average width of about 200 yards and is from 3 3/4 to 10 fathoms deep. The shore line is almost entirely rocky, and has a steep slope with mangroves growing at the edge of the water. The basin, at the head of the inlet, is bordered by mangroves and there are a number of small rivers, navigable by small craft, discharging into it. There is a channel leading through the basin, in which there is a least depth of 1 1/2 fathoms.

Gaas Inlet is recommended in preference to Malinao Inlet, as the entrance is better protected from northeast sea, and once inside affords perfect protection for small vessels. Care should be taken in entering to keep well in the center, as there are large reefs making off from either shore, and the reef line northward from the entrance incloses several large sunken bowlders.

Malinao Inlet (chart 4638) is the first break through the long range of mountains extending from Desolation Point southward on the

east coast of Dinagat and is situated 13 miles southward from Desolation Point and 5 miles northward from Peninsula Point. It is about ½ mile wide at the entrance and extends about 1½ miles northwestward, where it divides into two arms, which end in mangrove sloughs. The depth at the entrance is 5 fathoms; immediately inside the depth decreases to 1½ and then increases to 4 fathoms. This inlet affords fairly protected anchorage for small craft at all seasons. Shoal water, with a very irregular bottom, covered by depths of from 2 to 10 fathoms, makes off to the eastward from the entrance to Malinao Inlet for nearly 1 mile; good anchorage can be found off this shoal during the southwest monsoon.

Masdang Cove is a small cove 2 miles southward from Desolation Point, which affords shelter for boats and where a landing can generally be made in bad weather.

Halian Island, situated 8 miles eastward from Kagdyanao Bay, Dinagat, and 4¾ miles westward from Cowhagan Island, off the west coast of Siargao, is a small, low, coral-sand island, covered with trees, 60 to 80 feet high. It lies on the southern part of an extensive reef, which extends about 1 mile northward from it. Heavy swells roll over this reef, but a landing can be made a little north of the most western point of the island, where there is a sand beach and two or three houses.

SIARGAO ISLAND,

situated 15 miles eastward from the southern part of Dinagat Island, is 19 miles long north and south, and has a greatest width of 11½ miles. It is generally low, the greatest elevation, about 900 feet, being found in the southwest part.

Sugbuhan Point, the northern extremity of the island, is a low bush and tree covered rounding point, from which reefs extend ⅝ mile in a north-northeasterly direction.

Sugbuhan Reef, lying 2½ miles north-northwestward from Sugbuhan Point, is 1½ miles long in an east-southeast and opposite direction, ½ mile wide, and covered by a least depth of 1½ fathoms. Strong currents run over this reef and it can be plainly seen when the light is favorable.

Malayo Reef, lying 7½ miles 258° (256° mag.) from Sugbuhan Point, is about 1 mile long in an east-northeast and opposite direction, ¼ mile wide, and covered by a least depth of 1½ fathoms.

From Sugbuhan Point the coast trends in a general south-southwesterly direction for 15 miles to Venus Point, and thence southeasterly for 6 miles to Cambasac Point, on the northern side of the western entrance to Dapa Channel. Between Sugbuhan and Venus Point there is an extensive bank having a greatest width of 5 miles, on which lie Kambiling, Pagbasayan, Kangun, Dahican, Megancub, Cowhagan, Kangbangyo, Poneas, Tona, and Laonan Islands, and numerous reefs and shoals. A chain of reefs begins about 1 mile south of Laonan Island, and stretches southeastward, parallel with the shore and about ½ mile distant from it, as far as Venus Point, where it joins the shore. From Venus Point to Cambasac Point the coast is rocky, bordered with mangroves and fringed by steep-to reefs, nowhere exceeding 400 yards in width.

Rizal is a small village lying on the coast about 2½ miles southwestward from Sugbuhan Point. The reef, in front of this village, bares to a distance of about ⅘ mile, and exposes a cluster of very jagged, dead coral rocks, lying about ⅜ mile from the outer edge of the reef.

Kambiling Islet is a small sandy cay, awash at high water, lying 4½ miles southwestward from Sugbuhan Point, near the outer edge of the bank here about 2 miles wide.

Sapao, the largest town in this vicinity, lies at the head of a mangrove-bordered cove, about ½ mile southward from Rizal. It contains a stone church and convent, both of which are falling to ruin. Small steamers occasionally call here, anchoring about 1 mile from the town in 7 fathoms, at the entrance to a break in the reef leading to the town. This anchorage may be approached either northward or southward from Kambiling Islet.

Pagbasayan Islet is a small, low, sandy islet covered with trees and bushes. It lies on the bank over 1 mile from its outer edge and the same distance from the shore. It is surrounded by an extensive reef that bares at low water.

SHOALS.—A shoal, covered by a least depth of 3¼ fathoms, exists 3¾ miles, 311° (309° mag.) from Pagbasayan Islet.

A shoal, covered by a least depth of 2¼ fathoms, exists 2¾ miles, 304° (302° mag.) from Pagbasayan Islet.

A shoal, covered by a least depth of 1¾ fathoms, exists 2¾ miles, 325° (323° mag.) from Pagbasayan Islet.

Kangun Islet is a low sandy islet lying near the edge of the bank, 2½ miles southwest from Pagbasayan Islet and 2 miles from shore; a reef which bares at low water extends about 1 mile northward from it.

Litalit Bay, formed by Kangun, Dahican, and Litalit Islets and the coast of Siargao Island, is shoal in places and of little value to navigation. From the head of Litalit Bay there is a mangrove-fringed channel, navigable by small native craft, leading southward to Numancia.

San Benito is a small unimportant village on the eastern shore of Litalit Bay; the village and the sand beach in front of it are conspicuous from seaward. San Benito may be approached by entering Litalit Bay either northward or southward of Kangun Islet.

Dahican Island, lying about 2 miles westward from San Benito, is a long, narrow, flat island, consisting mostly of mangroves with a small wooded area in the middle.

Poneas Island, the largest island off the west coast of Siargao, is 5 miles long in a northeast and southwest direction and over 1 mile wide. It is separated from Siargao and Tona Islands by Sayug Channel, Baban Lagoon, and Tona Channel. It appears as a cluster of small peaks, the highest of which is 655 feet, lying close together, but separated from each other by deep gorges. An extensive area formed by a wide mangrove flat, intersected by mangrove sloughs, lies between the higher part of the island and the western part of Siargao Island, which is of a very similar formation to the western part of Poneas Island. **Sayug Channel**, **Baban Lagoon**, and **Tona Channel**, separating Poneas Island from Tona and Siargao Islands, are shoal, bordered by mangroves, and only navigable by the smaller class of native craft; they do not require any detailed description.

Cowhagan Island and **Rock** lie about ¼ mile from the edge of the bank westward from Siargao and form a rounding point for coasting vessels. The island is small and low; the rock, lying on the northern side of the island, is covered with trees and rises to a height of 62 feet.

Kangbangyo Island, about 1 mile west of the south end of Poneas Island, is covered with numerous wooded peaks, the highest of which rises to a height of 440 feet. It is surrounded by reefs which extend out ½ mile and surrounds several high rocks.

A shoal, covered by a least depth of 5¾ fathoms, lies 1½ miles westward from the north end of Kangbangyo.

Laonan Island, lying close to the southwest end of Poneas Island, is very small, wooded, and rises to a height of 452 feet.

Tona Island, composed almost entirely of mangroves, lies southward from Poneas Island. It is about 1½ miles square and is separated from Poneas by Tona Channel and from Siargao by Libas Channel. The Beyobo Channel, through which the town of Numancia is approached, lies on the southeast side of Tona Island.

Numancia, the largest town in this vicinity, lies about 8 miles northwestward from the western entrance to Dapa Channel and 2 miles from the sea; the only part of it visible from seaward is the conspicuous church tower. There is a very narrow and tortuous mangrove-fringed channel leading to the town. The entrance is made by approaching the coast nearly ¾ mile northwest from a very conspicuous, small, white-sand islet which is awash at high water. This channel should not be attempted by a person without local knowledge, as there are several small shoals which can not be seen until close over them. The most dangerous shoal is one in the center of the channel, about ⅓ mile south of the pier; this shoal bares at extreme low water, but there is deep water close to the mangroves to the westward. The currents run with considerable velocity and there are dangerous whirlpools at places. It is reported that small steamers, drawing about 8 feet, make the town at high water and anchor off the pier, which is built of stone and extends about 200 yards into the slough.

San Fernando, formerly known as Port Cacub, is a small unimportant town lying about 3 miles south of Numancia on a rather prominent green hill and is visible from seaward; most of its houses are deserted. It is on the right bank of the Lumaton River, a mangrove slough discharging into Pamay Bay. The entrance channel is narrow and dangerous, and the currents run strongly in the river. Anchorage may be found in Pamay Bay in about 15 fathoms, muddy bottom, ½ mile southward from Pamay Point.

Quico Reef is a small steep-to coral reef, which shows a few bare spots at extreme low water, on the bearings: San Miguel Point, the northern extremity of East Bucas Island, 111° (109° mag.) and Bagum Islet, a 60-foot islet off the northern extremity of Middle Bucas Island, 212° (210° mag.) distant ⅞ mile.

Barrabas Reef, similar to Quico Reef and somewhat larger, lies on the bearings: San Miguel Point 99° (97° mag.) and Mount Sibonga 182° (180° mag.).

These two reefs and the rock off the north end of Bucas Grande Island are the only detached dangers in the western approach to

Dapa Channel. The summit of Bancuyo Islet (100 feet) in Dapa Channel kept on a 110° (108° mag.) bearing will carry a vessel well clear of all dangers.

Cambasac Point, the southern extremity of Siargao Island, is fringed by a narrow, steep-to reef. It may be recognized by the village of Cambasac, which lies on its southern extremity.

Dapa Channel (chart 4638), separating the southern part of Siargao Island from East Bucas Island, is ½ mile wide at the western entrance between Cambasac Point, Siargao, and San Miguel Point, northern extremity of East Bucas. Inside the heads it widens quickly to a width of 1½ miles and then gradually narrows to a width of 1 mile at the eastern entrance. It is nearly blocked by islets, reefs, and shoal water, leaving three narrow tortuous channels through which the currents run with considerable velocity. The reefs show plainly, defining the channels, and Dapa Channel is safe for a small, carefully navigated steamer. The middle channel between Abanay and Bancuyo Islets is the best, it being fairly straight and deep and having a least width of 100 yards. The northern channel west and north of Abanay Islet is more generally used as it passes the town of Dapa; it is very narrow and deep. The southern channel between Bancuyo Islet and East Bucas is very narrow and tortuous and its use is not recommended.

Dapa is a small town situated on the northern shore of Dapa Channel. Small steamers occasionally call here, anchoring in 5 fathoms, mud bottom, about ⅜ mile southwestward from the end of the pier. This anchorage can be approached from the eastward, care being taken to avoid a 1½-fathom spot lying about 1 mile east-southeastward from the town and ¼ mile from shore.

From the town of Dapa the coast trends eastward for 3½ miles to Dolores Point, which is low and covered with coconut trees, thence turns sharply northward for ½ mile to the village of Unión, at the mouth of the Union River, and thence northeastward for 5 miles to Tuason Point, the eastern extremity of Siargao Island. This section of the coast is a smooth sandy beach with groves of coconuts, hemp, and bananas.

Bank.—The southeastern part of Siargao is faced by a wide bank which extends about 5 miles southeastward and on which lie Janoyoy, Guyang, and Daco Islets, Seco Reef, and numerous reefs and shoals, both awash and submerged. A reef, bare at low water, begins at Tuason Point and extends southward and then westward, with only two small breaks around Daco Islet to Seco Reef; it is steep-to and always defined by a line of breakers. Within this reef there is a large area of fairly shoal, always smooth, water, studded with numerous dangers, amongst which no one could attempt to navigate unless possessed of local knowledge.

Cabuntug lies on the shore about 3½ miles northeastward from Dolores Point. It may be approached by small craft through a narrow tortuous channel which crosses the bank between Dolores Point and Seco Reef and passes close to Janoyoy Islet.

Seco Reef, bare at low water, lies on the outer edge of the bank 1¾ miles southeastward from Dolores Point. There is a small sand cay on its northwest side. A small reef of dark coral formation, covered by a least depth of 3¼ fathoms, exists about 1 mile southward from Seco Reef.

Janoyoy is a small sandy islet lying on the bank about 1 mile east-northeastward from Dolores Point and 3/8 mile from shore.

Guyang Islet is a small sand islet covered with coconut trees lying on the bank just inside the barrier reef and 2½ miles southward from Tuason Point.

Daco Islet, about 1¼ miles long in an east-northeast and opposite direction and nearly ¼ mile wide, lies on the southeastern part of the bank about 4 miles southward from Tuason Point. It is surrounded by a reef which extends about 1 mile southeastward from it. Its ends are 105 and 130 feet high, but from a distance it appears perfectly flat on top and forms a good landmark.

Tuason Point, the eastern extremity of Siargao Island, is a very rocky point about 130 feet high. Its sea face is formed by a bluff 60 feet high. It is fringed by a very narrow steep-to reef.

Sharp Point, low, sharp, and covered with coconut trees, is situated about 2½ miles northwestward from Tuason Point. It is surrounded by a reef which extends 1 mile eastward and ½ mile northward from it.

Between Tuason and Sharp Points the coast recedes, forming a large, shallow, foul bay which extends about ½ mile southwestward. Reefs, partly bare at low water, extend nearly 1 mile outside a line drawn between the headlands of this bay. On the outer edges of these reefs there is a chain of islets, composed of three large bare rocks and one small mangrove islet, which extends with a curve northeastward for a distance of 1¾ miles northwestward. The southern rock, lying 1½ miles northward from Tuason Point, is 50 feet high, the next two are each 25 feet high, and the small islet lying off Sharp Point is covered with mangroves 10 feet high. Between the two 25-foot rocks there is a deep channel about 3/8 mile wide leading to a deep circular basin about ¾ mile in diameter.

Port Pilar (chart 4638) is an unimportant bay situated northwestward from Sharp Point. It affords the best anchorage on the east coast of Siargao Island, but its use can not be recommended, as even in the southwest monsoon a heavy sea usually sets in around Pilar Point, the northern entrance point. The southern half of the bay is filled with reefs, near the northern edge of which is situated Isda Islet, a small islet 120 feet high, and several large rocks. There are several small streams discharging into the head of the bay. The village of Pilar lies on the north side of the mouth of the Pilar River, a small river discharging into the northwest part of the bay. Anchorage for moderate-sized vessels may be found in 7 or 8 fathoms about ½ mile east-southeastward from Pilar. Small craft can enter the Pilar River and find perfectly protected anchorage 200 or 300 yards above the village.

From Pilar Point the coast trends northward for 12 miles to Sugbuhan Point at the northern end of the island. This section of the coast is high and bold, and is fringed by steep-to reefs from ¼ to ½ mile wide. The limits of the reefs can easily be seen and even in the southwest monsoon there is a continuous line of breakers all along the coast. The small and unimportant villages of Caridad, San Isidro, and Alegria lie on this coast.

Arena Point, the most prominent landmark in this vicinity, is situated about midway between Port Pilar and Sugbuhan Point. It

projects but slightly from the shore line and owes its name to a ridge which rises to a height of 600 feet at less than ½ mile inland.

BUCAS ISLANDS.

Bucas Grande Island, lying southwestward from Siargao Island, is 12 miles long north and south and about 5 miles wide. The northern and western sides are very irregular, being indented by numerous small bays, generally too deep to afford anchorage; the eastern and southern sides are more regular and comparatively straight. The shores are fringed with narrow steep-to reefs, nowhere exceeding ½ mile in width, and there are a few off-lying dangers which will be described in their proper order. The northern part of the island is formed by a flat-topped ridge, over 800 feet high, lightly wooded, and dropping off abruptly at the coast in bluffs nearly bare of vegetation, exposing to view a dark red soil. Proceeding southward the inner table-land is lower with several spurs at right angles to the coast and the slope to the shore is more gradual. The southern half of the island forms a striking contrast to the northern. It is made up of dozens of small, steep, separate peaks, all heavily wooded, the highest of which reaches an extreme elevation of 924 feet to the tops of the trees.

A conspicuous rock, 4 feet high, lies ⅜ mile northeastward from the northeast extremity of Bucas Grande Island, with which it is nearly connected by a reef.

Bucas Point, the northwestern extremity of the island, is sharp and high and surrounded by a reef to a distance of about 400 yards.

Manaol Point, the most western point on Bucas Grande in this vicinity, is high and fringed by a very narrow steep-to reef.

Kanlanuk Bay, situated about 4 miles southward from Manaol Point, is deep and its shores are fringed by a reef bare at low water. **Pamosaingan** lies at its head from where there is a fairly good trail crossing the island to **Socorro**; these two villages are the only ones on the island. Anchorage with sufficient swinging room to clear the edges of the reef may be found in 24 fathoms, about ⅜ mile northward from Pamosaingan. Vessels entering Kanlanuk Bay from the southward should exercise care in rounding Nilusingan Point, the western entrance point, as it is surrounded by reefs which extend ½ mile northwestward from it.

Nakiauit Point, about 3 miles southward from Kanlanuk Bay, is a small conspicuous point 200 feet high and is the most western point on Bucas Grande. It should be given a berth of at least 1 mile, as there are several 2½-fathom shoals off it. The outer shoal lies about ⅝ mile westward from the point and can not be seen until directly over it.

A small 1-fathom patch exists about ½ mile southeastward from Nakiauit Point.

Sohutan Bay (chart 4638), situated southeastward from Nakiauit Point, is about 1½ miles wide and extends about ¾ mile northeastward. From its southwestern entrance point a reef, on which there are a number of large rocks, extends ½ mile northwestward. The outer rock, lying on the northern edge of the reef, is 107 feet high and may be rounded close-to. Eastward from the above reef good

protected anchorage may be found in 23 fathoms, about ¼ mile from the head of the bay. In approaching this anchorage from the southward the 107-foot rock on the extremity of the reef should not be brought northward of 47° (45° mag.) in order to clear all dangers making off the southwestern entrance point.

Sohutan Inlet, making off from the head of Sohutan Bay, is of no value to navigation, there being only ¼ fathom of water at its entrance.

Dahakit Point is a sharp point extending westward from the south end of Bucas Grande Island. About ½ mile from the point and close to the most southern part of the island the land rises to a height of 330 feet. An automatic acetylene light, showing one short white flash every 5 seconds, visible from a distance of 10 miles, is exhibited, 100 feet above high water, from a white concrete beacon on the south coast of the point. The bay northwestward from Dahakit Point is nearly blocked by reefs on which lie the Dahikan Islets, Bobon Islet, and numerous other small islets and rocks.

From Dahakit Point to the southern entrance point to Port Batuecas the coast is a series of bold, rocky promontories and sandy beaches. At Socorro, about 3 miles northward from the south end of the island, there is a sand beach about 2 miles long. In front of the village there is a break in the coral reef, here about 600 yards wide, affording passage to small craft. The Socorro River, discharging northward of the village, has but 1 foot of water on its bar at low water, but inside the bar it is broad and deep for some distance.

A reef covered by from 4½ to 10 fathoms exists 1 mile off the east coast of the Bucas Grande on the bearings: East tangent to the island 6° (4° mag.), southeast tangent to the island 213° (211° mag.).

There are no off-lying dangers on this side of the island except those at the entrance to Port Sibonga.

Port Batuecas, separating the northern part of Bucas Grande from Middle Bucas Island, is about 2½ miles long north and south and from ½ to ¾ mile wide. Its shores are bordered by mangroves and fringed with reefs, about 75 yards wide in the entrance and widening to nearly ½ mile on the east central side and coming together about ½ mile from its northern end, completely closing the area northward. The northern entrance is nearly ¼ mile wide and is entirely closed by a coral reef which bares about 1 foot at low water. The southern entrance, leading from Port Sibonga, is reduced by reefs on either side to a navigable channel about 110 yards wide and 7 to 10 fathoms deep, through which the currents run with considerable velocity. Just within the port a reef on the south side extends about ¼ mile northward, rendering this part of the port useless and confining the channel along the eastern shore. Immediately northward from this reef good protected anchorage for moderate-sized vessels may be found in 9 fathoms, mud bottom. A small reef, covered by ¾ fathom, is found in the north central part of the port, making it inadvisable to use the area northward from it.

Middle Bucas Island, lying between Bucas Grande and East Bucas Islands, is roughly circular in shape and about 1½ miles in diameter. It is separated from Bucas Grande by Port Batuecas, already described, and from East Bucas by a narrow mangrove-bordered boat passage about 600 yards long and some 12 to 15 yards wide. This passage is bare at very low water, as is also a wide stretch of reef at either end.

Mount Sibonga, in the southeastern part of Middle Bucas, is a well-wooded conical-shaped peak, which rises to a height of 955 feet and forms a prominent landmark for miles around; it is the highest point on the Bucas Islands. **Bagum Islet** is a very small prominent islet, covered by a small growth and rising to a height of 60 feet, situated on the shore reef about 200 yards northward from the northern extremity of Middle Bucas Island; foul ground extends about ⅜ mile west-northwestward from Bagum Islet.

Port Castilla, formed by the northeast part of Middle Bucas and the northwest part of East Bucas Island, is about 1 mile in extent. The eastern part and also the head of the port are foul. There is a large reef awash in the middle of the entrance with a narrow channel on either side of it.

East Bucas Island is a very irregularly shaped island, 5 miles long in an east-northeast and opposite direction and 1½ miles wide. It is well wooded and rises, near the middle, to a height of 600 feet. Its shores are fringed with reefs, which, with those immediately adjacent, extend in some places to a distance of 1 mile and surround several small islets and rocks. The extent of the foul area surrounding East Bucas Island will be best understood by referring to the chart.

The village of **San Miguel** lies on the point of the same name, a sandy point, 146 feet high, which forms the northern extremity of the island. **Monserrat** lies on the southeast point and **Consolacion** lies on the southwest point facing Port Sibonga.

Port Sibonga is an unimportant bay about 1 mile square situated southward from Mount Sibonga and bounded by the east coast of Bucas Grande, the south side of Middle Bucas, and the west side of East Bucas Islands. A reef, bare at low water, extends about 400 yards southward from the middle of the head of the port, and near its southern end lies Banluto Islet, a small, wooded islet 150 feet high. Anchorage may be found off Consolacion, but care must be taken as the bottom is very uneven and full of coral heads; probably the best place to anchor is midway between Banluto Islet and the village.

Casulian Island, lying ¾ mile southeastward from East Bucas Island, is about 1 mile long in an east and west direction and ⅜ mile wide. It is heavily wooded on the eastern part, where it rises to a height of 295 feet, while the western end is lower and covered with coconut trees. It is surrounded by shoal water to a distance of about 600 yards, between which and the reefs surrounding East Bucas Island there is a narrow, deep channel.

About ½ mile southwestward from west end of Casulian Island is the northern end of a shoal, covered by depths of from ¼ to 10 fathoms, which extends 1¼ miles southward. Shoals covered by depths of 3½ and 4¾ fathoms exist ½ and 1¾ miles, respectively, from the east end of Casulian Island. A shoal covered by 4½ fathoms exists 1 mile southeastward from the east end and one of 5 fathoms lies 1½ miles southward from the summit of Casulian Island.

Anajauan Island, lying about 7½ miles southeastward from East Bucas Island, is 1¼ miles long in an east-northeast and opposite direction and is narrow. It is wooded and the highest point is near the eastern end, where it is 200 feet to the tree tops. It is fringed

by a reef, bare at low water, and lies on the southwestern part of a bank about 3½ miles long northeast and southwest, on which there are a number of rocks.

Lajanosa, Mamon, and Antokon are a group of islands lying on the same reef northeastward and eastward from Anajauan. **Lajanosa**, the northern island, is rather flat with three hills on the western side, the highest of which is 170 feet. **Mamon**, the middle island, is the highest, rising to a height of 270 feet. **Antokon**, the southern and smallest, rises in three cones, the southern and highest of which is 230 feet. Between the reef surrounding this group, which is always breaking, and the reef surrounding Anajauan there is a very narrow, deep channel.

A small coral bank covered by a least depth of 6 fathoms lies 6½ miles 263° (261° mag.) from the southern cone on Antokon Island.

Whale Rock, a small black rock, 12 feet high and surrounded by deep water, lies on the bearings: Tugas Point, Mindanao, 270° (268° mag.); Antokon Islet, summit 43° (41° mag.); and Auqui Islet, east tangent, 187° (185° mag.).

HINATUAN

or **Eastern Passage**, between Surigao Strait and the Pacific, is deep and free from dangers with the exception of Kabo Reef and Hinatuan Rock, both of which will be described later. Owing to the lack of good harbors on the northeast and east coast of Mindanao and the absence of a thorough survey of that locality, most of the trade has been carried on with Surigao in small vessels. Now that the survey of Hinatuan Passage has been completed, more of the larger vessels are using that passage.

Directions.—Vessels bound east should bring Bilaa Point to bear 272° (270° mag.) and steer 92° (90° mag.) until the light beacon on the southern edge of Rasa Island Reef bears 137° (135° mag.), when the vessel should be hauled southeastward, the beacon rounded at a distance of ½ or ¾ mile, and a mid-channel course held until the middle of Banug Strait, between Hinatuan and Talabera Islands, bears 137° (135° mag.). Pass through the middle of the strait and continue the southeast course until Amaga Islet is made, when it may be steered for and passed on either side. The 137° (135° mag.) course from Banug Strait leads near Hinatuan Rock, at present unmarked, and vessels drawing over 15 feet should make a slight detour to avoid it.

Banug Strait is unobstructed and less current is experienced than in the longer track around Hinatuan Island.

Hinatuan Passage is not recommended for a sailing ship without a pilot, because of the strength of the currents and tidal whirls met in the vicinity of Rasa Island. Pilots can be obtained and discharged at Surigao and Cantilan, a small town on the northeast coast of Mindanao. In case of necessity vessels can anchor off Surigao to wait for a favorable wind and tide.

Currents.—The currents run with great velocity and the tide rips and whirlpools are very marked in some parts of the Hinatuan Passage. The flood tide sets from the Pacific toward Surigao Strait; the ebb in the opposite direction. The maximum current is approximately 7 knots, being usually the strongest abreast and a little

to the westward of Rasa Island. In this latter area the tide rips during the strength of the flood are very marked; they are also bad, especially so with the flood current, in the vicinity of Kabo Reef, the submerged reef, about 2 miles to the westward of Rasa Island. The channel northward from Rasa Island is straight, unobstructed, and comparatively deep; this being a short cut the current becomes almost a mill race and when running ebb, full force, produces bad rips and whirls where it joins the currents coming around more slowly south of Rasa Island Reef. There are rips and whirls at certain stages all the way through from a little west of Kabo Reef to and abreast of Hinatuan Island, but the foregoing-mentioned places are the worst.

The time of high-water slack generally occurs abreast of Rasa Island about 40 minutes before high water at Surigao, while the low-water slack generally occurs about 50 minutes before low water at Surigao—although at times the times of both high and low water slack will vary from the foregoing by as much as 40 or 50 minutes.

The only good anchorage in the vicinity of Rasa Island for large vessels is in Panag Bay, about ¾ mile southward from Lapinig Island and nearly ½ mile southwestward from a very conspicuous bare, white coral sand island. Anchorage may be found here in 20 fathoms, sand bottom; the advantage of this anchorage is that there is no current here at any time, as it appears to be a neutral area of considerable size.

NORTHEAST AND EAST COAST OF MINDANAO.

Bilaa Point, the northern extremity of Mindanao, and Bilaa Shoal, lying northward from it, have already been described.

Basol Island, lying about 2½ miles east-northeastward from Bilaa Point, is a prominent landmark for vessels bound for Surigao or the Hinatuan Passage. It is about 400 yards long in a west-northwest and opposite direction by 200 yards wide. The eastern three-fourths is low, covered with coconuts, and has a sandy beach; the western part is higher and wooded with rocky shore line. It is fringed by a narrow steep-to reef, which, on the northwestern end, extends to a distance of about 400 yards.

From Bilaa Point the coast trends southeastward for about 4 miles to Surigao. The first 2 miles is mostly stony shore line, with sand beach in small coves and a fringe of jagged dead coral heads 50 to 100 yards from shore, outside of which the water deepens rapidly. The rest of the shore line is a narrow sand beach fringed with coconut trees, back of which are mangroves and low land.

Surigao River, discharging on the west side of the town of Surigao, has about 1 foot on its bar at low water; the ruins of an iron bridge near the mouth prevents large boats from entering. About 1¼ miles above the mouth of the Surigao River it divides into two branches; the larger branch, known as the Tomanday, flows northward forming Bingad Island between them. The Tomanday has about ¼ fathom on its bar at low water; at high water small boats drawing not more than 5 feet can enter and ascend the river for a distance of about 1½ miles.

Surigao (chart 4629), capital of the province of the same name, stands on low land at the eastern side of the mouth of the Surigao

River. It contains a number of large buildings and is prominent from the sea. It is a place of considerable commercial importance, most of the trade of eastern Mindanao passing through here. The wharves, warehouses, and hemp presses are located at the village of Bilanbilan, about ⅔ mile southward from Surigao, with which it is connected by a good road.

A fixed red light, visible 7 miles, is exhibited 22 feet above high water from a concrete tower on the edge of the shore reef about 90 yards from the shore and ⅔ mile southeastward from the river mouth. This light can be passed fairly close-to as the water deepens rapidly outside of it. Good anchorage for vessels not desiring to dock may be found in from 14 to 16 fathoms, sandy bottom, about ¼ mile eastward or southeastward from the light.

There are a number of small wharves at Bilanbilan, the largest of which has 18 feet of water close to its end. Vessels usually drop bower and stern kedge anchors and haul into the wharf according to draft.

A shoal covered by a least depth of ¼ fathom exists about 1¼ miles eastward from Surigao light. Vessels bound east should stand well off before shaping a course for Rasa Light.

From Surigao the coast trends southeastward for 8½ miles to the western entrance point to Canal Bay. This section of the coast is bordered by mangroves which extend inland to a distance of 1 and 2 miles and is fronted by numerous islands, some with and some without names, composed mostly of magroves lying so close to the shore and so close to each other as to appear to be part of the mainland. Many of the smaller islands have no hard land, the tide rising in the mangroves to a depth of about 2 feet. These islands are separated from the shore and from each other by a network of esteros, navigable only by small native boats in charge of those possessed of local knowledge, who utilize them to save distances and escape the rough weather and strong currents of Hinatuan Passage. The hills nearest the coast are generally covered with grass and coconut trees and are detached from the mountains farther inland, which are heavily timbered.

The principal mangrove-bordered islands off this part of the coast are Kabo, Load, Lapinig, Lamagon, Bilabid, Maanoc, Cobeton, Cepaya, and Condona. They do not require any detailed description. Their sides facing the Hinatuan Passage are generally clean and steep-to and free from danger.

Kabo Reef is a small reef covered by a least depth of 2½ fathoms lying a good ½ mile northward from the nearest point of Kabo Island and 2¼ miles 282° (280° mag.) from Rasa light beacon.

Lying beyond the mangrove islands previously mentioned are a number of high islands of entirely different formation, of which Bayagnan, Masapelid, Talabera, and Hinatuan are among the larger.

Hinatuan Island, lying 2½ miles southeastward from Nonoc Island, is 3½ miles long north and south, 2½ miles wide, irregular in shape, very conspicuous, and uninhabited. It is surrounded by a narrow, steep-to coral reef, which on its northwest extremity extends to a distance of about ¼ mile. From a distance it appears as two separate islands; the large southern part is joined to the northern part by a narrow neck of land only about 30 feet high. The southern part,

1,135 feet high, is covered with a sparse growth, through which large patches of bright-red soil are exposed to view. The northern part presents nearly vertical cliffs of dark stone, is heavily wooded, and rises to a height of 606 feet. The shore line is mostly rocky ledge, with a few short sand beaches. **Banug Strait**, about ⅜ mile wide, between the southwest point of Hinatuan Island and Banug Islet, is straight and deep.

Hinatuan Rock is a small rocky shoal covered by a least depth of 3½ fathoms and surrounded by deep water, lying directly in the fairway between Banug Strait and Amaga Islet on the bearings: Eastern extremity of Hinatuan Island 344° (342° mag.), and Nagubat Island 235° (233° mag.), distant 4 miles.

Talabera Island, lying ¾ mile southwestward from Hinatuan, is about 1½ miles long east and west, 1 mile wide, and of very irregular shape. It is covered with coconut trees and grass and is 605 feet high. It is fringed by a narrow, steep-to reef, which from its southwest point extends ¼ mile southward and surrounds the sand islet Bagumbanua. Talabera Island is well watered and cultivated. The village of Talabera lies on the north coast of the island.

A fairly good anchorage for small vessels may be found at the head of a small bay in the southwest part of Talabera Island in about 24 fathoms, muddy bottom.

Banug Islet is a small islet situated about ¼ mile northward from Talabera Island, from which it is separated by a deep, clear channel about 200 yards wide. It is formed by two hills joined by a low, palm-covered, sandy isthmus; the eastern hill is 130 feet high. It lies on the south side of a reef, bare at low water, about ⅜ mile long east and west and ¼ mile wide.

Bayagnan Island, lying 2 miles westward from Hinatuan, is about 3 miles long northwest and southeast and very narrow near the middle. It presents a very irregular sky line; two low passes, 15 or 20 feet high, divide the island into three distinct parts. **Telegraph Mountain**, the sharp peak on the southern part, is covered with tall green trees, rises to a height of 827 feet, and forms a conspicuous landmark for miles around. The island is well watered and settled, houses being scattered everywhere. The most important settlement is **San Jose**, situated on San Jose Point, the southeast extremity of the island. Bayagnan Island is fringed by reefs which at some points extend to a distance of ⅔ mile and surround a number of rocks and small islets. **Dayan Reef** is an extensive reef surmounted by a cluster of rocks about 7 feet above high water, situated immediately westward from the north end of Bayagnan Island, from which it is separated by a very narrow, deep channel, in which are violent tidal whirls.

Sugbu and **Sugbu Diutay Islets** are two small unimportant islets lying on the reef which extends nearly ¾ mile eastward from the northern part of Bayagnan Island. Sugbu, the eastern and larger islet, is 214 feet high and wooded on the northeast part; the remainder is grass and palm covered. This east shore is rocky ledge; the south and west shore is a sandy beach. Sugbu Diutay lies between Sugbu and Bayagnan and does not require any description.

Sagasae Islet lies on the reef extending nearly ¾ mile southeastward from the southeast extremity of Bayagnan Island. The northeast part is wooded, 175 feet high to the tops of the trees, and the re-

mainder is grass and palm covered. The eastern shore is rocky ledge; the south and west, sand beach. The channel between it and Talabera Island is about ¼ mile wide and is deep and clear.

Bilabid Island, lying close to the southwestern side of Bayagnan Island, from which it is separated by a narrow, foul mangrove slough, is about 2 miles long in a north-northeast and opposite direction and 1 mile wide. The eastern part is covered mostly with grass and scattered coconuts, but has a very prominent clump of green trees at the highest point, which is 298 feet to the tops of the trees; the remainder is mostly mangroves.

Caye Island is a small island lying close to the shore reef southeastward from Bilabid Island. Its western side is mangrove; its eastern side, sand beach. It is 269 feet high to the tops of the trees. There are very narrow, deep channels between it and Bilabid and between it and Masapelid.

Masapelid Island, southward from Bilabid, is about 4 miles long in a north-northwest and opposite direction and has a greatest width of about 2½ miles. The west part is a very rough, heavily wooded country, with many small peaks; the northeast part is covered with grass and scattered trees; the south part is a rolling ridge heavily wooded on the west side, while on the east side there is more grass and a great number of dead trees. The highest point on the island, 684 feet, is near the south end. A small reef that bares lies ½ mile southeast from its south point. **La Condola** lies on Canal Bay, near the southwest end of the island.

Mahaba Island lies close to the east side of Masapelid Island, from which it is separated by a narrow, deep channel, the southern and better entrance to which is marked by two small islets, one on the Masapelid Island reef and the other on the Mahaba Island reef. Mahaba is covered with green trees on top and has scattering coconuts near the eastern shore. Mahaba is fringed with coral reefs, which on the eastern and southeastern side extend to a distance of from ¼ to ½ mile.

Bonga Island, lying about ¾ mile eastward from the south part of Masapelid Island, is about 600 yards in extent, bold on the east side, heavily wooded, and 325 feet high. It is surrounded by a reef which extends about ½ mile south from it. About 400 yards from the northwest side of Bonga Island there is a small ½-fathom shoal.

Nagubat is a small island, 172 feet high, lying 7½ miles south of the summit of Hinatuan Island, near the middle of a narrow reef about 1½ miles long north and south.

Dijut Rock is a rock, 38 feet high, with a lone coconut tree on it, standing on the same reef with Nagubat Island and ¾ mile north-northwestward from it. Dijut Rock is surrounded by several smaller rocks and forms a conspicuous landmark. There is a 3½-fathom channel across the reef midway between Nagubat Island and Dijut Rock.

Isa Reef, a small, dangerous reef, covered by a least depth of 1¼ fathoms, lies about 1½ miles westward from Nagubat Island in the fairway of vessels approaching Placer, Gigaquit, Bacuag, etc., from the northward; to avoid it vessels should bring the summit of Bonga Island to bear 2° (0° mag.) and Dijut Rock to bear 92° (90° mag.), and from this position steer 182° (180° mag.) until Nagubat is abaft the beam, when the reef will have been passed.

Canal Bay, a large indentation on the southwest side of Masapelid Island, is 2½ miles wide at the entrance and extends about 2 miles northward. It contains a number of small islands and dangerous shoals.

Opong and **Dinago Islands** are two small islands, 402 and 416 feet high, respectively, lying in the western part of Canal Bay. They are of rough, jagged coral, much eroded at the water line, giving them a mushroom appearance. They are covered with vegetation and are readily identified. Close to the eastern side of Dinago there is a very small islet, having two summits 120 and 125 feet high, respectively.

Masapelid Passage connects Hinatuan Passage with Canal Bay. It is formed by Lamagon, Maanoc, and Condona Islands on the west and Bayagnan, Bilabid, and Masapelid Islands on the east. It is sometimes used by small steamers trading between Surigao and ports on the northeast coast of Mindanao. Its use is not recommended unless possessing local knowledge as it is narrowed in several places by dangerous reefs and shoals and the tidal currents run with great velocity. Owing to its intricate channel and the absence of good landmarks, no directions for it can be given.

Taganaan is a small village lying at the mouth of the river of the same name, which discharges into the Taganaan Estero about 1¼ miles westward from Opong Island. It lies in the center of a large coconut district, but is otherwise of little commercial importance, as boats drawing more than 2 feet can not get to it at low water.

Taganaan Estero, a narrow passage through the mangroves between the Hinatuan Passage and Canal Bay, is of considerable importance, as through it pass most of the small native craft plying between Surigao and Taganaan, Placer, etc., thus saving considerable distance and having to contend with only a current of about 2 knots, while in Masapelid the current is much stronger.

Bobon is a small village lying on the mainland abreast of Dinago Island. Here is found the first solid shore line southeastward from Surigao.

From Cog Point, western entrance to Canal Bay, the coast trends in a general east-southeasterly direction for 24 miles to Tugas Point. From the town of Placer, 1 mile south of Cog Point, to the mouth of the Bacuag River, 4½ miles southeastward, a range of heavily wooded mountains rises almost directly from the coast. From the Bacuag River to the Claver River, a distance of about 5 miles, the shore line is low and sandy and the country back from it flat and intersected by numerous small streams. From Claver Point, forming the eastern side of Claver River mouth, to Tugas Point, a distance of 14½ miles, the shore line is generally rocky with sandy beaches and very little mangrove, and the mountains rise almost immediately back from it. This section of the coast is fringed by reefs with a number of small islets and much foul ground outside of them.

Placer is a small town lying on a point about 1 mile southward from Cog Point. From Placer there is a trail to Mainit, on the lake of the same name, over which natives truck hemp and other articles for shipment. Placer has a small jetty with about 12 feet of water at its end. The harbor is formed by a large reef, bare at low water, which projects about ⅝ mile northeastward from the town and surrounds the small islet Bancay. There is a small shoal, covered by a

least depth of ½ fathom, lying nearly in the middle of the harbor, about 450 yards northward from Bancay Islet, back of which there is an area about 400 yards in extent, where two or three small vessels can find sheltered anchorage in 6 to 9 fathoms, muddy bottom.

Bacuag is a town somewhat larger than Placer, lying about 3½ miles southeastward from it on the south side of the mouth of the Tenanan River. It lies in the center of a large coconut district and is also near a small hemp region. Shoal water, covered by 1½ fathoms at its outer edge, extends about ½ mile from the mouth of the Tenanan River, and surrounds Puyo Rock, which is large and conspicuous.

The **Bacuag, Alambique, Gigaquit, Magallanes,** and **Claver Rivers,** which discharge between Bacuag and Claver Point, have very little water on their bars, but may be entered by a pulling boat at low water. The Alambique and Gigaquit discharge through a common mouth, which is faced by shoal water to a distance of over ¾ mile. The Magallanes discharges about 2 miles eastward from the Gigaquit, and is connected with it by a boat channel, which is used by native craft during rough weather. Claver River is used mainly by boats as far as the town, but above there it gets very narrow and has very little water in it.

Gigaquit is a large village lying on the left bank of the Gigaquit River, about 1 mile from its mouth. It is faced by a long sand spit projecting from Byby Island, which forms the northern side of the mouth of the Gigaquit River. There is a narrow channel with about 3 feet of water in it at low water, leading across the bar. There is very little water in the river above Gigaquit, but it is reported that there is a boat passage from the Gigaquit River to the Magallanes River, and thence into the Claver River. Shoal water extends to a considerable distance in this vicinity, the 5-fathom curve being found about ½ mile from shore.

Byby Island, lying between the Gigaquit and Magallanes Rivers, is low and flat, and has a small grove of coconuts, but otherwise is of little value, as it is mainly a mangrove and nipa swamp.

Cabgan Island is a small grassy island, 178 feet high, situated about ½ mile from Byby Island. It is surrounded by a reef, which extends about ½ mile northwest from it, and is generally marked by breakers. There is a small 3½-fathom shoal lying about ⅝ mile north-northeastward from Cabgan.

Claver is a village lying on the right bank of the Claver River about ½ mile from its mouth; it is not visible from the sea.

Claver Point is a narrow point, 106 feet high, which projects about ½ mile northward from the coast of Mindanao. Its southern part forms the eastern side of Claver River mouth.

Candos Bay is formed by an elbow in the coast eastward from Claver Point. Lapinigan Island, Pagbuy Rocks, and Bagong Islet lie in its entrance. Candos Bay is fringed with reefs, which at one point abreast of the west end of Lapinigan Island extend to a distance of over ½ mile and considerably narrow the channel between that island and the mainland.

Lapinigan Island, lying about 1 mile eastward from Claver Point, is ¾ mile long east and west and about ⅜ mile wide. It is covered with grass, coconuts, and scattered trees and rises to a height of 22

feet. It is fringed with reefs, bare at low water, which extend to a distance of from 400 to 500 yards. About 3/8 mile southeastward from Lapinigan Island there is a small detached shoal which bares at low water. Good sheltered anchorage may be found westward or southward from Lapinigan Island in from 6 to 10 fathoms, mud bottom.

Pagbuy Rocks are a group of rocks 15 to 34 feet high lying about 1 mile eastward from Lapinigan Island. They are fairly steep-to on their northern sides. About 400 yards westward from the reef surrounding Pagbuy Rocks there is a small detached patch which bares at low water.

Bagong Islet is a very small islet, 146 feet high, lying midway between Pagbuy Rocks and the shore on the northern edge of a reef, bare at low water, which extends 1/2 mile southward from it. Between this reef and the shore reef are detached shoals which bare at low water. The northern side of Bagong Islet is steep-to and may be rounded at a distance of 200 yards by vessels bound for the anchorages southward or westward from Lapinigan Island.

Male Islet is a small rocky islet, 104 feet high, situated on the south end of a reef, about 1 mile long north and south, about 4 miles eastward from Lapinigan Island, and 1/2 mile from shore.

A detached coral shoal about 400 yards in extent lies a little more than 1 mile westward from Male Islet and 1/2 mile from shore. It is easily seen on account of the breakers, and at low water there are a few rocks bare.

Aling Islet, lying 1/2 mile eastward from Male Islet, composed of coarse white sand, is at no point over 10 feet high and has a thick growth of pine and other trees. The sandy shore is always visible, making it easy to identify, as all other islets in this vicinity are of rough eroded coral rock. Aling Islet lies on the south part of a large reef, bare at low water, which extends over 1/2 mile northwestward from it. There are several detached dangers between the reefs, on which are situated Male and Aling Islets, and the coast; and while there is a deep channel between them and the coast, it is at one point only 200 yards wide.

A small shoal, covered by a least depth of 2 fathoms, lies nearly 5/8 mile east-northeastward from Aling Islet.

Taganeto is a small village lying on the left bank of Hegapit River about 200 yards from its mouth. From the beach it is obscured by high cogon grass, but is visible from offshore.

Hegapit River, discharging about 1/2 mile south-southwestward from Male Islet, is navigable by small boats to a point about 1/2 mile above the village, where it is blocked by rapids.

Telegraph Islet, 220 feet high, and the two Boheson Islets, the western one of which rises to a height of 152 feet, lie on the shore reef southeastward and southward from Aling Islet.

Lang Islets are a group of small, rocky islets lying 1 to 2 miles eastward from Telegraph Island. The largest islet is 132 feet high; the southerly of the two southeasterly islets is 78 feet high to the tops of the trees.

A shoal covered by a least depth of 5 1/2 fathoms lies about 7/8 mile northward from the largest of the Lang Islets.

Amaga Islet, situated in the middle of the channel between Mindanao and Bucas Grande Islands, forms an excellent landmark. It

is about 220 by 160 yards in extent and is 169 feet high to the tops of the trees. It is composed of jagged coral rock, much underworn at the water line, making landing on it impossible. It is clean and steep-to and can be passed on either side.

Hinadkaban Bay, situated westward from Kaba Point, is 2 miles wide at the entrance and extends about 1 mile southward. Its shores are fringed with coral, which from one point, near the head of the bay, extends to a distance of about ½ mile. Anchorage for a small vessel, partially sheltered from the northeast monsoon, may be found westward from Kaba Point.

Kaba Point is steep and rocky and 405 feet high at a point about ½ mile southeastward from its extremity. It is fringed by a steep-to coral reef about 350 yards wide, and from its eastern side a coral reef extends to a distance of ½ mile.

Red Hills, lying back from Hinadkaban Bay and following the coast to Tugas Point, are a very striking natural feature in this locality. They are nearly bare of vegetation and are composed of bright red soil and sometimes red rock, which is rapidly crumbling where exposed to the weather. Immense quantities of red soil are washed into the sea by heavy rains, leaving the hillsides scoured by deep valleys. The lower slopes in many places are covered with a dense growth of scrub.

Dahikan Bay, between Kaba and Tugas Points, is 3 miles wide at the entrance and extends about 2½ miles southward. It is divided into two arms by a sharp, narrow point extending from Tugas Peninsula. The shores of the bay are rocky and fringed with reefs, but red soil washed down from the hills has formed beaches in all the small coves. Anchorage, sheltered during the northeast monsoon, may be found eastward from the point dividing Dahikan Bay.

A large shoal, composed of coral and white sand and covered by a least depth of 3¼ fathoms, lies ¾ mile northward from the point dividing Dahikan Bay; this shoal breaks heavily during the northeast monsoon.

Tugas Point is the northeastern extremity of the peninsula of the same name. It is formed by a cliff 79 feet high, behind which the land rises to a height of about 300 feet at a distance of ½ mile inland. It is surrounded by a steep-to reef, which extends about ¼ mile northward.

Tugas Peninsula is a very irregularly shaped high and hilly peninsula about 2¾ miles long north and south, extending from the mainland of Mindanao, with which it is connected by an isthmus less than ¼ mile wide and 83 feet high. The shore of this peninsula consists of rocky bluffs with sand beaches in the coves between them. The eastern shores of the peninsula are fringed by a narrow reef, and a long reef, partly bare at low water, extends about ½ mile southwest from its southern end into Carrascal Bay, behind which there is good sheltered anchorage for small vessels. The limits of this reef can be plainly seen and its extremity can be rounded fairly close-to. About ½ mile from the southeast part of the peninsula there is a small 3¾-fathom shoal.

Carrascal Bay, between Tugas Peninsula and Capungan Point, is 3 miles wide at the entrance and extends about 3½ miles southwestward. It is divided into two parts by Gorda Point. The western

part is nearly blocked by reefs, on which lie Ludguron, Puyu, Diju, and Panwas Islands. A tortuous channel between the reefs leads to the village of Adlay, where considerable boat building is carried on. **Gorda Point** is 170 feet high; it is surrounded by reefs which extend ¼ mile eastward from it and fringe the shore of the eastern half of the bay as far as Capungan Point.

Capungan Point is the northern extremity of a large peninsula which forms the eastern side of Carrascal Bay; it is fringed by a narrow steep-to reef about 150 yards wide.

Capungan Peninsula is about 2 miles long north and south, 1 mile wide, and rises in the western part to a height of 450 feet. It is connected with the mainland by a low isthmus about ½ mile wide, on the eastern side of which is situated the village of Consuelo.

Carrascal is situated on the western side of the mouth of the river of the same name, which discharges at the head of the eastern half of Carrascal Bay. The usual anchorage is about ¾ mile northward from the church in 10 or 12 fathoms.

General Island is the largest and most conspicuous of a group of three islands lying off Capungan Point. It is situated northeastward from Capungan Point, from which it is separated by a deep channel ⅜ mile wide. It is about 2 miles long east and west and 1½ miles wide near the middle, where a long, irregularly shaped peninsula extends southward and forms a bay on either side of it. Along its northern side is a series of bluffs that are very prominent when viewed from eastward or westward. General Island is hilly and rises in the northern part to a height of 792 feet. The western bay on the south side, known as General Island Anchorage, is fringed by reefs; the eastern bay is entirely blocked with reefs and is of no value to navigation.

General Island Anchorage affords good anchorage for small vessels, sheltered at all times, in 14 fathoms, muddy bottom, in the middle of a basin about ¼ mile in extent. The western entrance point is marked by a prominent rock on the edge of the shore reef; the eastern entrance point is clean and steep-to. In entering, vessels should pass midway between the two entrance points, stand northward, and anchor when the second point on the eastern side is abeam. Buenavista lies at the head of this anchorage.

Ramilette Rock is a prominent rock, 57 feet high, situated over ¼ mile west from the western part of General Island. It is surrounded by deep water, and the channel between it and General Island is clear.

A small, dangerous rock, covered by ½ fathom and surrounded by deep water, lies about ¾ mile south-southwestward from Ramilette Rock and ¼ mile from the west end of General Island. When rounding Capungan Point vessels should favor the point side to avoid this rock.

A small shoal, covered by a least depth of 3 fathoms and surrounded by deep water, lies ½ mile southward from the extreme southern point of General Island in the fairway of the eastern approach to General Island Anchorage.

Auqui, the eastern of the General Island group, lies 2 miles southeastward from General Island; it is about 1 mile long northeast and southwest, narrow, and rises near the south end to a height of 337

feet. The southwest extremity is clean and steep-to; its other sides are fringed by reefs which extend about 5/8 mile northward from it. The area included between General and Auqui Islands contains much foul ground and should be avoided.

Triton Rocks are a group of rocks lying 1¼ miles north-northwestward from the north end of Auqui Island. The northern rock, 15 feet high, is steep-to on its northern side and marks the northern limit of the foul ground between General and Auqui Islands.

Unamao Island, a high, dead coral, wooded island, lies ½ mile eastward from the southern part of Capungan Peninsula. It has four distinct peaks, the highest and sharpest of which is 400 feet high. The eastern side of the island is clean and steep-to; the western side is fringed by a reef on which there are a number of high rocks. There is a channel between the shore reef and that on which Unamao is situated, over ¼ mile wide, with a depth of 5¼ fathoms in the middle.

A shoal about ½ mile in extent, the middle of which bares at extreme low water, lies ¾ mile northeastward from Unamao Island; about ½ mile northwestward from this shoal there is a 5½-fathom patch. About 2 miles eastward from the south end of Unamao Island there is a small shoal covered by 3½ fathoms.

Lanusa Bay is about 15 miles wide at the entrance between Capungan and Cauit Points and extends 8 miles southwestward. From the low isthmus connecting Capungan Peninsula with the mainland to a point 1 mile beyond the mouth of the Lanuza River, at the head of the bay, there is a continuous stretch of dark sand beach nearly 100 yards wide. The remainder of the shore of Lanuza Bay is bold and composed of black rocky cliffs. At Lucia and Caridad there are short sand beaches. Along this section of the coast the mountains come close to the shore, have almost precipitous sides, and are covered with a heavy growth of timber. About three-fourths of the way from Lanuza to Cauit Point there is a prominent shoulder of the mountains, 1,080 feet high, lying about ½ mile from the coast; from this shoulder the mountain range runs south and there are only hills of moderate height on the remainder of the promontory terminating in Cauit Point. There are a number of rocks, 10 to 30 feet high, lying close to the shore ½ to 1½ miles westward from Cauit Point. The middle of the bay is deep and clear; on the western side are situated the General Islands, already described, and the dangerous Cantilan Shoals. On the eastern side of the bay the only detached danger is a shoal covered by a least depth of 1 fathom lying 2¾ miles east-northeastward from Lanuza and ½ mile from shore.

Cantilan is a small town situated on the western side of the mouth of the Cantilan River, about 4 miles south from Capungan Point. It is an occasional port of call for small coastwise steamers, which usually anchor north-northeastward from the town in 7 fathoms of water. Vessels approaching this anchorage should pass close southward of Unamao Island and not attempt to pass inside the Cantilan Shoals. The Cantilan River has very little water on its bar; pulling boats are unable to enter at low water. The sandy point through which it discharges is surrounded by a reef, bare at low water, to a distance of about ¾ mile.

Cantilan Shoals are a cluster of shoals, covered by depths of ¾ to 4¼ fathoms, covering an area of about 1½ miles in extent, 1½ to 3 miles northeastward from Cantilan.

Suyatun River discharges about 2 miles southeastward of the Cantilan. It has very little water on its bar, but can be entered by a pulling boat at low water in fine weather.

The valley between the Cantilan and Lanuza Rivers is intersected with a network of waterways, forming a sort of delta, for the four mouths of these rivers are connected, making a through inland waterway from Cantilan to Lanuza, passable by small boats.

Lanuza is a village lying at the head of the bay on the eastern side of the mouth of the river of the same name. It may be located by a 550-foot hill less than ¼ mile southward from it, which is the most western hill in this vicinity.

Cauit Point, situated about 18 miles southeast by east from Tugas Point, is the most prominent point in this vicinity. It is the northeastern extremity of a long, well-wooded peninsula formed by a spur of the eastern mountain chain of Mindanao. It is 450 feet high, clean, and steep-to on the northern side, and fringed by a reef on the eastern side to a distance of about ⅗ mile. An automatic acetylene light, showing one white flash every 3 seconds, visible 12 miles, is exhibited, 55 feet above high water, from a white concrete beacon on Cauit Point.

Cauit Bank, about ½ mile long in a north-northeast and south-southwest direction and about ¾ mile wide, covered by depths of from 8 to 10 fathoms over a rocky bottom, lies with its southwestern extremity 2½ miles east-northeastward from Cauit Point. The channel between this bank and the reef fringing Cauit Point is deep and clear.

From Cauit Point the coast trends southward for 8½ miles to Panisaan Point. It is composed of sand and gravel beach as far as Cortes, about 2 miles southward, thence to Panisaan Point it is generally bordered with mangroves. It is fringed by an extensive reef, partly bare at low water, which varies in width from ⅗ mile eastward of Cauit Point to 1½ miles abreast of Taganauan Islet, about 4½ miles southward from Cauit Point. On this reef there are a number of rocks and small islets, and there are several breaks in it affording boat passages to the various villages. The outer edge of the reefs are generally marked by breakers, and there are no detached dangers, with the exception of a number of small reefs which break at all stages of the tide lying about 1¼ miles eastward from Tigao. **Cortes, Burgos,** and **Tigao** lie on this section of the coast 2, 3½, and 6 miles, respectively, southward from Cauit Point.

CURRENT.—During the progress of the survey in this vicinity a constant set southward of from 1 to 2 knots was experienced between Cauit and Panisaan Points.

Anchorage may be found in fair weather or with westerly winds anywhere along the coast between Cauit and Panisaan Points in from 12 to 20 fathoms, sand or sand and rock bottom. Good anchorage for small vessels may be found in a break in the reef about 1½ miles southward from Cauit Point in 8 fathoms, mud bottom, protected from all winds and seas except those from the eastward.

Taganauan Islet is situated on the shore reef about 4½ miles southward from Cauit Point and midway between the shore and the edge

of the shore reef, here about 1½ miles wide. It is about 600 yards in extent, bordered by mangroves, and on its western side there are coconut trees about 60 feet high. In the vicinity of Taganauan Islet there are a number of rocks and small islets, the largest and most eastern of which is 75 feet high to the tops of the trees.

Panisaan Point rises boldly from the water about 2½ miles eastward from a 2,130-foot hill, which is the highest point near the coast in this vicinity. This hill shows up well from seaward but it is frequently obscured in cloudy or rainy weather.

From Panisaan Point the coast trends southward for 3 miles to the mouth of the Paninilan River and thence southeastward and eastward to Tandag Point at the mouth of the river of the same name. From Panisaan Point to a point ½ mile southward from the mouth of the Paninilan River numerous steep and nearly vertical cliffs appear with short stretches of sandy beach between them, that are fringed with coral, which in some places extend to a distance of ½ mile; the remainder of this section is formed by a curving sandy beach with broken coral reefs off it, which extends to the mouth of the Tandag River.

In the bay between the mouths of the Paninilan and Tandag Rivers there are six separate, detached reefs with narrow passages between them. They lie from ½ to ¾ mile from shore and break in moderate weather at all stages of the tide. Their location will be best understood by reference to the chart.

Macangani Island, one of the most prominent landmarks in this vicinity, lies on the southern part of a bank about 1 mile long in a northeast and southwest direction and about 1⅓ miles wide within the 10-fathom curve, situated about 2½ miles northeastward from Tandag Point. It is of regular shape, about ⅓ mile long northeast and southwest, 175 yards wide, covered with brush and small trees, and rises to a height of 260 feet. There are two rocks 85 and 130 feet high lying off the northeastern part of Macangani Island.

The town of **Tandag** is situated on Tandag Point, a low, flat point between the Tandag River and the sea, and may be readily located by two small, steep, high, heavily wooded islands at the mouth of the river. It has a stone church and convent, several stores, and a population of about 1,500. It is a place of considerable commercial importance as most of the products of the valleys of the Tandag and Tago Rivers are shipped from here. The Tandag River has very little water on its bar but may be entered by a pulling boat at high water; its mouth is hidden from seaward by the two previously mentioned islands. **Lenungan,** the western and larger island, lies about 100 yards from the west bank of the river mouth and forms one side of the channel through which the river discharges. It is about ½ mile long in a northeast and southwest direction, ⅛ mile wide, and has three peaks of nearly equal height, the highest of which is 365 feet. The eastern island has no name; it is oval in shape, about ¼ mile in extent, has a sharp peak 353 feet high, and lies about ¼ mile eastward from the middle peak on Lenungan and the same distance from Tandag Point. The north and west sides of Lenungan are clear and steep-to; the reef surrounding the smaller island extends about ½ mile eastward from it. The Tandag River is said to have originally discharged between these two islands but now a sand spit closes the opening and the river discharges through the narrow chan-

nel between Lenungan and the mainland. The opening between the unnamed island and Tandag Point is closed by a coral reef.

Anchorage, sheltered from all winds except those from north to east, may be found in 7 to 10 fathoms, mud bottom, ¼ mile westward from the north end of Lenungan Island. Small craft of 4 or 5 feet draft may find sheltered anchorage at the mouth of the Tandag River, behind Lenungan Island.

From Tandag Point the coast trends southeastward for 11 miles to Lambillon Point, the northern entrance point to Caguait Harbor. About 1 mile southward from Tandag Point there is a small point between which and the unnamed island off Tandag Point, reefs, partly bare at low water, extend to a distance of ½ mile. There is a small reef about ¼ mile in extent, bare at low water and marked by a line of breakers, lying about 2 miles southeastward from Lenungan Island and 1 mile from shore; a narrow, deep channel, about ½ mile wide, separates it from the shore reef. From the point 1 mile south from Tandag Point to Magabao Cove, about 7 miles southeastward, the shore line is a clean sandy beach, off which there are no off-lying dangers.

Tago River, said to be the largest river in eastern Mindanao, breaks through the beach about 5 miles southeastward from Tandag Point. There is a narrow channel across the bar with a depth of 1 fathom at low water, but the heavy sea usually rolling in on this coast makes it unsafe to enter even in a whaleboat; it is reported that native boats never attempt it. The great size of the Tago River valley is indicated by the absence of coastal mountains, which north and south of this area rise abruptly from the shore. Here, however, the first mountains are 20 miles or more inland. The river rises back in these mountains and with many wide meanderings flows in a general easterly direction through its wide, flat valley.

The town of **Tago** is situated on the north bank of the Tago River about 1 mile from its mouth and is not visible from the sea. The big surf makes landing on the beach difficult and dangerous. The best landing in this vicinity is at the mouth of the Tandag River. There is a good road between Tago and Tandag, over which all the hemp and copra raised in this vicinity is trucked to Tandag for shipment.

Magabao Cove, about 7 miles southeastward from Tandag Point, is about ½ mile wide at the entrance, extends nearly ¾ mile southwestward, and is nearly blocked with reefs. It has a depth of 9 fathoms at the entrance and decreases to 5½ fathoms near its head; in the middle of the entrance there is a small 3½-fathom shoal. Its northwestern entrance point is low; the southeastern entrance point is high and rocky and is the first high land on the coast southeastward from Tandag Point. There are no inhabitants on its shore and nothing further in regard to it is known.

From Magabao Cove southeastward to Lambillon Point the coast is high, bold, and rocky, with patches of mangrove here and there, and fringed by a narrow steep-to coral reef on which there are a number of large rocks. There are no off-lying dangers with the exception of a small reef about 200 yards in extent, which breaks in moderate weather, lying about ⅗ mile northeastward from Lambillon Point and ½ mile from shore.

Caguait is a small and unimportant village lying on the south shore of Caguait Harbor about 1 mile southeastward from Lambillon

Point; the water in front of the village is shoal. Caguait Harbor is a circular basin about ¾ mile in diameter. The northern side of the harbor is high and rocky like the coast northward; the southern entrance point is low and rocky. The depth at the entrance is 7 fathoms. The depths decrease gradually from the entrance to the head of the harbor, where a sandy beach with scattering palms is found. Good anchorage, protected from all winds and seas except those from the eastward, may be found anywhere in the harbor according to draft.

From Lambillon Point the coast trends in a general south-southeast direction for 6 miles and from offshore presents a lower and smoother appearance than that northward from Lambillon Point. Immediately southeastward from Caguait Harbor is a small sand cove blocked with reefs and of no value. The shore, consisting of coral rocks, runs eastward from this cove for about 1 mile and then turns southward. From this point a fringing reef makes off for a distance of ¼ mile and continues along the coast to the head of Bitaugan Bay, varying in width from ¼ to ½ mile. About 1 mile southward of the point where the shore line turns southward, the rocky shore ceases and mangroves hide the shore line and continue for another mile and then turn westward and southward into a sand beach at the head of Bitaugan Bay. This beach continues southward for over ½ mile, where the rocky shore begins again and continues around Umanum Point.

Bitaugan Bay (chart 4628) is about 1½ miles wide at the entrance and extends about 1 mile westward. **Bitaugan**, from which considerable hemp is shipped, lies on the south shore of the bay. The head of the bay is shoal, and there are a number of reefs and sunken rocks in the bay, contracting the anchorage space and complicating the navigation. A triangular reef about 1½ miles in extent and bare at low water lies in the mouth of the bay, leaving a channel $\frac{3}{10}$ to ½ mile wide, where good sheltered anchorage for small vessels may be found.

Arangasa Islands are three unimportant islands lying on the large triangular reef in the entrance to Bitaugan Bay. The largest has no name and is simply a big mangrove patch, lying on the western part of the reef about 1 mile long east and west and ¼ to ½ mile wide. **Arangasa Island**, on the southeastern part of the reef, about 450 yards long north and south and 330 yards wide, is of sand and contains a coconut grove and other large trees, the tops of which are about 80 feet above the sea. An automatic acetylene light, showing one white flash every 5 seconds, visible 10 miles, is exhibited, 36 feet above high water, from a white concrete beacon on Arangasa Island. The third island, also unnamed, is about 200 yards in extent, rocky, and covered with brush; it lies about 100 yards south of Arangasa and is of no value.

A large rocky shoal, which breaks in moderate weather, lies with its center about 1½ miles east-southeastward from Arangasa Island. It is about 1 mile long in a north-northwest and opposite direction, ½ mile wide, and covered by 1½ to 10 fathoms of water. Foul ground exists in the channel between this shoal and the reef on which Arangasa Island lies and its use is not recommended. There are a number of small detached reefs lying so close to the big reef that they practically form part of it. The tangent to the land northward

from Lambillon Point, bearing nothing northward of 317° (315° mag.), clears the northeastern side of the dangers off Bitaugan Bay, and the south side of Umanum Point, bearing nothing southward of 247° (245° mag.), clears the southeastern side of the same dangers.

A rock covered by 3 fathoms of water exists on the bearings: Tangent to the south entrance point of Bitaugan Bay 300° (298° mag.), and Umanum Point 174° (172° mag.).

About ¾ mile northward from Umanum Point and ½ mile from shore there is a coral reef on which the sea is constantly breaking; it is about ⅜ mile long, north and south, ⅛ mile wide and surrounded by foul ground. Umanum Point, bearing 200° (198° mag.), clears all dangers around this reef.

Directions for Bitaugan Bay.—The northern channel into Bitaugan Bay is narrow and tortuous and in the absence of any aids to navigation or local knowledge should not be attempted. To enter by the southern channel, when still outside the dangerous area included by the clearing marks, the southern entrance point, on which there is a hill over 200 feet high, should be brought to bear 288° (286° mag.), and steered for; pass it at a distance 150 or 200 yards and haul northwestward and good sheltered anchorage in 12 fathoms will be found with the south end of Arangasa Island bearing 96° (94° mag.), and the dock at Bitaugan bearing 194° (192° mag.).

Umanum Point is a rocky point fringed by a narrow reef. Immediately back of the point the land rises to a prominent 460-foot hill.

From Umanum Point the coast trends in a general southwesterly direction for about 10 miles to Jobo Point at the entrance to Lianga Bay. It is very irregular in outline and is intersected by a number of small rivers, indented by numerous bays, fringed by coral reefs of varying width and fronted by numerous detached dangers. From Umanum Point the coast trends westward for 1 mile and then southeastward for the same distance, forming Santa Cruz Bay. The shore southward continues low, rocky, and black to a point 2 miles south of the Marihatag River, from which point mangrove predominates to the mouth of the Otieza River. From the mouth of this river a sand beach extends southward for 1½ miles to a point where mangroves begin and extend 2 miles eastward, surrounding and forming Jobo Point.

Santa Cruz Bay, immediately southwestward from Umanum Point, is about ¾ mile wide at the entrance and extends about 1 mile westward. The shores of the bay are bordered by mangroves and fringed with reefs, bare at low water. In the middle of the bay there is a detached reef, bare at low water, which renders this bay useless to navigation. Santa Cruz, small and unimportant, lies at the head of the bay.

A reef, bare at low water, lies ⅜ mile southeastward from the northern entrance to Santa Cruz Bay, and two reefs, also bare at low water, extend ⅝ mile eastward from the south point of the same bay; southward of the first-mentioned reef there is a deep channel, over ¼ mile wide, leading into Santa Cruz Bay.

Marihatag is a small village on the south side of the mouth of the Marihatag River, which discharges 3 miles southwestward from Umanum Point through a narrow mouth about 20 yards wide. The Marihatag River has very little water on its bar; at high water small boats can enter the river and ascend it about 3 miles. Marihatag

is a port of call for small coastwise steamers that usually anchor about ¾ mile northeastward from Ayninan Islet and ½ mile southward from the breaking reef, lying 1 mile eastward from the mouth of the Marihatag River in 16 to 18 fathoms of water.

A reef about ¼ mile long east and west and 300 yards wide, which breaks in moderate weather at all stages of the tide, lies 1 mile eastward from the mouth of the Marihatag River; immediately southward of this reef there is a small 2¾-fathom patch. About ¼ mile westward from the first-mentioned reef there is a small breaking reef with a deep channel between them.

Ayninan Islet, lying 1½ miles southward from the mouth of the Marihatag River and ¼ mile from shore, is oval shaped, ¼ mile long east and west, and 90 feet high to the tops of the trees. It is surrounded by a reef, partly bare at low water, which extends ¼ mile northeastward and the same distance southward. The western end of the islet is a white sand beach, clean and steep-to. A deep passage, about 200 yards wide, separates it from the shore reef.

About ¾ and 1¼ miles eastward from Ayninan Islet are two reefs covered by 4 and 3½ fathoms, respectively. The outer reef is about ½ mile long north and south and ¼ mile wide; the inner one is about 300 yards in diameter. There is also a 4½-fathom patch, about 200 yards in diameter, lying about ¾ mile southward from the east end of Ayninan. All of these shoals are surrounded by deep water and are readily picked up by their color.

Antipolo is a small village lying about 1½ miles westward from Ayninan Island.

Santo Niño is a small village lying about 2½ miles westward from Antipolo at the month of the Santo Niño River; some hemp is shipped from here in small sailing craft. The Santo Niño River has very little water on its bar.

Oteiza is a small village lying at the mouth of the Oteiza River, which discharges about 2 miles southwestward from the Santo Niño River. Small steamers call here for hemp brought from the neighboring ports in small craft. The Oteiza River has more water on its bar than either the Marihatag or Santo Niño; ships' launches can cross it at high water.

Salvacion is a small village in the bend of the coast about 2 miles southward from Oteiza, where the sandy beach turns to mangroves. It does most of its business through Oteiza.

Two dangerous detached reefs lie near the middle of Oteiza Bay. The first, lying 1¼ miles 58° (56° mag.) from the church at Salvacion, bares at extreme low water; the second, lying 1 mile 73° (71° mag.) from the same point, breaks with a moderate sea. Both are steep-to and at high water with a smooth sea can not be seen until directly over them. These and a small detached reef lying close to the shore reef, ¾ mile southeastward from Oteiza, constitute the only dangers in Oteiza Bay, and they all may be avoided by steering for Oteiza Church on a 324° (322° mag.) bearing and anchoring according to draft.

Jobo Point is a low mangrove-covered point extending about 2 miles eastward from the village of Salvacion. On it are two hills rising from the mangroves, both of which are 110 feet high. Jobo Point is surrounded by a steep-to coral reef about ⅛ mile wide, and its eastern extremity may be passed in safety at a distance of ½ mile.

is about 11 miles wide at the entrance between Jobo and Banculin Points and extends 13 miles westward. From Jobo Point the coast trends in a general southwesterly direction for 10 miles to the town of Lianga; then turns sharply and trends southeasterly for about 11 miles to head of Gamot Bay, a long narrow bay; thence back in a northwesterly direction for 3 miles to Conceson Point; thence in an easterly direction for about 10 miles to Banculin Point. The north side of Lianga Bay is bordered by mangroves with rounded hills rising out of them and is fringed by a wide reef, off which there are numerous detached dangers. The south side of the bay is higher and is fringed by a wide coral reef as far as Conceson Point; thence to Banculin Point the shore is rocky and steep, with a narrow steep-to coral reef.

Jobo Islet, about 1¾ miles southwestward from Jobo Point, is about 300 yards long northeast and southwest, 100 yards wide, flat topped, covered with trees and brush, and about 75 feet high to the tree tops. It is composed of sand and lies on a coral reef, partly bare at low water, which extends about ¼ mile northeast and southwest from it. About ⅔ mile southeast from Jobo Islet there is a small shoal covered by a least depth of 6 fathoms. This is believed to be the "P. D." shoal shown on the old charts 1¾ miles southward from Jobo Islet. Between the reef surrounding Jobo Islet and the shore reef there is a channel nearly ½ mile wide, but it contains a number of shoal patches, and its use is not recommended.

Haycock Islands are a group of some 12 small islets and rocks lying on the shore reef 3 to 3½ miles westward from Jobo Point and ¼ to 1 mile from shore. They are of various heights up to 205 feet and are covered with brush.

About 2 miles westward from Jobo Islet there is a small flat sandy cay, about ⅛ mile in extent, lying on the center of a reef about 1⅓ miles long northwest and southeast and ¼ mile wide.

Malinonok Islands are three small high islands lying on the shore reef about 6 miles westward from Jobo Island. Malinonok, the western one, is 110 feet high.

Lianga, a port of call for small coasting steamers, lies at the head of Lianga Bay, about ¾ mile south of the mouth of the Lianga River. It is clean and well-kept and contains a prominent church that is visible from a long distance. The shore in front of the town is fringed with coral, rendering landing at low water or after dark difficult. Anchorage, sheltered only during the southwest monsoon, may be found in about 20 fathoms, muddy bottom, with the church bearing 289° (287° mag.) and about ⅜ mile southeastward from a prominent 35-foot rock standing on the shore reef about ¼ mile eastward of the northern part of the town.

Panirongan Island, about 3 miles southeastward from the town of Lianga, appears to be a part of the mainland, being separated from it only by a narrow mangrove-fringed boat channel. Panirongan is wooded, 130 feet high, and bordered by mangroves except on its eastern side, where there is a sandy beach with coconut trees at the back, where a landing for the village of Panirongan can be made.

Tomajo Rock is a small rock, about 25 feet high, lying on the shore reef immediately eastward from Panirongan Island.

Between Panirongan and Conceson Points, a distance of about 4 miles, the coast recedes about 3 miles southward, forming a large bay blocked by reefs and of no value to navigation; the northern limit of the reefs is clearly defined by an almost unbroken line of breakers.

Cabgan and **Gabao** are two small rocky islets on the northern edge of the reefs filling the above-mentioned bay. Cabgan, the western and larger one, lying about 1½ miles northwestward from Conceson Point, is about ⅜ mile long northwest and southeast and 200 yards wide. Its north side is formed by vertical cliffs undermined by the sea and is clean and steep-to. Cabgan is about 100 feet high to the tops of the trees. Gabao Islet, lying about ⅜ mile east-southeast from Cabgan, has the same general appearance as Cabgan, and is about 175 feet high to the tops of the trees. A number of conspicuous bowlders lie off its eastern side.

A channel, about ¼ mile wide and 12 fathoms deep, between Cabgan and Gabao Islets leads to a deep lagoon about 2 miles long east and west and ⅛ to ½ mile wide. This lagoon, though navigable by small boats and launches, is of little value to navigation.

Gamot Bay, southward from Conceson Point, is about 1 mile wide at the entrance and extends about 3 miles eastward to the mouth of the Gamot River. Both sides of this bay are fringed with reefs, leaving a deep channel between them, which is accessible only to native canoes.

Conceson Point is a long peninsula forming the northern side of Gamot Bay. On it are a number of hills, the highest of which, 830 feet in elevation, slopes gradually northward to the shore of Lianga Bay. **Sua Islets** are two small islets, 65 and 100 feet high, lying off Conceson Point. A prong of the shore reef extends about 1 mile northward from the western end of Conceson Point.

From Conceson Point the shores are rocky, the cliffs rise abruptly from the sea, and parallel ridges rise in successive steps to the high mountains in the interior. From the prong of the reef extending about 1 mile northward from Conceson Point, the shore reef as far as Banculin Point is narrow and steep-to.

Banculin Point, the southern entrance point to Lianga Bay, is a bold, prominent headland, 590 feet high. The coral reef extends about 1 mile eastward of the point and is dotted with numerous large rocks, the largest one being 70 feet high and covered with vegetation. In the bay southward of this reef, there is an extensive area of clear water, but entrance to it is blocked by a reef which bares at low water.

Singag Island, 450 by 350 yards in extent and rising to a height of 185 feet, lies about 1¼ miles eastward of Banculin Point, being separated from the shore reef by a narrow foul channel with a depth of 2¾ fathoms near the middle. The island has steep rock cliffs on all sides and is steep-to on the north and south with 6 and 7 fathoms of water extending ½ mile eastward of it.

From Banculin Point the coast trends southward for 15 miles to the northern entrance point of Bislig Bay; a constant southerly current of moderate strength exists offshore, but in the narrow channels, among the numerous coral reefs lying in the deep indentations of the coast, the current is influenced by the tide, flooding northward and causing frequent swirls and eddies.

Lamon Point, 4½ miles southward of Singag Island, consists of perpendicular cliffs, 50 feet high, with a narrow, rocky beach at low

tide. From a little distance offshore these cliffs have the appearance of a fresh slide. Northward of the point the narrow valleys are separated by vertical cliff points and the coral reef broadens, entirely filling the indentations of the shore. Southward of Lamon Point the shore recedes to the westward, then southward and eastward, forming a large bay almost filled by a large coral reef, on which lies Bagasinan Island.

Bagasinan Island, 150 feet high, is long and narrow with steep, rocky slopes. The eastern end appears to be cut off from the main island and is separated from it by a narrow boat passage at high water. Several rocks lie on the reef to the westward of the island.

Lamon Anchorage (chart 4627) lies between Bagasinan Island and its reefs and the shore reef to the northward. It affords fairly protected anchorage for moderate-sized vessels in 6 to 7 fathoms of water, mud bottom. This anchorage is open to eastward and has not been tried in heavy northeast weather, but is believed to afford protection from wind and sea from that direction.

A large shoal area lies southeastward of the east end of Bagasinan Island. The least depth, 2¾ fathoms, lies 1½ miles 145° (143° mag.) from the east end of Bagasinan Island, with a 3-fathom shoal ½ mile westward of it. Between the latter shoal and the reefs and shoals extending 1½ miles northeastward of San Juan there is a clear channel over ¼ mile wide. The shoals break in heavy weather, but in smooth weather they are hard to distinguish, as they have the same appearance as the deeper water around them.

San Juan is of little commercial importance. At the time of the survey it had about 40 nipe houses.

Mahaba Island is low and flat, being only about 6 feet above high water. The greater part of the island is covered with trees and bushes, having only a small strip of cultivated land with a few houses on the western shore. A snug anchorage for launches and small vessels of 6 to 8 foot draft exists about ½ mile south of the mangrove islet in the channel westward of Mahaba Island. The best approach is from the northward, through the western channel which carries a depth of about 2 fathoms of water, the channel eastward of the small island being only about 80 yards wide. The channels among the reefs southward and eastward of this anchorage are narrow and tortuous, with strong tidal currents, and should not be attempted without local knowledge.

Tigdos Island, lying ¾ mile southeast of Mahaba Island, is 110 feet high to tops of trees, the surface of the ground being about 8 feet above high water. It shows very prominently from seaward and is a good landmark in approaching Hinatuan from northward.

Hinatuan is an important shipping center for this section of Mindanao. The church, municipal building, and the school are of strong material, with tin roofs, which show up prominently from the southeast. The Hinatuan River drains an extensive area. Launches drawing 7 feet cross the bar at high water and go alongside the wharf in front of the town. About a mile above its mouth rocks obstruct the passage of the larger boats, but native bancas ascend the river for more than 20 miles. Strong tidal currents run in and out fair with the channel, which is usually marked by stakes or beacons.

The usual anchorage for Hinatuan is about 1½ miles southeast of the river mouth in 4 fathoms, mud bottom. Better-protected anchor-

age may be found behind the reefs to the northward, in 7 fathoms of water, mud bottom, with Manomawan Islet bearing 120° (118° mag.) distant ½ mile. The approach to Hinatuan Anchorage is deep and clear and almost 1 mile wide. It is however, bordered on both its north and south sides by numerous reefs and shoals, the most dangerous one being a shoal with a least known depth of 2¼ fathoms of water lying 1½ miles 165° (163° mag.) from the eastern end of Tigdos Island. It has been observed breaking, but in smooth weather has the same appearance as the deep water around it.

Mancahorom Island marks the eastern end and **Maowa Island** the western end of the chain of shoals lying on the south side of the approach to Hinatuan. The former has an extensive coral reef surrounding it and should be passed to eastward and northward at a distance of not less than ½ mile. Both islands are low, but trees and palms make them conspicuous and excellent landmarks.

Loyola is a small settlement near the mouth of the Bigaan River. The latter is navigable for a whaleboat for about 5 miles from its mouth, but sand bars block the entrance at low water. Extensive coral reefs with several small mangrove islets and mud flats fill the head of the bay southeastward from Loyola.

Mawes Island lies on an extensive coral reef off the northern entrance point of Bislig Bay, being separated from the shore reef by a narrow channel with a depth of 4 fathoms of water. There are some coconut palms at the southwest end. The remainder of the island is covered with trees and bushes, and a fringe of mangroves entirely surrounds it.

BISLIG BAY,

5 miles wide at the entrance between Mawes Island and Sanco Point, extends 8 miles in a southwest direction, forming a large open bay containing numerous shoals and reefs. A heavily wooded ridge, about 600 feet high, but without prominent peaks, lies along the south side of the bay. On the north side the land slopes gradually to a height of 420 feet, the shore being fringed by mangroves and bordered by a wide coral reef, on which lie **Tumano** and several other small mangrove islands. **Agonoy Island** lies on a detached coral reef, is about 6 feet above high water, and has a sand beach around it. It is prominent on account of the coconut grove upon it. The valley of the Bislig River, which empties into the northwest corner of the bay, is low, flat, and heavily wooded. The river is navigable for whaleboats beyond San Jose, a small settlement about 5 miles above its mouth. Launches drawing 6 to 8 feet enter the river at half tide, the channel across the bar being usually marked by stakes, but care is necessary on account of the strong tidal currents.

Bislig, at the mouth of the Bislig River, and **Haramelio**, in the southern angle of the bay, are the only settlements on the shore of the bay and are of little commercial importance.

Directions.—Vessels entering Bislig Bay should keep from ½ to ¾ mile off the southern shore until Agonoy Island bears 320° (318° mag.), when the course should be changed to 272° (270° mag.), which leads to an anchorage in 4 to 5 fathoms of water off the mouth of the Bislig River. If bound for Haramelio or the head of the bay, keep ¾ mile offshore to avoid two 2-fathom shoals lying ½ mile off the

southern shore, and anchor according to draft. The head of the bay is shoal and affords no protection from northeast weather. Some protection from the seas may be obtained in the northwest corner of the bay behind the reefs, but the anchorage space is very limited.

Sanco Point, the southern entrance point to Bislig Bay, is low, thickly covered with bushes, and has a white sand beach at high-water line. A coral reef bares at low water from 1½ to 2 miles eastward and southeastward of the point. The town of **Valencia** is small and unimportant and is not visible to passing vessels.

From Sanco Point the coast trends almost due south for 15 miles to Catarman Point. The shore is bordered by a wide coral reef, and the land rises to a heavily wooded ridge about 400 feet high, which presents no distinguishing features. About 5 miles from Sanco Point, in front of the town of **Barcelona**, a break in the reef affords anchorage and some protection. The entrance is narrowed to about 400 yards by a 2¼-fathom shoal. An anchorage in 7 fathoms, sand bottom, may be had ½ mile southwest of **Maopia Island**, a small island, 20 feet high, lying on the reef. This anchorage is well protected by the reef in all directions except from the southeast. The 3-fathom shoal 2½ miles northeast of Maopia Island and the 4-fathom shoal 1½ miles south of that island both break in a moderate sea. The best boat landing at Barcelona is at the mouth of the Taon River.

Tambog Point, rising to a height of 260 feet, is covered with scattered trees, hemp, and bushes and is very prominent. The point itself is double, the southern and higher point being about 50 feet high. The bight northward of Tambog Point is partially protected from the swirls and constant southerly currents which prevail off the point.

Lingit, near the mouth of the Lingit River, is of little importance. The best boat landing is found by following the break in the reef northward of the town at half tide or better, thus gaining the protection of the reef.

Catarman Point is bold, steep, and very prominent, with rocky cliffs about 40 feet high. The point is covered with bushes with large trees scattered among them. Close northward of the point is a break in the coral reef forming Catarman Anchorage. The entrance between the reefs is about 400 yards, widening to ½ mile inside. It is protected on the north by the reef on which the **Majangit Islands** lie, and its surroundings allow none but an easterly sea to enter. The depth of 18 fathoms at the entrance gradually lessens to 7 fathoms, mud bottom, 1 mile farther in, where safe anchorage may be had ¼ mile from the shore.

From Catarman Point the coast trends southwest and south, then southeast to Bangai Point, forming a large, open bay known as **Cateel Bay**. The waters of this bay are deep and almost free from currents, Catarman Point protecting it from the constant southerly current which is felt farther offshore. The shore is bordered by a wide coral reef, showing in some places a glistening white sand beach, but in the main the vegetation comes to the water's edge. The land rises to a high, flat, heavily wooded ridge with several peaks among the higher mountains farther inland showing over it.

Hamuan Island, on the shore reef 2½ miles southwest of Catarman Point, is 275 feet high and covered with big trees. The western

part of the island is being cleared for hemp. The south and east sides are rocky. A number of high, rocky islets, covered with bushes, lie on the reef between Hamuan Island and Catarman Point. At half tide a small boat can pass between them and the mainland, thus gaining the protection of the reef. A large detached reef, with coral heads breaking at all times, lies ½ mile southeast of Hamuan Island with a deep channel between it and the shore reef.

Cabugao Island, 220 feet high, tree-covered and prominent, lies on the edge of the reef northward of Boston. A shoal with a solitary rock 30 yards in diameter on its eastern edge baring at low water, lies ½ mile 13° (11° mag.) from the east end of Cabugao Island. This rock is a serious danger as it lies in the fairway to Boston Anchorage and in a smooth sea is hard to distinguish.

The best anchorage is in 5 to 7 fathoms of water, mud bottom, about ½ mile northwest of Cabugao Island. It is open from north to east and may become untenable during heavy easterly weather. **Boston** is an important shipping point for the products of this section of Mindanao.

Between Tonquil and Tanguip Points there is a break in the high ridge near shore, forming a broad, fertile valley drained by the Cateel River. The channel across the bar of the river is about 100 yards wide and carries about 5 feet of water with deeper water inside; but the river can only be entered in the smoothest of weather. Strong tidal currents into and out of the river cause confused seas near the entrance. The town of **Cateel** lies at the mouth of the river. Anchorage may be taken up ¼ to ¾ mile offshore anywhere between Tonquil and Tanguip Points in 12 to 14 fathoms of water, mud and sand bottom, but preferably off the mouth of the Cateel River.

Bagoso Island, lying on the shore reef ½ mile southeast of Bangai Point, is a prominent landmark when seen from north or south; a large tree on **Quinablangan Island** is especially prominent, being visible for 20 miles up and down the coast. Both islands are low, being only about 7 feet above high water, with their seaward faces of coral rock formation. A break in the reef leads back of Quinablangan Island and at high water a boat can continue on over the reef back of Bagosa Island, thus avoiding the heavy rips and swirls that frequently exist off this coast.

San Victor Island is the largest of a number of low bush-covered islands lying on the reefs between Quinablangan Island and Paypay Point. A narrow channel separates San Victor Island from the shore reef. A large shoal area lies southeast and east of the island, on which there are three spots that bare at extreme low water and that break heavily at all times. There is another detached reef about midway between Paypay Point and the mouth of the Dapnan River. Fair-weather anchorage may be had off the mouth of the Dapnan River, but the remainder of this stretch of coast should not be approached without local knowledge.

Baganga Bay is a deep indentation in the coast southward of Lambayon Point. A coral reef extends ⅓ mile southward of the point and a breaking reef lies ½ mile 228° (226° mag.) from Lambayon Point. Good anchorage, protected from northerly and easterly weather, may be had in 7 fathoms, mud bottom, about ½ mile westward from Lambayon Point and ¼ mile offshore. The breaking

reef divides the approach to this anchorage into two channels, of which the western is the better, being the wider one and having an even bottom. Anchorage protected from southeasterly and southerly weather may be had in the southern part of Baganga Bay in 5 fathoms, sand bottom, ¼ mile offshore.

Baganga, the only town of importance, lies on the southwest shore of the bay. A nipa house, with a tin roof, stands out prominently, but the stone church and school are not visible from the bay. Neither the Baganga River nor the Panglimasan River can be entered by boats at low water.

Daquit Island lies on the shore reef that fringes the southern entrance point to Baganga Bay. It is low, covered with bushes and trees, and from a distance appears to be a part of the coast line. The coast to Baculin Point, 7 miles southward, is fringed by coral reef but is steep-to and clear. The Languyon River has a wide mouth, but can only be entered at half tide through a narrow channel near the southern bank.

Between Baculin Point and Pusan Point, 9 miles southward, there are three indentations in the coast. **Baculin Bay,** between Baculin Point and Bacul Point, is deep and clear. Both points are low and rounding and are fringed by a coral reef about 400 yards wide. The head of the bay is sand beach. **Baculin, San Luis,** and **Manorigao** lie on the shore of this bay but are of little importance at the present time, the products of this section, a small amount of hemp and copra, being taken by trail or native boat to Caraga or Baganga for shipment. Anchorage protected from northerly and northeasterly weather may be found about 2 miles west of Baculin Point in 7 to 10 fathoms of water, sand bottom, about ½ mile from shore.

The bay between Bacul Point and Alisud Point does not afford any safe anchorage. **Santa Fe,** at the mouth of the Hipayaan River, is of no special importance. A rock, which is reported to bare at extreme low water, lies 1 mile 174° (172° mag.) from Bacul Point. It is marked by breakers at all stages of the tide.

Caraga Bay, between Alisud Point and Pusan Point, affords anchorage protected in easterly and southeasterly weather in the southwest corner in front of Santiago. The anchorage in front of Caraga, on Alisud Point, is available in fair weather only; the depth of water and character of bottom render it unwise for any vessel to remain in this vicinity during heavy weather. Caraga is an important shipping point for the products of this section and is a port of call for coastwise steamers. The Caraga River can be entered by small boats at half or full tide only; heavy breakers extend across the entrance even during moderate weather.

Pusan Point is low and rounding. It is steep-to, but even in moderate weather heavy rips and swirls are met with off this point, apparently caused by the constant southerly current which exists off the east coast of Mindanao.

From Pusan Point the coast trends south-southwestward for 20 miles to Tugubun Point. The points in between are coral cliffs 15 to 30 feet high with sand and shingle beaches at the heads of the several bays. The coastal ridge is somewhat broken, but does not show any prominent landmarks. It is separated from the higher mountains inland by a valley or depression of 400 or 500 feet, and

the entire coast is heavily wooded. The only danger to navigation along this coast is a coral shoal lying 2¼ miles north of Tugubun Point. It is connected to the shore reef and has a shoal spot of 1½ fathoms ¾ mile offshore, with a detached shoal ¼ mile eastward having a depth of 4¾ fathoms.

No anchorage protected from easterly or southerly weather is available along this section of the coast. At the head of **Bunga Cove** there is a small semicircular opening, into which launches can enter. Bunga Creek, emptying into this basin, affords a good quality of fresh water. Batinao Point is a high, rounding coral cliff.

Manay Bay affords anchorage protected from west through north to northeast, westward of Manaol Point. A 38-foot rock close to the cliff of the point makes an excellent landmark when seen from northward or southward. Manay is an occasional port of call for coastwise steamers. The Manay River can be entered by small boats, but the rapids block it a short distance from its mouth.

The **Casauman River,** 1½ miles north of Casauman Point, can be entered by small boats at low water. Just in front of the river mouth is a high shingle ridge cast up by the heavy seas that frequently prevail along this coast. Heavy tide rips frequently exist off Casauman Point.

The bays between Casauman, Buan, Manduao, Tambuc, and Yako Points afford indifferent anchorages, all open to eastward and southward. Zaragosa, Santa Cruz, San Ignacio, Quinonoan, and Tarragona are settlements of Visayans, the latter being an occasional port of call for coastwise steamers. Jovellar is a settlement of Mandayans, the natives of this section, whose villages usually are 3 or 4 miles from the coast. Hemp and copra are the principal products of the country and are usually carried to Caraga or Mati for shipment.

Mayo Bay, between Tugubun Point and Lamigan Point, is a deep, open body of water that affords no protected anchorage and very precarious anchorage even in fair weather. Tidal currents are weak within the bay, but at the entrance points they come in conflict with a strong constant southerly current of about 2.2 knots and frequently caused heavy tide rips and much disturbed water. The only known danger is a small coral reef baring at half tide, which lies ¼ mile southeast of Flacca Point on the north shore of the bay. The channel between this reef and the shore reef has a depth of over 3 fathoms. The north shore of the bay is similar to the shore north of Tugubun Point. The points consist of low coral cliffs, the bights of shingle, and sand beaches on a narrow coral reef. At Magbiga Point, between Flacca and Tugubun Points, the rocky ledge shows prominently. At Tacaquinay Point the cliffs are of hard conglomerate, rising sheer from the water for 200 feet in four separate headlands separated by deep gorges. **Mount Ambutig,** 1,940 feet high, with a sharp grassy top, is conspicuous from seaward and especially easy to identify when seen against the sky. The remainder of the shore of Mayo Bay is a prominent shingle beach overlying a coral reef with the exception of Gorda Point, which is a rocky ledge with a broad sand beach in the bay to the westward. Bobon Point is low and rounding.

Lucatan and **Mayo** are the principal settlements, the inhabitants being mostly Mandayans. The government road from Mati passes

through Mayo and it is the intention to continue it along the coast to Caraga. Freight for the plantations in this region is frequently landed at Mati and transported over this road to its destination.

Lamigan Point is the southern end of Guanguan Peninsula, separating Mayo Bay and Pujada Bay. It is very bold, having a sheer cliff 108 feet high. The 1,825-foot hill back of the point is a very conspicuous landmark for vessels approaching Pujada Bay. It is overtopped by the higher mountains to the westward, but its isolated position permits of easy identification.

PUJADA BAY,

6 miles wide at the entrance between Lamigan Point and Tumadgo Point and extending 12 miles northwestward, is too deep to afford good anchorage though otherwise well sheltered. The entrance narrows to 4 miles in width and is divided into two deep clear channels by Pujada Island. The land in this vicinity rises steeply from the water's edge, the shore being fringed by a narrow coral reef, except at Taganilao, where the coral reef extends out ⅖ mile from shore. The land in the eastern side of the bay from Batiano Point northward is low, and a broad coral reef fringes the shore.

Pujada Island, 1⅓ miles long, ½ mile wide, and attaining a height of 485 feet, divides the entrance into two deep, clear channels. The island, originally heavily timbered, has been cleared and planted to coconuts. The shore reef on the western side is about 100 yards wide, about 200 yards at its north end, and gradually widens on the east side until it attains its greatest width of 400 yards at the southeast end. Two small sand islands, on coral reefs that bare, lie ¾ and 1½ miles southeast of Pujada Island. They are separated from each other by a narrow, foul channel, and from Pujada Island by a channel ¼ mile wide with a depth of 4 fathoms of water. Both sand islands are conspicuous objects, and Pujada Island forms an excellent landmark for entering the bay.

Uanivan Island, 105 feet high and covered with trees, lies on the east side of the bay about ¾ mile northwest of Taganilao Point, with which it is connected by a reef having 5½ fathoms of water over it. The island has a sand beach on its eastern side but is rocky on the west and a wide coral reef bares to the southeast.

Guanguan Estero is entirely filled by coral reefs, which extend nearly 1 mile offshore between Licoc Point and Guanguan Point.

Mati, the seat of government and the most important town of this section, lies at the head of Pujada Bay. It is connected by road and trail with the towns on the east coast of Mindanao and with the east shore of Davao Gulf. It has regular steamer communication with other ports of Mindanao and with Manila, and is an important shipping place for hemp and copra.

Business is generally in the hands of Chinese traders. The people are mostly Visayans, with one More settlement, **Babiasan,** at the mouth of the Guanguan Estero and another one, **Bajucan,** in Balete Bay.

Anchorage may be taken up off the town of Mati in 15 to 18 fathoms, sand bottom, about 400 yards from shore. A fixed red light is exhibited from a white-framed structure on the beach eastward of

the old pier. Good anchorage may also be had 1 mile northward of Batiano Point in 15 to 20 fathoms, ½ mile offshore.

The western shore of Pujada is steep-to, the land high and heavily wooded. A detached rock lies ½ mile eastward of Camansi Point, while the shore reef fills the indentations northward and southward of the point. **Calayan Point**, 1 mile southward, is a high, rounding rocky point.

Lacutan Cove has a very irregular shore fringed by a wide coral reef with a 3½-fathom shoal nearly in the middle of the cove.

Tataidaga Point and **Daca Point** are the southeast and southwest extremities of the peninsula separating Balete Bay from the main body of Pujada Bay. Shoal water extends some distance off these points and they should be given a berth of at least ½ mile.

Balete Bay (chart 4625) affords perfectly protected anchorage for small vessels. About ¾ mile northwestward of Daca Point, the entrance channel is narrowed to 200 yards by a shoal with a least known depth of ¼ fathom of water over it. Beyond this shoal anchorage may be had in 16 to 20 fathoms of water, or near the head of the bay in 8 fathoms, mud bottom. Wide coral reefs border the shore with mangroves at the head of the bay. No river enters this bay, though the gently sloping valley would indicate its existence.

Macambal and **Magun** are two small unimportant settlements on the southwest shore of Pujada Bay. Fresh water can be procured but with great difficulty at these places.

Tumadgo Point is a crumbling cliff rising to a height of about 500 feet. Back of the point the land rises in irregular ridges to Mount Hamiguitan, 5,345 feet high.

From Tumadgo Point the coast trends 188° (186° mag.) for 30 miles to Cape San Agustin. The first half of this stretch of coast is characterized by steep clifflike points, from the top of which the land rises steeply to the higher mountains. The cliffs are of soft rock, which are undermined by the heavy storm seas striking this coast, and the fallen rock forms huge bowlders on the narrow ledge between the high-water line and the foot of the cliff. Between the several points, of which **Macaonan, Nagas**, and **Salasala** are the most prominent, are narrow valleys that rise steeply from the shore and are not noticeable from offshore. A large rock 10 feet high lies on the edge of the shore reef ⅔ mile eastward of Kabtaya.

Luban Island, 219 feet high, has an almost perpendicular cliff face on its eastern side, gradually sloping to the mangrove shore line on the western side. A large rock 25 feet high lies close to the cliff face. Luban Island is connected to the mainland by a coral reef that bares at low water. At high water small launches drawing not more than 4 feet can pass back of the island into a small lagoon in front of Luban town. Entrance to this lagoon from the south side is made difficult by numerous bowlders on the reef.

About 3 miles northward of Lagum Point there is a decided change in the character of the vegetation. The country to the northward is heavily wooded with large trees and has a decided jungle appearance. To the southward the trees are stunted, and from a distance offshore the many large-leaved palms have the appearance of nipa houses.

There are no good anchorages along this coast. In case of necessity anchorage may be had at several places along the coast. Outside

of about 1 mile from the shore there is a constant southerly current. Inshore there is an eddy, and the direction of the currents seems to be influenced by the tides. Heavy tide rips and swirls are encountered around Luban Island and southward.

Cape San Agustin and San Agustin Reef have been described on page 207.

CURRENTS.—A constant current southward has been observed on the east coast of Mindanao, especially at a distance of beyond 4 miles from shore. Within this distance the tides preserve their influence in some places, but near the projecting points the current remains constant. Northward of Mayo Bay this current shows itself in strong races, which increase on approaching Pusan Point, where they attain their greatest force. They are very violent off Lacud Point and also off Lambajon and Bagoso Points. In order to lessen the effects of the current, a vessel should keep a good distance offshore. Near the coast the sea is always very rough and choppy, and vessels suffer a good deal from it.

PALMAS ISLAND,

or Miangas Island, lying 48 miles south-southeastward from Cape San Agustin, is about 1⅓ miles long northeast and southwest and ⅔ mile wide. The greater part of the island is low and covered with coconut palms, the land being only about 5 feet above high water. The northeast part of the island rises to a series of hills, the highest of which is 365 feet. The northeast corner of the island is a sheer, vertical cliff 150 feet high. The island is surrounded by a wide coral reef. A break in the reef in front of the village on the southwest shore is the best and practically the only landing place for small boats. The survey vessel anchored off this break in the reef in 17 fathoms about 200 yards from the bowlder line, putting a small anchor on the reef to prevent dragging off the ledge into deep water. This place was protected from the heavy northeast swell which prevailed at the time.

The southeast anchorage is found about ⅓ mile east-northeast from the extreme south end of the island in 18 to 20 fathoms of water, sand bottom, with an ample clearance from the shore reef for moderate-sized vessels. This anchorage is subject to swirls and tide rips. A strong southerly current splits on the bank, extending more than a mile off the north end of the island, causing violent overfalls and boiling water in that vicinity and a considerable eddy near the reef to the southward. The range of tide was found to be about 3½ feet.

SULU ARCHIPELAGO.

The Sulu Archipelago consists of a long chain of islands extending from Basilan Strait, off the southwestern extremity of Mindanao, for 180 miles in a southwesterly direction to Sibutu Passage, off the northeast coast of Borneo, and includes over 300 islands of various sizes. It is divided into three principal groups: That of Basilan to the east, Jolo in the center, and Tawitawi to the west. Besides these there are smaller groups, the descriptions of which are included in that of the three larger groups.

The inhabitants, about 120,000 in number, are nearly all Mohammedans, of Malay race, speaking a Malay dialect which they write with Arabic characters. They are considerably advanced in civilization and are engaged in cultivating rice, fishing, and rearing horses, cattle, and poultry. The pirates of this archipelago were once a terrible scourge to the eastern seas and are still a terror to small native craft and to unprotected coasts.

The principal articles of commerce are tortoise shell, trepang, edible birds' nests, pearls, and pearl shells. There is regular steam communication between the islands and Singapore and Manila.

BASILAN GROUP.

Basilan Island, which with the southwest end of Mindanao, forms the strait of Basilan, is the largest and principal island of the group. It is 32 miles long east and west and 20 miles wide. The island is thickly wooded and is traversed by high mountain ranges that are frequently enveloped in clouds. The highest peak, lying somewhat southward of the center, attains a height of 3,346 feet. The shores of the island, which are generally low and wooded, are bordered by a belt of sand and coral débris from 50 to 100 yards wide. This belt is sometimes covered at high tides and forms mangrove swamps.

There are many small rivers; their mouths are wide and can be entered by boats at high water, but a short distance up the width contracts until the river becomes a mere rivulet flowing among stones. Good watering places do not exist, as fallen trees intercept the passage of boats.

Navigation around the island presents no difficulties; the water is clear, and the bottom can be seen at a depth of 8 to 9 fathoms; as the weather is generally fine, vessels can anchor anywhere round the coast on coral bottom.

Malamaui Island is situated off the northwest coast of Basilan, from which it is separated by the Isabela Channel. It is 370 feet high and heavily wooded. The timber is considered to be superior to any found in the neighborhood and is well adapted for spars and building. A fixed red lens lantern light, visible 7 miles from seaward and in the Isabela Channel as far south as the town of Isabela, is exhibited, 36 feet above high water, from a white wooden frame structure on the eastern point of Malamaui Island.

Lampinigan Island is about 5/8 mile east and west, about 200 feet high, and is situated 4 miles westward from the western entrance to Isabela Channel.

Pamelukan Bank is situated about 2 miles westward from the west side of Malamaui Island. From the position where 3/4 fathom, the least water, is found, the highest part of Lampinigan Island bears 227° (225° mag.) and Moro Island 103° (101° mag.). The remainder of the bank has from 5 to 10 fathoms of water over it.

DANGERS.—There is a long shoal westward from Pamelukan Bank, stretching east and west for 4 miles, which has two patches of 4 fathoms on it, lying, respectively, 347° (345° mag.) 1 3/4 miles and 305° (303° mag.) 2 miles from the summit of Lampinigan. There are besides these several banks northwest of Malamaui, on which the least depth of water shown on the chart is 6 to 8 fathoms.

Malamaui Road, southwestward of the island of the same name, affords a safe anchorage for ships of all sizes and is particularly convenient for vessels making Port Isabela after nightfall, when the entrance into the channel would be dangerous. The holding ground is good and strong winds are rare.

The shores are generally low, heavily wooded, and bordered by coral reefs. Abreast the streams there is usually sufficient depth over the reef at high water to permit of the entrance of a ship's boat, and it is advisable to make landings at these points, as there is frequently enough surf to damage a boat attempting to land along the shore at other places.

ANCHORAGE.—The best anchorage will be found in the vicinity of San Rafael Bay and small vessels can lie close in eastward of Matanaye Island. In approaching this anchorage from northward, Pamelukan Bank is the only danger that need be considered. Unless there is sufficient light to make out Matanaye Island and the high land behind it, it is not advisable to pass between Malamaui Island and this bank, as the border reef extends some distance from the shore and the general character of the land makes the estimation of distances at night difficult. It will usually be found best, in making this anchorage either from northward or westward, to head for Lampinigan Island, which can usually be distinguished, leaving Pamelukan Bank eastward, when entering from northward, and passing between Basilan and the 26-foot shoals when entering from westward. Lampinigan Island may be approached safely, and from its vicinity Matanaye Island can usually be made out.

Moro Island, lying close to the south side of Malamaui, is low, covered with trees 50 to 65 feet high, and is usually visible from a distance of 7 miles.

About 300 yards southeasterly from Moro Island there is an extensive reef awash, nearly always covered by driftwood and well marked by the ripple round the edges; part of the sand is always above water and mangrove bushes are beginning to grow there. The depth of water off the eastern edge of the bank is decreasing toward the coast.

At 300 yards distance westward from Moro Island there is a small shoal covered by 16 feet. The channel either side of Moro Island may be taken, but that on the north of the island and south of Malamaui has the greater width and depth of water.

Kalut Island is situated in a bight on the eastern side of Malamaui Island, from which it is separated by a very narrow, deep channel.

Port Isabela (chart 4543) is situated on the island of Basilan, facing Isabela Channel, which separates Basilan from Malamaui. The roadstead is between Malamaui and Lampinigan Island and offers good anchorage in 6 to 15 fathoms, muddy bottom. Port Isabela was formerly a naval station and contains an old fort, barracks, hospital, repairing yard with workshops for machinery, and a slipway for hauling out small vessels.

There is a shed and wharf on Malamaui Island opposite Port Isabela, but the wharf is too light to secure vessels to; they must therefore anchor in the stream and breast in by lines. Vessels going to the wharf should go against the ebb, heading southwestward. The stern line will then lead nearly fore and aft. There are anchors securely set on shore for the bow and stern lines and piles for the breast lines. The rings of the anchors are covered at half tide and the rocks in wake of them are whitewashed. A vessel drawing 20 feet can safely go alongside the wharf. There is a rock covered by 6 feet of water about 200 feet southwestward from and in line with the end of the wharf.

The bottom is rocky and the anchorage bad in Isabela Channel; the tides are very irregular and the greatest velocity of the ebb is 4 to 5 knots and of the flood about 1 knot less. According to the last report received, there are no buoys nor beacons existing in the approaches to Port Isabela.

Directions.—Port Isabela can be entered from either direction, but vessels generally take the entrance which will bring the tide against them to avoid turning in the channel. The channel is about 4 miles long and the least width between the 5-fathom curves is 150 yards. The northern entrance is rendered somewhat difficult by the absence of buoys or beacons. In entering, the only precaution necessary is to avoid a shoal covered by 2 feet least water lying ¼ mile from the Basilan shore, which can be done by rounding the east point of Malamaui at a distance of ¼ mile, the shoal water off Malamaui not extending out over 250 yards. Inside the channel the chart shows a small shoal of 16 feet 200 yards from the Basilan shore; a shoal with 13 feet on it 200 yards from the east side of Kalut Island; near the middle of the channel, a little over ½ mile northeastward of Port Isabela and extending 200 yards from the Basilan side, a shelf of coral, level with the surface; but nearly everywhere after passing the shoal off Kalut Island the Malamaui shore can be passed at a distance of 150 yards. Vessels entering from westward should give the coast of Malamaui a berth of ¼ mile and pass either north or south of Moro Island, care being taken to avoid the 16-foot patch westward of it. If passing northward of Moro Island, the northeast point of the islands should not be approached too closely, as the tide seems to set vessels toward the reef, which at this point extends a short distance from the shore. The channel southward of Moro Island is good for small vessels, but as there is considerable cross current care must be taken to avoid being set upon Moro Island or the reef lying southeastward of it.

Current.—The currents encountered are tidal and run with considerable velocity. Their directions vary with the locality and no general rule can be laid down. The stream through Basilan Strait

splits on Malamaui Island, a portion going through the Isabela Channel. Just westward of Malamaui some set northward or southward will usually be found. This diminishes in force as the distance from Malamaui Island becomes greater. In Isabela Channel the flood tide runs southwest; the ebb northeast. For further information regarding tidal currents in Basilan Strait, see page 145.

PROVISIONS, WATER, ETC.—There are a number of native settlements along the shore. Provisions are scarce, although at Panagahan, the largest village, situated on Malamaui Island, near the western entrance to Isabela Channel, a few chickens and eggs may sometimes be obtained. Other villages may be found at the head of San Rafael Bay, at the Atonaton River, and on Lampinigan and Matanaye Islands. There are many native boats built at the last-named settlement. Fresh water may be had by ascending the streams a greater or less distance, depending upon the season. During the rainy season the water is fresh almost to the mouth. It is best, however, to obtain fresh water from the hydrant at Port Isabela. The natives are generally peaceful, although not to be trusted. They are most troublesome toward Maluso, lying southward and westward.

The west and south coasts of Basilan are high, wooded, and steep-to and can be navigated at a distance of 1 mile with the help of a chart. On the western side, near Pangasahan Point, there is a small islet, separated from the coast by a channel 300 yards wide and 6 fathoms deep, into which small craft can enter.

Maluso Bay.—This anchorage, on the west side of Basilan Island, is formed by two islands: **Great Govenen,** which is conical in shape and 308 feet high, and **Little Govenen,** also conical, but only 59 feet high. A shoal of 3¾ fathoms lies 24° (22° mag.) distant 200 yards from the Great Govenen. Good anchorage and holding ground will be found ½ mile northward of Great Govenen with the northern point of Goreno Islet bearing 255° (253° mag.) and the extreme point of Pangasahan 300° (298° mag.). A river enters the head of the bay, the bar of which bares at low water, but within the bar the depth is 9 feet and the river is just wide enough for a boat to pull up.

Anchorage for small vessels may also be found off the sawmill wharf on Basilan opposite Great Govenen Island in 7 to 9 fathoms, mud bottom. Good fresh water may be obtained at the wharf.

Teipono Island is small, low, and wooded. The chart shows a reef extending a short distance from the south end.

Goreno Islet is situated nearly ¾ mile northerly from Teipono Island with a reef off its north point and a small shoal of 1 fathom about 200 yards from its northeast side.

Islands west of Maluso Bay.—**Tengolan, Takela, Dauan,** and the two **Langasmate Islands** are flat and covered by vegetation; the channels between them are clear except between Tengolan and Takela, where there is a coral shoal of 2¾ to 4¾ fathoms, which leaves a channel over ½ mile wide. The chart shows two shoal spots of 1 and 1½ fathoms off the north side of Takela. The small, low, wooded islet **Teingalaguit** lies 1½ miles northwesterly from Tengolan; a reef projects 1,200 yards 351° (349° mag.) from it. **Odel Island,** lying nearly 3 miles westward from the northern end of Takela, is also small, low, and wooded.

TIDES AND CURRENTS.—The maximum rise and fall amounts only to 5 feet, but the velocity of the tidal stream in the channel between

the coast of Basilan and Teingalaguit and Tengolan Islands is very strong and reaches 3 knots at times; the flood stream sets northwest and the ebb southeast.

Tamuk Island, about 1 mile in extent and 180 feet high, lies 3½ miles southward of Teipono and about the same distance from the coast of Basilan. **Cancuman Islet** is a small, clean islet lying 1½ miles eastward of the south end of Tamuk.

South coast of Basilan.—**Lahatlahat** and other small islets border the coast between Maluso Bay and Mangal Point, the southern extremity of Basilan. **Mangal Point** is low and sandy. **Tumajubun Point** has a little hill upon it. At 1 mile southeast of Tumajubun Point is the eastern edge of a shoal with 1 to 4 fathoms of water on it and no bottom, with 60 fathoms at less than 200 yards from it, which extends about 1¾ miles eastward from Bihintinusa Island.

Kauluan Island, off the southeast coast of Basilan, is low. It is separated from Basilan by a narrow channel with several small shoals at the northern end. The soundings on the southeast side of Kauluan appear to be very deep, as no bottom could be obtained with 60 fathoms 300 yards from it.

Matanal Point.—In the large bay between Kauluan Island and Matanal Point, the eastern point of Basilan, the depths decrease from 10 to 20 fathoms toward the shore; bottom coarse sand and rotten coral, favorable for anchoring to wait a tide. The land above the point rises to **Mount Matanal**, 2,050 feet above the sea. The northern coast is bold and steep-to. The islands in Basilan Strait have already been described.

PILAS ISLANDS

is the name given to a group of islands situated west and northwest of Basilan, of which Pilas Island is the largest.

Teinga Island, the northernmost of the group, is about 1¼ miles north and south, low, wooded, and surrounded by a reef. The bank, of 5 to 11 fathoms, on which the group is situated, extends to a distance of about 5 miles east-northeast of Teinga. There is a sounding of 6 fathoms (doubtful) shown on the chart at 7 miles 277° (275° mag.) from Teinga.

Sangboy Islands, or **Hare's Ears**, are two remarkable islands, 617 and 856 feet high, and may often be clearly seen when the high land of Basilan is obscured by clouds. The mountain of the southern island resembles a cupola, while the land around it is low. A shoal with a least depth of 2 fathoms lies from 1 to 3 miles southward of the southern island.

Kaludlud and **Dassalan Islands** are low and said to have good timber. Shoal ground, covered by 10 feet least water, extends 2¾ miles westward of Kaludlud and terminates in **Griffin Rocks**, which have 10 feet least water over them. These rocks do not always break. Besides these dangers and a patch of 2 fathoms lying 106° (104° mag.), 2 miles from the south end of Dassalan, the chart shows many shoal patches about these islands. Capt. Davenport, of the yawl *Haidee*, reports finding a rock covered by a depth of about 10 feet on the 3¼-fathom shoal lying 6 miles 253° (251° mag.) from Kaludlud Island.

Salkulakit Islet and the **Lakits Islets** are on the western side of the Pilas Bank. North and northwestward of the Lakits, which are

mere rocks, and to a distance of 4 miles, there are soundings of 2¾ to 8 fathoms and there may be dangers not yet discovered.

Favorite Bank is a large bank, the eastern edge of which lies about 25 miles westward of Pilas Island. It has not been surveyed. H. M. S. *Nassau* carried a depth of 6 to 10 fathoms for 8 miles over it. The U. S. S. *Charleston* anchored near this bank in 12½ fathoms on the following bearings: Mount Bahu, Jolo, 187° (185° mag.); Sangboy Islands 66° (64° mag.); and Pilas Island 92° (90° mag.). The mark for clearing the eastern edge of Favorite Bank is Mount Bahu, Jolo, bearing 190° (188° mag.). The soundings on this line are not less than 18 fathoms, the shoaler water being about 5 miles westward of that line.

Pilas Island is the largest of the islands near Basilan. It is about 8 miles long north and south and its greatest breadth is 2 miles. The land is low and flat, except at the northern part, where there are two hills close together, 919 and 522 feet high. The southern part of the island tapers gradually to Panducan Point, the southern extremity. This part of the island is low, heavily wooded mangroves, and intersected with numerous channels, which at high water probably separate the southern portion from the main body of the island. There is a shoal extending southward from Panducan Point, on which 5 fathoms is the least water shown. This sounding is ⅝ mile southward of the point.

The little islet **Tagutu** lies about ⅜ mile off the east coast. On the western side of Pilas there are several small islands with good anchorages between them, especially one on the northwest part; but a good local pilot is necessary for entering it, particularly if the northern entrance be taken, as the islets have reefs off them and one very dangerous one must be passed close-to in order to clear the reef off the northwest coast of Pilas, as well as the Tamila Shoal, on which, at ½ mile from the shore, there is a rock above water, surrounded by depths of 5 fathoms.

The islands **Bantulinos, Cujangan, Minis, Saloro, Tambilunay, Manangal, Siringo, Palajangan, Lemondo, Orell, Mamannak, Pasigpasilan, Tinutungan,** and **Tiguilabun** are small islands lying westward of Pilas Island. Being of little importance and situated out of the regular track of navigation, it is not considered necessary to describe each separately.

Coral shoals.—A patch covered by 2 fathoms lies 227° (225° mag.) 3 miles from Panducan Point; another 2-fathom patch lies 247° (245° mag.) 4¾ miles from the same point.

Mindoro Shoal, covered by 2¾ fathoms least water, lies 276° (274° mag.) 10 miles from Panducan Point.

Pilas Channel, between Pilas Island to the west and Balukbaluk and Mataja Islands to the east, has a width of 3 miles and a depth of 9 fathoms. The tidal current in it attains a velocity of 6 knots at springs; the flood stream sets to the north and the ebb to the south.

Balukbaluk Island, east of the north end of Pilas, rises to a peak 525 feet high on the northern part; the southern part is low. The chart shows a shoal around the northern part to a distance of 300 yards.

Mataja Island, lying 3½ miles southward of Balukbaluk Island, is small, low, flat, and wooded. It is steep-to on all sides except the northern. The chart shows a sounding of 1½ fathoms about ¾ mile northerly from the north end of Mataja. A fixed white light, visible 12 miles from all around the horizon except where obscured by Balukbaluk Island, is exhibited, 62 feet above high water, from a white framed structure, 52 feet high, on the southern extremity of Mataja Island.

TAPIANTANA ISLANDS.

The Tapiantana Islands are a group of eight islands situated southward of Basilan Island.

Bihintinusa, the most northern island of the group, is small, low, sandy, and wooded. It is situated less than 1 mile from the south coast of Basilan. It is surrounded by a reef, and shoal water extends to a distance of 1¾ miles 81° (79° mag.) of the island, where there is 2¾ fathoms at the edge of the bank. At ¼ mile eastward of the bank there is no bottom at 60 fathoms.

Bubuan Island, situated 2½ miles southward of Basilan, is about 2 miles in extent and has a hill rising near the center to a height of 794 feet. In the channel between Bubuan and Tapiantana Islands there is a shoal called Tacut Balas, covered by ½ fathom least water.

Lanahuan Island lies about 2 miles southwesterly from Bubuan. It is about 1½ miles long north and south, ½ mile wide, and has two hills on the western part, of 318 and 394 feet in height, respectively. A reef projects ¼ mile 160° (158° mag.) from the south end, and at ½ mile in the same direction the depth is 2 fathoms. The northern side of this island is inhabited.

Tapiantana Island, lying 1¼ miles southward of Bubuan, is about 2 miles long east and west and 1¼ miles wide, and has in the western part a hill which rises gently to a point 938 feet above the sea. The eastern part is low and ends in an extensive reef, which bares more than 1 mile eastward and incloses the small islet **Haluluko**. The reef southward terminates in a narrow, wooded islet, known as **Tolon Pisa Island**, 2¾ miles long, with very deep water on its southern side. The western side of this island is inhabited.

Salupin and **Timbungan** are two low, wooded islands on one reef at the eastern edge of the bank on which the group is situated. This bank is very steep; at 200 yards distance from it no bottom is found with 60 fathoms.

Soundings.—The soundings between Lanahuan and Mataja Islands are irregular, from 10 to 40 fathoms, but from 30 to 35 fathoms are the common soundings in the fair track. The bottom is fit for anchorage, consisting of sand and gravel mixed with coral in some places. Near the south side of Tamuk the depths are less than at 4 or 5 miles distance.

Tides and currents.—The mean tidal interval at Tapiantana is $6^h\ 03^m$; the maximum rise and fall is 7¾ feet. The tidal stream turns at $4^h\ 15^m$ after high and after low water. The tidal currents in the channel south of Tamuk set nearly northwest and southeast, the ebb to the southeast being strongest in the southwest monsoon, about 2½ and 2 miles an hour at spring tides.

SAMALES ISLANDS

are a group of islands lying on a bank extending 25 miles in a northeast and southwest direction. Tapiantana Channel, between Lanahuan, of the Tapiantana Group, and Tatalan Island, of the Samales Group, is 6 miles wide and 11 to 33 fathoms deep. Nearly midway between the two islands there is a patch of 7 fathoms.

Tatalan Island, about 1½ miles long north and south and ¾ mile wide, rises in the northern part in a hill 387 feet high. It is situated 6 miles 220° (218° mag.) from Lanahuan and 4 miles westward of the edge of the bank. An automatic acetylene light, showing one white flash every 5 seconds, visible 12 miles, is exhibited at a height of 45 feet above high water from a white concrete beacon on the extreme south end of Tatalan Island.

Batumandi is a rock awash with 9 fathoms around it, lying 2 miles westward from the north end of Tatalan. At 3¼ miles westward of Batumandi there is a narrow bank 2 miles in length north and south, with a least depth of 8 fathoms, bottom sand and rock. Caution must be used in navigating in the vicinity of these shoals.

Bolod Islands are two small wooded islands, each about ½ mile in extent, lying about 20 miles south-southwestward from Mataja Island light. The western island is 643 feet high and the eastern one 597 feet high. They lie about 1¼ miles apart in an east-northeast and opposite direction and form good landmarks for vessels trading between Zamboanga and Jolo. The channel between them is deep and clear. A shoal covered by depths of from 3¾ to 8 fathoms extends 2 miles southeastward from the eastern Bolod Island.

Tirana Rock, lying ½ mile northward of the eastern Bolod Island, is a dangerous, small patch of flat rock almost level with the water.

Sibarut Bank, of sand and rock, 1½ miles in extent in a northeast and southwest direction, lies with the western Bolod 53° (51° mag.) distant 5¼ miles and Bitinan Island 209° (207° mag.) distant 8 miles. The chart shows 6 fathoms on this bank.

Sungu Shoal lies 4½ miles southeasterly from the eastern Bolod. It is 2 miles in extent northeast and southwest and 1¾ miles in breadth, and consists of sand, gravel, and rock. Near its southwest extremity there are rocks with a depth of 1 fathom. At 400 yards northward of these is a patch of 2½ fathoms and at ½ mile eastward of them is a large patch with depths of from 4 to 5 fathoms, gravel bottom. There are depths of 18 fathoms close to the southwest side of the bank, 22 fathoms off its south side, and 11 to 13 fathoms on the north and northeast sides. From the position of least depth the eastern Bolod bears 304° (302° mag.) distant 4½ miles.

Bucutua and **Bulan Islands**, lying 2½ miles southward of Tatalan, are separated by a narrow channel 200 yards wide and 6 to 26 feet deep. Bucutua Island is low, having only a hill of 157 feet upon it. **Buta Kalut Bank**, with 16 feet of water on it, lies ½ mile west of Bucutua. Bulan has on it a round mountain 1,184 feet high. At 1¼ miles northeasterly from Bulan are the two **Dipolod Islets**. The eastern and larger is 250 feet high and is ¾ mile from the edge of the bank. **Mamad Islet**, situated 1¾ miles westward of Bucutua, is 128 feet high, and has no dangers beyond ¼ mile from its shore.

The channel between Tatalan and Bucutua is 2½ miles wide and the soundings are from 30 to 50 fathoms.

Tonquil Island is situated on the southeastern edge of the bank and is low and crescent-shaped, with the concave side northward. At ¼ mile from Eguet Point, the eastern point of the islands, there is no bottom at 55 fathoms, and at 200 yards from the southern point the depth is 90 fathoms. The channel between Sagui Point, the western point of the island, and the islands Bucutua and Bulan is 3 miles wide. The soundings are deep, with the exception of one patch of 2¾ fathoms from the position of which, the peak of Bulan bears 17° (15° mag.) and Sagui Point 273° (271° mag.).

Inside of a line drawn between the horns of the crescent from Sagui Point to Eguet Point there are several reefs and shoals.

Balanguingui Islands consist of **Mamanoc, Parol,** several islets, and the principal island, **Balanguingui.**

Balanguingui Island, including the main island and numerous small islands lying on the reef, is about 4 miles in extent. These islands are separated by lagoons and narrow, tortuous boat channels, and, seen from a distance, have the appearance of one island.

Mamanoc, lying 1½ miles northwesterly from Balanguingui, is about ¾ mile in extent. It is surrounded by a narrow reef extending nowhere more than ¼ mile from shore.

Parol, lying ¾ mile from the northeast part of Balanguingui, is 1½ miles long northwest and southeast, is fringed by a narrow reef, and has shoal ground extending more than ½ mile from its northwest and southeast points.

Bangalao and **Simisa Islands,** lying westward of Balanguingui, are low and intersected with lagoons. Shoal water of 2¾ fathoms extends to ¾ mile southwest of Bangalao and 2 fathoms 1¾ miles north of the same island.

Manungut Island, the most western of the Samales Islands, is only about ½ mile in extent and is situated about 1¼ miles northwesterly from Bangalao Island. In the western part there are two hills, the northern and higher of which rises to a height of 276 feet.

TIDAL STREAMS AND WHIRLPOOLS.—Navigation for sailing vessels is dangerous on account of the strong currents and eddies. It is stated that at times the tides between Jolo and Balanguingui run 8 knots, with strong eddies and whirlpools.

JOLO GROUP.

Jolo Island, from which the group is named, is about 34 miles long east and west and 3 to 13 miles broad from north to south. The island from east to west is a series of hills and valleys, the highest mountain being on the west end and rises 2,893 feet above the sea. The coasts, especially the northern, are in general wooded, clean, and steep-to, as also the islands and islets that border them. They are slightly indented, forming several bays where there is anchorage, the most sheltered and secure in both monsoons being that of Dalrymple or Tulayan Harbor. There is no good watering place in the island; it must either be had from the rivers at low tide or from wells.

The island has a pleasing appearance. The mountains are covered with magnificent trees or beautiful green pasturage; some are cultivated to the summit.

The climate of Jolo, although so near the equator, enjoys a much more even and cooler temperature than Mindanao; the nights are

sensibly cool, and, although the island abounds in water, mosquitoes are not troublesome. The Jolo Islands are seldom, if ever, visited by gales, although strong winds and heavy falls of rain are not uncommon.

Pabunuan Shoal, of sand and shells, lies 20 miles northward of Jolo Island and 290° (288° mag.), distant 18 miles, from the western Bolod Island. It is 4 miles in extent from north to south and about 2 miles across from east to west. The general depth over it is 4¾ to 6 fathoms, but in the middle there is a ridge of 4½ fathoms with two patches of 2¾ fathoms and 2 fathoms. From the position of least depth, 2 fathoms, the following bearings were taken: Gujangan Islet, summit, 183° (181° mag.); Mount Tandu, Jolo, 164° (162° mag.); Pangasinan Islet, 233° (231° mag.). The eastern Bolod Island, in line with Bulan Island, summit bearing 120° (118° mag.), shows that a vessel bound to the north and east, is clear of Pabunuan Shoal. Currents in this vicinity make ranges much more reliable than compass courses.

Halcon Rock, lying 6½ miles 64° (62° mag.) from the 2-fathom patch on Pabunuan Shoal, is awash at high water, steep-to, and surrounded by depths of 25 to 30 fathoms.

Capual Island, situated at the northeast extremity of Jolo Island, is circular, about 3 miles in diameter, and 1,066 feet high on the southeastern side. A narrow coral spit makes out from the northern side in a north-northwest direction to about 600 yards. Bearings were taken from the spit when in 2 fathoms of water as follows: Left tangent Capual Island, 95° (93° mag.); right tangent Capual Island, 220° (218° mag.). Elsewhere the coast of this island is reported to be clear and steep-to except on the southwest side, where it is united to Jolo by a shoal of sand with 2½ to 4½ fathoms of water in places. The islet Bulicutin is situated on this shoal.

Capual Channel, between Capual and Jolo Islands, is deep at the eastern end, but has only 1¾ fathoms at the western end.

Goitya Shoal, of 300 yards extent and covered by 1½ fathoms of water, lies 1 mile from the northwest part of Capual Island.

Bitinan Island, to the northeast of Capual and separated from it by a clear channel 1 mile wide and 13 fathoms deep, is 1½ miles in extent, 722 feet high, and steep-to.

TIDAL CURRENT.—In the channel between Bitinan and Capual the tidal current runs 3 knots.

Dalrymple Harbor (chart 4541), or Port Tulayan of the Spanish Derrotero, is formed by the island of Tulayan on the north and the coast of Jolo on the south, and, being the only well-protected harbor on the island, may at some future day be a place of importance. Good anchorage will be found during the northeast monsoon under the lee of Tulayan Island. The natives report that during this monsoon the wind seldom blows home.

Tulayan Island is about 1 mile in extent. The western side is steep, running up to a height of 672 feet, the summit being covered with long grass.

Coast of Jolo.—From Dixon Point, 1½ miles westward of the south end of Tulayan Island, the coast trends east-southeast, east and east-northeast to Petley Point, forming a large indentation. The shores are covered with mangroves and fronted by a reef with numerous

small bays, mangrove islets, and rocks in it. The village of Limawa lies on the southeast shore of the bay.

DANGERS.—In the eastern entrance there are two patches of 2¾ fathoms, the westernmost of which lies over ¾ mile eastward from Martin Bluff, on Tulayan Island, and 10° (8° mag.) from Limawa. A shoal of 3¼ to 4¼ fathoms lies 800 yards southeast from Martin Bluff; a patch of 2 fathoms on a shoal of 4¾ fathoms lies 1,400 yards south from Martin Bluff; and in the western entrance there is a 2-fathom patch lying ½ mile 276° (274° mag.) from the southwest point of Tulayan Island.

ANCHORAGE.—A large vessel visiting Dalrymple Harbor should round Tulayan Island northward and bring the village of Limawa to bear 180° (178° mag.) and steer for it, giving the eastern side of Tulayan a berth of about ½ mile to clear the 3¼-fathom shoal lying southeast of Martin Bluff. When the south end of Tulayan bears 270° (268° mag.) it may be steered for and anchorage taken up with Martin Bluff bearing between 0° (358° mag.) and 30° (28° mag.), in 7 to 9 fathoms, bottom sand and broken shells.

From Dixon Point the coast trends westward for 4 miles, and, curving first southward and then round to the northward, forms a bay 3½ miles across to Tuctuc Point. This bay is bordered by a steep reef, at ½ mile from which is Eseo Shoal, of 400 yards extent, covered by 2 fathoms of water and surrounded by depths of 5 to 7 fathoms. From Tuctuc Point the coast trends northwest for 3 miles to Igasan Point, near which is Bancungan Island; from thence westward to Daingapic Point, the northern limit of Jolo roadstead, it is clean and steep-to. The towns along this coast offer no resources. The natives are very poor.

Gujangan Island, situated 315° (313° mag.) distant 3½ miles from Tulayan, is small, moderately high, and steep-to. It has the appearance of two islands about 400 feet high, thickly wooded and connected by a flat neck of land, the two portions being well opened when bearing 117° (115° mag.). The northern part is slightly the higher and the island stands out prominently and forms a good landmark. The pilot reports a rock lying about 3 miles 47° (45° mag.) from Gujangan, and it is so shown on the chart, marked position doubtful; no other information is available.

Bancungan Island, situated eastward of Igasan Point, is small and of triangular form, 1,145 feet high. It is clean and steep-to, except to the northwest, on which side a reef projects 300 yards, with rocks awash on it. There is a narrow but safe channel, with a depth of over 7 fathoms between the island and the coast.

Panganaa Islet, lying 1 mile east of Bancungan, has some rocks close to its southern part; elsewhere it is clean. There is a depth of 13 fathoms between the islet and Tuctuc Point.

From Daingapic Point the coast trends southwestward with a bend southward for 2½ miles to Belan Point. It is clean and consists of coarse sand. The water shoals gradually and the 5-fathom curve is generally 400 yards from shore. A reef, about 300 yards wide, that bares in places, borders the shore in front of the town of Jolo, leaving a passage of 1 foot depth to a lagoon which extends southward.

Jolo (chart 4541).—The town of Jolo, situated in a bight in the coast about ½ mile eastward from Belan Point, is a port of entry

and the seat of considerable trade. It is well laid out in three or four streets, planted with shade trees and surrounded by a wall. The Chinese town is built on a long wharf about 1/8 mile westward from the town proper. Trade is largely in the hands of the Chinese, who do a large business in fitting out boats engaged in the pearl fishery. The imports are principally rice, hardware, and cotton goods, and the exports pearls, pearl shells, and a variety of hard woods.

COMMUNICATION.—Jolo has regular communication with Singapore and Borneo and also maintains steam communication with all ports of the Philippines.

There is a radio station at Jolo operated by the Bureau of Posts: Call letters, FS.

WHARF.—There is a stone mole, projecting northwestward from the north gate of the town, with a wooden extension having about 24 feet of water at its end. Vessels approaching this wharf must be careful to avoid the reefs on either side. There is a pipe laid down on the wharf, from which a good supply of water can be obtained.

A fixed red light, visible 7 miles, is exhibited, 58 feet above high water, from a white steel-framed structure erected about 25 feet southward from the stone tower on the north side of the stone mole.

ANCHORAGE.—The usual anchorage for vessels which do not intend to go to the wharf is northwestward from the lighthouse in 12 to 14 fathoms. During the northeast monsoon ships are sometimes obliged to leave this anchorage and take shelter under the lee of Marongas Island. This is a poor anchorage as the bank is steep and the tidal currents strong.

TIDES.—It is high water, full and change, at $7^h\ 30^m$; springs rise 5 feet. The flood stream sets to the southwest and the ebb to the northeast.

From Belan Point the coast trends west-southwest for 3½ miles to Candea Point, then curves gradually southward for 6 miles to Silangon Point, the western extremity of Jolo Island. All this part is safe, a depth of 4½ to 10 fathoms being found at the edge of the narrow reef that fringes the shore.

Buansa Shoal, covered by a depth of 4 fathoms with 5 fathoms immediately inside of it, lies 1 mile 50° (48° mag.) from Candea Point and nearly ¾ mile from shore.

Tulian Island, situated 1¼ miles northwestward from Pulaluaac Point, the nearest part of Jolo, is 208 feet high, clean, and cultivated. The channel between Tulian and Jolo is clear and deep on the Tulian side, but there are only 4¾ fathoms at a distance of nearly ½ mile from Pulaluaac Point.

Busson Rock, which lies ¼ mile 317° (315° mag.) from Tulian Island, is covered by 4 feet of water with 19 fathoms outside of it.

Matos Shoal, about 1 mile northward of Silangon Point and ½ mile from shore, is covered by 4¾ fathoms.

Islands north of Jolo.—These form a group of six large islands and several small ones, separated from the northwest point of Jolo by a safe and deep channel nearly 3 miles wide and 15 to 30 fathoms deep.

Marongas Islands, lying 3½ miles northwesterly from Jolo light, is about 1 mile long northeast and southwest, ½ mile wide, and 285

feet high. The channel between Marongas and Pangasinan is ½ mile wide and 8 fathoms deep.

Pangasinan Island is 548 feet high. At 1¼ miles northeastward there is a shoal 1 mile in extent with 3¾ fathoms on it and at ½ mile south there is a smaller shoal of 3¾ fathoms.

Anchorage may be had in 7 to 12 fathoms 200 yards from the coasts of these islands, but the currents have considerable velocity.

Hegad Island, lying northward of Pangasinan, is low and flat and separated from Bubuan and Pangasinan by safe and deep channels. The little islet **Tauitaui,** 1 mile west of it, has a small reef on the east and west sides, but is steep-to on the north and south sides.

Minis Island is the northeasternmost of the group, 1 mile in extent, flat, and steep-to.

Bubuan Island is 499 feet high on the north side. On the south side, which is low and flat, are two inlets of no importance. The channel that separates it from the islands off Cabucan Island is divided into three by the islet **Lahatlahat** and the **Concas Bank.** These three passages are each about 400 yards wide and 5½ fathoms deep.

Cabucan Island is 4 miles in extent east-northeast and west-southwest, about 50 feet high, and perfectly flat. On the south side it is clean, but the north and west sides are bordered by a reef which extends ½ mile westward. The eastern part ends in several small islets, known as the Palliagan Islands, covered by mangroves.

Aguirre Bank, with less than 10 fathoms of water on it, extends 3 miles from the southwest coast of Cabucan and is 1 to 2 miles wide north and south. The shoalest part, with 4 fathoms of water on it, lies about 2 miles from the western extremity of Cabucan. A sounding of 3 fathoms is shown at a distance of 6 miles west-southwest of Cabucan, with 5½ and 9 fathoms near it.

Pantocunan Island, situated 3½ miles northwest of Cabucan, is circular, about 1 mile in diameter, low, and flat. It is clean and steep-to on the south side, but bordered by a coral reef ⅓ mile wide on the north side. This island appears to be on the Pangutarang Bank, hereafter described, as in the channel between it and Cabucan there is a depth of more than 110 fathoms.

Sulade Island, lying about 7 miles southwest from Bunga Point, is very flat and forms a complete lagoon, inclosing an archipelago of islets, with an entrance on the south navigable by boats at high water. On its western extremity are two remarkable trees, like fan palms, which when approaching the island from north or south appear, when sighted, like the sails of two vessels. There is anchorage on the west side of Sulade Island in from 6 to 10 fathoms, sand, the bottom being even and the soundings decreasing regularly to the shore.

The currents in this vicinity have considerable velocity, a rate of 3¼ knots having been experienced at ordinary tides, running principally northeast, the weaker west-northwest, 2¼ knots.

Southwest coast of Jolo.—Bunga Point, situated 2 miles southward of Silangon Point, is surrounded by a reef which extends along the coast from before the town of Bauisa northward and as far as the town of Parang eastward. The reef is about ½ mile wide and near its edge the depth is 7 to 14 fathoms.

Parang.—This village, consisting of 30 or 40 houses in line, is built on piles in the sea, each house being connected with the shore by a

separate bridge. Anchorage may be had in 8 fathoms about ½ mile from shore, close to some fishing stakes, with Mount Tumatanguis, bearing 32° (30° mag.), and Tubingantan Point 119° (117° mag.). From this anchorage the water shoals gradually to the landing place opposite the east village.

Batolaqui Bank consists of a number of shoal patches extending about 1¼ miles easterly and southeasterly from Cabalian Point. They are covered by 1 to 3 fathoms, with rocks awash at low water on the western edge of the bank. The depth between the patches is 6 to 8 fathoms and there is a narrow channel between a small sand cay northward of the bank and Jolo Island, with not less than 6 fathoms in it.

Clearing marks.—Bunga Point, open of Tubingantan Point (the point westward of Cabalian), bearing 308° (306° mag.), clears the southwest side of the bank and Mount Mabintan, 1,519 feet in height, bearing 58° (56° mag.), clears the southeast side.

Maibun Bay (chart 4541) affords good shelter during the northeast monsoon, but is liable to a heavy swell during the southwest monsoon, which sets in in June. The bay is about 8 miles wide between Cabalian Point, the western entrance, and Putic Point, the eastern entrance point, and extends 3 miles in a northerly direction; at the head are the river and town of Maibun. The shores of the bay are bordered by a narrow coral reef, and a depth of 5 fathoms will generally be found at 400 yards from the shore. The eastern side is covered by mangroves. The western shore is wooded with cleared spaces. The town of Punungan is situated not far from Putic Point.

Banks and shoals.—Within the bay and fronting the town are two shoals. The southernmost is always bare and is named **Dry Bank**; the northernmost bares at half ebb. There are, besides, four shoals; **Marban Bank,** with 6 feet least water on it, lies about ½ mile 120° (118° mag.) from Dry Bank; another shoal of 10 feet, about ½ mile 171° (169° mag.) from the same bank and two patches of 29 and 27 feet lie 84° (82° mag.) and 92° (90° mag.) from Dry Bank. The depth between the shoals and the eastern shore is 5 to 15 fathoms.

Directions for Maibun Anchorage.—There are two good channels into the anchorage off the town. The eastern, between Marban Bank and the eastern shore of the bay, seems to be the better; it is about ½ mile wide and has not less than 5 fathoms in the middle. The other passage is between Dry and Marban Banks. If this passage be taken, Dry Bank should not be brought to bear northward of 10° (8° mag.) until the 10-foot patch lying 171° (169° mag.) of it is passed. Should this bank not be buoyed it can generally be distinguished by the fishing stakes on it, and also by the light color of the water over it. When this patch bears 92° (90° mag.) a course should be shaped to pass midway between Dry and Marban Banks.

Anchorage.—Vessels can anchor anywhere in the bay, but the usual anchorage is about ⅜ mile southward of the town, with Dry Bank bearing 223° (221° mag.) in 8 or 9 fathoms, coral sand bottom.

Tides and Currents.—In Maibun Bay the tides are irregular; it is high water, full and change, at $6^h\ 25^m$; springs rise 4½ feet. Inside of the shoals the current is not noticeable, but in the offing it is strong and irregular. Flood stream sets westward and ebb sets eastward. The flood and ebb streams overrun the time of high and low water by about two hours.

Maibun.—The town of Maibun is built on piles on the outer edge of the bar, at the mouth of the river of the same name, which has only 1 foot of water on it at low water.

Teomabal Island, situated about 3½ miles southwestward of Putic Point, is small and low and surrounded by a coral reef which extends about ½ mile from the southeast side. There are coral patches of 24 to 30 feet lying as much as 1¼ miles southeastward of the island. The greater part of the interior of the island is a large lagoon that nearly bares at low water.

Patian and **Lumbian Islands** are clear and steep-to. The passage between these islands is reported to be clear and deep. There is anchorage in 12 fathoms in this channel.

The master of the launch *Ranger* reported, under date of December 28, 1914, the existence of a hitherto uncharted reef, with a least depth of 4 fathoms over it, lying about 2½ miles southwestward of Patian Island.

Garcia Shoal, lying ⅛ mile southwesterly from Lumbian Island, is of small area and covered by a least depth of 3 fathoms.

Villamil Rock, lying about ¾ mile southward of Putic Point, in the middle of the pass between Putic Point and Patian Island, is small and covered by a least depth of 4 feet. It is surrounded by deep water.

Tutu Bay, east of Maibun Bay, is only separated from the bay on the north side of Jolo Island by a low isthmus 2½ miles wide. A narrow steep reef skirts the western shore of the bay, but from the northern shore, and also from the northeastern, between Tutu and Carangdato Points, the reef extends 1½ miles from the coast. **Serantes Shoal,** covered by 1½ fathoms, lies ¾ mile from the western shore. The towns, Pandanpandang and Carongdong, are on the eastern shore. Anchorage may be had in the bends of the western shore of the bay and in the breaks of the reef on the northern and eastern sides. The bay is sheltered from southerly winds by Pata Island.

Pata Island is circular, about 4½ miles in diameter, and rises in the center to a mountain 1,433 feet high. The shores are clean and steep-to, except on the eastern side from which a reef extends 2 miles eastward having on it an island almost joined to Pata, and off the south side of this island is **Tanquique Rock.** The islet **Damocan** lies 800 yards northwestward of Pata Island.

Dongdong Island, situated between Pata and Jolo Island, is low, flat, and surrounded by a steep reef.

Tambulian Island lies ¾ mile northwesterly from Dongdong. It is a small, round island, with a shoal extending to ½ mile from its southeast shore. Anchorage may be had near the shoal in 8 fathoms.

Pitogo Bay, between Carangdato and Tandican Points, is bordered by a shoal which extends 1 mile southward from Tandican Point and fills up the bay northward.

The edge of the bank on which the archipelago is situated is close to the shoal southward of Tandican Point and is at the distance of 1 mile from it southeast of the point. It is also 1 mile from Tandu Point, the eastern point of Jolo.

The towns of Higan and Ganon are in the bay between Tandican and Tandu Points.

TAPUL ISLANDS

are situated between the Jolo and Tawitawi groups. Tapul and Bolipongpong Islands are two fertile and well-cultivated islands lying about 8 miles south of Cabalian Point, Jolo. Both have conical peaks; the former is 1,676 feet and the latter 954 feet high. The narrow channel between them is fit only for boats. They are apparently clear, except eastward of Bolipongpong, from which a reef projects about 2 miles.

A reef, not shown on the chart, also extends from the northwest end of Bolipongpong. Keeping westward of a line drawn from the southwest point of Bolipongpong Island to the 1,010-foot hill on the north end of Lapac Island clears this reef.

At 1 mile south of Bolipongpong the depth is 9 and 10 fathoms, and anchorage may be had in the bight on that side of the island east of the little islet, **Gondra**, in 8 fathoms. The town of Caunpan is on the north side of Tapul.

Cabingaan and **Taluc** are two low, flat islands, on the same reef, with a lagoon inside between them. **Paquia Island**, close to the west side of Cabingaan, is also low and has a narrow reef projecting 1¾ miles to the southeast, with 1½ fathoms on the end of the reef and 11 fathoms off it. There are two villages on the islands. Between Tapul, Cabingaan, and Jolo Islands the depth varies in general from 20 to 40 fathoms, with patches of 10 fathoms.

Siasi Island (chart 4544) is about 6½ miles long north and south and 5¾ miles in an east and west direction. **Gorro**, the highest peak on the island, is in latitude 5° 32′ N. and longitude 120° 52′ E. It is situated southward of the center of the island, rises to a height of 1,673 feet, and is surmounted by a remarkable clump of dark trees. Siasi Island is the highest land between Jolo and Tawitawi, except Tapul Island. There are several large villages, built in the usual Moro style, on the reefs that fringe the southwest and east coasts, the inhabitants of which carry on the pearl fishing, the pearl oyster being found in great abundance in this vicinity.

An extensive reef runs off for about 4 miles eastward of Siasi, on the eastern and southern shores of which are numerous low, thickly wooded, and uninhabited islands. **Sibijindacula**, the largest, is very low, the sea in some places washing through it at high water.

Off Basbas Point, the southern point of Siasi, the reef only extends to ¼ mile, and at the distance of ½ mile there is no bottom at 66 fathoms.

Southwest of Siasi the reef extends to about 3 miles and is separated from the reef running south of Lapac Island by a narrow, deep channel which varies in width from 100 to 200 yards and is fit only for small craft.

Tara Island lies on the reef northward of Siasi and is about 1½ miles long in an east and west direction. It is crescent-shaped with the convex side toward Siasi, and the space between the horns is filled with islets and shoals, forming a deep lagoon in the center. It is very low on the west side, but the east end is about 110 feet high.

The channel between Tara and Siasi is about 500 yards wide and 12 fathoms deep, but there are shoals at both ends of it.

Tincalan Islet is situated near the northern edge of the foul ground, between the points of Tara Island. It is a solitary rock, standing 8

feet above high-water mark, and when seen from a distance resembles a canoe under sail.

Shoals.—Northward of Siasi Island, in the fairway of the channel between that island and Bolipongpong, three shoals have been found, viz:

Sungu Shoal, about 1 mile in extent east and west and ¼ mile from north to south, with a least depth of 2½ fathoms, coral and sand bottom, and from 16 to 20 fathoms northward of it. From the western 2½-fathom patch the small islet north of Tara Island bears 98° (96° mag.) and the north point of Siasi 129° (127° mag.).

Langon Shoal.—About 1 mile westward of Sungu Shoal is the eastern extremity of Langon Shoal, with a depth of 8 fathoms. Thence the shoal takes a west-northwest direction for 1¼ miles, with a breadth of ½ mile, having depths of 4¾ to 7½ fathoms. From the shoalest part, 4¾ fathoms near its western extremity, the northeast point of Lapac Island bears 161° (159° mag.), and Sirun Island 241° (239° mag.) distant 4 miles.

Unnamed shoal.—At 2 miles 55° (53° mag.) of Sirun Island there is a shoal about ½ mile in extent, covered by a least depth of 6 fathoms.

Kadyajan Shoal, lying 2½ miles eastward of the north point of Siasi and 2 miles north of Laminusa, extends about 2 miles in a northwest and southeast direction and is covered by from 13 to 30 feet of water.

Between this shoal and Laminusa there is a channel ½ mile wide, with a depth of 6 to 12 fathoms. During the northeast monsoon heavy tide rips are seen near this bank. Between Kadyajan and Siasi there are several small shoals, and a reef named Bambagan, which partly bares, is situated ½ mile from the shore.

Between Kadyajan and Bambagan is the northern channel to Laminusa, with a depth of 6 to 11 fathoms, sand bottom. Inshore of Bambagan Reef there is a good anchorage in from 4 to 5 fathoms.

Laminusa Island, which lies ⅝ mile northeastward of the east point of Siasi Island, is low and covered with mangroves; on the northwestern part there is a village and coconut plantation. Eastward of the island a reef bares out to ¼ mile, and from there the water deepens gradually eastward for 1¾ miles to the edge of the bank, which has 10 fathoms. At ¼ mile beyond the 10-fathom curve there is no bottom with 60 fathoms.

The channel which separates Laminusa from Siasi is divided into two passages by **Guiun Reef**, composed of sand and coral, which bares at low water and can at all times be distinctly seen. The passage between the reef and Laminusa is clear but narrow, and winds more than that westward of the reef, which is perfectly clear.

Laminusa Anchorage, between Laminusa Island and the reefs adjacent to the east point of Siasi, is of good width, well sheltered, with good holding ground. The reef uncovers in part at low water. It is steep-to, but can not be easily distinguished and must be approached with caution.

Tidal currents.—The tidal stream is very strong at springs; the flood sets from east to west and then north through the channel, the ebb from north to south and then east. Springs rise 6 feet.

Directions for entering Laminusa Anchorage.—Vessels entering Laminusa Anchorage should pass ½ mile eastward of Tara

Island; then a course 152° (150° mag.) will lead in 4 to 11 fathoms until westward of the head of the reef north of Laminusa. A course should then be steered for Punungan Islet in line with the eastern point of Siasi, which will clear the reefs off Laminusa. **Punungan** can easily be recognized, being a truncated cone 289 feet high.

The channel between Laminusa and the Siasi Reef should be used only in fair weather and with a favorable light for seeing the edges of the reef. It is not recommended for large vessels.

To enter the inlet leading toward Punungan it would be well first to mark the channel and to keep on the Siasi side, as the reefs on that side show lumps of coral and have more water near the edge.

Tolen Point, on the northwest coast of Siasi and 2 miles north of the town, is low and wooded. From it and from Busbus Point, farther to the south, a coral reef which uncovers at low water extends westward ¼ mile. Northward and westward of this reef, at 400 yards from it, are two detached coral patches covered by 13 feet of water, and beyond them a shoal of 4¾ fathoms extends to ½ mile west of Tolen Point. An isolated shoal, 4¼ fathoms, ¼ mile in extent, lies 1,200 yards northwesterly from Tolen Point. Within the channel two shoals of 4¾ fathoms lie off the Siasi shore, about midway between Tolen Point and Siasi town. The northernmost shoal extends halfway across the channel. A small patch of 4¾ fathoms lies 700 yards north of Siasi fort and 400 yards from shore.

Siasi.—The town of Siasi is situated on the west side of the island facing the channel between Siasi and Lapac. It is of very little commercial importance. There is a military post there at the present time and it is connected with Jolo by cable. A small red light, visible about 2 miles, is shown at an elevation of about 20 feet, from a framework near the end of the pier. From the north entrance it should be seen bearing between 169° (167° mag.) and 197° (195° mag).

Currents.—November 1 to 4, 1901, when the southwest monsoon was weak and with no unusual local winds, the tidal current ran strong through the strait from south to north during the ebb tide. The current during the flood tide was weak, setting from north to south. The directions of the currents are reported as being changed by heavy winds.

Anchorage.—Vessels anchor in mid-channel, abreast of the town. The depth of water here is greater than shown, the 62-foot hole covering nearly the whole channel abreast of the wharf.

Directions.—No particular directions are necessary for entering Siasi; Gorro Peak, on a 135° (133° mag.) bearing, clears the banks to the northward. After passing Tolen Point, on the eastern side of the entrance, from which foul ground extends ⅜ mile, a mid-channel course should be held.

The southern entrance is very narrow and fit only for vessels of light draft; the bottom is foul and the tidal currents strong. It should not be attempted without a pilot.

Lapac Island, situated westward of Siasi, is about 5 miles long in a northeast and southwest direction and 3 miles wide; unlike Siasi, it has two conspicuous peaks with a great dip between them, so that at a distance on a southeast bearing it looks like two islands. A reef runs 3½ miles to the southward and eastward of this island

and nearly joins the reef running to the southward and westward of Siasi. About ⅓ mile from the southwest point of this island there is a dangerous point of rocks.

Alican Point, the northeastern point of Lapac, forms the western entrance point to Siasi Channel. A shoal of 3¼ to 4¾ fathoms extends about 600 yards 0° (358° mag.) to 340° (338° mag.) from this point, and another of 3¾ fathoms 400 yards eastward. South of Alican Point the Lapac shore is clean as far as a conspicuous beach opposite the town of Siasi.

Luangat Point, the northernmost point of Lapac, situated 1 mile 294° (292° mag.) from Alican Point, is of rock and clean, and may easily be recognized by a small hill inland close to it.

Busluc Point, about ½ mile 261° (259° mag.) of Luangat Point, is easily distinguished from it by being formed of huge rocks, and also by its being quite separated from the mountain.

Pandami Island lies close to the northwest side of Lapac, with which the northern end is connected by a shoal having a least depth of 10 feet over it.

ANCHORAGE.—There is good anchorage in from 7 to 12 fathoms, sand and coral bottom, southward and westward of Pandami Island, and immediately off the village of Pandami.

Sirun Island is a small island situated about 2½ miles northwesterly from Lapac. It is about ¼ mile long, 157 feet high, covered with trees and steep-to, with a clear channel between it and Lapac.

Manubul Island is situated on the south part of Lapac Reef and has a large fishing village on the northeastern side.

Tapaan Island is a low island southwest of Lapac. It is of semicircular form with its concave side to the westward and very narrow in the middle, being in some places only 100 yards across. It stands on a coral reef that is bare at low water, with a small sand cay on the north and an extensive one on the south side, curved toward the coast of Lapac. The channel between Lapac and Tapaan is about 1½ miles wide, and when entering from the south, Sirun, just open of Lapac, clears the reef off the southeast point of Tapaan. Steering northward with this mark on until the southeast point of Lapac bears 70° (68° mag.) a course 306° (304° mag.) leads through the channel northward of Tapaan.

Tapaan Passage, which is formed by Tapaan and Lapac eastward and Bubuan and Maniacolat Island westward, is about 6 miles wide at the narrowest part, which is between **Maglumba**, a small island 121 feet high, off Maniacolat, and the northwest side of Tapaan. This passage is clear for a steamer and would be convenient for a sailing vessel, as the tides make fairly through it, and in calms or light winds a vessel could always anchor to await the change of tide.

Crest of Wave Shoal is in the fairway of the Tapaan Passage, and the shoalest part of 4½ fathoms lies about 52° (50° mag.) 4¾ miles from the little conical island of **Parangaan**, 88 feet high, on the southwest side of the passage. It is composed of sand and coral and the bottom is rather uneven, the 10-fathom limit extending 1¾ miles in a north and south and more than 1 mile in an east and west direction. As a rule, it is easily discerned by the tide rippling around the edge of the shoal water; the discoloration of the sea is also very marked.

Tapaan Shoal is a small shoal of coral and sand nearly midway between Tapaan and Bubuan Islands. It is a little more than 1 mile in extent north and south and 4/5 mile wide northward, terminating in a narrow point southward. The least water shown on the chart is 4¾ fathoms.

TAWITAWI GROUP.

Tawitawi Group, the western group of the Sulu Archipelago, extends about 65 miles in an east-northeast and west-southwest direction and includes all the islands and reefs between the Tapaan and Sibutu Passages.

Parangaan Islet, the most northeasterly point of the group, is a small conical islet clothed with light grass and is 88 feet high. About 700 yards westward of this islet there is a small flat-topped islet, 14 feet high, with a narrow 7-fathom channel between the dry reef running eastward from it and Parangaan.

Maniacolat and **Parangaan** are connected by a bank with soundings from 7 to 10 fathoms. Maniacolat is thickly wooded, 1½ miles long north and south and ¾ mile wide. The peak, 771 feet high, shows from nearly every direction as a perfect cone.

Babuan Islet, about 59 feet high and wooded, lies nearly 800 yards west of the southwest extremity of Maniacolat, with a channel between.

Maglumba Islet, about 300 yards long and 121 feet high, lies about 1 mile 81° (79° mag.) from the north point of Maniacolat. There is a deep channel westward of this islet.

Bubuan Island is about 2½ miles long northwest and southeast and 2 miles wide, with a shallow channel, ½ mile wide, between it and Maniacolat. Bubuan is covered with trees, and from the highest peak (457 feet) a chain of hills extends eastward, terminating at the north point.

On the west side of Bubuan there is a shallow lagoon with the bar nearly bare at low water, in which the pearl-fishing boats seek protection from stress of weather.

Mid-Channel Bank.—The chart shows a shoal northwest of Maniacolat, extending 7 miles in a northwesterly and southeasterly direction, covered by 4 to 9 fathoms, with rocks awash about the middle, and two patches of 1¾ fathoms on the British chart but marked as shoals that bare on the Spanish chart.

A dangerous rock, awash at spring tides and in smooth water hardly discernible until close-to, lies on the bank about 2½ miles 238° (236° mag.) from Parangaan.

Cacataan Island, though low and flat, is covered with trees the tops of which are 105 feet above the sea. It is about 1 mile long northwest and southeast, with a reef that bares 600 yards from its northwestern extremity.

Sigboye Island, one of the highest islands of this group, is thickly wooded to the summit, 777 feet above sea level. It lies 216° (214° mag.), 6 miles from Cacataan. It is steep-to on the north side, but a rock with 2½ fathoms lies 650 yards southward of the island.

Tambagaan Island, the northeast point of which lies 249° (247° mag.), 1½ miles from the west point of Sigboye, is about 3 miles long east and west and 1½ miles broad, with a conical green peak 724 feet high on its eastern part.

Off the south point of this island there are two rocks or islets. The rock nearer the island, 24 feet high, is surrounded by reefs. From the other rock, 8 feet high, the west side of Tambagaan bears 328° (326° mag.), and the larger rock 62° (60° mag.). There is a deep channel with strong overfalls between Sigboye and Tambagaan. Good anchorage may be had southward of Tambagaan.

Simaluc and **Kuad Basang Islands.**—The east point of Simaluc, which is the eastern and larger of these two islands, lies 5 miles northwestward of Tambagaan Island. These islands are similar in shape, being of horseshoe form with concave sides eastward. The indentation of Simaluc is nearly filled with numerous small islets.

Both are surrounded by a fringing reef, and between the two there is a shallow coral patch, ¾ mile long north and south, on which the sea breaks heavily during the northeast monsoon. There is anchorage both east and west of this patch, but it is not recommended, as the anchorage southward of Tambagaan, only 6 miles distant, is preferred. The islands are wooded, similar in appearance, and the tops of the trees are 127 feet above the sea. There are no houses on either island, but the natives visit them in great numbers, the fishing ground inside of the reef being good. It is said that the natives take to the woods on the approach of a boat or steamer and that it is difficult to hold communication with or obtain information from them.

Magpeos Island is a small island situated about 5 miles southward of the west end of Bubuan Island. It is almost a perfect cone, rising to a height of 417 feet. There is a reef with a rock awash at the end of it, extending a little over 600 yards in an east-northeast direction.

Tagao Island, somewhat larger than Magpeos, from which it bears about south by west, distant 1⅓ miles, has four small peaks, the highest of which, on the northwest extremity of the islands, is 270 feet above the sea. It is hilly on the west, but flat on the east side, the whole covered with trees. There is a deep channel between this island and Magpeos. A rock has been found with 1¾ fathoms on it, ⅓ mile southeast of Tagao Island, and this island should be given a berth of 1 mile when passing eastward of it.

Tancolaluan Islet is a small coral islet lying 5 miles westward of Tagao Island. It is covered with trees and about 170 feet high. There is a small rock that seldom covers and on which the sea breaks heavily with strong northeasterly winds lying about 400 yards westward of Tancolaluan.

Pandanan Islet, lying west by north, 3⅓ miles from Tancolaluan, is a small coral tree-covered islet, 88 feet high.

Kinapusan Islands, lying about 10 miles southward of Bubuan Island, consist of the three low, densely wooded coral islands **Tabawan, Bintoulan,** and **Kinapusan.** Tabawan has several small islands and islets on a large reef extending nearly 2 miles southward and is separated from Bintoulan and Kinapusan, which latter islands lie on the same reef, by a 4-fathom channel. There is also a clear channel between Tabawan and Loran, which lies westward of it.

The reef off Kinapusan, the eastern island, extends 1⅓ miles eastward from that island, and near the outer edge there is a sand cay that bares 3 feet at low water.

As the reefs southward of these islands are steep-to and the lead consequently gives no warning, care should be taken when navigating

in this vicinity. The tidal currents here also have considerable velocity.

Two miles south of the western islet of Tabawan, on the corner of the reef, there is a patch or rock that seldom covers except at very high tides.

ANCHORAGE.—The best anchorage is with the west extremity of the village of Tahingtahing, on the north side of Tabawan, about 160° (158° mag.), ¾ mile from shore.

The tides here are regular and not very strong.

SUPPLIES.—The island of Tabawan is thickly populated, but Bintoulan and Kinapusan are only resorted to for fishing, this being the chief occupation of the natives, upon which they depend principally for the means of subsistence. Numerous boats also leave Tabawan in the season for the pearl oyster banks. No provisions are to be obtained here except fish and coconuts in small quantities.

Loran Island.—The northwest point of this island is 210° (208° mag.), distant 6½ miles from the south point of Tagao. It is 1⅓ miles long northwest and southeast, about 600 yards wide, and elevated on the northwest side 157 feet above the sea. It is connected by a coral reef with the little islet **Manote** to the southward.

The northern point of Loran is steep-to. A fringe of coral surrounds the remaining shores at a distance of from 200 yards on the northeast to 1,200 yards on the southwest. On this reef, southward, are several small islets. Loran is inhabited and partly cleared and cultivated, as also is South Ubian Island, southward.

South Ubian Island, about ¾ miles southwest from Loran Island, is triangular in shape with the apex to the northwest. It is the best cultivated and most thickly populated island in this vicinity. The principal houses are built on the northeast and southwest sides. The island is surrounded by a coral reef extending from it to a distance of ¾ mile on the east side, having several small islets upon it, the highest of which is only 8 feet above low water. There is no passage, except for boats or small vessels, between South Ubian and Loran Islands.

Tabuan Islands, about 2 miles southward and westward of South Ubian Island, consist of a number of rocks and islets, the largest of which, **Tabuan,** is inhabited. The group lies on the eastern edge of a large coral reef called **Bucutcut,** which stretches northwestward for 5 miles from Tabuan Islet, with the Lijatlijat Rocks on the northwestern extremity, and 1 mile southward, with numerous sand cays upon it. In the center there is a cluster of rocks 15 feet high. The northeast edge of the bank is marked by the Celandat Islets. The chart shows a 1-fathom patch about 1 mile from the southwestern edge of the bank, with Tabuan Islet bearing 83° (81° mag.), distant 2½ miles.

Pasegan Samal is a low coral island 5 miles west-northwest of South Ubian, covered with trees the tops of which are 88 feet above the sea. It is fringed with a reef northward and eastward to a distance of 800 yards from shore, with soundings of 2¾ to 6½ fathoms at the edge. About 1,200 yards northwest of the island there is a narrow shoal nearly 1 mile in length covered by 2½ to 5 fathoms, with 5½ to 8 fathoms at its edge.

Pasegan Guimba, situated 1½ miles westward of Pasegan Samal, is very similar to it. Northwest, east, and southeast of this island are

several banks separated by narrow channels. Those to the southeast almost join the Lijatlijat Rocks on the northwest edge of the Bucutcut Bank.

ANCHORAGES.—There is a fair anchorage off the north end of the channel, between Loran and South Ubian Islands, in from 7 to 12 fathoms, sand bottom, and on the bank east of Pandanan Island, in from 8 to 10 fathoms, sand bottom. Anchorage may also be had east of Cacataan in 10 fathoms, sand bottom, and on the mid-channel bank between Cacataan and Bubuan Islands, both to the southwest and north of the rocks awash; at the former anchorage in 7 and at the latter in 8 fathoms, bottom sand and shells.

TIDAL CURRENTS.—Between Sulade and Cacataan Islands the flood tide runs to the northwest and the ebb to the northeast, not with much force in the open channel but very strong around the islands.

In the channels on either side of the mid-channel bank the flood tide runs nearly north and the ebb about south with a velocity of from 1 to 3 knots.

Off Pandanan the tides run about north-northwest and south-southeast and at the anchorage north of South Ubian Island the flood tide runs northwest and the ebb tide southeast with a velocity from 1 to 3 knots.

It is high water, full, and change at 6^h 15^m and springs rise 5 feet.

South of South Ubian and between that island and the Tabuan Islands the tide runs fully 4 knots at springs around the edges of the reefs, where its greatest strength is felt.

SUPPLIES.—At present there are no supplies to be obtained from any of the islands of the Tawitawi Group. Vessels navigating these waters are advised to be very cautious as the natives are very treacherous and not to be depended on.

Tawitawi Island, the principal one of the group, is 29 miles long and 13 miles greatest width. A range of mountain traverses its entire length. To the northeast **Mount Bujimba** rises to a height of 791 feet. **Mount Butua,** overlooking Port Dos Amigos, is 1,078 feet; in the center is **Mount Dromedario,** which culminates in four peaks, the highest of which is 1,754 feet; and **Thumb Hill,** which rises near the western end of the island to a square-topped hill, 725 feet in height. The appearance of the island is very varied and presents a number of wooded tracts separated by spaces of bright green.

Islands off the east coast of Tawitawi.—Basbas Island, situated off the northeast point of Tawitawi, from which it is separated by a channel nearly ½ mile wide, is low and covered with mangroves. There is a hill in the middle of the western side 256 feet high. The island is clean and steep-to, except to the northeast, where there are three rocks 800 yards offshore, while off the south point two rocks are near the end of the bank, which extends more than 1 mile southeastward with several heads above water.

Pajumajan Island lies 1 mile eastward of Basbas and has on its northwest extremity a hill 112 feet high. It is surrounded by a narrow bank of sand with a rock on a small shoal and two great rocks, named Pamacalan and Pamagbaran, situated, respectively, 400 and 800 yards from the south coast. There are several rocks in the channel between Pajumajan and Basbas.

Basbas Channel, between Basbas Island eastward and Tawitawi and Tabulunga westward, is 2½ miles long and 800 yards wide. The

northern part is direct and safe, with 11 to 4¾ fathoms' depth, but the southern part is narrowed by shoals, patches of ½ to 1 fathom in the fairway being shown on the chart. In the northern part of the channel there is sheltered anchorage with good holding ground for vessels of all sizes; there are no dangers in it and the sides are steep, but the entrance points are surrounded by sand shoals which extend 300 yard out.

DIRECTIONS.—Bring the highest part of Basbas Island to bear 137° (135° mag.) and steer for it; when fairly in the entrance keep in mid-channel and anchor when the highest part of Basbas bears 47° (45° mag.) in 5 fathoms, sandy bottom. It is not advisable to go farther in as the bottom is foul above this position.

Tabulunga is separated from Tawitawi by a narrow and presumably impracticable channel. There are 2 and 3 fathoms close inshore on its eastern side. This coast and the banks which extend southeast from Basbas Island toward Daluman Island form the continuation of the Basbas Channel, which is narrowed here by an islet and a steep bank, covered by ½ fathom of water, with a rock on its northern end.

Daluman Island, lying 1½ miles southeasterly from Basbas, has a small shoal on the northwest side and another on its south point. A rock, awash at low water, lies north of Daluman, about midway between it and Pajumajan, and a similar rock lies about 400 yards from the northeast coast.

Tancan Islet, lying 600 yards southeasterly from Daluman, is round, 600 yards in diameter, and surrounded by depths of 5 to 7 fathoms. In the middle of the channel, which separates it from Daluman, there are 2¾ fathoms, and near Tancan 6 fathoms.

Tonkian Islets are two small islets, clean and steep-to, lying ¾ mile south of Daluman. In the middle of the channel between them and Daluman there are 7 fathoms.

Tubutubu Island lies westward of Tonkian Islets, from which it is separated by a passage 400 yards wide and 2 to 5 fathoms deep.

Baturrapa Islet lies 1¼ miles southeasterly from Tancan and is clean and steep-to. There are 6 fathoms in the channel between it and Tancan.

Dangers.—At 1,400 yards 192° (190° mag.) from the eastern extremity of Baturrapa there is a rock that uncovers, surrounded by 5 fathoms, and at 1,800 yards 171° (169° mag.) there is another rock covered by ½ fathom. A patch of ½ fathom lies 600 yards northeasterly from the east point of Baturrapa and another of ½ fathom lies 1¼ miles east of the same point.

Tandubato Island, separated from the east end of Tawitawi by an almost impracticable channel named **Gallo Malo**, is nearly round and about 5 miles in diameter. A peak rises to a height of 528 feet from a chain of hills on the northeast coast. The highest part of the island is a peak in the southeast part, which attains an elevation of 633 feet. The shores of the island are skirted by a labyrinth of reefs and islets. **Timbaunan** is a small islet off the north coast. **Taruc** is a low island about 1½ miles in extent, almost joined to Tandubato. It is surrounded by shoals and islets, and the space northward and westward between it and the Tonkian Islands is filled with unnamed islets, surrounded by very little water. The

islets and shoals surrounding Taruc on the eastern and southern sides form the western side of the Nochebuena Channel. One of the islets on the northeast side, **Nahuan**, 282 feet high, is a mark for the Nochebuena Channel. A shoal, covered by a least depth of ½ fathom, extends northeast parallel to and about ⅔ mile distant from the west coast of Calupag Island.

Calupag and **Tigungun Islands** form the eastern side of the Nochebuena Channel and the western side of Calaitan Channel. Together they are 5 miles long. They are divided by a narrow channel. There are several hills, the highest of which is 591 feet above the sea. Northward Calupag is clean, with deep water near it, but the southern part of Tigungun is surrounded by reefs and islets, near which the depth is 2½ to 5½ fathoms.

Calaitan Islets lie on an extensive reef between the southeast coast of Tigungun Island and the Bucutcut Bank.

Little Calupag Island lies ½ mile northeast of Calupag Island. It has on its northwest and southeast extremities two conical peaks, 371 and 354 feet high. When seen from Pasegan and South Ubian Islands it appears united to Tawitawi. The island is clean and steep-to.

At ¾ mile northeast of its northeast point there is a patch covered by 2¾ fathoms.

Bakeke Islet, about 40 feet high, lies about 700 yards from the northwest point of Little Calupag.

Charuc Islet is a little clean islet. It lies in the passages between the Calupag Islands, which is ½ mile wide, and divides it into two deep channels.

Channels east of Tawitawi.—There are four channels between the islands and reefs that lie east of Tawitawi and west of Bucutcut Reef. Of the four, two only are navigable by vessels of any draft, these two being **Nochebuena**, or **Tambiluanga**, and **Cambacamba**, or **Lijatlijat**. The other two are foul and of little depth.

Cambacamba Channel, between Bucutcut Reef to the east and the reefs of Calaitan to the west, is 2 miles long north and south and ⅓ mile wide in the narrowest part, with a depth of 9 fathoms. To enter it from northward a vessel should pass between Calupag and Pasegan Guimba or between the two Pasegans. This channel is considered preferable to that of Ubian for vessels of good draft of water, but should not be attempted at night. The currents in it are very strong.

Calaitan Channel, between the edge of the Calaitan Islands Reef and the southeast coast of Tigungun Island, is only practicable for handy vessels of less than 6 feet draft. The north entrance is divided into two arms by Batan Bank. The southern end joins the Cambacamba Channel by the Sipungut Channel, which runs east and west and is practicable for small craft. The little channel north of Tandubas is impracticable.

Nochebuena Channel, between Calupag and Tigungun Islands and Tandubato Island, allows a passage to the south of Tawitawi without leaving the archipelago, and without exposure to the sea of the open waters, which is sometimes very heavy during the southwest monsoon. It is practicable for vessels of 19 feet draft and there is anchorage anywhere in it. It is 6 miles long and 700 yards wide in the narrowest part.

DIRECTIONS FOR NOCHEBUENA CHANNEL.—Coming from the north, when westward of and near to Little Calupag, a vessel should steer 224° (222° mag.) for a hill 282 feet high on the southeast part of Nahuan Islet and continue that course until a hill 591 feet high on the eastern part of Calupag bears 140° (138° mag.), in line with a smaller one 476 feet high near the beach. She should then steer 203° (201° mag.) and pass in mid-channel between a narrow bank westward, covered by 13 feet on the northern end and 3 feet on the southern end, and a rocky shoal covered by 10 feet, eastward, until abreast of the little verdure-clad islets, Tampatampa and Gandol, which must be passed close-to. She should then steer 224° (222° mag.) for a hill 633 feet high on the southeast coast of Tandubato Island and continue this course in mid-channel to between Sinagbuan Islet westward and Sibaloc eastward, and when the southern end of Sibaloc is abeam the course should be altered southward to pass 200 yards eastward of a remarkable and clean rock (designated A) east of Tambiluanga Island and close to it; thence a 173° (171° mag.) course should be steered to pass midway between the Ambilon and Casapaan Shoals in 5½ to 6½ fathoms, with some patches of 4½ fathoms, which can be avoided by borrowing somewhat eastward, where the depth is greater; then the passage is to the west, between the islets Plus and Ultra into the great bay south of Tawitawi. The channel between the islands is narrow and the least depth 4 fathoms. Another passage practicable for small vessels is north of Plus and Pintada Islets, which lie on the same bank.

CAUTION.—It is not prudent to pass Plus and Ultra Islets with the sun low and in the face. At other times the banks can be distinctly seen and no mistake can be made with the chart under the eyes.

WATER.—On the southeast part of Tambiluanga Island there are three wells of good water, but the supply is not great.

Gallo Malo Channel, between Tandubato and the east coast of Tawitawi, can be navigated by small craft. The sides of the channel are high and covered with lofty trees. Many inlets open into it, and it is supposed that there is in the locality an important town named Mapait by the natives.

Islands south of Tawitawi.—Tandubas, Secubun, and Latuan Islands are low. They are inhabited and cultivated in the interior, with wooded coasts. They lie so close together that they generally appear as one island. The outer edge of the reef on which they are situated is very distinct and steep, there being no bottom with 114 fathoms at 200 yards distance from it. The passage between Tandubas to the northeast and Secubun is only fit for native craft. The channel between Secubun and Latuan, called Paragua Channel, can be used by vessels of any size. It is narrow, tortuous, and deep. The edges of the reef can always be seen from aloft.

Mantabuan and **Banaran** are two flat islands united by a reef on which there is an islet, **Sasa**. Mantabuan is inhabited but Banaran is not. The channel between Mantabuan and Latuan has a least depth of 5 fathoms. The edges of the Mantabuan reef can be clearly seen, and it is very steep, but the western end of the Latuan reef projects farther and is not so clear. In order to enter this channel from the south a vessel should be placed with the north point of Mantabuan bearing 288° (286° mag.) and the south point 241° (239° mag.). From this position a course should be steered 308° (306° mag.), on

which bearing a small sand bank named Circe Bank, that generally uncovers, may be seen.

The channel west of Banaran is wide and has 6½ fathoms of water in the middle. It can be navigated by keeping in the middle between the edges of the reefs.

Basibuli Reef, with **Basibuli Islets** in the center, some smaller islets to the southwest, and **Panampanang Islet** on the northeast end, uncovers at low water. The reef is of sand and coral, steep-to, and may be passed close-to. The channel westward of the reef is clear and deep.

Bilatan Island and **Bilocbiloc Bank.**—Bilatan is an island about 3½ miles long, on the eastern side of the Bilocbiloc Bank, that runs south from the highest part of Tawitawi Island. There appear to be some large villages in the interior of this island, and, judging from the number of boats passing between it and Tawitawi and the islands to the southwest, there is considerable traffic carried on between them.

From the southwest end of Bilatan the coral reef runs southwestward for about 6 miles. It is from 1½ to 2½ miles wide and upon the reef is a chain of small islets running to the southwest, known as the **Tijitiji Islets**, the largest of which, **Tumbucan**, has a large tree in the center.

Tijitiji Bank is a bank about 2½ miles in extent, lying westward of the southwest end of Bilocbiloc Bank, from which it is separated by **Balseyro Channel**, having a depth of 5 fathoms. This channel is shown on the Spanish charts and described in the Derrotero, but on the British survey the reef appears continuous. There is a sand cay on the northern edge of Tijitiji Bank and also one on the western part.

Balambing Channel separates Bilocbiloc Bank from the coast of Tawitawi. The northwest extremity of the reef is not easily distinguished; vessels using the channel should therefore keep on the coast side. On the northwest part of the reef, about 1 mile south of the town of Balambing, are two flat-topped rocks standing 12 feet above the water, named **Dulangdulang**, from which the reef bares as far eastward as can be seen, dotted here and there with little black bowlders. From the Dulangdulang Rocks the reef runs southward for about 5 miles and then trends southwestward toward Simonor Island.

Laa Island, of coral formation and covered with trees, the highest being 116 feet above the sea, lies about 1½ miles from the northwest edge of Tijitiji Bank.

Sanguisiapo is a low coral islet with a few straggling bushes on it, standing on a coral reef that runs in a west-northwest and opposite direction, about 1¾ miles long. This reef is steep to the east-southeast, but from its west-northwest extremity a shallow bank of sand and coral runs out, the 5-fathom limit of which is 1½ miles west-northwest of the western end. There is also a patch of rocks and a rock awash about 327° (325° mag.), distant 1 mile from the highest bush on the island.

Danger.—Between Laa Island and Sanguisiapo is a dangerous coral reef about ¼ mile in extent, and northwestward of this is a 2¼-fathom shoal.

Simonor and **Manucmanca** are the two largest off-lying islands southward of Tawitawi. Simonor has a fringe reef of coral, around it which is steep-to, and there is no anchorage around the coast. There is a shallow lagoon in the middle of this island, in which the native craft take refuge on the approach of danger.

Manucmanca has a fringe reef nearly all around it and is also steep-to. There is a deep channel between these islands, as well as between Simonor and the islets and reefs north and east of it. There are several large towns on Simonor, and both it and Manucmanca are well populated.

DIRECTIONS.—If bound to Balambing from southward and eastward the north sandy point of Manucmanca should be steered for until the west end of Laa Island comes in line with a remarkable cliffy hill on Tawitawi, called Thumb Hill, bearing 358° (356° mag.), which leads nearly in mid-channel between Simonor and Tijitiji Bank. When near Laa Island the vessel may be hauled to the northeast, passing it at about 400 yards distance.

Bongao Island, the most western of the Tawitawi Group, is about 2¾ miles long by 1⅓ broad. **Mount Vigia**, the highest peak, is 1,138 feet above the sea, but other peaks attain nearly the same altitude. All the peaks are cliffy northward and present a curious appearance on some views from that direction, the summit of the island having apparently been broken up by volcanic agency. With the exception of the cliffs before mentioned, the whole island is heavily wooded, the jungle being impenetrable for more than a few yards, and it is uninhabited except by a few refugee slaves from Tawitawi.

Sangasanga Island is about 6 miles long in a northeast and southwest direction and 3½ miles across at the widest part. It lies immediately northward of Bongao, between it and Tawitawi Island, and separated from the former by a narrow passage for boats of very light draft. It is reported that there is not less than 2 fathoms in this passage.

Unlike Bongao, this island is not high, has no conspicuous hill on it, and is covered with trees. There are a few small patches of cultivation on the southeast side, near Pandan Bay, but there are none in any other part of the island.

Papahag Island lies south of Sangasanga and east of Bongao and divides the entrance into Port Bongao into two narrow channels, each having a navigable width of about 150 yards and a depth of 3¾ to 8 fathoms. The southwest side of the island is well planted with coconut trees, but it does not appear to be thickly inhabited. About 800 yards west of Matos Point, the south point of the island, there is a coral patch of 3 fathoms, and foul ground extends ½ mile eastward of the same point.

Port Bongao (chart 4514) is formed by the islands Bongao, Sangasanga, and Papahag and would be a fine harbor were it not for the numerous reefs, which contract the anchorage space to a basin about 600 yards in diameter, having a depth of about 6 fathoms in the center. There is at present a constabulary post on the west side of a rocky point making out from the northeast point of Bongao Island, from the end of which a reef, partly bare at low water, extends out into the channel. At the extremity of the reef there is a beacon composed of three piles with slats attached. There is a wharf imme-

diately inside of the point that is said to have 10 feet of water at low water at the end. Bongao is of little commercial importance and few vessels are seen there except an occasional Government steamer. Vessels bound in here generally use the southern channel, pass the beacon close-to, and round it sharply if bound to the wharf. The space between the end of the wharf and the reef in the middle of the port is only about 150 yards wide. No water or stores of any kind are obtainable. Vessels bound into Port Bongao by the southern entrance should keep Thumb Hill open of the east end of Papahag Island to clear the shoals extending from Martinez Point, and when the middle of the channel between Bongao and Papahag Islands bears 322° (320° mag.) it may be steered for.

TIDES AND CURRENTS.—At Bongao it is high water, full and change, at $6^h\ 40^m$; springs rise 6 feet. The flood stream sets northwest and the ebb southeast at the rate of 2 to 4 knots an hour, but it takes many directions around the reefs. Southward of Bongao, and between Simonor and Sanguisiapo, it runs like a race with whirls and heavy overfalls, even in a calm.

Chongos Bay.—On the south side of Sangasanga there is a snug anchorage, well sheltered from all winds, with good holding ground, taking care if going close in to avoid the rock awash and the 6-foot coral patch in the middle of the entrance. The best anchorage is, however, outside the bay, in 12 fathoms, muddy bottom, with the south point of Sangasanga 250° (248° mag.) and the east tangent of Papahag 155° (153° mag.). Vessels bound into this anchorage or into Port Bongao by the northern channel should not bring Thumb Hill to bear eastward of 39° (37° mag.) until Matos Point bears 272° (270° mag.) to clear the reef extending southeastward of Papahag Island.

SUPPLIES.—There are no supplies to be obtained, the few people there being in a state of semistarvation, their existence almost depending on the few fish they catch.

Tangao is a small islet, covered with trees, about 1¾ miles 81° (79° mag.) from Papahag Island and has a reef running 100 yards southward of it, the extremity of which bares at half ebb. There is a clear passage on either side of this islet when bound to Pandan. A rocky point on the southern shore of Tawitawi Island, off which a reef extends for 400 yards, lies 1¾ miles eastward of Tangao, while a reef that bares about 2 feet lies ¾ mile eastward of the rocky point; from this to Lubucan there are no outlying dangers.

Lubucan Island, nearly 6 miles eastward of Tangao, is moderately high. There is no passage between this island and Tawitawi, the two being connected by a reef bare at low water. Between this and Balambing Point there is an extensive bight, with Samanput Island, 276 feet high, in the middle, westward of which there is anchorage in 9 fathoms, muddy bottom.

Balambing, a town on the south coast of Tawitawi, was destroyed by a Spanish squadron in 1871, since when, on the smoke of a steamer being seen, the inhabitants take to their boats with all of their goods and chattels and seek refuge in some of the well-sheltered islets that abound to the northeastward and where boats would find difficulty in following them.

They are pirates when opportunity offers, taking and enslaving the crews of any trading paraos that may happen to be weaker than them-

selves. This was the great boat-building establishment for nearly the whole of Tawitawi, but since the destruction of the town they have removed about 2 miles northeastward.

ANCHORAGE.—There is good anchorage anywhere along the south coast from Bongao to Balambing, in about 13 fathoms, sand and coral, muddy bottom being sometimes obtained west and southwest of Lubucan Island, where the holding ground is good. There is also good anchorage on the Sanguisiapo Bank in from 6 to 10 fathoms, sand bottom, but there is none south of a line drawn between the north end of Simonor and the sand cay on the north end of Tijitiji Bank.

Tawitawi Bay.—The interior of this great bay, lying south of Tawitawi Island, is filled by banks and shoals with navigable channels between them too numerous and intricate to describe. By piloting from the masthead and with the aid of the chart the navigation is easy, but the sun should be at a good altitude and behind the pilot. It is also essential that the vessel be handy, as many of the turns in the channels are very sharp.

Lupa Island, eastward of Balambing, is separated from Tawitawi by an impracticable channel.

Buan Island is in the great bay north of Balambing and near the coast of Tawitawi. It is 396 feet high, well cultivated, and has good water. There is a remarkable tree in the center of the island. Large vessels can anchor about 2 miles south of Buan in 10 fathoms, while vessels of lighter draft can anchor north of it in 4 to 5 fathoms.

Simanale Channel (chart 4514), which separates Sangasanga Island from the west end of Tawitawi, is about 4½ miles long and from ⅛ to 1 mile wide. The navigable channel is narrow and tortuous, and the least depth of water between the southern entrance and Simanale Anchorage is 8 feet.

Simanale Bay is in the northern part of Simanale Channel. **Tusang Bongao Island** shelters and almost conceals the northern entrance to this anchorage, which is ¼ mile in extent and 29 feet deep in the middle. Vessels drawing over 16 feet should moor.

WINDS.—On the coast of Tawitawi and at the anchorage south of Bongao, during the months of February and March, the winds were from the north-northeast to northeast, with occasional calms, and light airs from the northward. The squalls from the northeast blew very heavily at the anchorage at Bongao. During April and the early part of May it still blew fresh from the northeast, but after the 6th of May calms and light airs were experienced until the end of the month, when it began to blow steadily from east-northeast to southeast, force 1 to 3. These southeast winds prevailed steadily in the Sulu Sea until July.

WEATHER.—Heavy showers were experienced in January and February, with misty weather. March and April being finer, but the weather was still misty. May was almost free from rain, with the exception of an occasional passing shower, the atmosphere being generally clear. In June it was clear between the passing showers, which were, however, very heavy and frequent.

Tataan Islands consist of a chain of nine small islands or coral reefs, extending for nearly 8 miles northeast and southwest, nearly parallel to the north coast of Tawitawi, leaving between it and them

a clear, commodious channel 1 to 2 miles wide, which forms Tataan Pass. The two Simalac Islands are the most easterly of the group. They lie close together, are very narrow, surrounded by a beach broken by mangroves, and are covered with high trees visible 12 miles off. **Cabancauan Island** lies ¾ mile southwest and consists entirely of mangroves on a flooded reef. These three islands rest on a great coral reef which almost bares at low water and which extends ¾ mile northeast of the smaller Simalac. On the northern part of the reef there is a cay of sand and gravel, visible 4 miles off, which serves to indicate the reef. Another shoal on the northwest part is generally covered.

Nusa Lajit and **Nusa Tacbu** are two wooded islands lying ¾ mile west-southwest of Cabancauan. The reef they stand on is separated from those on each side by navigable channels known as the Nusa Tacbu Channel eastward and Basun Channel westward. The reef extends nearly 1 mile northward of the islands and has on its northeast end a sand cay which marks the western edge of the Nusa Tacbu Channel. Southeastward of the islands the reef extends to 400 yards and has off it a chain of coral patches extending 400 yards farther out and from one channel to the other, making the approach dangerous.

Basuns and **Tinagta.**—The Basuns are two wooded islands which lie ½ mile west of the Nusa Islands. Tinagta, which is small and covered by high trees, lies over 1 mile southwest of the Basuns and on the southwest extremity of the reef on which these three islands stand. The reef, which is of sand and coral with mangrove islets on it, reaches more than ½ mile to the north and northwest and is steep-to. On the northern part there is a cay of broken coral, glistening white and visible more than 4 miles off. This cay marks the western edge of the entrance to the Basun Channel. Southeastward of the Basuns the reefs run out in two points to a distance of ½ mile.

Sipayu, the westernmost of the Tataan chain, lies 2¾ miles southwestward from Tinagta and nearly ½ mile from the coast of Tawitawi, from which it is separated by a clear, deep channel. The island is of clean sand. It stands on the southern edge of a coral reef which extends ½ mile northward and westward and has on its northern part a cay of sand and coral which serves to mark it. The channel between Tinagta and Sipayu is of uneven depth and has in it several shoals with very little water over them; bottom, sand and coral.

Bacun Point, at the eastern entrance of Tataan Channel, is a low, prominent point, covered with tall trees and surrounded by a reef about 100 yards in extent. The little bay of **Moco** lies nearly 2 miles eastward, and midway between it and Bacun Point is a noticeable beach, the rest of the shore consisting of mangroves.

ANCHORAGE.—During strong southwest winds a heavy sea sets up Tataan Pass, and at such times a good anchorage can be found eastward of Bacun Point, about ¼ mile from shore, in 8 fathoms; bottom, sand and shells.

Tataan.—From Bacun Point the coast trends west-southwest for 1½ miles to the next point, including a slight indentation at the mouth of the Bacun River; from this point, which is opposite Cabancauan Island, and is clean and steep-to, the coast trends south-south-

west for about 2 miles toward the head of the bay, having in it two small shoals which uncover at low water, and then west-southwest to the settlement of Tataan. The settlement is on a small hill and consists of a fort and a few houses.

ANCHORAGE.—The best anchorage is in 9 to 11 fathoms, with the mole in line with the fort. Farther westward the depth is 14 fathoms and is a better berth for large vessels. The anchorage is exposed to gales from the northwest and southwest which blow in the months of June and December, when a sea sets in. Vessels can then anchor eastward of Cabancauan Island, where there is shelter from all winds.

TIDES AND CURRENTS.—It is high water, full and change, at Tataan at 7^h 23^m. Springs rise 3½ feet at the equinoxes and 6½ at the solstices. The tidal streams are weak inside the islands.

SUPPLIES.—There are no supplies to be had here except fish and water. An unlimited supply of fresh water may be obtained by vessels carrying at least 300 feet of hose.

From the settlement the coast, which is thickly wooded, continues west-southwest for 3 miles to a bay almost closed by a coral reef. It then continues in a generally westerly direction for 3 miles more—low, wooded, and fringed by a reef which extends out about 200 yards to Bagut Lapit Point, which is fringed by a reef to the distance of 200 yards.

DIRECTIONS.—The northeastern channel, between Bacun Point and the Simalac Islands, is the best. It is 1 mile wide and 12 fathoms deep in the middle, decreasing on either side to 8 fathoms near the coast and near the Simalac Reef. Within, the channel widens to 2 miles and deepens to 17 fathoms. A vessel making for the Tataan Anchorage should bring the fort to bear 185° (183° mag.) and steer for it. This course will pass clear of the two shoals previously mentioned.

Nusa Tacbu Channel, between Cabancauan and Nusa Tacbu, is ¼ mile wide and 4¾ to 7 fathoms deep and runs north and south in a direct line toward Port Tataan. Vessels using this channel should keep a mid-channel course while north of Nusa Tacbu, but after passing that island the reef off Cabancauan, which is steep-to, should be closed in order to avoid the shoals extending southeast of the Nusa Tacbu Reef.

Basun Channel separates the Basun and Nusa reefs. Its northern entrance is marked by the cay of broken coral already described. The southern part of the channel is dangerous on account of two shoals of 6 and 10 feet off the extremity of Nusa Lajit Reef. In taking this channel, therefore, it is better to keep on the western side. With this exception this channel is shown as deep and clear.

Western Channel lies between Sipayu and the coast. In this channel there are two small banks. One, covered by 23 feet of water, lies 200 yards northward of the edge of the shore reef; the other, of 4½ fathoms, lies 400 yards from the coast, in front of the little bay eastward of Bagut Lapit Point. Between these shoals and Sipayu Island there is a clear channel over ¼ mile wide, with depths of from 10 to 16 fathoms. The southern shore of Sipayu is clear. It is best, therefore, to keep on that side of the channel.

Port Dos Amigos (chart 4514) is situated 6 miles eastward of Bacun Point. The entrance between Tocanhi and Lamnuyan Points, both

of which are clean, is nearly ½ mile wide. The port extends southward for ½ mile from Tocanhi Point and then turns northeast for about 1 mile with a width of 300 yards, the depth diminishing from 15 to 20 fathoms at the entrance to 8 fathoms at the turning and to 5½ and 3 fathoms at the head of the port. The best anchorage is at the turning in 8 fathoms, sand and mud bottom. There is a good watering place in the port.

Shoal.—The chart shows a shoal of 4¾ fathoms about ¾ mile westward of Lamnuyan Point.

PANGUTARANG GROUP AND ISLANDS WESTWARD.

Pangutarang, the largest of this group, is low and level. Little more than the trees are visible above water. It is thickly inhabited and carries on a brisk trade with Jolo. The principal place, **Maglacob**, lies on the east side, some distance inland. The coast near it is enveloped by coral and sand banks, between which there is an entrance at high water into the lagoon formed by the coast and the reefs. The island contains numerous groves of timber and coconut trees.

Panducan is a long island east of Pangutarang extending north and south. Like the rest of the group it is covered with trees, a conspicuous peaked clump on its south end being the highest. The passage between Panducan and Pangutarang is about 2½ miles wide.

Kulassein is about 4½ miles northward of Panducan and is joined to it by a chain of black rocks on a bed of white sand. Over these rocks are 6 to 9 feet of water and between them 3 to 4 fathoms.

The charts show a small island lying 9 miles northward of Kulassein, in latitude 6° 35′ N., longitude 120° 41′ E.; marked existence doubtful. The U. S. S. *Annapolis* passed 4 miles north and 1 mile south of this position, and, although the conditions were favorable, did not see any land.

CAUTION.—Large vessels should not attempt to pass between the islands northeast of Pangutarang, for the tidal streams have a velocity of 6 knots at springs.

Tubigan, situated about 3 miles northeasterly from Kulassein, is a wooded island with a small river and good drinking water.

Teomabal, lying about 9 miles eastward of Panducan, is low and wooded. The reefs off Teomabal extend more than 12 miles to the northeast.

Pangutarang Passage lies between Pangutarang Island to the north and North Ubian and Usada Islands on the south; it has an average width of 5 miles and is very deep. North Ubian and Usada are the largest of a group of thickly wooded islands lying southward and westward of Pangutarang.

North Ubian is about 3 miles long east and west and 2¼ miles wide; it is inhabited, the largest town, **Suangbunah**, being on the southwest side in a deep bight, well protected by a coral reef. There is a village in the interior named **Aloh**, but it is not visible from the sea. An automatic acetylene light, showing one white flash every 2 seconds, visible 10 miles, is exhibited, 35 feet above high water from a white concrete beacon on the northern point of North Ubian Island.

From North Ubian a bank with from 7 to 11 fathoms over it runs in a west-southwest direction for nearly 19 miles to Cap Island. This bank affords a good stopping place for a vessel taking the Panguta-

rang Passage; its northern edge is very steep and the lead should be kept going when approaching from this direction.

Malicut, a small island southwest of North Ubian, distant about 3½ miles, is a little more than ½ mile long by ¼ mile wide.

A reef extends ¼ mile northwestward, bare at low water, and is continued by a bank in the same direction, the 5-fathom limit of which is about 310° (308° mag.), 1¾ miles from the northwest extremity of the island.

Ticul lies about ¾ mile eastward of North Ubian, with a deep channel between them; it is ¾ mile long and off its north end are two sand cays with trees on them, while immediately south of this point is a lagoon of salt water. There are paths through this island, all converging to a well near the center; the water, however, is brackish, but it is said that the natives of North Ubian come here for water.

Usada, southeast of Ticul, is fringed by a reef; there is a lagoon on the western side of the island with a break in the reef through which native boats pass at high water. Usada appears to be well inhabited from the number of canoes and paraos seen, but no towns are visible from the sea.

Cunilan is about 1½ miles southwest of Usada, with a passage between the two islands; it is about 1 mile long in a northwest and southeast direction by about ½ mile broad; the tops of the trees on this island are 67 feet above the sea.

Basbas, which is about 2¾ miles 205° (203° mag.) from Cunilan, is covered with trees, the tops of which are about 63 feet high; in fact, all the islands of this group appear to have been coral reefs or sand cays at one time, as the surface of the soil is not much above the high-water level of extraordinary spring tides.

A shoal covered by a least known depth of 2 fathoms is reported to exist about 2½ miles northward from Deatobato Islet.

ANCHORAGE.—There is anchorage between Malicut and North Ubian in from 5 to 10 fathoms, but the bottom is hard and smooth. Anchorage may also be had ½ mile south of the rocky islets at the entrance of the inlet on the southwest side of Usada, in 11 fathoms, sand and coral bottom, with fair holding ground.

There is also anchorage about 1 mile westward of the north end of Malicut, in 7 to 9 fathoms, but the tidal currents run strongly at springs.

Laparan Island is situated 23 miles 240° (238° mag.) from Malicut; it is 5 miles long from north to south and 2 to 3 miles wide, and is covered with trees. Westward it is fronted by a coral reef with several small islets on it, the reef being steep-to. There is no anchorage westward of Laparan. It has been reported that a coral reef extends from the east side of Laparan to Deatobato Islet, about 3 miles eastward and about 1½ miles across. Soundings of 4¼ to 5 fathoms were obtained on this reef midway between the islands. Mariners are warned that this locality is absolutely unsurveyed.

Doc Can is separated from the southwest extremity of Laparan Island by a channel ¼ mile wide. In the center of this island there is a large lagoon with several islets in it. A shoal with 5 to 8 fathoms extends about 2 miles to the northwest of Doc Can Island.

ANCHORAGE.—There is anchorage south and west of Doc Can, but none north of it. Outside of the 20-fathom limit the bank is steep-to;

on the southern side of the island a ship should anchor as soon as 9 or 10 fathoms is obtained, as deeper water will be found between those soundings and the edge of the reef.

TIDES.—It is high water, full and change, at 6^h; springs rise 5 feet. The observation was made at the time of the equinox when there was only one tide in the 24 hours, and the flood stream ran for nine hours and the ebb for three hours; the flood setting north-northwest, ebb southwest, 3 to 5½ miles per hour.

Billanguan Island, about 18 miles southeastward of Doc Can, is about ¾ mile long northwest and southeast, and, like the majority of islands in this locality, is low and covered with trees. A bank with about 9 to 12 fathoms extends nearly 3 miles southward of this island, where a vessel may anchor if necessary, but the holding ground is not good.

Bambannan, another low coral island, covered with trees, is about 4½ miles southeast of Billanguan. It is only visited by the natives of Tawitawi occasionally for fishing purposes. Off the south side there is anchorage in about 13 fathoms during the northeast monsoon.

Uwaan, Mamanuc, and **Lahatlahat,** lying northeast of Billanguan and Bambannan, are similar to those islands in formation and character.

The other islands included between North Ubian, Laparan, and Bambannan have not been surveyed and vessels should not pass between them.

Tablas Shoal is a large shoal covered by a least known depth of 4 fathoms and surrounded by deep blue water, lying between Deatobato, Sipang, and Tubalubac Islands.

This shoal has not been examined and probably less water exists.

Approximate position of the center of the south edge is latitude 5° 54′ N., longitude 120° 21′ E.

Depths of 4 to 12 fathoms have also been recently reported between Datu Bato and Sipang Islands.

CURRENTS.—Great caution should be used at all times and particularly during the prevalence of the northeast monsoon in the navigation of the southern part of the Sulu Sea, because of the strength of the currents. This effect has been particularly observed between meridians 119 E. and 121 E., where the currents set toward Sibutu Passage and the channels between the islands of the Jolo Group. The following is the experience of the steamer *Kudat:* After setting at nightfall a course from Taganak Island for a position 28 miles north of the north end of Pangutarang Island, an additional allowance of 6° being made for leeway, as the night was thick and rainy, next morning Pangutarang Island was reported ahead and the course was changed to the southward, and then, as the land appeared strange, the ship was anchored in 18 fathoms; on the weather clearing up she was found to be at the south and west of Cap Island. The vessel had drifted 48 miles during the night, and had her course been set as usual for the north end of Pangutarang Island there is no doubt but that she would have grounded on Pearl Bank.

Unusual care should be taken when the wind is fresh from the northward, as the currents are then strongest.

Pearl Bank.—This extensive bank, on which are Taja and Zau Islets, situated about 10 miles westward of Doc Can, is a formation

of coral and sand about 15 miles long northeast and southwest, about 9 miles wide, and is steep-to. Nearly in the middle of the bank is a circular coral reef about 7 miles in diameter, which bares in patches at low-water spring tides. The opening leading into this lagoon has a bar extending across it with 9 to 13 feet of water over it.

The reef has several small islands and islets on its west, south, and east sides, the highest (50 feet) being near the southeast extremity: all these are low, covered with bushes, and hardly visible at a distance of 6 miles.

In running down at night to pass either east or west of this bank, the soundings would give warning of the vicinity of the center reef, but it is too steep to the north and south for the lead to be of much use unless going very slowly.

An automatic acetylene light, showing one white flash every 6 seconds, visible all around the horizon for a distance of 13 miles, is exhibited, 65 feet above mean high water, from a white steel tower erected on Zau Island.

ANCHORAGE.—There is fair anchorage on the bank on either side according to the season, but tides are very strong, running at the rate of from 3 to 5 knots.

TIDES.—It is high water, full and change, at $6^h\ 05^m$; springs rise 5 feet.

Talantam Shoal is composed of sand and coral, the shoalest part of 5 fathoms being in latitude 5° 42′ N., 119° 26′ 30″ E. It is about 3 miles long northwest and southeast and 1½ miles wide, with an average depth of 8 fathoms within the 10-fathom curve. A report states that the German S. S. *Offenbach* obtained a sounding of 4¼ fathoms, under favorable conditions, about in the middle of the shoal. Deep-draft vessels should therefore avoid crossing it, as less depths are liable to exist.

With wind against the tide there are heavy tide rips around this bank, sometimes extending as far as the eye can see, and much resembling broken water.

SIBUTU PASSAGE.

Sibutu Passage separates the Borneo Islands from the Sulu Archipelago. It is a safe and deep channel, 18 miles wide between Sibutu and Simonor Islands, the shore on either side being steep-to.

TIDES AND TIDAL CURRENTS.—When navigating this passage, great attention must be paid to the tides, which run with a velocity of 2 to 4 knots. The times of high water at Sibutu Island, Dent Haven, Port Bongao, Pearl Bank, Doc Can, and Sagayan Sulu are from 6^h to $6^h\ 40^m$, and the streams run for three hours after high and low water, but it must be borne in mind that the times of high water at Tambisan, and on the Borneo coast northward, are from $10^h\ 52^m$ to 12^h, and that the streams are weaker than in the offing.

The officers of H. M. S. *Nassau* remarked during the survey in 1872 that the tidal streams in the main channel were very steady in direction, the flood stream setting northwest and the ebb south, but there was uncertainty as to duration, the streams occasionally running as much as 10 hours at a time, probably influenced by the winds and also by changes of the moon's declination, as with the tides on the south coast of Mindanao.

In the channel west of Sibutu Island the officers of H. M. S. *Egeria* in 1892 observed the flood stream to set south, and the ebb north, with a velocity of from 3 to 4 knots an hour, and the streams to turn with high and low water by the shore.

Sibutu Islands and Reefs lie directly on the route between Dent Haven and Sibuko Bay. The channel between their northern limits and the southern shore of Tanjong Labian, upward of 16 miles wide, forms the main approach to Darvel Bay from northward and eastward.

Navigation amongst these reefs is rendered easy by the help of the islets, which are readily distinguished and are conveniently situated for fixing a ship's position.

The channel on the western side of Meridian and Frances Reefs, and eastward of Blake Reef, Payne Rock, and James Patch, is convenient as affording anchorage in every part; the only narrow part of it is when passing Maranas Islet, which may be passed on either side, and no special directions are necessary.

The channel westward of the line joining Blake Reef and Payne Rock and eastward of Riddells Reef is 27 miles long and 3 miles wide in its narrowest part between Blake Reef and Siluag Islet. It is perhaps the most convenient to use generally, being more direct than those farther eastward, whilst the tidal streams do not attain the same strength as in the channels westward.

The channel west of Siluag Islet and Riddells Reef and east of Bajapa Reef is 7 miles long, with a minimum breadth of 1¾ miles. The tidal streams run here with great strength, and they should be well considered before using this route.

The channel between Bajapa Reef and Alice Reef is about 6 miles long and 1½ miles wide between the steep edges of the reefs on either side. The tidal streams run straight through the channel with considerable strength.

Along the southern edge of the bank on which these reefs stand, a rim of shoaler water runs close within and parallel to the 100-fathom line, but nothing less than 17 to 20 fathoms could be found on this rim. The edge falls steeply to depths of over 100 fathoms and is very clearly marked by tide rips and overfalls, which give the appearance at times of shoaler water than actually exists.

Sibutu Island, the north end of which is in latitude 4° 55′ N. and longitude 119° 27½′ E., runs nearly north and south, and is 16 miles long with an extreme breadth of 2½ miles in the middle, narrowing toward the extremities. The eastern coast is slightly convex and the western coast concave. With the exception of a conical hill 500 feet high on the east coast, the island is flat and densely wooded.

The coast line is mostly a low cliff of upraised coral, broken here and there by a sandy beach. A narrow reef fringes the coast on both sides and northward, but from the south point the reef extends southward for 4¼ miles, with a breadth of 2½ miles, inclosing a shallow lagoon 6 miles long, lying close to and parallel with the southeast coast, but no entrance to the lagoon could be discovered in passing on either side.

The reef bares in patches at low water, and near the southern end there is a sand bank with a wooded islet on it, the trees on the summit reaching to a height of 120 feet. Another smaller wooded islet,

flat-topped, lies ½ mile southward, and a low bushy islet lies ¾ mile northwestward of the first islet.

The fringing reef is steep-to all around, and there is no anchorage, but a ship might stop a tide by dropping anchor in 15 fathoms north of Sibutu Island, swinging round within 150 yards of the fringing reef. On the western shore, at 4½ miles southward of the northern point, there is a village with a small wooden pier for landing.

An automatic acetylene light, showing one white flash every 8 seconds, visible 15 miles, is exhibited 94 feet above mean high water from a white steel-framed structure erected on Saluag Isand, Sibutu Group.

Omapui, Sipankot, and **Tumindao** are a chain of low flat-topped wooded islets on an extensive reef lying 2 to 3 miles west of Sibutu Island. Tumindao is the largest of these islands. It is 7½ miles long north and south, with an extreme breadth of 1½ miles, and. like the other islands, is wooded and of uniform height, the tops of the trees being from 130 to 190 feet high. A chain of small islets and rocks stretches for 3 miles south of Tumindao.

Sitanki, the first islet southward from Tumindao, although very small, is of considerable importance, as most of the trade between Borneo and the Bongao district centers there. It is inaccessible except by small boats at high water; by keeping under steam in the channel between Sibutu and Tumindao a boat may be sent across the reefs and return the same tide.

Sitanki may also be visited by boat from the anchorage in the southern lagoon, following the rising tide over the reefs and in most cases stopping in Sitanki till the next tide and starting to return as soon as the boat floats.

It is stated that there are few permanent inhabitants on any of these islands, but they are much frequented by fishermen from Simonor and Borneo for trepang, which is found in great profusion on the reefs westward. The natives report that wild cattle are very numerous in Sibutu and that Omapui abounds with pigs.

From the northeast point of Omapui, the northernmost of these islets, the reef trends northwestward for 2 miles and then southwestward for a distance of 4 miles, to the entrance of a large lagoon which extends 10 miles southward and southwestward and affords access to the western shores of Tumindao, where there is a village.

This lagoon was not examined in detail, but it appears to be fairly clear of coral patches and to have a general depth of 7 to 10 fathoms. The entrance is considerably narrowed by obstructions, but in case of necessity a vessel could doubtless enter the lagoon with a favorable light and a boat ahead.

From the entrance of the lagoon the western edge of the reef trends southward for 23 miles, passing at a distance of 6 miles westward of Tumindao, with no break in its continuity except two narrow channels into a lagoon near the south end of the reef. This southern lagoon has depths of 7 to 12 fathoms and a narrow, shallow opening eastward.

The edge of the reef is everywhere very steep, except on the northwest side, where the 10-fathom curve stretches away from 200 yards' distance at the north end of the reef to nearly ¾ mile distance near the entrance to the large lagoon.

The southern lagoon, previously mentioned, consists of two basins, each over 1 mile in extent, connected by a channel over ¼ mile wide, in which the least depth found was 10 fathoms. The eastern basin is clear and affords a very safe anchorage, and the only one in the vicinity of Sibutu. The western basin was not thoroughly examined, but also appears to be clear and free from danger. With the sun astern it is easy to enter by either channel and pass through the connecting channel even at high tide, and at low water the reefs are uncovered. The reefs on the southern sides of the channel are more steep-to than those on the northern sides. The eastern entrance channel has a navigable width of fully 200 yards and the least water found in it was 4 fathoms, sandy bottom; the western channel is about ¼ mile wide and the least water found in it was 6 fathoms; the southwestern channel is impassable except by rowboats at high water.

Directions.—To enter from eastward, bring the entrance to bear 272° (270° mag.) and steer in, favoring the reefs on the southern side; haul gradually northward and anchor in 9 fathoms, sandy bottom. To enter from westward, steer approximately 148° (146° mag.), favoring the southwestern side of the channel; haul gradually eastward, pass through the connecting channel, haul northeastward, and anchor as previously directed.

The channel between Sibutu, eastward, and Omapui, Sipankot, and Tumindao is from 1½ to 2 miles wide, but the tidal streams run from 2 to 4 knots at springs, flood southward and ebb northward.

Andulinang Islet, lying 11½ miles southwestward from the northwest point of Omapui, is small and wooded, with a conspicuous tree on its summit, 110 feet high, and a rock about 300 feet high close-to and immediately north of it.

The islet is situated close to the western edge and nearly 3 miles from the south end of a pear-shaped reef 6 miles long north and south and 1½ miles wide at the southern end, tapering to ½ mile wide at the northern end. The reef bares in patches at low water and has on it near the northern end two sand cays baring 3 feet.

Purdie Patches are a series of small detached sand and coral banks, with 7 to 10 fathoms water over them, lying off the north end of the above reef and 5 miles north by east from Andulinang Islet.

Chambers Knoll, situated 3⅗ miles northeastward from Andulinang Islet, is a small detached coral knoll with 9 fathoms water on it.

Maranas Islet, lying 2¾ miles north by east from Andulinang Islet, is small and wooded, the tops of the trees being 85 feet above the sea. It stands on a reef that projects from ½ to ¼ mile from the islet. The edges of the reef are steep and there is a clear channel ½ mile wide between it and the southwest angle of Andulinang Islet Reef.

Meridian Reef, separated from the southern end of Andulinang Reef by a channel ½ mile wide and 7 to 8 fathoms deep, stretches southward for 12 miles, with an average width of 1 mile. A sand cay that bares 4 feet at low water lies near its southern end.

The western side of this reef runs off shoal for upward of ½ mile from the edge for the greater part of its length and then drops down suddenly into 10 fathoms.

Middle Reef, lying ½ mile southward of Meridian Reef, is 2½ miles long north and south. A sand cay lies near its northern extremity.

The channel between Meridian and Middle Reefs has a depth of 13 fathoms in the middle, but is too much narrowed by shoal water running off the reefs on either side to admit of a ship using it with safety, as the currents run through it with great velocity.

Frances Reef, immediately southward of Middle Reef, is the southernmost of the chain of reefs extending from Andulinang Islet. It is 4¾ miles in length northeast by north and southwest by south. The eastern side of Frances Reef is quite steep. The western side, on which there is a long sand cay bare at low water, shoals gradually. The channel between Middle and Frances Reefs has 6 to 7 fathoms in it, but it is narrow and the edges of the reefs are ill defined. Moreover, it has not been closely examined.

Blake Reef, westward of Maranas Islet, is 2¾ miles long north and south by 1 mile in width. The channel between Blake and Maranas Reefs is ⅔ mile wide.

Bulubulu Islet, situated 3¾ miles 207° (205° mag.) from Maranas Islet, is small and wooded, showing a well-defined summit over the center, 105 feet high to the tops of the trees. The islet is surrounded by a reef to a distance of from 200 to 400 yards, and a small coral patch of 7 fathoms lies ¾ mile 314° (312° mag.) from it.

Anchorage may be found eastward of Bulubulu Islet in 9 to 12 fathoms, sandy bottom.

Payne Rock, awash at low water, is nearly in the center of a narrow shoal of sand and coral, ¾ mile long north and south, with depths of 3 to 5 fathoms over it, and lies 6¾ miles south from Bulubulu Islet.

James Patch is a small coral patch with 7 fathoms on it and 8 to 20 fathoms around. It lies 3¼ miles southward of Payne Rock.

Siluag Islet is somewhat larger than the islets noticed above, being ⅓ mile long north and south, lying 6½ miles 244° (242° mag.) from Andulinang Islet. It is wooded and flat topped, the tops of the trees being 85 feet high. A sand cay, that bares 3 feet, stands on the narrow fringing reef close to and immediately north of the islet.

Riddells Reef, the north end of which lies 4½ miles southward of Siluag Islet, is a narrow coral reef, 2¾ miles long, north and south, with two sand cays that bare at low water near its southern end.

Nearly midway, and exactly in the line between Siluag Islet and Riddells Reef, there are two coral shoals; the northern of these has on it a patch of 5 fathoms at 2 miles south of Siluag Islet, with 15 to 19 fathoms over the rest of the bank; the other is 1 mile farther south, or 1⅓ miles from Riddells Reef, and ½ mile in diameter with 3½ to 4 fathoms on it.

Bajapa Reef, the northeastern end of which lies 2¼ miles west-northwest from Siluag Islet, is 8¾ miles long in a north-northeast and south-southwest direction and 1½ miles wide in the middle. It bares in patches at low water and incloses a lagoon in the center, the entrance to which is on the southwest side. This reef is steep-to on all sides, except at the north end, where shoal water extends out for a short distance.

Panguan Islet is a small wooded islet, 75 feet high, standing on the southern side of a narrow, steep reef, which projects ⅓ mile to the northward of the islet. It lies 6¾ miles 269° (267° mag.) from Siluag Islet.

Alice Reef, northward of Bajapa Reef, is 5½ miles long north-northeast and south-southwest, with an extreme width of 1¾ miles

in the middle. It is steep-to around, except off the northeast point, from which point the 5-fathom depth-curve lies at a distance of over ½ mile.

Alice Channel is the deep channel between Panguan Islet and Bajapa Reef to the northeast and Mataking Islet and Reef to the southwest. It is over 6 miles wide at the narrowest part between the south point of Bajapa Reef and Mataking Islet.

Bank.—A bank, composed of coral and sand, on which the least depth obtained was 7 fathoms, lies near the southern entrance to Alice Channel, in latitude 4° 30′ N., longitude 119° 04′ 30″ E. It is about 1 mile long in a north-northeasterly and opposite direction and about ½ mile wide.

Tides.—It is high water in Alice Channel, full and change at 6^h 20^m. The tidal streams run strongly, especially in the vicinity of Panguan Islet and Bajapa Reef, flood southward and westward and ebb northward and eastward with a velocity of 2 to 2½ knots.

In the channel westward of Sibutu Island and also in the channel eastward of Meridian Reef the streams run from 2 to 4 knots. The streams change approximately at high and low water by the shore.

On the edge of the bank, southwest of Frances Reef, there are strong tide rips and overfalls. The flood stream runs here with exceptional strength, frequently as much as 3 knots, and sets southward and southeastward over the edge of the bank.

NORTH COAST OF BORNEO.

This chapter describes that portion of the northern coast of Borneo and the off-lying islands and reefs between the Sibutu Passage and Gaya Island.

The principal harbor and chief place of trade is Sandakan, the seat of government of British North Borneo.

MONSOONS AND WINDS.—On this coast the northeast monsoon begins about the middle of October and continue till the middle of April. During a greater part of the time the wind blows steadily and with moderate strength from the north and east, gradually dying out. In the course of this monsoon, more particularly in December and January, there are generally one, two, or three steady, moderate gales lasting from three to nine days; at other times the wind is a moderate breeze, which, beginning about 11 a. m., gets rather stronger toward evening, and dies away in the early morning, when it may be overcome by a gentle land breeze. At the beginning and end of the monsoon the wind is not so strong nor so steady and the land breeze continues till late in the afternoon.

The southwest monsoon lasts from the middle of April till the middle of October. The wind as a rule is not so strong in this monsoon; the land breeze in the morning is more marked and the gales are not so heavy nor so long continued as in the northeast monsoon. On the other hand, there are frequently squalls in the afternoon and evening lasting for an hour or two, and sometimes blowing with the force of a fresh gale. Neither in this monsoon nor in the northeast monsoon does the wind rise to the strength of a storm nor even to a whole gale.

The prevailing winds in the afternoon during the southwest monsoon on this part of the coast of Borneo are generally east to south; at night there is usually a land breeze.

RAINFALL.—The annual rainfall near the coast ranges from 101 to 157 inches, with an average of 124 inches.

The true wet season occurs in the northeast monsoon, and includes the months of November, December, and January, and generally part of October or February, or both. During this season the greater part of the rain falls from a uniform dull-gray sky and is pretty well equally distributed between day and night, but the rain is not continuous.

The true dry season immediately follows this true wet season, and includes March, April, and May, and generally part of February. During this time any rain that falls generally occurs in showers at night or early morning, and no month passes without several showers.

This true dry season is followed by a period of moderate rainfall, beginning usually about June, the first month or six weeks of which may almost be called a second wet season and the rest of the period up to the beginning of the true wet season a second dry season. As, however, the limits of these two are ill defined, their characters similar, and the difference in rainfall comparatively small, it is better

to consider them together as a sort of intermediate season. During this period the rain falls chiefly in heavy squalls (either with thunder or from thundery clouds), occurring most frequently in the afternoon or evening, but is not confined to that time; it is during these squalls that the heaviest falls of rain occur. On June 15, 1884, 2.05 inches fell in 40 minutes.

CLIMATE.—The climate is noted for nothing more than for its equability and the absence of extremes. The temperature, rainfall, winds, natural phenomena generally, and the diseases are, for a tropical country, of the most mild and temperate types.

TEMPERATURE.—The temperature recorded on this coast has ranged between the extremes of 67.5° and 94.5°; but the difference in temperature between the various seasons of the year is very slight. The lowest average temperature (79°) for both day and night is during the wet season, in December and January; the highest average during the night occurs during the dry season, in April and May (74°); and the highest average temperature during the day occurs in August and September (89°).

The absence of tornadoes, cyclones, and earthquakes is to be noted. The peculiar phenomena of tropical climates generally are found here; thunderstorms, with much sheet lightning, are frequent during July, August, and September and are sometimes severe. Mirage is generally present in the afternoon to a slight degree; phosphorescence occurs in great perfection in Sandakan Harbor.

On the whole, the country appears to be fairly healthy for the Tropics, less so than Singapore, but much better than the Dutch islands south of the Equator. There is a considerable amount of intermittent fever and visitors are frequently attacked, but the disease is seldom fatal to Europeans.

TIDAL STREAMS.—The tidal wave that enters the Sulu Sea from the China Sea by Balabac Strait and Banguey Channel penetrates as far as the northeast point of the island, where it meets the wave from the Celebes Sea, which enters by the Sibutu Channel. The time of high water of the wave from the China Sea is from $11^h\ 30^m$ to $12^h\ 00^m$, and that from the Celebes Sea from 6^h to 7^h. The range of the tides is 6¾ feet at Sandakan and 3½ feet in Dent Haven.

On the coast between Mallawalle and Sandakan no regular tidal stream is perceptible, but when the northeast monsoon is blowing steadily there appears to be a constant set northwestward.

Labian Point, the northeast point of Darvel Bay, is low and difficult to locate from seaward. From here the coast curves very gradually northeastward and northward for about 7 miles to Dent Haven. In the vicinity of Labian Point the shore is a hard sand beach, closely backed by jungle, through which, however, it is not difficult to force one's way, but as the shore curves northward toward Dent Haven it becomes swampy and fringed with mangroves.

Dent Haven is nearly 2 miles wide between Mangrove and Reef Points and affords good anchorage in the southwest monsoon in 3 to 4 fathoms, sand and mud bottom, but a slight swell sometimes sets into the bay. Three brackish streams discharge into Dent Haven. The two northern are dry across their mouths at low tide; in the southern, boats can find good shelter behind the spit in deep water, the entrance being through a narrow channel in the reef. The whole

coast line is but the barrier of a great swamp filled with trees, mostly dead or blasted.

Mangrove Point, the southern entrance point, is the northern end of a mangrove-covered island lying close to the land and fringed on the northern and eastern sides by a narrow reef.

Reef Point, the northern entrance point to Dent Haven, is foul for nearly 150 yards from the shore. A sandy shoal, awash at low water, lies 600 to 1,200 yards northeastward of the point. Northward from Reef Point within the 5-fathom curve, which is about ½ mile from shore, the soundings are very irregular.

Hull Rock, situated about 1½ miles 68° (66° mag.) from Reef Point, has only 4 feet of water over it and breaks at times. It is on a long narrow tongue of hard sand, with 1 to 5 fathoms on it, which stretches nearly 1¼ miles northward and 1 mile southward from the rock.

Between the shoal ground making off from the shore and the northern end of Hull Rock Shoal there is a channel ½ mile wide with depths of 6 and 7 fathoms, but it is obstructed by a sandy patch about 300 yards in diameter and covered by a least known depth of 3 fathoms. This channel is not recommended.

A small patch of 4¼ fathoms, with depths of 7 to 9 fathoms around, lies 1,200 yards 255° (253° mag.) from Hull Rock.

Hardy Patch, a narrow coral shoal about 300 yards in extent, with a least depth of 3 fathoms on it and 7 and 8 fathoms around, lies in the approach to Dent Haven. The shoal is marked by strong tide rips over it, and the water is usually discolored. From it Mangrove Point bears 255° (253° mag.), distant 2¼ miles, and Hog Point 328° (326° mag.).

This shoal constitutes a danger to vessels passing Dent Haven at night or in thick weather, but it may be avoided by keeping outside of the 20-fathom curve, which passes 1 mile eastward of it.

Anchorage.—Between Mangrove and Reef Points the general depths are 3½ fathoms over a sand and mud bottom, the deeper water and less irregularity of bottom being found in the northern part of the bay. There are two patches of 2¾ and 3 fathoms situated about ½ and ⅞ mile, respectively, northward from Mangrove Point.

Directions.—Approaching from northward, to avoid Hull Rock and shoal, the extreme point southward of Dent Haven should not be brought southward of 216° (214° mag.) until the southern end of the long sandy beach in the bay bears 255° (253° mag.), when it may be steered for, giving Mangrove Point a berth of at least 1 mile and anchoring as convenient.

Supplies.—There is no village in Dent Haven, but natives occasionally visit the place. Fish may be obtained with the seine near the beach southward of the southern stream. Bathing is dangerous on account of alligators.

Tides.—It is high water, full and change, at Dent Haven at $6^h\ 34^m$; springs rise 3½ feet.

Tidal currents.—Between Dent Haven and Labian Point the currents run with considerable velocity, from 1½ to 3 knots at times, flood to the north and ebb to the south, but the tidal currents are extremely variable hereabouts, and there is no certainty as to their

direction. Occasionally the current was observed to run strongly in one direction for one or two days, and then in the opposite direction for a day, for no reason that could be assigned; at other times the currents changed approximately at high and low water on the shore.

In Dent Haven the tidal current begins to set northward three hours before high water and southward three hours before low water; it appears probable that this is an eddy.

From Dent Haven the coast curves gradually northwestward for 10 miles to Unsang Point and then trends west-northwestward for 3½ miles to Tambisan Island. It is densely wooded and fronted by a narrow fringe of coral which is steep-to.

Tambisan Island, 3 miles in length east and west by 1¼ in width, is about 220 feet in height and covered with trees. The west point is high and easily distinguished from seaward, but the east point is low; the island is fronted by a coral reef to a distance of ¾ mile. A narrow channel, navigable only by small craft, separates the island from the mainland.

TIDES.—It is high water, full and change, at Tambisan Island at $10^h\ 52^m$; springs rise 3½ feet.

TIDAL CURRENTS.—Between Dent Haven and Tambisan the tidal currents are strongly marked. The flood tide sets northward and the ebb southward at the rate of from 2 to 3 knots per hour.

Off-lying banks and shoals.—Sentry Bank, the northern edge of which has not been defined, is probably about 7 miles in extent; it has a least known depth of 7 fathoms, and deep water around, the shoalest spot ascertained being about 1 mile within its southwestern edge in approximately latitude 5° 40′ N., longitude 119° 18′ E.

CURRENTS.—During the two days that the British surveying vessel *Egeria* was at anchor on Sentry Bank (in the month of August) the current was observed to set almost constantly between northeast and southeast, varying from 0.3 to 1½ knots an hour, but the tidal currents appeared to exercise a decided influence on the strength and direction of the current. The flood was observed to set to the south and the ebb to the north.

Normandy Bank, about 5 miles in length north and south and 2½ miles in width, has depths of 6 to 50 fathoms, coral, and very deep water around. The shoalest part lies near the southwest end, 20 miles 18° (16° mag.) from the highest part of Tambisan Island.

Sunday Bank, distant about 23 miles 5° (3° mag.) from Tambisan Island, is somewhat circular in shape and about 4 miles in diameter; it has depths of 9 to 47 fathoms upon it and very deep water around. The shoalest part known (9 fathoms, coral bottom) lies near the northwest edge in approximately latitude 5° 50′ N., longitude 119° 09′ E. The depths between this bank and Normandy Bank, 2 miles southeastward, are upward of 100 fathoms.

Magpie Bank.—This extensive bank lies southwestward from Sunday Bank with its southeastern end about 6 miles northward of Gem Reef; within the 20-fathom curve it is 7 miles long in a northwest and southeast direction and 2½ miles wide. With the exception of the western side of the bank, the depths increase suddenly to upward of 100 fathoms. The center of the bank, with a depth of 10 fathoms, lies 2° (0° mag.), distant 17½ miles from the highest part of Tam-

bisan Island; an isolated patch of 9 fathoms, the least water found on this bank, lies 1½ miles southwestward of this position.

Gem Reef, situated 8½ miles 10° (8° mag.) from the highest part of Tambisan Island, is a coral patch 3 miles in length northwest and southeast and nearly 2 miles in width, with a depth of ½ fathom in the center.

René Shoal, composed of coral and sand, is 5 miles in length northwest and southeast and 2½ miles in width. From the least depth of 3 fathoms the highest point of Tambisan Island bears about southwest, distant 4½ miles.

A rock, with about 2 feet of water over it, lies 6 miles northwestward of Tambisan Island summit in approximate latitude 5° 32′ 30″ N., longitude 119° 04′ 00″ E.

From Tambisan Island the coast trends in a general west-northwest direction for 60 miles to the entrance to Sandakan Harbor. It is low and swampy and intersected by numerous streams and backed by dense jungle.

LANDMARKS.—**Mount Hatton**, rising to a height of 1,990 feet, situated 33 miles westward from Dent Haven and 16 miles from the coast, is the most conspicuous mountain in the vicinity, appearing as a sharp peak from all directions. **Ragged Hill**, 1,455 feet high, about 7 miles westward from Mount Hatton, appears from eastward as two cone-shaped hills. **Mount Bagahak**, 2,740 feet in height in the center of a long sloping ridge, situated northward from Darvel Bay, is seen in clear weather beyond Mount Hatton. **Notch Hill**, 803 feet in height, about 11 miles southward of the mouth of the Kinabatangan River, is a conspicuous hill having a sharp fall near the summit. **Confusion Hill**, about 10 miles westward from Notch Hill, shows a round top when seen from eastward. **Aguja Peak**, 638 feet high, midway between Confusion Hill and the coast, appears as a cone when seen from eastward. **Kinabatangan Hills**, 963 feet in height, situated about 15 miles northwestward from Notch Hill and about 10 miles inland, appears from seaward as a long range with a slight peak. **Abai Clump**, 17 miles eastward of the entrance to Sandakan, is 185 feet high; when seen from eastward it makes as an island, but it is not easily distinguished from westward.

Tangusu Bay is a shallow bight southwestward from Tambisan Island.

Rock.—A rock, with 4 feet of water over it at low-water springs, lies nearly 1 mile off the shore reefs with the highest part of Tambisan Island bearing 58° (56° mag.), distant 2 miles.

Marowop River.—The mouth of this river, 10½ miles westward from Tambisan Island, is about ¾ mile wide, with depths of from 3 to 5 fathoms between the entrance points. At the mouth of the Marowop River shoal water extends out to a considerable distance, the 3-fathom curve being found over 3 miles from the shore.

Bar.—There is a depth of 14 feet on the bar at high-water spring tides, but caution is necessary in crossing, as the sea breaks in northeast wind. From the entrance the river trends southward a distance of 3 miles to Evans Island, where it divides into numerous branches.

Segama River.—The mouth of the Segama River is 9 miles northwestward from the Marowop; between the entrance points it is ½ mile wide with a depth of 2½ fathoms. From the entrance the river

trends southward for about 2 miles, with an island in it; thence it splits up into several creeks, which are narrow with depths of from 2 to 3 fathoms.

Bar.—The shallow flat fronting the river extends about 3 miles from the coast, the least depth over which, leading to the entrance, is 9 feet at high-water springs. Vessels entering should send a boat ahead, as the tides are irregular.

Kinabatangan River.—The mouth of the Kinabatangan is about 15 miles northwestward from the Segama River. **Driftwood Point,** the eastern entrance point, is wooded and may be distinguished at the distance of 15 miles from the coast, making a sharp and well-defined point.

From the entrance the river trends southwestward and southward for 5 miles to Dewhurst Bay, which is 3 miles long and 1 mile wide, having depths of 2 fathoms and less. The main branch turns westward at 5 miles from the mouth, from whence it was examined for a distance of 6 miles; depths of from 4 to 6 fathoms were found and the river at this distance was 300 yards wide, with a depth of 5 fathoms. No villages were seen and but few boats; no fresh water was obtainable.

Bar.—The river between the entrance points is over ½ mile wide, with depths of from 4 to 5 fathoms; the bar, which extends 3 miles seaward, has a depth of 12 feet at high-water springs. Vessels drawing more than 8 feet should not attempt to cross the bar without a boat ahead, as the tides are much influenced by the winds, rendering the time of high water uncertain.

Pegasus Reef, situated 14 miles 58° (56° mag.) from Driftwood Point, is nearly 2 miles in length north and south by 1½ miles in width, with a least depth of 3 feet, and is composed of live coral with patches of sand. Depths of 26 to 30 fathoms are found at a distance of 1 mile from the shoal heads. The discolored water on the reef can be made out from the masthead. The center of the reef lies in latitude 5° 46′ 15″ N., longitude 118° 50′ E.

Royalist Rock, a coral shoal 800 yards long in a north-northeast and opposite direction, with a least depth of 1 fathom near its southwest end and 18 fathoms around, lies with Driftwood Point bearing about 204° (202° mag.) distant nearly 5 miles.

Nymphe Reef, about 1 mile in extent with a depth of 1 foot, lies 1¾ miles north-northeastward from Royalist Rock, just within the 20-fathom curve. Patches of 5¾ and 7 fathoms lie between it and Royalist Rock. Being within the limits of discolored water from Kinabatangan River, Nymphe Reef is seldom seen, but it is marked by a slight ripple; it breaks in heavy weather.

Clearing marks.—Abai Clump, bearing 286° (284° mag.), leads southward of Royalist Rock and Nymphe Reef, and the mouth of the Kinabatangan River, bearing 227° (225° mag.), leads eastward of them.

Between the Kinabatangan River and Sandakan, about 30 miles northwestward, the coast is intersected by numerous streams, some of which are said to lead into the river and to be navigable for boats.

Bahala Island, lying on the northwest side of the entrance to Sandakan, is about 2 miles long north and south. The northern part

is low, but the southern rises in two conspicuous hills, 643 and 544 feet in height. These hills slope gradually westward, but their eastern faces are imposing precipices with two light-red streaks running perpendicularly from the top to the bottom, by which the island may be recognized. Shoal water extends about 1½ miles northeastward from Bahala, but the southern end is clear and steep-to.

SANDAKAN HARBOR.

This magnificent harbor is 1¼ miles wide at the entrance between Bahala Island and the broad point opposite to the southeast. From here it gradually increases in width, forming a spacious basin north of Pulo Bai more than 3 miles in diameter, which forms the usual anchorage. The harbor extends south and west of Pulo Bai to a distance of 15 miles from the entrance, and large vessels proceed as far as Germantown, on the Island of Timbang, 11 miles up the bay, to load timber. From the entrance to the head of Sandakan Harbor the depths vary from 16 to 3 fathoms.

Bar.—Some 13 rivers discharge into Sandakan Harbor and a bar has formed 7 miles from the entrance with a depth of 4 fathoms at low water. The harbor master at Sandakan reported that H. B. M. S. *Alacrity* had obtained soundings on the bar outside, showing about 1 fathom more water, generally, than is represented on the charts. The U. S. S. *Rainbow* left the harbor about one hour before high water and crossed the bar at the speed of 10 knots. The vessel followed the track laid down on the chart and nothing less than 6¼ fathoms was obtained.

Entrance Points.—Bahala Island, on the northwest side of the entrance, has already been described. The eastern side of the harbor entrance is formed by a large island, low and densely wooded and separated from the coast by a channel named Trusan Duyon. From the shore eastward of the entrance an extensive flat projects seaward, the northern edge of which, in a depth of 3 fathoms, lies 8 miles northeastward of the eastern entrance point; the 5-fathom curve is 2 miles farther out.

The north shore of the bay is hilly. Two of the hills are very conspicuous—one on Tanjong Papat, the point southwest from Bahala; the other, a three-peaked hill, is 844 feet in height. Both of these hills, like Bahala, slope gradually on the western side and are somewhat precipitous on the eastern face.

Directions.—When in a position about 10 miles northeastward of the entrance to Sandakan, bring the cliffy hill on the eastern side of Bahala to bear 220° (218° mag.) and steer for it. This leads across the flats in the approach in depths of not less than 4 fathoms and 1½ miles northwestward of the shoal projecting from the southeastern shore. As soon as the bar is crossed and soundings of 5 or 6 fathoms are obtained the vessel should be hauled a little southward, heading to give the south end of Bahala Island a berth of about ½ mile.

Atjeh Rock, with 2¼ fathoms at low water and the only detached danger off the town of Sandakan, lies 750 yards 112° (110° mag.) from the end of the wooden pier. It is marked by a checkered red and white buoy surmounted by a white staff and globe moored off its southern side.

Sandakan, the principal town and headquarters of the North Borneo Co., is built on the north shore of the harbor, ¾ mile within Tanjong Papat. The commercial town is on the land, but the Malay town is built on piles over the water. At the census taken in 1887 the population was 3,312, of whom 31 were Europeans.

TELEGRAPH.—Sandakan is in telegraphic connection with Mempakol and thence via Labuan with Singapore and Hongkong by submarine cables.

ANCHORAGE.—The most convenient anchorage is about ½ mile southward from the wharf, in depth of 8 fathoms, muddy bottom.

TIDES.—It is high water, full and change, at noon; springs rise 6 feet 9 inches—neaps 1 to 4 feet.

WHARF.—There is a substantial wharf with a depth alongside at low water of 15 feet. An extension to the wharf has been made which gives a minimum of 18 feet at low water. The head of the wharf is now 338 feet long, 30 feet wide, and has a depth alongside of 20 feet at ordinary low water. A light showing red north-northeastward and green south-southeastward is exhibited from the wharf.

SIGNALS.—A cone and ball tide signal is hoisted on the east arm of the west flagstaff on the wharf to show the state of the tide to vessels approaching it; cone, point up, ebb tide; cone, point down, flood tide; ball, slack water.

COAL.—Borneo coal from Sarudong River, near Tawao, in Cowie Harbor, is always kept on hand. A wharf has been erected by the Cowie Harbor Coal Co. with a storage capacity of 2,000 tons, which is the minimum quantity expected to be kept. Prices are fairly low, but the steaming value of the coal is only 70 per cent of that of Newcastle coal.

WATER—SUPPLIES.—Water can be obtained from a hydrant on the wharf; the charge is 65 cents per ton. Meat, bread, and fish can be obtained. Vegetables are not very plentiful.

REPAIRS.—There is a small marine railway with a lifting power of 400 tons, length of cradle 145 feet, draft forward 4½ feet, aft 9½ feet. Small repairs can be undertaken. The depth on the cradle at high-water springs varies from 10 to 10½ feet.

Harbor dues are 3 cents per ton.

All vessels carrying cargo must load and discharge at the Government wharf unless permission to do so elsewhere has been obtained from the superintendent of customs.

IMPORTS.—The imports are principally cloth, hardware, manufactured goods of all kinds, rice, oil, sugar, and opium.

EXPORTS.—The exports comprise mostly jungle produce, gutta-percha, sago, tobacco, rattan, and rubber. Large quantities of timber are shipped from here, the uncleared land being covered with forests containing very fine trees.

BEACON.—A white tripod beacon, about 15 feet high, has been erected on the extremity of the rocks bordering the channel, extending about 400 yards eastward from Pulo Bai Island.

Borneo Rock, covered by a least depth of 4 feet, lies about 1,200 yards westward from the western extremity of Tighowis Island in the fairway southward from Sandakan. It is marked by a red can buoy. The best channel is close westward from it.

From the western entrance point of Sandakan Harbor the coast trends in a general northwest direction for 16 miles to Tanjong

Pandaras, the eastern entrance point to Labuk Bay, and is covered with thick jungle, principally casuarina trees from 150 to 180 feet high, fronting low, swampy land, with narrow sand beach. This section of the coast is faced by islets and shoals extending in places to a distance of 5 miles.

Nanuyon Laut and **Nanuyon Derat** are two low wooded islands lying about 2 miles northwestward from Bahala Island; they are about 3 miles within the 3-fathom curve and are almost connected with the mainland.

Labuk Bay is about 19 miles wide at the entrance between Tanjong Pandaras and Pulo Purapura and extends 16 miles southwestward. The northwest part of the bay is shallow and blocked by numerous sand banks, which render that part dangerous even for boats. The southeastern side is somewhat deeper, affording a passage to the Labuk River. The western side is densely wooded, with numerous creeks; the southeast side is fringed by islets and rocks extending some distance offshore.

About 8 miles northwestward from Tanjong Niug, a well-defined point covered with trees about 150 feet high, just southward from Pulo Purapura, are Quoin and Flat Hills, 650 and 630 feet high, respectively.

Islets.—Off Tanjong Pandaras are some low islets, merely clumps of mangroves on the fringing reefs. On Bankawan, the outer one, there are trees about 100 feet high.

Pulo Tikus is a wooded pyramidal island, 234 feet in height, lying 1 mile westward from Tanjong Pandaras; about ½ mile northward of it there is a rock nearly awash at high water.

Pulo Gusong is a small sandy islet about 2 feet in height on the eastern extremity of a large sand bank near the middle of the bay, and being perfectly bare, is difficult to pick up.

A chain of islets, of which Torongohok is the northern, lie in the southwestern part of the bay. The northern part of Torongohok is wooded with casuarina trees about 40 feet high, forming a prominent object when approaching from northeastward.

Labuk River.—The mouth of the Labuk River is 20 miles southwestward from Tanjong Pandaras; the entrance is about ½ mile wide, with a depth of 5 fathoms. The Bongaya River and several small streams of no importance to trade discharge in the northwestern part of the bay.

Bar.—The best channel to the Labuk River is between Libarran Island and the low islets off Tanjong Pandaras; the least water on the bar is between Pulo Gusong and Sungei Gumgum, in the southeastern part of the bay, on which there is a depth of 9 feet.

Directions.—From eastward, having passed Gubbins Rock, the course must be shaped to pass between Libarran Island and the low islands off Tanjong Pandaras, avoiding the rocks which lie off the reef extending about ½ mile southward of Libarran Island; and when Round Islet (westward of Libarran) is in range with Gulisaan bearing 58° (56° mag.) the course must be altered to 238° (236° mag.). These islets in range astern will lead clear and westward of the islets and rocks off Tanjong Pandaras, and the same course continued, allowing for tide, will lead over the flats in a depth of 9 feet at low-water springs. When the water deepens the course may

be shaped to pass about ¾ mile westward of Semawang Point, from whence to the mouth of the Labuk River there is a depth of 3½ to 5 fathoms.

TIDES.—It is high water, full and change, in Labuk Bay at 9^h 30^m during the period of the southwest monsoon in the China Sea; springs rise 8 feet, neaps 5 feet. The maximum velocity of the ebb observed in the river was 3 knots.

SUPPLIES.—There is a village in Pulo Tetabuan and another on Pulo Linkabo, but no supplies were obtainable, neither was any fresh water met with. The village of Balmoral is also shown on the charts near the river mouth, but no other information in regard to it is available.

Off-lying islands and rocks.—Within a radius of 25 miles of the entrance to Sandakan Harbor there are a number of islands and rocks, some of which are high and prominent, forming good landmarks for locating a vessel when navigating in this locality.

Laurel Rock, the most eastern danger in this locality, is of small extent, stands 6 feet above high water, and is situated in latitude 6° 09′ 30″ N., longitude 118° 29′ E.

Clotilde Rock, in latitude 6° 14′ N., longitude 118° 23′ E., is a small coral reef, part of which stands 2 feet above high water. There is about 20 fathoms of water close-to around it.

Baguan is a densely wooded island, 228 feet high, lying 210° (208° mag.) 3½ miles from Laurel Rock. From the north point of it discolored water has been seen to a considerable distance in the direction of Laurel Rock. The passage between Baguan and the rock should therefore not be taken.

Rock.—The Norwegian steamer *Progress* reported striking on a pinnacle rock with a depth of 3 fathoms over it 2 miles 311° (309° mag.) from Baguan Island.

Taganak.—This island, 554 feet in height, is about 1 mile in length in a north-northeast and opposite direction and is surrounded by a coral reef to a distance of nearly ½ mile. It is densely wooded. Strong currents are reported in its vicinity. It lies 39° (37° mag.), distant 15 miles from Bahala Island, and is a good mark for vessels approaching or leaving Sandakan.

Taganak Patches, of from 5 to 10 fathoms, with greater depth between them, are about 2½ miles in extent in an east by north and opposite direction, and lie with the central and shoalest part 293° (291° mag.), distant 4 miles from the southwestern end of Taganak Island. This position is occasionally marked by ripples.

Gubbins Rock is a dangerous patch of coral, with about 1 fathom of water on it and steep-to, lying 7 miles 265° (263° mag.) from the southern point of Taganak Island and 7¾ miles 143° (141° mag.) from Little Bakkungaan.

A coral shoal, with a least depth of 3 fathoms over it, lies about 2½ miles southwest of Gubbins Rock. Depths of 5 fathoms were obtained for a distance of about 300 yards to the westward and about 250 yards to the eastward of the 3-fathom spot.

Boaan, 192 feet in height, the northernmost of a chain of islands which extends in a northeasterly direction from the mainland, is about 1 mile in length northeast and southwest. It lies 14 miles 23° (21° mag.) from Tanjong Pandaras. It is surrounded by a coral reef about ⅓ mile wide and has its lower parts densely wooded.

Sibaung is a small coral reef lying 4½ miles westward of the north part of Boaan Island. There are a few bushes 35 feet high on this reef.

Shoal.—A small shoal, covered by 2¾ fathoms, lies 2.1 miles 104° (102° mag.) from the summit of Boaan Island.

Flying Fish Rock, of small extent, with deep water around, lies 2½ miles eastward of Boaan Island and has 2¾ fathoms on it.

Lihiman lies about 2½ miles southward of Boaan Island, is about ¾ mile in length northeast and southwest, densely wooded, and 172 feet in height. Lihiman Island is surrounded by a coral reef which extends northwestward for ¾ mile and has upon it a small islet 30 feet high.

Both Boaan and Lihiman are mud volcanoes, which appear to have been active within the last few years.

Langaan is a small wooded islet, 120 feet high, situated 4½ miles 110° (108° mag.) from Lihiman on the southwest edge of an extensive coral reef, projecting 1¼ miles northeastward. A rock 2 feet above water stands on the reef about 800 yards eastward of Langaan.

A coral patch, apparently of small extent, having a depth of 4 fathoms and possibly less, lies 4½ miles 112° (110° mag.) from Langaan Island.

Johnston Rock, a coral patch of 2¼ fathoms, 58° (56° mag.) 2¼ miles from the southeast extremity of Langaan Island, lies near the middle of shoal ground with depths under 10 fathoms, extending about 1 mile in an east-northeast direction.

Great Bakkungaan is a wooded island, about 190 feet in height, fringed with coral, lying 1¾ miles southwestward from Langaan.

Detached coral reefs extend from Great Bakkungaan northwestward 1½ miles and westward and eastward to the distance of 1 mile. A coral patch, with 8 feet of water over it, is reported to exist in the channel between Great Bakkungaan and Langaan.

Little Bakkungaan is a small wooded island, 157 feet in height, fringed with coral, lying 3 miles southwestward from Langaan.

Silangaan is a small wooded island, 139 feet in height; fringed with coral to the distance of ¼ mile, lying 3 miles southward of Lihiman. About 1 mile eastward of Silangaan is a coral reef ½ mile in extent on which is a sand cay awash at high water.

Gulisaan is a small islet on the southern edge of a coral reef, ¾ mile in extent east and west, and lies about 1¼ miles 193° (191° mag.) from Silangaan; on it is a conspicuous clump of trees 76 feet high.

Libarran is a wooded island, 140 feet high, about 1½ miles long in an east-northeast and opposite direction, lying about 3 miles northward from Tanjong Pandaras and 2 to 3 miles within the 3-fathom curve. From it a coral reef extends eastward 1¼ miles with two rocks near its end—**White Rock**, the western rock, 6 feet high, and **Black Rock**, the eastern, 8 feet high. The reef westward extends about 1¼ miles and terminates in a sandy shoal which dries 2 feet at low water. On this reef is situated **Tree Rock**, 20 feet high, and **Round Islet**, previously mentioned as forming a range with Gulisaan Island for entering Labuk Bay.

From Pulo Purapura the coast trends northerly for about 11 miles to Tanjong Siasib, thence northwesterly for 26 miles to Simaddel or

Jambongon Island. From the northwest point of Simaddel, the coast recedes about 11 miles southward, forming a large bay known as Paitan Bay.

The off-lying islands and reefs between which a vessel must pass on her way to and from the Mallawalle Channel have been surveyed to a distance of 13 to 18 miles from shore. Beyond this distance there is an unexplored region extending northward to the Pudsey Dawson Dangers.

Lankayan Island, situated 11½ miles 65° (63° mag.) from Tanjong Siasib, is a sand cay covered with trees 100 feet high and is surrounded by a coral reef which extends 1¼ miles southward, ¾ mile northward and eastward, and has a 3½-fathom patch at ½ mile farther in the latter direction. A small detached shoal, covered by an estimated depth of from 1 to 3 fathoms, lies 1 mile 313° (311° mag.) from Lankayan Island. A small detached coral patch lies 1⅔ miles 5° (3° mag.) from the same island. The depths for about 4½ miles north-northeastward of Lankayan are irregular, there being several patches, each about ½ mile in extent, upon which the depths are from 3 to 5 fathoms, with about 12 fathoms of water between them.

Shoal ground, with depths of 3½ to 4 fathoms and 12 fathoms around, extends west-southwest for 2 miles from Lankayan; and there is foul, rocky ground 1 mile in extent in a northeast by north and opposite direction, with depths of 1 fathom lying with its farther extremity 216° (214° mag.), distant 3 miles from the cay. This shoal is a danger to vessels passing westward of Lankayan.

There is a steep-to coral reef about 4 miles westward of Lankayan Island. This reef is about 1 mile in extent in a north-northeast and opposite direction; the southern half bares at low water.

Two shoals with depths of 1¼ fathoms and 8 to 10 fathoms around, and together about 1 mile in extent north and south, lie with their northern edge 220° (218° mag.), distant 6¼ miles from Lankayan.

Beacon.—A beacon consisting of staff and globe has been erected 1$\frac{8}{10}$ miles 213° (211° mag.) from Lankayan Island to mark the northeastern limit of the foul ground, 1 mile in extent, the southern extremity of which lies 216° (214° mag.) from Lankayan. The recommended track is apparently northward from the beacon, but patches of 4 fathoms are charted westward from Lankayan.

Kestrel Shoal, about ½ mile in extent and with a depth of 2 fathoms near its center, is situated 4 miles eastward from Lankayan.

Kechil Rock, a coral patch about 600 yards in extent, with a depth of 4¼ fathoms and deep water around, lies 54° (52° mag.), 7 miles from Lankayan.

Wanderer Shoal, about 16 miles 43° (41° mag.) from Lankayan Island, is about 2 miles in extent and has a depth of 2 fathoms or less at its southeastern end, situated in latitude 6° 42′ N., longitude 118° 06′ E.

Billean, situated 304° (302° mag.) distant 11 miles from Lankayan, is a sand cay on which there are a few bushes about 38 feet high. It is surrounded by coral reefs and dangers which extend in a northerly and northeasterly direction from it for the distance of about 4 miles.

Buoy.—A red and white vertically striped buoy marks the 3-fathom patch at the northeastern extremity of the dangers extending northeastward from Billean Island with that island bearing 222° (220° mag.) distant 3¾ miles.

Billean North Dangers.—About 9 miles northward from Billean is a group of coral reefs, about 4 miles in extent, upon which the least known depth is 1½ fathoms. As these dangers have not been completely examined, they should be carefully avoided.

Billean South Dangers is another scattered group of coral reefs lying east-northeastward of Billean Cay, distant 7 to 11 miles. They consist of the following: A small 2½-fathom patch situated 9 miles 49° (47° mag.) from Billean Cay, **Sunbeam Shoal**, a 3-fathom patch lying 71° (69° mag.), distant 7 miles from Billean, with similar shoal of 3 fathoms 1 mile farther in the same direction; a patch of 3¼ fathoms situated 81° (78° mag.) from Billean and 6° (4° mag.) from Lankayan; and **Paknam Shoal**, with less than 3 fathoms, in latitude 60° 40′ N., longitude 117° 56′ 45″ E. All of these shoals are steep-to and may have less water upon them.

Tagipil is a densely wooded, small, conspicuous island, situated 219° (217° mag.) distant 4½ miles from Billean. The tops of the trees are about 184 feet high.

Bankuruan Cays are two small sand cays covered with trees about 50 feet high. Billean, Tagipil, Bankuruan, and the mainland are almost connected by a chain of coral reefs.

There is a sand cay, about 4 feet high, standing on a coral reef about ½ mile in extent, situated 5 miles 155° (153° mag.) from Billean Cay.

Northeast and **Southwest Bluffs** are two prominent headlands, both apparently on the west coast of Simaddel, but the limits of this island are uncertain. The former is 442 feet in height and the latter somewhat less.

From the coast of Simaddel Island reefs and dangers extend north and northeast to a distance of about 5½ miles and eastward for 9 miles. On these reefs are many sand cays, two of which—**Mabahok** and **Kalangaan**—are especially conspicuous, being covered with trees whose tops are about 80 feet above the sea.

Sipindung is a sand cay covered with bushes, the tops of which are about 200 feet high; it lies 8 miles 37° (35° mag.) from the northeast point of Simaddel Island at the western end of a coral reef about ½ mile in extent. Dangers extend ¾ mile south and southwest of this islet, 2½ miles in a north-northeast direction and 1¼ miles to the northwest.

Between the Sipindung dangers and the reefs projecting eastward from Tigabu (an island lying 4½ miles westward) there is a clear passage 1½ miles wide.

Southwest of Sipindung a distance of 1¼ miles there is a group of reefs about ½ mile in extent; between these and other dangers also southwest, but nearer Sipindung, there is a clear passage nearly ¾ mile in width through which lies the track from Mallawalle Channel.

A shoal with less than 6 feet of water lies between the above group of reefs and the reef extending from Simaddel Island.

A beacon has been established on the 2-fathom patch 1½ miles southwestward of Sipindung Islet.

Sandy Island is a small sand cay which sometimes covers, and is near the middle of a coral reef about ½ mile in extent, off which detached patches extend ½ mile westward; it lies 4½ miles 126°

(124° mag.) from Sipindung; and between them, at the distance of 2¾ miles in a west-northwest direction from Sandy Island, there is a coral reef about ⅓ mile in extent.

BEACON.—Sandy Island is marked by a skeleton tripod beacon 35 feet high, painted red and black, with a basket cage on its summit.

Coral patches.—About ¾ mile southeastward of Sandy Island is a coral patch of 4 fathoms. Another patch lies 1¾ miles 234° (232° mag.) from the beacon and a patch of 7 fathoms lies 228° (226° mag.) from it, the track for Mallawalle Channel lying between.

Leonan is a sand cay, 5 miles 178° (176° mag.) from Sandy Island, which also sometimes covers. It is situated on and about 1 mile from the northeast end of an extensive chain of reefs which at this part extend 8 miles east-northeastward from the shore of Simaddel Island.

BEACON.—An iron-pole beacon with spherical topmark painted red, situated nearly 3 miles 64° (62° mag.) from Leonan Cay, marks a small, dangerous coral patch. Between this reef and that on which Leonan is situated there is a clear channel nearly 2 miles wide.

At about 1 mile northeastward of the above beacon is the southwest end of some coral patches that bare, which extend northeastward to the distance of about 1 mile.

A rock, covered by less than 6 feet of water and with 4¼ fathoms seaward of it, is situated 6 miles 179° (177° mag.) from Leonan. A reef, bare at low water, lies 1½ miles 148° (146° mag.) from this rock, and three similar reefs trend southwestward for a distance of 2½ miles from the rock.

Tigabu Island lies 4½ miles 286° (284° mag.) from Sipindung. It is about 1 mile in length and densely wooded, the tops of the trees being over 200 feet high. Reefs extend about 3½ miles in a northeasterly direction from Tigabu and about ⅔ mile northwestward.

Tibakkan Islet, situated about 2½ miles northward of the west end of Tigabu, is a sand cay covered with trees over 100 feet high. Dangers extend 1½ miles in a northeasterly direction from the cay. Two coral reefs, about 1 mile in extent, lie 1½ miles northwestward of Tibakkan on the northeast side of the track recommended through the Mallawalle Channel.

Tambulian (with bushes 12 feet high), **Buaning**, and the adjacent reefs (including the two coral reefs, just described) form the southeastern boundary of the Mallawalle Eastern Dangers.

Mosquito Rock, about 200 yards in extent, with a depth of 3 feet and steep-to, lies 41° (39° mag.) 2¼ miles from Tibakkan.

Kukuban is a sand cay situated on the southwest part of a coral reef, about ½ mile in diameter, lying 302° (300° mag.), distant about 4½ miles from Tigabu. The trees on it are about 70 feet high.

Rocks.—Between Tigabu and Kukuban there are the following dangers lying near the recommended track through the Mallawalle Channel, and much caution is necessary when navigating in this neighborhood. A rock, situated 148° (146° mag.), distant 1.1 mile from Kukuban, and marked by a beacon surmounted by a black spherical cage; a rock, lying 164° (162° mag.), 2 miles from Kububan, nearly awash at low water and difficult to see. **Merlin Rock**, apparently nearly awash at low water and dark colored, is situated 1,400 yards eastward of the rock, marked by a beacon. A sand cay on a

coral reef, 600 yards in extent and a coral patch of nearly the same dimensions, lie, respectively, 1½ miles 106° (104° mag.) and 2¼ miles 126° (124° mag.) from Kukuban; these are easily made out from the masthead.

In addition to the above, the following shoals have been found in this neighborhood: A depth of 1½ fathoms, with Kukuban Islet bearing 327° (325° mag.), distant 2.1 miles. A patch of 3¼ fathoms lies about 400 yards southeastward from it. These shoals are small in extent and surrounded by depths of from 9 to 10 fathoms, muddy bottom.

MALLAWALLE ISLAND,

about 7 miles distant from the southeast part of Banguey, and the same distance from Inarungtang Point, Borneo, is of irregular shape, 5 miles in length in a northwesterly and opposite direction, and about 4 miles in breadth. The island for the most part consists of ranges of hills from 400 to 500 feet high but one range, toward the northwest end, attains an elevation of 562 feet. Close to the coast, on the west side, is **West Islet**; **Northwest Islet** lies a short distance off the northwest end; and **North Islet**, low, and nearly 1 mile long, almost joins the north part of the main island. The island is fringed by a reef, which extends nearly 1 mile in places from the east, north, and west points and to about one-half that distance from its south point.

A sand cay is situated on a reef, about 1 mile in length, at nearly the same distance northeastward of Mallawalle North Islet, with patches east and west of it, forming the south side of Banguey South Channel. Another sand cay marks the west end of a reef, about 1 mile off the east end of Mallawalle Island; north-northwestward 1½ miles from this sand cay, there is a narrow coral patch, ½ mile in length, with 13 fathoms close around it.

Mallawalle Eastern Dangers comprise a large number of detached reefs and shoals which extend 10 or 11 miles in an easterly and southeasterly direction from Mallawalle. It is only the northern edges of these dangers, forming the eastern part of Banguey South Channel, which require description, for there can be no object in risking a vessel among them.

About 2¾ miles 58° (56° mag.) from the sand cay off the eastern end of Mallawalle Island is a coral reef which bares and has depths of 14 and 15 fathoms close around. About ⅓ mile northward of this reef is a reef, ½ mile in extent, with less than 6 feet of water over it. A cluster of reefs, occupying a space 1¼ miles in extent, with 13 fathoms close-to on the northern side, lies 1 mile eastward of the coral reef just described; and 75° (73° mag.) from the same cluster is a reef ½ mile in length, with 7 feet of water on its northern end. This danger, being always covered, is not so readily seen as the others, and it is important to bear this in mind, as the shoal occupies a prominent position, bordering as it does on the deep water of Banguey South Channel.

The Straggler, a small coral islet, with trees 20 feet high, is a useful object for assisting in the navigation of the eastern part of Banguey South Channel. From it the 7-foot reef, just described, lies 300° (298° mag.), nearly 1½ miles, while westward of the islet are several other dangers. The reef surrounding the islet extends 1¼ miles

in an easterly direction and more than ½ mile southwestward. About 1½ miles southeastward of the eastern extremity of Straggler Reef and 109° (107° mag.) from the islet is the outer edge of a reef having in some places less than 6 feet of water; ½ mile eastward of it is a 3¼-fathom coral patch. Other dangers of the group extend 7 miles farther southward.

Fairway Shoal, at the eastern entrance to Banguey South Channel, is ¾ mile in diameter, with a rock awash near its southern part, from which Straggler Islet bears 225° (223° mag.) distant 2½ miles. The rock awash is, however, only 1½ miles from the eastern extremity of Straggler Reef, which limits the channel southward of Fairway Shoal; the channel northward of the shoal is 3 miles wide. A beacon, consisting of a steel tripod painted red, surmounted by a barrel painted in black and white vertical stripes, has been placed 360 yards northwestward of the rock. At 1½ miles eastward of Fairway Shoal there is a patch of 3¼ fathoms, ½ mile in extent, with deep water around.

Meander Shoal.—This dangerous reef, composed of coral and sand, with 1¾ fathoms least water, is nearly ½ mile in extent and steep-to. It is situated about 6 miles northeastward of Fairway Shoal and 67° (65° mag.) 17½ miles from the northeast point of Mallawalle Island.

About 1 mile westward is a patch of 3 fathoms, and the same distance eastward one of 6 fathoms. There are also patches of 4 fathoms south of Meander Shoal at the distances, respectively, of 2 and 4 miles.

A number of dangerous shoals have been reported to exist 5 to 7 miles northward and eastward of Meander Shoal. Their position can be best understood by reference to the chart.

The **Pudsey Dawson Dangers** are a series of coral patches, the westernmost of which lies 98° (96° mag.) 19 miles from the east end of Mallawalle Island. From this patch for about 16 miles in an east-northeast direction there are several shoals and banks, principally coral and sand, with from 2½ to 10 fathoms of water upon them and deep water between.

Detached shoal patches.—Northward of Pudsey Dawson Dangers and of Meander Shoal, to the parallel of latitude 7° 25′ N., and between the meridian of longitude 117° 50′ E. and the dangers, already described, lying eastward of Banguey Island, there are numerous coral patches dangerous to navigation. Many of these have depths of from 3¼ to 5 fathoms, and the space within the above approximate limits should be avoided by vessels when possible.

The **Muligi Patches** consist of a number of coral banks, extending about 7 miles east and west, upon which the ascertained depths are from 5 to 10 fathoms; the easternmost of these patches, with 8 fathoms of water, lies 275° (273° mag.), distant 20 miles from the southern Muligi Island. There may be less water on these patches, and numerous reefs are reported westward of them. (See Muligi Islands.)

Wanderer Shoal, about 16 miles 43° (41° mag.) from Lankayan Island, is about 2 miles in extent and has a depth of 2 fathoms or less at its southeast end, situated in latitude 6° 42′ N., longitude 118° 06′ E. Wanderer Shoal is about 13 miles southward of the Muligi Patches.

A small shoal spot, covered by an estimated depth of 1 to 3 fathoms, exists 10½ miles 41° (39° mag.) from Tigabu Island with Straggler Islet and Banguey Peak in range.

Minna Reef, about 3½ miles in length northwest and southeast and ¾ mile in width, with a depth of ½ fathom at each end and 1½ fathoms between, lies with its northwestern extremity situated 58° (56° mag.) distant 8 miles from Tigabu Island.

Schuck Reef, about 1 mile in extent and with a depth of 3½ fathoms, is reported to be situated in latitude 6° 49′ N., longitude 117° 52′ E.

The space included between the Pudsey Dawson Dangers, Muligi Patches, Minna Reef, Billean Dangers, and Schuck Reef has not been examined; this area is reported to contain numerous reefs with from 1 to 2 fathoms of water.

Mallawalle Channel.—Dangers extend 3 or 4 miles off from the northeast coast of Borneo, and between these and Mallawalle Island there is a channel 2⅓ miles in width.

Egeria Rocks, about 400 yards in extent, covered by 3 feet of water, and a depth of 9 fathoms close around, lie 238° (236° mag.), distant 2½ miles from the islet northwest of Mallawalle Island, with the south extremity of the island bearing 112° (110° mag.).

Lingisan is a small, rocky reef, with a head 30 feet in height, lying about 30° (28° mag.), distant 1¾ miles from the northeast point of Bankoka.

Passage Reef.—At the distance of about 2 miles southwestward of the south end of Mallawalle Island and 1¼ miles 36° (34° mag.) of Lingisan Rock lies Passage Reef, awash at low-water spring tides and easily distinguished; it may be passed either side, but the route recommended lies northward.

Another reef, awash at low water, on which is a small sand cay, is situated 2⅔ miles 96° (94° mag.) from Passage Reef.

Fly Rock, on the south side of the Mallawalle Channel, awash at low water, and about 300 yards in extent, lies 81° (79° mag.) 2¼ miles from Lingisan, and is distant 1½ miles 246° (244° mag.) from the sand cay above mentioned.

Southward of Fly Rock and separated from it by a narrow channel there is a coral reef about 1 mile in extent, parts of which bare at low water.

Clearing marks.—Banguey Peak, in range with the western extremity of West Island (Mallawalle), bearing 325° (323° mag.), leads between Passage Reef and the cay eastward of it; and Kukuban Island, on with the north end of Tigabu Island, leads between Fly Rock and the cay above mentioned.

Mandiralla, an island about ½ mile long east and west, is surrounded by a coral reef which extends to a distance of about 1,200 yards on the north side and for 1 mile eastward; it lies 6 miles southward of the eastern end of Mallawalle. Mandiralla is densely wooded, the tops of the trees being 144 feet above the sea.

Foul ground extends about 3½ miles east-southeastward of Mandiralla.

Bankoka Hill is a conspicuous wooded hill, 587 feet in height, on the mainland west-southwestward of Mandiralla.

Tanj Bungaan is a thickly wooded island of considerable extent lying about 4 miles southeastward of Bankoka Hill.

Bush Island is a sand cay on which are a few bushes, the tops of which are about 10 feet high. It stands near the middle of a coral reef about 1½ miles in length in a northeast and opposite direction.

Foul ground.—Much foul ground exists between Mandiralla, the coast of Borneo, Tanj Bungaan, and Bush Island.

Mallawalle Channel to Sandakan.—DIRECTIONS.—The route now generally used by vessels proceeding to Sandakan is by the Balabac Main Channel, that by the Banguey South Channel and the Mallawalle Channel being practically abandoned because of the numerous charted and uncharted dangers existing in it.

Should, however, the Mallawalle Channel be used, the track recommended lies midway between Mallawalle Island and Passage Reef and passes about 600 yards northward of the reef (awash at low water), situated 2¾ miles eastward of the latter. Hence, to Tigabu the track lies either eastward of Kukuban Islet and the shoals southeastward of it or westward of this central group until 1½ miles southwestward of Tigabu, when Sipindung Island may be steered for, bearing 92° (90° mag.), until Tigabu northeast extremity is in line with the western extremity of Mallawalle Island. This latter mark leads between the shoals extending southward of Sipindung and the shoal waters off the northeast edge of the small coral reef situated 1½ miles southwestward of that island. Another good mark leading through this, the narrowest part of the channel, is a sand cay, with a few bushes on it, lying 1 mile northward of Tigabu, in line with the eastern summit of Mallawalle Island 313° (311° mag.), which mark also leads past Sandy Island and between the Leonan Reef and the detached reef northeastward of it marked by a beacon.

Billean Island should be rounded at a distance of from 4½ to 5 miles and the course then altered to pass about 2½ to 3 miles west of Lankayan between that island and the reef lying 3¾ miles westward of it. Foul ground, marked by a beacon, exists from 2 to 3 miles southwestward from Lankayan, and especial care is needed at this part. The track lies between Lankayan Reefs and the beacon on the north end of the foul ground, passing over or near the 4-fathom patches westward from Lankayan Reefs or vessels could pass southward of the shoal marked by the beacon in apparently better water, but it has not been surveyed in detail. The route now lies eastward of Sibaung and of the reef extending 1¼ miles eastward of Silingaan and westward of Lihiman, Little Bakkungaan, and the dangerous Gubbins Rock, situated 7¾ miles 143° (141° mag.) from the last-mentioned island.

CAUTION.—This route is marked on some charts and has been followed with safety, but there may be less water than shown on some of the shoals, and in such reef-strewn waters other dangers not chartered may exist.

It should be borne in mind also that no reliance can be placed on the position of the sand cays which have no vegetation on them; the action of the sea frequently causes them to shift considerably and even disappear. The beacons are difficult to make out, and are liable to be washed away.

TIDES.—At Tigabu it is high water, full and change, at $11^h\ 38^m$; springs rise 6½ feet; neaps vary between 9 inches and 2¾ feet, and are exceedingly irregular.

In the Mallawalle Channel the flood runs eastward and the ebb westward at springs, with a velocity of about 2½ knots.

On the coast between Mallawalle and Sandakan, no regular tidal stream was perceptible, but when the northeast monsoon blew steadily there appeared to be a constant set to the northwest.

Balambangan Island, situated 27 miles southward of Balabac Island, is of irregular shape, about 13 miles long northeast and southwest, with an extreme breadth of 4 miles. The composition of the elevations of this island varies between limestone, basalt, trap, and sandstone. All the rocks exhibit traces of violent convulsion. The southern part of the island presents a range of hills, the highest being 440 feet; there are other elevations, one of which, Thumb Peak, 314 feet high, near the southwest end of the island, is conspicuous. These hills are terminated on the coast line by abrupt cliffs. The northern part of the island is flat and thickly covered with high trees. On the east coast of Balambangan Island are two inlets, known as North and South Harbors, both affording sheltered anchorage and good drinking water.

Kalutan Island is situated ¾ mile northwestward from Kalutan Point, the southwestern extremity of Balambangan, and about ½ mile from shore. It is small and round, 278 feet in height, and has a reef projecting nearly ½ mile from its western side.

Coast.—Between Kalutan Point and Buttun Point, 5¼ miles northward, the reef extends nearly ¾ mile from shore, and the large bay northeastward of Buttun Point has less than 3 fathoms water extending nearly 1½ miles from shore.

Siagut Shoal, lying 2 miles westward of Siagut Point, the northern extremity of Balambangan, is a detached coral bank 1½ miles in length, with less than 6 feet of water over some parts of it. By keeping in depths of not less than 14 fathoms all these dangers will be avoided.

Reefs and shoals extend more than ¾ mile from Siagut Point, and a 3-fathom patch lies nearly 1¼ miles north-northwest of it. Vessels when rounding Siagut Point should, therefore, give it a berth of 2 miles or not come into less than 9 fathoms.

The whole of the east coast of Balambangan is fronted by a coral reef, outside of which there are detached patches here and there, but the 3-fathom curve embracing these is, for the most part, distant ½ mile from shore. At 1½ miles southeastward of Siagut Point, and separated from the shore reef by a narrow passage, lies a coral reef more than ½ mile in diameter, having less than 6 feet of water over some parts of it. Eastward of this danger, in the channel between it and the reef surrounding Tiga Islet, is a shoal of 3½ fathoms and another of 2½ fathoms. Caution is therefore necessary when passing through that channel.

The shoals along the southeast coast are not easily distinguished unless the sun is shining behind the observer.

Kalutan Point, the southwestern point of the island, is fronted by several islets and rocks extending ¾ mile in a southeasterly direction. At 1 mile eastward of these is a coral patch with 3 fathoms of water, with the point bearing 292° (290° mag.), distant 1 mile.

South Harbor, the entrance to which is about 3 miles northeastward of Kalutan Point, is fronted by isolated shoals to a distance of about

2 miles, with reefs on either side. The channel abreast of Raha, the south point of the entrance, is ¼ mile wide between the reefs, with a depth of 7 fathoms.

DIRECTIONS.—To enter this harbor requires close attention to the following directions, as well as to the lead and lookout, and it is not advisable to attempt to enter unless the reefs are visible from aloft: From southwestward, having given Kalutan Point a berth of at least 1 mile, haul nearer the shore, bringing Cone Islet, the outer islet off Kalutan Point, to bear 250° (248° mag.), well open of Observatory Point, which leads southward of the reefs off Raha Point. When Raha Point bears 317° (315° mag.) haul up to 2° (0° mag.), passing between Raha Reef (the edge of which will be seen from aloft and probably marked by breakers) and Raha Rocks and other dangers eastward; round Raha Point at a prudent distance and haul in westward for an anchorage in 7 fathoms in the fairway northward and westward of Raha Point.

WATER.—Fresh water will be found on the south shore about 600 yards within Raha Point. The reef prevents access until about half flood.

North Harbor offers more commodious anchorage and is much easier of approach, the shoals being better defined. It is not advisable to enter this harbor, however, unless the reefs are visible from aloft.

DIRECTIONS.—Approaching from southward, keep Kalutan Point bearing westward of 261° (259° mag.) to pass southward of Half Channel Patch, which has only 3 feet of water on it and breaks at times. Keep within 1 mile of the Banguey coast until Battang Point bears about 322° (320° mag.); then steer to pass between it and the reef awash nearly 1 mile southwestward of it, looking out to avoid a 1½-fathom knoll lying ½ mile from shore just within Battang Point. A reef awash lies about 700 yards northwestward of this knoll, and anchorage may be obtained in 10 fathoms, with the center of this reef in range with Battang Point. The head of the harbor is known as **Lung Bay** and has depths of 5 to 7 fathoms between the reefs fringing its shores.

WATER.—There are two streams discharging near the southern entrance point. The western, it is stated, will furnish about 15 tons per day.

Banguey West Channel separates Balambangan and Banguey Islands and has a least breadth of 2¼ miles between Battang and Manyangit Points. The southern portion is deep, with Half Channel Patch, with 3 feet on it, nearly in the fairway but with a passage 2½ miles wide eastward of it.

The northern entrance, between Siagut and Samarang Points, about 8½ miles apart, is obstructed by Tiga Islet and its reef and Rifleman Rock and other patches. The channel between Rifleman Rock and Tiga is navigable and has depths of 6 to 7 fathoms in its fairway, but it would not be safe to reckon on more than 5 fathoms unless the channel were thoroughly buoyed. The rock is buoyed and there is a beacon marking the southeastern edge of the Tiga Islet reefs, but these marks must not be depended on. The channel along the Banguey shore seems equally good if buoyed. The channel westward of Tiga is narrow and more obstructed. They should only be navigated when the danger can be made out.

Tiga Islet, situated in the northern entrance of Banguey West Channel, is low and covered with trees. It is a little more than ½ mile long north and south, ¼ mile in breadth, and surrounded by reefs fairly steep-to, extending more than 1 mile in a northerly and about ¾ mile in other directions. The shoal westward of Tiga Islet and southward of Siagut Point and the 2½ and 3½ fathom patches lying in the fairway between that shoal and Tiga Islet Reef have been referred to.

BEACON.—A black iron tripod beacon stands southeastward of Tiga Island near the edge of the reef.

Rifleman Rock, a small coral patch with 1½ fathoms and 5 fathoms close-to, lies in the fairway between Tiga Islet Reef and the Banguey coast dangers with the south end of Tiga Islet 280° (278° mag.), distant 2 miles; westward of this rock are depths of 6 and 7 fathoms in the fairway. A buoy has been placed on Rifleman Rock, but it is not to be depended on.

Shoals.—About midway between Rifleman Rock and the northwest coast of Banguey are patches of 2½ and 3 fathoms, on a bank about 2½ miles in extent, northeast and southwest, within the 5-fathom limits, and with a depth of 6 to 7 fathoms in the channel between them and the shore.

Labuan Rock, covered by 1½ fathoms, lies in the fairway 2 miles 159° (157° mag.) from the southern extremity of Tiga Island and 47° (45° mag.) from Battang Point in approximate latitude 7° 18′ 35″ N., longitude 117° 03′ 45″ E.

Half Channel Patch, which has only ½ fathom of water on it and breaks at times, lies in the middle of Banguey West Channel with Manyangit Point, Banguey, bearing 35° (33° mag.) and Kalutan Point, Balambangan, 259° (257° mag.).

Samarang Point, the eastern entrance point of the northern end of Banguey West Channel, has a reef extending nearly ¾ mile northwest of it, on which there is a small sand cay about 400 yards from its end. Nearly 2 miles southwestward there is an islet on the reef fronting the shore.

The coast southward is foul only to about 600 yards, except in one or two places, for which see chart.

DIRECTIONS.—The channel between Rifleman Rock and Tiga Island reefs is available for vessels of moderate draft; if the beacon on Tiga Islet reef and the buoy on Rifleman Rock are in position there will be no difficulty. Vessels from northward should bring Battang Point, Balambangan, to bear 220° (218° mag.) and steer for it. This is apparently a good mark and should carry a vessel about ¼ mile westward of Rifleman Rock, ¼ mile eastward of the reefs off Tiga Islet, and the same distance westward of the assigned position of Labuan Rock. When Banguey Peak bears 110° (108° mag.) all dangers will have been passed and the course should be altered southward along the Banguey side at a distance of 1½ to 2 miles from shore until southward of Half Channel Patch, when the course may be shaped as desired. Banguey Peak should not be brought to bear northward of 24° (22° mag.) if near Molleangan Islands Reefs.

To pass southward of Rifleman Rock in about 3 fathoms steer with Saparoak and Battang Points in range until approaching Manyangit Point, when the vessel should be hauled in toward the point to avoid

Labuan Rock. This passage is not recommended, as patches may exist in it.

TIDES.—It is high water, full and change, in Banguey West Channel at 10^h; springs rise 6 to 8 feet.

BANGUEY ISLAND,

the northwestern extremity of which lies 2¼ miles eastward of Balambangan, is 19½ miles in length in a northeast and southwest direction and about 13 miles in breadth. The island is surrounded by a fringing reef, the southeast coast being faced by small islands having deep-water channels between them and large concealed channels which formerly served as the principal rendezvous and hiding places for pirates. These islands form part of the northern limit of Banguey South Channel. For several miles off the northeast and east coast of Banguey are numerous islands, islets, and dangers, as will be seen on the charts.

There are several ranges, also some detached hills on Banguey. The highest, **Banguey Peak**, 1,876 feet high, is at the northwest end of the island, and shows up as a very conspicuous object for more than 30 miles around. Viewed on a northwesterly or opposite line of bearing, the apex appears as a nipple, but as this line of bearing is departed from the nipple shape becomes less apparent, and the summit assumes a rounded form. A range of hills extends eastward for a distance of 6 miles, with **East Hill** at the end, elevated 1,076 feet; thence some smaller ranges lie in a northerly direction and terminate near the coast in **North Hill**, 742 feet high. About 1¼ miles southeastward of Banguey Peak is a conspicuous hill 1,480 feet in height.

Samarang Point has a reef extending nearly ¾ mile northwestward from it, on which there is a sand cay about 400 yards from its end. Nearly 2 miles southwestward there is an islet on the reef fronting the shore.

Between Samarang Point and the north point of Banguey the coast recedes, forming two bays, each having a small stream running into it. The points and sides of the western bay are fringed with coral extending 300 to 400 yards from the shore, but the head of it is a coral and sand beach. Vessels may anchor in the entrance to this bay in 4 fathoms. The eastern bay, with the exception of a narrow boat passage, is blocked with coral, upon the outer part of which is a small islet.

The limits of the islands and dangers fronting the north and northeast coasts of Banguey and bordering the south side of Balabac Main Channel are surrounded on the chart by a dotted line, within which no vessel should enter. The principal ones are contained in the following description:

North Guhuan Islet is situated on a reef ¾ mile in extent, nearly 1 mile off the north shore of Banguey and 5 miles eastward of Samarang Point. There are no offshore dangers westward of it. From North Guhuan, a bank of less than 3 fathoms, extends eastward, parallel to the shore for about 4 miles, on which are two sand cays and reefs dry at low water.

Louisa Shoal, composed of coral, covered with 1½ fathoms of water, is ¾ mile in length. From its north end North Guhuan bears 196°

(194° mag.) distant 1½ miles. Manyangit Point, well open of Samarang Point, leads northward of it.

Maggie Reef, situated about 3 miles eastward of Louisa Shoal, is about 1 mile east and west, with a coral patch ¼ mile in extent on its northern side and many rocks just below the water. The reef, which bares, lies with the western sand cay between it and the shore bearing 204° (202° mag.), distant about 2 miles.

Black Watch Rock, on which the British bark *Black Watch* is reported to have struck, lies just within the danger line shown on the chart, 2 miles northward of Maggie Reef. From the position of the rock as given by the master of the *Black Watch*, North Mangsee Island is well open of South Mangsee Island bearing 10° (8° mag.), and the cay on Banguey Outer Northeast Reefs 129° (127° mag.). From the irregularity of the soundings in this locality it is possible that coral heads may exist other than those shown on the charts.

East Guhuan Islet, about ¼ mile in extent, stands on a coral reef 1½ miles in length, the northern part of which bares. About 1 mile north-northwestward of East Guhuan there is a 1½-fathom patch.

Banguey Outer Northeast Reefs are a cluster of reefs separated from Maggie Reef and East Guhuan Islet by a channel 1 mile wide, with depths of 7 to 9 fathoms. These reefs extend 3½ miles in northwest and southeast directions and are a little over 1 mile in breadth, with a large central position bare at low water. Near the northwest end of these reefs there is a sand cay which is useful for pointing out the locality of these dangers, which lie 6 miles from the shore. Close to the edges of these reefs there are depths of 6 to 9 fathoms. North Hill, bearing southward of 242° (240° mag.), leads northward and the west side of South Mangsee 326° (324° mag.), or westward of that bearing, leads eastward of these reefs.

Fearless Shoal, a coral patch of 4 fathoms, with another of 6 fathoms 400 yards eastward of it, and a sounding of 8 fathoms 600 yards northeastward of the same patch, is reported to exist in approximate latitude 7° 23′ N., longitude 117° 38′ E. From the 4-fathom patch Balabac Peak bears 314° (312° mag.) and the summit of Mallawalle Island (562 feet) 226° (224° mag.), distant 28 miles. This is the most eastern danger reported northeastward from Banguey Island. About 3½ miles southwestward from Fearless Shoal there is a 3¼-fathom patch.

Borneo Shoal.—A shoal with a depth of 2 fathoms over it is reported by the S. S. *Borneo* to lie in the eastern approach to Balabac Strait, 13 miles 62° (60° mag.) from the summit of Latoan Island, or in approximate latitude 7° 22′ N., longitude 117° 32′ E. This shoal appears to be about 1½ miles long north and south. About 4¼ miles southward from the 2-fathom spot the charts show a 3¼-fathom sounding.

The east coast of Banguey is fronted by dangers which extend off several miles. They consist for the most part of extensive reefs, bare at low water, separated from each other by narrow channels.

Kahamkamman is a small islet 2 miles southeastward of East Guhuan on the northwest end of a coral reef about 1 mile in extent. The part surrounding the islet bares at low water.

Westward of this islet is a reef, about 2½ miles in extent, having 3 islets, a sand cay, and several patches of reef, bare at low water, upon

it. **Balundangan** is the name of the southwesternmost and smallest islet. At about 1 mile southwestward of Balundangan, and 600 yards within the edge of the reef fronting the Banguey shore, is an island about 1¼ miles in length with the summit near the center. This island lies a little more than ½ mile from the coast, which is covered with mangroves.

Samson Patches, three in number, have 3½ to 4 fathoms of water on them. They lie eastward of Kahamkamman near the edge of the danger line marked on the chart. From the eastern patch Kahamkamman bears 275° (273° mag.) distant 3 miles.

May Williams Shoal, situated 150° (148° mag.) distant 1¼ to 2 miles from Kahamkamman, is about 1 mile in length with a least depth of 2 fathoms and steep-to at a short distance.

Latoan Island, situated about 4¼ miles southward of Kahamkamman Islet, is an oval-shaped island about 1 mile in extent, the trees upon it rising to an apex near the center. It is situated at the southwest part of a reef which bares, extending 2½ miles eastward and 1½ miles northward of it. A large reef lies westward of Latoan, upon which trees are growing.

Outer Latoan Patch is the easternmost of three isolated patches which lie off the northeast edge of Latoan Island Reef. It has a rock a few feet under water near the eastern edge, from which Latoan apex bears 244° (242° mag.).

Rock.—On the middle isolated patch mentioned above there is a rock 7 feet high.

East Banguey Patches are two small coral heads with 2 and 2¾ fathoms, lying ¾ and 1 mile, respectively, off the Bankawan Reefs. From the outer one Latoan Summit bears 292° (290° mag.) distant 3¾ miles.

Bankawan Island, situated about 1 mile from the east coast of Banguey, is an irregular-shaped island, 2¼ miles long north and south and 1¾ miles wide. Close to its east side there is an island with an islet off its northeast point, and a little more than 1 mile southeastward of it a small round island, from which a narrow tongue of sand projects ¾ mile in a southeasterly direction. From the south point of Bankawan numerous small reefs extend out for about 2 miles, which, with the reef extending ½ mile southeastward of the tongue of sand, form the northern limit of Bankawan Channel.

Molleangan Island, 466 feet high, situated 1¼ miles southwestward of the south point of Banguey, is 1¼ miles long east and west and ¾ mile wide, with reefs and rocks above water extending ¾ mile in a northwest, west, and southwesterly direction; the northeast and southeast sides of the island are steep-to. Several reefs with rocks above and below water lie nearly midway between Molleangan and Banguey.

At 1 mile southwest of Molleangan lies Little Molleangan Island, from which dangers extend ⅓ mile eastward and ¾ mile westward, with depths of 13 to 17 fathoms close-to.

Patanunam Island, situated ¾ mile eastward of the south point of Banguey, is more than ½ mile in extent and 428 feet high. The summit is a useful object for determining a vessel's position when passing through the channel. The island is fringed by a coral reef projecting 400 yards from its southwest end, and off its northeast end a detached narrow reef extends nearly 1 mile northeastward.

Pagassan Island, hilly in character, is about 2 miles in extent and fringed by a reef which projects 600 yards from the southern part, with a rock awash 200 yards beyond. Westward of the rock awash there are patches of 4 and 5 fathoms, the outer and most distant of which is situated 255° (253° mag.) from it.

Lampassan Island lies ¾ mile eastward of Pagassan and is about 3 miles long northeast and southwest. From its southern and eastern points coral spits, dry at low water, extend to the distance of ¾ mile.

Mitford Harbor is situated on the south side of Banguey Island and within the islands just described. There are three entrances to it; the middle, between Pagassan and the island westward of it, is less than 200 yards wide and has depths of 7 to 10 fathoms. The western entrance and channel within has about 5 fathoms. The eastern entrance between the reefs, extending from Pagassan and Lampassan Islands, is 450 yards wide, narrowing to 150 yards at 1 mile from the sea, the depths varying from 7 to 10 fathoms. The channel up to the settlement is marked by beacons, painted red on the port hand and white on the starboard, situated on the edges of the reefs. There is no danger in the channel, it being only necessary to steer midway between the beacons, or, if they are not in position, between the reefs. A depth of 5 fathoms can be carried right up to the anchorage, which is situated between Modum Island and the mainland of Banguey.

Settlement.—A small settlement is situated on the coast of Banguey Island, abreast Modum Island.

Beacons, made of nibong palm, were reported to be erected on the reefs on either side of the middle and western channels, but they must not be depended on.

Water.—The water supply is reported to be good.

Directions.—**Middle Channel.**—In steering for the entrance of the middle channel the two patches 1 mile southeast of it must be avoided. The western extremity of Pagassan Island, bearing 311° (309° mag.), clears the 4-fathom patches eastward; and the same point, bearing 351° (349° mag.), clears the 5-fathom patch westward. The middle of the hill (663 feet in height) close behind Mitford, bearing 317° (315° mag.), leads through the middle of the middle channel, and midway between the palm beacons on the fringing reefs should they exist.

About ½ mile eastward of Lampassan a point extends from Banguey toward the channel, forming one side of an inlet choked by reefs, the other side being a peninsula forming the southeast end of Banguey. A short distance off the point, on the reef extending from it, lie two islets, and from these a number of rocks, almost connected, extend in a south by west direction nearly 1½ miles. The southeast extremity of Banguey is bordered by reefs, and off the mouth of the inlet just mentioned lie two large patches, the outermost being 1 mile from the shore reef.

Carrington Reefs, situated 2½ miles southeastward from the east end of Lampassan, are composed of coral, for the most part bare at low water. They extend 4 miles in an east and west direction and are 1 mile in width. At 800 yards from the north side of these reefs there is a detached patch of 2½ fathoms. Between this shoal and the dangers extending from the Banguey shore is a channel ¾ mile wide, but which, as a matter of ordinary navigation, no vessel would require to use. It is, however, practically available for small

steamers, which may afterwards round the Carrington Reefs and return into Banguey South Channel; or they may proceed into the Sulu Sea, either by the narrow and intricate passage between the shore reefs and those surrounding Bankawan and Latoan or by Bankawan Channel, a broader and much less intricate passage, separating the Bankawan and Southeast Banguey Dangers.

The main channel, however, lies between the Carrington Reefs and those off the north part of Mallawalle Island, and this channel only should be used by strangers, taking care not to near the former dangers under a depth of 13 to 15 fathoms. The apex of Pagassan, bearing 279° (277° mag.), leads close southward, and the east end of Lampassan 348° (346° mag.) leads westward.

Southeast Banguey Dangers comprise an extensive group of reefs and shoals 10½ miles in length in an east by north and opposite direction, and nearly 5 miles in width, situated about 1½ miles eastward of Carrington Reefs. The west end of the group is defined by two small isolated reefs, bare at low water and steep-to. A good lookout is essential when nearing them, and the same precaution will have to be observed when passing through the channel, as the reefs forming the southern edge of these dangers are all steep-to. A space about 2 miles in extent, at the eastern part of Southeast Banguey Dangers, is studded by a number of coral patches with from 1 to 5 fathoms of water, and from the outer or eastern one the summit of Latoan Island bears 299° (297° mag.) distant 9½ miles.

Bankawan Channel, separating Bankawan Reefs from Southeast Banguey Dangers, is ¾ mile wide at its narrowest part. The channel is nearly straight and lies in a 55° (53° mag.) and 235° (233° mag.) direction, but it will be necessary to keep a good lookout for reefs on either side; with proper precaution there will be no difficulty in taking a vessel through in safety.

Banguey South Channel, leading from the China into the Sulu Sea, is somewhat intricate and requires careful navigation, being for the greater part of its length bordered by dangers, and with others near the fairway. The western entrance, about 1¾ miles wide, lies between Outer Shoal and Molleangan Islands, off-lying the coasts of Borneo and Banguey, respectively. The southern limits of the channel are formed by the Northwest and North Borneo Dangers, South Channel Dangers, the reefs off the northern part of Mallawalle, Mallawalle Eastern Dangers, and Fairway Shoal. The northern limits by the islands which lie close-to, and appear to be a part of the southern shore of Banguey, Carrington Reefs, and Southeast Banguey Dangers.

Islands and Dangers on the North Coast of Borneo. —Lying off the northwest and north coast of Borneo are a number of coral shoals, generally of small extent, some partially bare at low water, whilst others bare entirely, and two are marked by sand cays which shine brightly in the sunlight. Those dangers only will be described which limit the channels proper for vessels to proceed by. To mention the others in detail would tend rather to confuse navigators, who can have no inducement to risk the safety of their vessels by venturing among them.

Outer Shoal, the largest of these dangers, forms the southwest limit of Banguey South Channel. It is about 1 mile in extent and steep-to, with about 6 feet of water and a patch which bares on its eastern side.

From its northwest end the summit of Little Molleangan bears 36° (34° mag.) and is distant 2½ miles.

BUOY.—The northwestern extremity of Outer Shoal is marked by a red and white vertically striped can buoy moored in the following position: Summit of Molleangan Island, 50° (48° mag.), and the northwest point of Perak Island, 139° (137° mag.), distant 5 miles.

A sand cay, on the east side of a coral ledge nearly awash and steep-to, lies 103° (101° mag.) 2¾ miles from the northeast extremity of Outer Shoal.

Nearly midway between Outer Shoal and this sand cay is a small coral patch with 6 feet of water and a depth of 15 fathoms around.

Another sand cay, in the center of a coral ledge, lies 1 mile eastward of the former. These cays are useful as marking the limits of the channel on the Borneo side; and, being composed of white coral sand, are conspicuous.

Nearly 3 miles east-northeastward of the eastern sand cay is a 2-fathom patch, with two ledges which bare a short distance southward. From this shoal, which is the most northerly of the North Borneo dangers, the summit of Patanunam bears 330° (328° mag.), distant nearly 4 miles.

About 1¾ miles 95° (93° mag.) from the 2-fathom shoal is the outer of two coral ledges lying close together, with Patanunam summit bearing 314° (312° mag.), distant 5 miles. A 3-fathom patch lies 600 yards east-southeastward, and a ledge of rocks is distant a little over 1½ miles in the same direction from these dangers. The latter is within ⅓ mile of the reef fronting the Borneo shore to a distance of about 2 miles.

Dangers in the fairway.—**Petrel Rock** is a narrow ridge of coral about 40 yards in extent, with 2¼ fathoms of water and a depth of 12 fathoms close around. It lies with the southern extremity of Molleangan Island bearing 278° (276° mag.), distant about 3½ miles.

A patch of 5¼ fathoms lies about ¾ mile eastward of Petrel Rock, with the southern extremity of Molleangan Island bearing 273° (271° mag.) and the 663-foot hill at Mitford 348° (346° mag.).

BEACON.—A beacon, consisting of a staff surmounted by a ball, painted vertically red and white, has been erected to mark a shoal which is reported to have a depth of 1¾ fathoms over it, situated in Banguey South Channel at a distance of about 2½ miles 143° (141° mag.) from the eastern point of Patanunam Island.

Ten-foot Rock, the westernmost of the dangers in the fairway, is a coral head 70 yards in length, with a least depth of 10 feet and 17 fathoms close around. It lies with Petrel Rock, bearing 33° (31° mag.), distant about 1,400 yards. As other dangers may exist here, the utmost caution should be used when navigating in this vicinity.

South Channel Dangers comprise six coral reefs lying in the fairway eastward of Petrel Rock, with irregular depths between. Three of these reefs lie in an east and west direction, about ½ mile apart. The two westernmost bare at low water; the other is a strip of coral nearly ¾ mile in length, with a rock nearly awash at its eastern end. A 2½-fathom patch lies 165° (163° mag.) 1,200 yards, and another 58° (56° mag.) 1½ miles from the rock nearly awash. Between the different dangers are passages which it is possible for vessels to pass through, but as this would serve no useful purpose it is advisable to consider these shoals as a dangerous group.

CLEARING MARKS.—The apex of Molleangan Island, bearing 261° (259° mag.), leads northward of South Channel Dangers; the same object 275° (273° mag.), leads southward of them and about 600 yards northward of Petrel Rock.

DIRECTIONS FOR BANGUEY SOUTH CHANNEL.—Attention to these directions must be supplemented by a vigilant and careful lookout from aloft. The best time for proceeding through from westward is with the sun astern, when there is seldom much difficulty in making out the various dangers as the vessel advances. Balabac Main Channel is, however, considered a much safer route.

Entering from westward, bring Molleangan Islands to bear about 92° (90° mag.) and steer for them. When about 5 miles from the reef encircling them, edge southeastward, opening the summit of the larger island southward of the smaller one. Then steer to pass about ¾ mile southward of the latter, observing that the whole of Patanunam Island should not be opened eastward of Molleangan Island until the summit of Little Molleangan Island bears 25° (23° mag.), which will lead clear of Outer Shoal. Having passed Little Molleangan, steer more northeastward, keeping within 1 mile of Molleangan and Patanunam.

Having passed those islands, bring the peak of Patanunam to bear 265° (263° mag.) and steer 85° (83° mag.) through the fairway between the South Channel Dangers and the rock off the south end of Pagassan until the sand cay off the north side of Mallawalle is abeam, distant about 1 mile, when a 109° (107° mag.) course will lead clear of the dangers off the northern side of Mallawalle. When the sand cay off the eastern extremity of that island bears 182° (180° mag.), distant 2¼ miles, steer 70° (68° mag.), which course being preserved will lead 1 mile northward of Fairway Shoal into the Sulu Sea. Bearings of Straggler Islet will check the position of the vessel while westward of Fairway Shoal.

North coast of Borneo.—Inaruntang Point, the most northern point of Borneo in this vicinity and the eastern entrance point to Marudu Bay, is situated in approximate latitude 7° 01′ N., longitude 117° 09′ E. It is surrounded by a reef to a distance of about 1 mile, northward from which are the dangerous detached patches known as the North Borneo Dangers. Inaruntang Point should be given a berth of at least 2½ miles.

MARUDU BAY

is about 24 miles wide at the entrance between Inaruntang and Sampanmangio Points and extends some 28 miles southward. The depths in the middle of the entrance are 18 and 19 fathoms, decreasing gradually toward the head of the bay, where there is considerable shoal water and extensive mud flats that bare at low water. The only danger in the bay, outside of numerous shoal patches lying close to the shore reefs, is **Barraut Reef**, a small coral patch covered by a least depth of 4 feet lying on the bearing: Sandilands Light 345° (343° mag.) and the chimney of the cutch factory at Mempakit 118° (116° mag.), distant 3⅔ miles.

From Inaruntang Point the coast trends southwesterly for about 9 miles to Cape Mafsie. Between these two points the shore is fringed by reefs outside of which are numerous detached shoals

known as the Northwest Borneo Dangers. On this section of the coast there are two deep indentations. The one immediately westward from Inaruntang Point is completely blocked by reefs; the one northeastward from Cape Mafsie is about 1 mile wide at the entrance between the reefs and extends about 3 miles southeastward to the mouth of the Melobong River. The eastern entrance point is marked by **Perak Island**, a small, heavily wooded islet with steep, cliffy sides, about 120 feet high and ¼ mile long. The reefs on the eastern side of this bight are marked by a beacon, and depths of 2 and 2½ fathoms can be carried as far as Tarang Puteh. Boats entering steer for Perak Island on a 103° (101° mag.) course, and when within a distance of 1 mile of it a southeasterly course leads to the mouth of the river.

Cape Mafsie is prominent, 56 feet high, with conspicuous white cliffs and has a sharp rock 35 feet high lying close to it. It is surrounded by reefs which extend about 1 mile westward and 2½ miles northwestward from it, where there is a boat passage leading to the bight northeastward from Cape Mafsie, into which the Melobong River discharges.

Shoals.—A shoal having over it a depth of 2¾ fathoms is situated 2 miles 283° (281° mag.) from Cape Mafsie, and a patch of 4 fathoms lies 1 mile in an east-southeasterly direction from this shoal.

Perawan Point, about 3 miles southward from Cape Mafsie, is 56 feet high and is easily distinguished by its red cliffs. The reef which surrounds Cape Mafsie gradually narrows and finally disappears at Perawan Point. Shoal water extends some distance westward from Perawan Point, the 5-fathom curve being found at a distance of 1½ miles from shore.

Benkoka River discharges about 3½ miles southward from Perawan Point. **Benkoka Islet**, a small wooded islet covered with trees about 25 feet high, lies at its mouth. The mouth of the Benkoka River is about ½ mile wide, rapidly decreasing to a uniform breadth of 200 yards. It is obstructed by a sand spit, but launches drawing 6 to 8 feet can ascend, at high water, a distance of 12 miles to the village of Pitas. There are a number of other villages in this vicinity.

The Benkoka and other rivers flowing into Marudu Bay shift their channels after every rainy season and are only available for boats after the beacons have been again placed in position.

Tenga River, which is a branch of the Benkoka River, discharges about 1½ miles southwestward from Benkoka Islet. The Taka River discharges 3½ miles southwestward from the Tenga. At the mouth of the Taka River there is a bar covered by 3 feet at low water which generally breaks. A long sand spit extends northward from the mouth of this river.

The area included between the Benkoka and Taka Rivers is low, intersected by numerous small streams, and heavily wooded with mangroves and casuarina trees.

Zebra Reefs are several coral patches with deep water between them and also between them and the shore. They are situated about 1 mile from the coast; from the western reef the cutch factory chimney bears 180° (178° mag.) distant 3¼ miles.

Mempakit is a small town situated 3½ miles east-northeastward from Ridge Point. It contains a cutch factory with a chimney 90 feet high, which forms a conspicuous landmark.

Powell Rock, with less than 1 fathom over it, lies ½ mile from shore with the factory chimney bearing 171° (169° mag.) distant ⅝ mile.

ANCHORAGE.—Good anchorage may be obtained in a depth of 8 fathoms, muddy bottom, with the factory chimney bearing 118° (116° mag.) distant 800 yards.

Ridge Point is 170 feet high and cliffy. A coral reef, bare at low water, extends about 1 mile northward from it.

From Ridge Point to the mouth of the Taritipan River, 5½ miles southwestward, the high land approaches the shore and is heavily wooded.

Batu Point, about 4 miles southwestward from Ridge Point, is low and sandy and can be passed at a distance of ¼ mile.

PIER.—About ¾ mile southward from Batu Point is a pier over 400 feet long, with a depth of 5 feet at low water at its end, belonging to the North Borneo Exploration Co. A railway 3 miles long connects the pier with the manganese mines at Taritipan.

Anchorage for large vessels may be found in a depth of 5½ fathoms with the end of the pier bearing 115° (113° mag.) distant about ¾ mile. Small vessels may anchor farther to the southward and eastward according to draft.

Marudu River discharges 5 miles westward from Taritipan. The shore between the mouths of these two rivers and thence northward for 5 miles to the mouth of the Matungan River is low and fringed by mud flats which bare at low water, beyond which shoal water extends to a considerable distance. There is a narrow tortuous channel, about 3½ miles long, across the bar and through the mud flats to the mouth of the Marudu, passable at high water by small launches drawing about 6 feet, but it must be previously staked out. Marudu River is reported to be shoaling.

ANCHORAGE.—Large vessels should anchor about 4 miles northeastward from the river mouth in 6 fathoms, muddy bottom, with Woody Islet bearing 312° (310° mag.) distant about 2¼ miles.

Woody Islet is a small mound about 18 feet high, surrounded by low rocks, at the mouth of the Matungan River.

From abreast of Woody Islet the coast trends north-northeasterly for 8½ miles to Pirate Point and thence northward for 5 miles to Tigasamil Point, at the southern entrance to Kudat Harbor. Between Woody Islet and Pirate Point foul ground extends a considerable distance from the shore. From the eastern extremity of this foul ground, Pirate Point bears 17° (15° mag.) distant about 4½ miles. Low hills rise from the western shore of the bay. **Melau Besar,** 680 feet high, and **Matungan,** 1,360 feet high, are easily recognized, the summit of the former being bare and flat while the latter is thickly wooded.

Pirate Point is a low sandy point fringed with mangroves; shoal water extends over ½ mile eastward from it.

About 3 miles northward from Pirate Point there is a low point from which a coral reef bare at low water extends 1 mile eastward and surrounds Melau Islet.

Melau Islet rises to a height of 65 feet and forms a good landmark; vessels bound up the bay should give it a berth of not less than 1 mile.

The shores of the bay between Melau Islet and Tigasamil Point are fringed by reefs bare at low water, and the middle of the bay contains several shoal patches.

Kudat Harbor, situated on the western shore of Marudu Bay, affords anchorage in 4 to 7 fathoms, sheltered from the swell during the northeast monsoon by a reef which extends ¾ mile from its northern entrance point. It is about 1½ miles wide at the entrance between Bornugus and Tigasamil Points and extends some 4 miles westward. The head of the harbor is shoal and of little value to navigation.

TIDES.—It is high water, full and change, in Kudat Harbor at 10^h 50^m; springs rise from 5½ to 6½ feet; neaps rise 4½ feet. The tidal streams are weak, the maximum velocity observed during a stay of three months being ½ knot.

Tigasamil Point, the southern entrance point, is high and surrounded by a coral reef, bare at low water, on which there are a number of rocks from 1 to 20 feet high. The coral reef surrounding Tigasamil Point fringes the southern shore of the harbor as far as White Rock, about 2 miles westward.

Tigasamil Spit is a prong of the reef surrounding Tigasamil Point, which extends northeastward for about 800 yards and bares at low water, with depths of about ½ fathom at its extremity, increasing to 2½ fathoms 300 yards beyond, with 9 and 11 fathoms close-to. The edge of the shoal water is usually marked by a beacon in 12 feet, but its presence must not be relied on.

Sandilands Rock, with 1 fathom least water and situated in the middle of the entrance, is about 150 yards long east and west and 50 yards in breadth. It is marked by a lighted pile beacon.

Witti Rocks are two small rocks covered by less than 1 fathom with 3-fathom spots close to them, lying 300 yards 8° (6° mag.) and 500 yards 17° (15° mag.), respectively, from Sandilands Rock beacon.

Gueritz Rock, with about 3 feet of water, lies 650 yards 150° (148° mag.) from the harbor jetty and is marked by a wooden beacon, 12 feet high, surmounted by a white daymark. Gueritz Rock forms the southern extremity of a reef, partly bare at low water, which stretches off ¾ mile between Bornugus and Kapor Points. A narrow shoal, 300 yards long and having over it depths of from 2½ to 3 fathoms, lies about 300 yards off the eastern edge of this reef. From its eastern extremity Sandiland Rock beacon bears 203° (201° mag.), distant about 1,200 yards.

Datum Rock, only covered at the highest springs, lies on the edge of the shoal fronting the shore westward from the harbor jetty.

BUOY.—A red buoy, shown on the plan of Kudat Harbor, is on the edge of the 3-fathom curve, about 300 yards eastward from Datum Rock.

Kudat.—The town of Kudat stands on the northern entrance point to the harbor. It owes its importance to its being the distributing center for the various tobacco and rubber estates in the vicinity. The chief exports are tobacco, cutch, timber, camphor, and beeswax.

CLIMATE.—The mean maximum temperature is 87° and the mean minimum is 74°. From May to August the temperature reaches 92° at times. Rainfall is about 130 inches. December to March are the most rainy months, about 85 inches falling in that period; the re-

mainder is distributed over the other months. The southwest monsoon is the most unhealthy period at Kudat; fever is then prevalent and rather severe. During the opposite season, with the wind from the sea, it is almost absent.

Communication.—Frequent communication by steam launches is maintained with Sandakan. Kudat is connected by telegraph with Labuan, Jesselton, and Sandakan.

LANDMARKS.—The flagstaff at the jail in Kudat and White Rock, 27 feet high on the edge of the reef on the southern side of the harbor, are prominent objects.

A red and green fixed light, visible 2 miles, is exhibited from a white pile beacon, erected on Sandiland Rock. The light now shows as follows: Red from 203° (201° mag.) to 219° (217° mag.); green from 260° (258° mag.) through west to 342° (340° mag.); green between 349° (347° mag.) through north to 71° (69° mag.); red between 99° (97° mag.), and 129° (127° mag.), and obscured on all other bearings.

A fixed red light, obscured over the western part of the harbor, is exhibited from the harbor jetty.

JETTY.—There is a jetty in the southeastern part of the town alongside of which vessels of 16 feet draft can lie afloat.

SUPPLIES.—The water supply is not good. No coal is kept in stock. Cattle and vegetables can usually be procured.

DIRECTIONS.—Vessels from the northward and westward, after passing Kalampunian Island, off Sampanmangio Point, should give the coast a berth of about 2 miles, and when abreast of Aru Point, Melau Besar Hill, 680 feet high, will be seen southward from Kudat Harbor. Melau Besar bearing 199° (197° mag.), open eastward of the 20-foot rock off Tigasamil Point, leads eastward from the dangers off Kapor and Bornugus Points and Sandilands Rock; when Johnstone Bluff, 189 feet high, at the head of the harbor, bears 275° (273° mag.) it may be steered for, passing between the beacons on Tigasamil Spit and Sandilands Rock. After passing Sandilands Rock beacon continue on heading for Johnstone Bluff and anchor when a depth of 6 fathoms is reached. Small vessels anchor farther northward nearer the wharf.

Sampanmangio Point, the northern extremity of Borneo Island and the western entrance point to Marudu Bay, in latitude 7° 02′ 30″ N., longitude 116° 44′ 30″ E., is readily distinguished by the tall casuarinas which rise from its grassy bluff and by the island of Kalampunian off it.

Kalampunian Island, 1 mile northward of Sampanmangio Point, is of sandstone formation, similar to the nearest bluff of that point, and rises abruptly from a flat to the height of 40 feet. The flat is of considerable extent and composed of detached reefs.

There is a safe channel, nearly ½ mile wide, between it and the main, having depths of 7 and 8 fathoms. The dangers are visible and are easily avoided by a careful lookout from aloft.

Shoals.—The American ship *Big Bonanza*, drawing 17 feet of water, struck on a shoal since found by H. M. S. *Merlin* (1910) to be situated on the east extreme of a coral bank 7 miles in length in an east and west direction and 2 miles in breadth, with general depths of 6 to 9 fathoms. The shoal is of small extent, with a least depth

of 2½ fathoms, and is situated in latitude 7° 05¾′ N., longitude 116° 24¾′ E.

A coral bank, circular in form, having a diameter of 1¼ miles, upon which the least depth found is 7½ fathoms, lies 5½ miles southeastward of Big Bonanza.

Katiga Point is a black, rocky promontory about 6 miles southwestward of Sampanmangio Point; it is foul to a short distance. The shore from Sampanmangio Point to Katiga Point is fronted by reefs and rocks to about ½ mile in places. **Pertama** and **Kadua Points** lies between; patches extend about ½ mile northward of Pertama Point, the northern one. The **Ruru River,** barred by a reef, discharges northward of Katiga Point.

If bound southward from Katiga Point, a distance of not less than 3 miles from shore should be kept, it not having been surveyed. The rollers are heavy on this shore.

Agal Point, about 7 miles southwestward of Katiga Point, derives its name from a species of fucus similar to bird's nest and trepang, which is collected on its rocky ledges by fishermen. The **Kurina River,** navigable for boats at high water, has its entrance on a sandy beach in front of a white cliff 3 miles northeastward of Agal Point. A few other unimportant streams discharge into the bay.

Reef.—A narrow reef, studded with rocks, extends 1¾ miles 283° (281° mag.) from Agal Point and is steep-to on both sides, the lead affording no warning.

Batomande Rock, composed of yellow sandstone, 40 feet high, lies nearly 2¼ miles from Agal Point on the same bearing as the reef. Its surrounding reef is steep-to and separated by a narrow channel from Agal Point.

Ganda Head is a rocky bluff situated about 5 miles southward of Agal Point.

Agal Bay lies midway between Agal Point and Ganda Head. It is nearly 1 mile wide, but blocked by reefs extending from both shores. The Garu River and Fishermans Creek discharge into its head, which is shallow. The bay is said to afford secure anchorage for small craft during the northeast monsoon period.

A patch of 3 fathoms lies 1 mile southwestward of the north point of Agal Bay not far from the edge of the reef fronting the point.

Bisa Island or **Black Peninsula,** about 9 miles southwestward of Ganda Head, is high, composed of black basalt, crowned by trees and connected with the main by a narrow isthmus over which boats may be hauled. The shores on both sides are rocky, but fairly protected from the swell. The coast between Ganda Head and Bisa Island recedes about 2½ miles eastward, forming a large bay, in the middle of the entrance of which are situated White Rocks and White Rock Reef. The shores of this bay have not been examined, but two reefs with rocks above water southwestward of Pirate River are charted from ⅓ to ⅔ mile offshore; Pirate River has a conical rock named **Beehive** off its mouth.

White Rocks, situated 3½ miles 25° (23° mag.) from Bisa Island, and 2 miles from the shore, consist of two rocks, surrounded by a reef, extending 2½ miles in a north by east direction and nearly 1 mile in breadth. On the northern part of this reef there are several rocks above and below water, named **White Rock Reef.**

A doubtful shoal, with depths of 4 fathoms and 10 to 12 fathoms around, lies 4½ miles northward of White Rocks and 1¾ miles 250° (248° mag.) from Ganda Head; shoaler water may exist here.

Gasap Point is about 3 miles southwestward of Bisa Island. The point a little northward of it is fronted by a reef, with rocks upon it to the distance of about ¾ mile and steep-to. The coast on either side is fronted by the shore reef to about 600 yards in places; landing is difficult.

Kranga Point, situated 34½ miles southwestward of Sampanmangio Point and 8 miles from Bisa Island, is fronted by a reef studded with rocks to a distance of ¾ mile. On this reef, near the point, are the two **Ant Islets**. About ¼ mile beyond the reef are the **Ant Rocks**, an isolated group of rocks above water and steep-to.

Three-foot Rock, on which the sea breaks, is awash at low-water springs, steep-to, and lies 3 miles from the land, with the outer Ant Islet bearing 64° (62° mag.) distant 4½ miles, and Usukan Island, just open of the land about Sak Point southward. If these objects overlap, a vessel will pass outside of the rock. Vessels navigating in this neighborhood during the night should not come inside of 20 fathoms.

Off-lying islands and dangers.—Mantanani Islands, situated between 12 and 17 miles west by north from Bisa Island, consist of two coral islands and an islet named Nob lying between them. Nob Islet and the northwest end of Tree Island, the easternmost one, are tolerably high; the western one is about two-thirds the height of the others. These islands are uninhabited except during the season when the edible birds' nests are collected from the caves which exist there.

There is good anchorage within ½ mile of the reef on the south side of Tree Island, with Nob Islet open. Landing is easily effected. The channel between Nob and the western island should not be used, as other shoals may exist; 3 fathoms is charted in its fairway.

Tringganu Shoal, on which the North German Lloyd S. S. *Tringganu* stranded, lies with the southeast point of Tree Island bearing 221° (219° mag.) distant 2¼ miles. The depth on the shoal was not given, but the vessel sustained considerable damage and remained fast until lightened. It should be given a good berth by passing vessels.

North Furious Shoals are three coral patches lying about 20 miles northward from the Mantanani Islands. They were examined by the surveying vessel *Rifleman* in 1863, and from the ship's position at anchor in 11 fathoms, Nob Islet, of the Mantanani Islands, bore 174° (172° mag.) and Banguey Peak 72° (70° mag.). These shoals extend in a northwest by north and opposite direction for nearly 2 miles, and the least water found on them was 7 fathoms, with very irregular depths around them.

South Furious Shoal, a group of coral patches lying 5 to 10 miles or more northwestward from the Mantanani Islands, were also examined in 1863 by the surveying vessel *Rifleman*, which ship anchored on a coral bank barely ½ mile in extent with 7 fathoms of water 331° (329° mag.) nearly 7 miles from the western extremity of the Mantanani Islands.

About 2 miles southeastward from its coral bank is a bank with least known depth of 6 fathoms. About 2 miles south-southwestward

from this bank there is another of 7 fathoms about 1 mile in extent. Westward and southwestward of this bank are other and more extensive banks the limits of which were not determined. These banks are steep-to, with very irregular depths around them.

Barton Rock appeared on former charts as a rock awash and as being situated 9½ miles northward from the Mantanani Islands. The *Rifleman* passed over this position without finding any indication of the rock, but circumstances did not allow of a prolonged search.

Bank.—A bank about 3 miles in length in a northwest and opposite direction and covered by depths of from 7 to 9 fathoms is shown on the charts 10 miles north-northeastward from Nob Islet.

Shoals.—CAUTION.—The charts show in dotted outlines several banks passed over by vessels at various times westward and southwestward from the Mantanani Islands. Over most of them the least water shown is 6 and 7 fathoms, but upon one of them there is only 5 fathoms. There is good reason to believe that many shoal patches may exist in this vicinity, and every caution must be used in navigating these waters. The *Rifleman* passed over a shoal at night with as little as 4 fathoms, lying 238° (236° mag.) about 17 miles from Nob Islet.

St. Josephs Rock, on which the French bark *St. Joseph*, drawing 9 feet, struck in 1877, is said to lie in the vicinity of the 4-fathom patch passed over by the *Rifleman*. At the time the vessel struck, Mount Kini Balu bore 137° (135° mag.), and the estimated distance from the land was from 15 to 17 miles; immediately afterwards a depth of 4½ fathoms was obtained.

Bank.—An extensive coral bank, with depths from 6 to 10 fathoms over it, the limits of which have not yet been fully determined, is situated at a distance of about 20 miles northwestward from Cape Ambong. The southeastern extremity of this bank lies in latitude 6° 32′ N., longitude 116° 02′ E.

From Kranga Point the coast trends southwestward for 12½ miles to Abai Point, at the mouth of the river of the same name. From the mouth of the Pandassan River, less than 1 mile southward from Kranga Point, the beach is nearly straight and sandy, and from the shelving nature of the bottom off the whole extent of coast from the Ant Islets southwestward is constantly subject to heavy rollers, rendering landing dangerous, if not impracticable. In standing in toward the coast Usukan Island should not be opened of the land about Sak Point or the water shoaled to less than 15 fathoms.

Pandassan River discharges about ⅔ mile south of Kranga Point. The entrance appears to be studded with rocks projecting from the cliffs on the northern side of the river, and the rollers prevent ingress. The village of the same name lies about 1 mile up.

Tampassuk River, discharging about 9 miles southwestward from Kranga Point, is barred by a sand bank, over which at high water there is probably 12 feet, but at low-water springs not more than 6 feet. Owing to the strength of the current meeting the swell from the sea unpleasant curls and frequent breakers are produced, making it dangerous for boats to enter. Within the river the water deepens to 3 or 4 fathoms, which depths, it is stated, continue up to the town, probably to Fort Alfred.

Abai Port and River.—Abai Port, on the west side of the point of the same name and at the mouth of Abai River, is available for vessels of 9 feet draft at low water and 12 to 14 feet at high water by its northern entrance.

For boats only the passage from the westward, southward from Usukan, should be used, as the northern entrance is troubled by rollers. There will possibly be 3 feet at half tide in this channel.

The bottom within the port is hard sand, and unless vessels of over 6 feet draft pass into the river, where 3 or 4 fathoms, muddy bottom, will be found, they are endangered by the swell and rollers, which would cause them to strike heavily. They must not then calculate on anchoring in the outer harbor.

Abai Village is situated on Abai Point. The British North Borneo station has been withdrawn.

Usukan Island, fronting the Abai River entrance, is a prominent feature, standing out clear from the land, when seen from a vessel near the coast. It is about 1 mile long east and west, 470 feet high, conical, well covered with timber, and at low water of lowest spring tides is possibly connected with the shore. A depth of 1 foot was found in the passage when examined.

Offlying dangers.—Hill Rock, covered by 1½ fathoms of water, is situated 4 miles 4° (2° mag.) from the peak on Usukan Island.

Mayne Rock, about 600 yards in length, with a depth of 1½ fathoms, lies 4 miles 334° (332° mag.) from the western extremity of Usukan Island. This is a very serious danger, lying as it does in the usual track of vessels navigating this coast.

A rocky patch, bare at low-water springs, on which the sea breaks, lies 8° (6° mag.) distant 1⅓ miles from the western extremity of Usukan Island. The entrance to Abai River, open eastward from Usukan, bearing 160° (158° mag.), leads eastward from the patch, and Saundal Point, well open westward from Slime Rock, bearing about 193° (191° mag.), leads westward; the latter two objects in line lead over the rock.

Usukan Bay, situated southward from Usukan Island, is about 1 mile in extent. It affords safe anchorage, has an excellent watering place, and is the only convenient spot for communicating with Abai River.

Slime Rock, 14 feet high, is situated near the southern extremity of a shoal ⅓ mile in extent lying off the southwest side of Usukan Island. From the rock the western extremity of the island bears 39° (37° mag.) distant about 1,200 yards. The shoal is connected with the island by a sunken ridge, with depths of less than 3 fathoms in places.

During a recent survey of this vicinity the following dangers were developed in Usukan Bay and its approach: A rock with less than 6 feet of water, at a distance of 220 yards 196° (194° mag.) from Slime Rock; a 4-fathom shoal, at a distance of 1,580 yards 130° (128° mag.) from Slime Rock; and a 3-fathom rock off the point eastward from Sak Point, about 400 yards from shore.

Directions for Usukan Bay.—From the northward give Slime Rock a berth of about ¼ mile; from the southward keep Slime Rock bearing nothing northward of 50° (48° mag.) until the bay is well open to clear the dangers westward and southwestward from Sak

Point. Stand up toward the head of the bay and anchor in from 7 to 9 fathoms. The several points of the bay are foul to a short distance.

Sak Point.—Within a depth of 13 fathoms between Sak Point and Saundal Point, a little over 1 mile southwestward, there is reason to believe that sunken rocks exist. A rock which bares 3 feet at low water, surrounded by a coral shoal to a distance of 400 yards northwestward, lies 600 yards westward from Sak Point.

Rock.—A 3¾-fathom rock lies westward from Sak Point at a distance of 1 mile 206° (204° mag.) from Slime Rock.

Shoal.—An extensive shoal, with 3 fathoms least water, lies about 2 miles 218° (216° mag.) from Slime Rock and ¾ mile 299° (297° mag.) from Saundal Point.

Saundal Bay lies between Saundal Point and Tangah Point, over 1 mile southward, and extends about 1 mile eastward. It affords anchorage, exposed to westerly winds, in from 7 to 9 fathoms.

Jaga, a cliffy limestone island, 144 feet high and thickly wooded, stands on the south end of the reef extending from Saundal Point.

Tangah Bay lies between Tangah Point and Perunjuk Point, about 1 mile southward. The upper part of it has not been examined. A village stands at the head of the bay.

Rock.—A 3-fathom rock lies 350 yards 238° (236° mag.) from the western extremity of Tangah Point.

Cape Ambong, situated 5 miles southwestward from Usukan Island, is moderately bold, the land at ½ mile within rising to a height of 548 feet. Immediately off the cape foul ground exists to a distance of about 200 yards and off the eastern side of the cape to about ¼ mile.

Ambong Bay, lying eastward from Cape Ambong, about 1 mile wide at the entrance between Cape Ambong and Perunjuk Point, is reduced to about ½ mile by the shoals off both points. The bay has depths of from 6 to 8 fathoms over the greater part of it, and the inner bays on either side, with depths of 4 and 5 fathoms, will afford shelter according to the monsoon.

Telur Island, 230 feet high, and Perunjuk Point are foul to a distance of about 300 yards, and the bights between, within the soundings shown on the chart, are probably shoal.

Dangers in the approach.—A 1¼-fathom rock on the southern side of the reef northward from Cape Ambong at a distance of 820 yards 356° (354° mag.) from the northern extremity of the cape; a rock with less than 6 feet of water on the southwestern side of the reef northward from Cape Ambong, at a distance of 1,480 yards 19° (17° mag.) from the northern extremity of the cape, and a 3-fathom rock about 400 yards southwestward from Perunjuk Point.

Aspect.—Approaching from the northward, Ambong Bay may be recognized by the peculiar projections or high peaks, as it were, into the sea between Usukan Island and Cape Ambong. Northward from the bay will be noticed Usukan Island, rising to a height of 470 feet, showing as a black bushy cone. The mountains near it on the mainland appear with rounded summits, sloping into apparently level land. At the head of the bay will be seen the high ranges, skirting it, and if sufficiently clear the blue tinted mountain, **Kini Balu,** 13,450 feet high, in the distance. To the southward, the Ambong Range, heavily wooded from base to summit, stands in the foreground, sloping grad-

ually toward Sulaman River, where the high ranges cease excepting at 10 to 15 miles miles in the interior.

DIRECTIONS.—The approach to Ambong Bay is easy. Vessels from the northward, with Mount Kini Balu visible, should bring it to bear 142° (140° mag.) and steer for it, which will lead in the best water; or bring Perunjuk Point to bear 150° (148° mag.) and steer for it; round it at a distance of ¼ mile and thence proceed to the desired anchorage.

Vessels from the southwestward keep the whole of Usukan Island open of Sak Point or **Mount Roberton**, 614 feet high and bare, in line with Jaga Island until Perunjuk Point bears 150° (148° mag.) and then follow previous directions.

In fine weather the shoals will probably be visible from aloft.

From Cape Ambong the coast trends southwestward for 18 miles to Gaya Head. The margin of the muddy water discharged by the rivers along this section of the coast is clearly marked at a distance of about 5 miles from shore.

Mount Lokpussok, lying close to the shore, about 4 miles southwestward from Cape Ambong, rises to a height of 1,446 feet and forms a prominent landmark.

Between Cape Ambong and the mouth of the Sulaman River, 8 miles southwestward, shoal water extends to a considerable distance from the shore; then to Mengkabong Bluff, 5½ miles farther in the same direction, the coast is clean and steep-to.

Mengkabong Bluff is a high-crowned peninsula, 369 feet in height, with a sandy beach connecting it with the Mengkabong River, which discharges over 1 mile southward from it.

The bight between Mengkabong Bluff and Gaya Head is filled with shoals formed by deposits from the Mengkabong River.

Gaya Head is a prominent, bold, steep-to headland which rises to a height of 1,112 feet.

Gaya Bay, situated between Gaya Head and Gaya Island, is about 5 miles wide at the entrance and extends some 3½ miles southeastward. **Sapangar Island** (670 feet high), **Udar Island** (201 feet high), and **Udar Kechil** and **Udar Priok Islets** lie on the northern side of the entrance.

BEACON.—A beacon 300 yards 151° (149° mag.) from the southern extremity of Udar Island marks the edge of the shoal water.

Between Sapangar and Udar Islands there is a deep channel about 250 yards wide between the 5-fathom curves, which can be used by handy vessels, but in the absence of local knowledge mariners are advised to pass outside of Sapangar.

Sapangar Bay, the northern arm of Gaya Bay, affords excellent anchorage with good shelter; it is free from dangers except the reefs that bare and are steep-to. These reefs show clearly at low water and fringe the shores from which they extend for distances of from 200 to 600 yards except off Melanim Point.

Four isolated coral patches which bare at low water lie on the eastern side of the bay at about 1 mile northward from the Kabatuan River; the outer of these lies ¾ mile from shore. Avoiding these reefs, anchorage may be taken as convenient, the holding ground being good all over the bay.

Kabatuan or **Menggatal River**, discharging 1½ miles southeastward from Melanim Point, has a depth of 3 feet on its bar at low water.

Inanam River, available for small boats, flows into Gaya Bay about 2 miles southward from the Kabatuan. Foul ground, on the outer part of which are two rocks 4 and 5 feet high, extends 1¼ miles northwestward from the mouth of the river, with an isolated shoal, having a depth of 4 fathoms on it, situated about 700 yards northward from the northern rock.

Gaya Island, about 4½ miles long in a west-northwest and opposite direction and 1½ miles wide, is very irregular in shape, hilly, and densely wooded. The summit, which is bare, rises to a height of 950 feet at a distance of 1¼ miles from the western end. The western side is steep and unbroken, but the other sides are indented with bays which would afford shelter. Shoal water extends off the points on the northern sides of the island, which should not be approached within 600 yards. Its southeastern point is nearly connected with the shore by a reef about 1 mile wide, which is almost bare at exceptionally low tides except for the narrow South Channel, which runs through it.

Snake Rock, which is about 3 feet above high water, stands on about the center of this reef.

Gaya Harbor, at the east end of Gaya Island, affords good anchorage in a depth of 9 fathoms. The Plompong Islets stand on the northern reefs which break in the northeast monsoon; they are situated about 800 yards from shore, and the eastern and larger islet is 46 feet high and conspicuous. The eastern and southern points of the reefs which surround Plompong Islets and form the protection for Gaya Harbor are marked by white beacons.

Jesselton Harbor, the southern arm of Gaya Bay, is situated between Gaya Island and the mainland. The northern entrance is obstructed by Creighton Patch, Normanhurst, Comber, Gueritz, and Grieve Reefs; the southern entrance, known as South Channel, is a narrow, tortuous passage among the reefs which nearly connect Gaya Island with the mainland.

Creighton Patch is situated in the middle of the approach; it is about 250 yards long and 150 yards wide within the 10-fathom curve and has over it a depth of 5 fathoms, from which Plompong Islet bears 244° (242° mag.), distant about ⅞ mile.

Normanhurst Reef, about 300 yards long in a northwest and southeast direction and covered by a least depth of 4 feet at low water, is situated 1,800 yards 126° (124° mag.) from the outer Plompong Islet with Snake Rock bearing 227° (225° mag.).

Comber Reef, about 200 yards in extent and covered by a least depth of 2 feet at low water, lies midway between Normanhurst Reef and Lipat Point. There is a depth of 3½ fathoms between this reef and the reef extending from Lipat Point.

Grieve Reef, with 5 feet least water and 9 fathoms around, lies 900 yards 241° (239° mag.) from Normanhurst Reef with Plompong Islet bearing 337° (335° mag.), distant 1,650 yards.

Gueritz Shoal, a very small patch of 14 feet, marked by a red beacon, lies 102° (100° mag.) from Grieve Reef.

Hewlett Reef, on the eastern side of the harbor, has a depth of 1 foot over its southwest end and is situated 600 yards northeastward

from the outer end of Jesselton jetty and 400 yards from shore. It is marked on the northwestern side by a red beacon.

Harris Reef, with a depth of 1 foot of water over it, lies on the western side of the harbor, in a position nearly 800 yards northwestward from the outer end of the old pier.

Jesselton.—The town of Jesselton is situated 1¼ miles southwestward from Lipat Point. It is the principal port on the northwest coast of Borneo and is the terminus of the railway which runs from there to Weston (in Bruni Bay) and Tennan (Fort Birch) on the Padas River, with a junction at Beaufort.

The clock tower is a white rectangular wooden structure forming a conspicuous object, situated close northeastward from the Government offices.

A long pier extends from the shore, about 800 yards northward from the town, in a northwest direction, into a depth of 23 feet. The railway runs out on this pier, and an occulting white light is shown from the end of it. A fixed white light is occasionally shown from the end of the extension of the pier about 95 yards southwest of the occulting white light.

Weather.—The temperature attains about 88° F. in July and is lowest in January—82°; the daily range is about 9°. Rainfall, about 125 inches; April to November are the rainy months, but rain falls every month, the least being about February, when the amount is 1 or 2 inches.

Tides.—It is high water, full and change, at $10^h\ 15^m$; springs rise 5¾ feet; neaps rise 4 feet.

Directions.—The ordinary approach to the harbor is from the northward; bring Lipat Point to bear 148° (146° mag.) and steer for it on that bearing, which will lead between the Plompong Reef and Creighton Patch; when the godown of the pier bears 176° (174° mag.) steer for it, this course leading between Gueritz Shoal and Grieve Reef, after which the ship can be anchored in 6 fathoms 300 yards northwestward from the light or be taken alongside the pier.

About 200 yards southward from the pier is the northern entrance to South Channel. From the western side of this entrance the reef extends in a northwesterly direction, forming the head of Jesselton Harbor, and is marked by four red beacons.

APPENDIX.

COAST PILOTS AND FIELD STATIONS OF THE COAST AND GEODETIC SURVEY.

COAST PILOTS.

	Price.
U. S. Coast Pilot, Atlantic Coast, Section A, from St. Croix River to Cape Cod	$0.50
U. S. Coast Pilot, Atlantic Coast, Section B, from Cape Cod to New York, including Long Island Sound	.50
U. S. Coast Pilot, Atlantic Coast, Section C, Sandy Hook to Cape Henry, including Delaware and Chesapeake Bays	.50
U. S. Coast Pilot, Atlantic Coast, Section D, Cape Henry to Key West	.50
U. S. Coast Pilot, Atlantic Coast, Section E, Gulf of Mexico, from Key West to the Rio Grande	.50
Inside Route Pilot, coast of New Jersey	.20
Inside Route Pilot, New York to Key West	.20
Inside Route Pilot, Key West to New Orleans	.20
U. S. Coast Pilot, Pacific Coast, California, Oregon, and Washington	.50
U. S. Coast Pilot, Pacific Coast, Alaska, Part I, from Dixon Entrance to Yakutat Bay	.50
U. S. Coast Pilot, Pacific Coast, Alaska, Part II, Yakutat Bay to Arctic Ocean	.50
U. S. Coast Pilot, West Indies, Porto Rico, and Virgin Islands	.50
Coast Pilot Notes on Hawaiian Islands	.20
U. S. Coast Pilot, Philippine Islands, Part I, Luzon, Mindoro, and Visayas	.50
U. S. Coast Pilot, Philippine Islands, Part II, Palawan, Mindanao, and Sulu Archipelago (this volume)	.50

FIELD STATIONS.

Boston, Mass., room 1806, customhouse.
New York, N. Y., room 503, customhouse.
New Orleans, La., room 314, customhouse.
San Francisco, Calif., room 310, customhouse.
Seattle, Wash., room 202, Burke Building.
Manila, P. I., Intendencia Building.

At these stations complete files of United States Coast and Geodetic Survey charts, Coast Pilots, Tide Tables, and other publications relating to navigation may be consulted and information affecting navigation obtained without charge.

Light Lists, Buoy Lists, and Notices to Mariners are kept for sale or for free distribution to mariners.

The field stations are also sales agencies for the Coast and Geodetic Survey publications.

A chart catalogue, giving lists of charts, coast pilots, tide tables, and agencies of the Coast and Geodetic Survey, can be obtained from any of the field stations, or will be sent, free of charge, on application to the Coast and Geodetic Survey, Washington, D. C. Frequent changes occur in the agencies, and the list of agencies is published in the first notice each month of the Notices to Mariners.

HARBOR REGULATIONS.

The following extract from Customs Marine Circular No. 53, publishing rules and regulations governing the operations of Philippine vessels within Philippine harbors, is republished for the information and guidance of all concerned:

PAR. 125. All confluent rivers and other inland waters having outlets within the harbor limits defined for Philippine ports of entry shall for purposes of these regulations be considered as portions of the respective harbors into which they empty.

PAR. 126. All vessels on entering any port, entry or coastwise, in the Philippine Islands, shall show their colors and signal their official numbers or letters and the number of sacks of mail (if any) on board for that port, and such signals shall be kept flying till the vessel is boarded by the proper officials: *Provided*, That all vessels on entering Manila Bay shall also show their colors and signal their official numbers or letters and the number of sacks of mail (if any) on board when within signal distance of Corregidor, and shall keep such signals displayed for a period of not less than fifteen minutes and in all cases till the signal station on Corregidor Island is abeam of the vessel displaying them.

PAR. 127. Should vessels require such service, a licensed pilot will be furnished upon display of the proper signal or upon application to the pilot station. Signal by day: International code letter "S"; at night, Bengal light, which may be preceded by two whistles.

PAR. 128. When a vessel is approaching or leaving a wharf, other vessels in the immediate vicinity shall obey the orders of the pilot on board the vessel in motion.

PAR. 129. Only licensed pilots shall be permitted to pilot vessels at ports having pilots' associations, viz: Manila, Iloilo, Cebu, Nueva Caceres (Naga), Daet, Tacloban, Aparri, and Dagupan.

PAR. 130. The following signals or calls shall be used and recognized at Philippine ports of entry:

Customs.—International code K G W; at night, three or four short blasts of whistle and waving of a light.
Quarantine.—International code Q at fore.
Pilot.—International code S.
Explosives or inflammables.—International code B at fore.
Medical assistance.—International code Q, or customs call.
Infectious or contagious disease.—International code L.
Death.—Customs and quarantine calls.
Distress.—International code N S (or other code signals).
Mail.—International code R E W. Vessels for Manila should also fly this signal when passing Corregidor Island; if mail launch does not respond, fly customs call.
Water boat.—International code G U J.
Harbor police.—Customs call.

In Manila Harbor a customs boarding officer in charge of a harbor launch is on duty daily from sunrise to sunset, and a customs patrol boat is on duty from sunset to sunrise. Communication may be established by the international code signals with the customs semaphore station, which is equipped with telephones. At other Philippine ports of entry signals will be responded to from the pilot tower or customhouse.

PAR. 131. Vessels entering a harbor shall be considered in quarantine and shall keep the quarantine flag flying at the fore until boarded and given pratique by the quarantine officer. This regulation shall be subject to such exceptions as may be prescribed from time to time by the chief quarantine officer.

PAR. 132. No person shall be permitted to disembark from or go aboard a vessel, except the pilot and quarantine officer, until pratique has been given; unless the vessel be in distress, in which case those rendering assistance, if compelled to go on board, shall be subject to quarantine restrictions.

PAR. 133. All official orders and regulations of the quarantine officer shall be strictly and promptly obeyed by all persons on board or alongside while the vessel is under quarantine jurisdiction.

PAR. 134. All cases of sickness of a contagious or communicable character which may occur while the vessel is in port shall be at once reported in writing to the quarantine officer.

PAR. 135. Deaths, illness, or accidents, involving physical injury to any person on a vessel in a harbor, shall be at once reported to the collector of customs and the quarantine officer.

PAR. 136. Every vessel arriving in port with inflammable or explosive cargo shall hoist a red flag at the foretruck and keep said flag flying during the hours

of daylight while any such cargo is on board, and shall display by night one red light, which light shall be at a height of not less than 20 feet above the deck. Such vessel shall anchor where indicated by the harbormaster and shall not change anchorage without his permission.

PAR. 137. Smoking and the use of any light or fire, with the exception of the regulation harbor lights at night, on board any boat, lighter, or similar vessel carrying inflammables or explosives either in a harbor or a river is prohibited.

PAR. 139. Every vessel, lighter, or boat carrying inflammable or explosive cargo shall hoist a red flag on its foremast; or, if there is only one mast, at the masthead; or, if there is no mast, on a pole at least 6 feet above the highest point of the vessel; and if permitted to move at night they shall carry a red light in the same position as the flag.

PAR. 140. Discharging, carrying, and other handling of inflammables and explosives in a port shall be permitted only between sunrise and sunset, except on written authorization of the collector of customs or surveyor of the port.

PAR. 141. Vessels of all classes carrying inflammables or explosives shall not lie alongside of nor be tied to another vessel, except when actually discharging or receiving such cargo. They shall be berthed or lie at such places as may be designated by the harbormaster, and shall be discharged or loaded with the least possible delay.

PAR. 142. Upon the arrival of a foreign vessel in port no persons except the pilot, customs and quarantine officers, and, subject to permission of the customs boarding officer, consuls and agents of the vessel shall be permitted to go on board; nor shall any of the crew or passengers disembark until the vessel has been placed under customs jurisdiction.

PAR. 143. A coastwise vessel on arrival at a port shall not required to wait for customs boarding officers before entering the harbor or river. Such vessels upon mooring shall be boarded by a customs officer, who, if there is foreign cargo in transit, shall place a customs inspector on board.

PAR. 144. Masters or officers in charge of vessels shall, upon demand, exhibit to the customs officers the ship's roll, register, crew list, passenger list, manifest, or any other public ship's paper.

PAR. 145. Any vessel having foreign cargo consigned to a port of entry shall discharge such cargo within the harbor limits of such port, unless permission is obtained from the insular collector of customs to discharge outside such limits.

PAR. 147. No launch, lighter, or other vessel shall be allowed to make fast to any channel or marking buoy.

PAR. 148. In case two or more vessels are making for the same landing, the one nearest to such landing shall have the right of way, and the other or others are prohibited from making any attempt to go alongside.

PAR. 149. All orders of the harbormaster in connection with the berthing or movement of vessels shall be at once carried out by the master or other officer in charge of the vessel to which such orders relate.

PAR. 150. Every vessel entering a port whose harbor limits are prescribed shall be berthed or moored at the point designated by the harbormaster, and no vessel shall change its anchorage or berthing place without his permission.

PAR. 152. Masters of vessels desiring to load or discharge ballast shall first obtain permission from the collector or surveyor of customs and shall obey the instructions given them by the harbormaster as to where the ballast shall be taken from or discharged, as the case may be.

PAR. 153. At ports having no regularly appointed harbormaster the duties of such official shall be performed by the surveyor of customs or other designated customs officer.

PAR. 154. Where it is necessary for a vessel in a harbor to have repairs made that will temporarily disable or prevent the vessel from being controlled or moved, it shall be the duty of the master thereof to report that fact to the harbormaster, and to take adequate precautions against fire and storm. Before such repairs are made the vessel shall be berthed as directed by the harbormaster.

PAR. 155. There shall not be thrown, deposited, or discharged from any vessel or floating craft of any kind, or from the shore or wharf, into the waters of any of the harbors described above, or into the navigable waters of any river tributary thereto, any refuse or other matter or thing which might impede or obstruct navigation or cause an obstruction thereto.

PAR. 156. Whenever a vessel, raft, or other craft is wrecked and sunk in a navigable channel, accidentally or otherwise, it shall be the duty of the owner of said sunken craft to mark it immediately with a buoy or beacon with a red flag attached thereto during the day and with a red lantern at night, which

flag or lantern shall show at least 4 feet above water, and to maintain such marks until the removal of the sunken craft; and it shall also be the duty of said owner to commence the immediate removal of the same and to prosecute said removal with due diligence.

PAR. 158. No vessel or other craft shall tie up or anchor in the navigable waters of any harbor in such manner as to prevent or obstruct the passage of other vessels or craft, nor so as to obstruct or endanger the Government dredges, towboats, scows, and other floating apparatus in their work of improving rivers and harbors, nor shall they navigate said waters at a rate of speed that may endanger other vessels or craft at anchor or under way, nor shall any person voluntarily or carelessly sink, or permit to be sunk, vessels or other craft in navigable channels, nor float loose timber and logs in streams or channels actually navigated by steam vessels in such manner as to obstruct, impede, or endanger navigation.

PAR. 159. No vessel shall be anchored within any fairway of a harbor set apart by the harbormaster for the passage of vessels, nor shall any vessel be so anchored as to obstruct the passage of other vessels in such fairway.

PAR. 163. Steam vessels towing shall have the right of way over steam vessels not towing: *Provided*, That vessels of over 10 feet draft shall have the right of way in deep and narrow channels. In carrying out the rules for right of way, due regard shall be had to the fact that a vessel going against the tide or current is much more manageable than one going with it. In rivers and narrow channels connected with harbors or the sea which are traversed by steam vessels, such steam vessels shall have the right of way over launches, lighters, cascoes, and other river and harbor vessels: *Provided*, That the steam vessels are of 100 gross tons or more. Coastwise vessels of less than 100 gross tons shall conform to the rules of the road with river and harbor vessels. In rivers and narrow channels every steam vessel shall, when it is safe and practicable to do so, keep to that side of the fairway or mid-channel which lies to the starboard of such vessel.

PAR. 164. Steam or other vessels are prohibited from turning around in navigable rivers or narrow channels by means of warping lines stretched across the channel in such manner as to obstruct free navigation, but shall be so managed as to leave at all times one side of the river free for the passage of other vessels.

PAR. 168. All vessels entering, leaving, or lying in the rivers of the Philippine Islands shall swing all boats inboard, keeping the davits in that position. All gangways shall be folded against the side of the vessel. Each vessel shall have one or more of the small boats which are swung inboard ready at all times to be swung out and lowered in case of necessity. On sailing vessels the yards shall be braced fore and aft and the jib boom shall be run in.

PAR. 176. A vessel in a harbor in distress and requiring assistance from other vessels or from the shore shall use or display the following signals, either together or separately, viz:

Day signals: International signals N C or N S and a continuous sounding of any fog-signal apparatus.

Night signals: First, flames on the vessel as from a burning tar barrel, oil barrel, etc.; second, a continuous sounding of any fog-signal apparatus or firing a gun.

PAR. 177. Any vessel entering an entry or coastwise port shall, if mail is to be discharged, inform the port authorities thereof by the prescribed signal at the earliest practicable moment.

PAR. 178. Masters or other officers in charge of vessels shall give due notice to the collector of customs of their intention to clear, stating the day and hour of proposed sailing, and shall fly the "blue peter" (International Code P) at the fore for 24 hours before sailing.

PAR. 179. Nothing in these regulations, whether general or special, shall relieve any vessel, or the owner, master, or crew thereof, from the consequences of any neglect to carry lights or signals, or to keep proper lookout, or from the consequences of any neglect to take the precautions to do that which may be required by the ordinary practice of seamen or by the special circumstances of the case.

PAR. 180. Harbor police duties are performed by customs officers. Any master or officer in charge of a vessel within the limits of any harbor defined in these regulations desiring police assistance shall fly the international code customs call K G W, and such other signal as the urgency of the case may require. Customs officers have the power to make arrests within harbor limits

of persons violating the customs, immigration, Chinese exclusion, and navigation laws and regulations, and of persons committing crimes or breaches of the peace, and shall report without delay to their superior officer. Any person who assaults, resists, opposes, or interferes in any manner with a customs officer in the discharge of his duty shall be liable to the penalties prescribed by law.

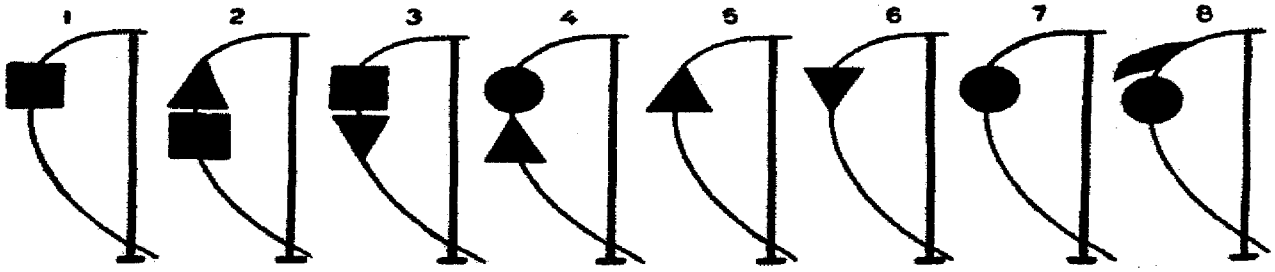
PAR. 181. Typhoon warning signals are displayed in accordance with advices from the Weather Bureau, and their meaning is the same wherever shown in the archipelago. Masters of vessels are required to notify the collector of customs or the harbormaster if, after typhoon signals have been hoisted, any vessels fail to take suitable precautions for their own safety and thus endanger other vessels.

PAR. 182. The following typhoon signals will be displayed when occasion requires:

DAY SIGNALS.

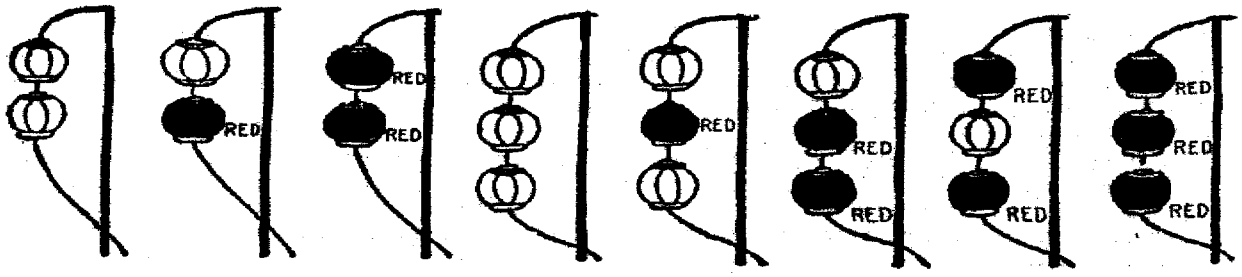
Black cylinder, 1½ feet in diameter, 2 feet high.
Black cone, base 1½ feet in diameter, 2 feet high.
Black sphere, 2 feet in diameter.
Flag 3 or 4 feet square, of any convenient color.

Arranged as follows:



NIGHT SIGNALS.

Red and white lights in either vertical or horizontal line, arranged as follows:



FIRST SIGNAL.

The meaning of the first signal is necessarily somewhat indeterminate; it may signify—

(*a*) Indications of a distant typhoon the direction of whose movement is still unknown. The signal will be changed in case the typhoon approaches;

(*b*) The direction of the distant typhoon is at present such that the storm may pass off without seriously affecting the archipelago; or

(*c*) A general warning, viz: When the weather indications are dangerous but such as are not covered by any one of the other signals in use. For instance, when the typhoon recurves east of the archipelago. In such cases see the daily weather note posted at all the meteorological and telegraph stations and customhouses.

Precautions.—Vessels should prepare to strengthen their moorings and to get up steam. Small vessels, especially open launches, should not risk going far from port.

SECOND SIGNAL.

The center of the typhoon will pass (or is passing) to the northward at a considerable distance. Winds from third quadrant (west to south) are to be expected, which may acquire considerable force and continue for several days.

Precautions.—Vessels should strengthen their moorings. It is deemed advisable that vessels should send down light yards and masts. Steamers should be ready to use their engines on short notice. Dangerous for small vessels to be in Manila Bay; bancas must not leave the rivers.

THIRD SIGNAL.

The center of the typhoon will pass (or is passing) to the southward at a considerable distance. Winds from the second quadrant (east to south) are to be expected. These are generally less violent than those corresponding to the second signal.

Precautions.—The same as for signal No. 2.

FOURTH SIGNAL.

The location of the typhoon is dangerous for the place where the signal is hoisted, though the danger is not imminent. Look out for the next signal.

Precautions.—Vessels strengthen their moorings. Steamers must be ready to use their engines in case of sudden emergency. Small vessels must remain at their moorings; bancas are not to move about in the river nor cascoes to leave it.

FIFTH SIGNAL.

The center of the typhoon will pass (or is passing) to the northward at a short distance. Strong winds from the third and fourth quadrants (south over west to north) are to be expected, which may become very violent.

Precautions.—Vessels strengthen their moorings as much as possible. Lower and secure all gear. Use steam to help anchors. Vessels outside Manila Harbor may find it necessary to seek refuge in Cavite. No vessels under way while this signal is up.

SIXTH SIGNAL.

The center of the typhoon will pass (or is passing) to the southward at a short distance. Strong winds from first and second quadrants (north over east to south) are to be expected, which may become very violent, though usually they are less severe than those corresponding to the fifth signal.

Precautions.—The same as for signal No. 5.

SEVENTH SIGNAL.

The center of the typhoon will pass over the place where the signal is hoisted.

Precautions.—The same as for signal No. 5. It must be noted, however, that after the absolute or relative lull, due to the actual passing of the center, the winds will suddenly change to a direction opposite to the one from which they came before the calm; also that they may often be more violent than before.

EIGHTH SIGNAL.

Strong winds, very high tides, and floods.

Precautions.—The same as for signal No. 5. No vessels of any description must attempt to enter or leave a harbor or river, nor to move about in them.

PAR. 183. Masters of vessels are requested to furnish all shipping news of general interest and such sanitary and hydrographic information as they may have. Masters wishing to have barometers tested can do so by giving glass reading to the harbor master, who shall compare the same with observatory instruments and return correction to ship. The harbor master shall, when requested, supply masters with latest pilot charts, Notices to Mariners, and other hydrographic publications, and harbor regulations, and such meteorological data as may be of use in these waters, for which no charge shall be made.

PAR. 184. Any person violating any of the provisions of these harbor regulations is liable, under the terms of section 8 of act No. 1136, upon conviction thereof, to imprisonment for not more than six months, or to a fine of not more than two hundred pesos, or both such fine and imprisonment, at the discretion of the court.

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