

with perhaps no insurance coverage. A few people suffered minor injuries.—H. W. R.

Weather Bureau staff meetings, 1928-29, by W. R. Stevens, Secretary.—The regular biweekly meetings of the scientific and technical staff of the Central Office, which were initiated in the autumn of 1923, were continued during the winter of 1928-29. Following is a list of the discussions (asterisks denote speakers from outside the Weather Bureau).

October 3, 1928

W. R. Gregg. Meteorology as an aid to safe flying.

October 17, 1928

W. W. Reed. Discussion of two papers by W. Pepler.
(a) Contributions to the knowledge of the surface temperature of Lake of Constance.

(b) Changes in relative humidity over Lake of Constance with warm and cold invasions.

October 31, 1928

C. F. Marvin. Discussion of the transactions at the meteorological meetings in Paris and London.

November 14, 1928

A. J. Henry. Rainfall of China.

E. B. Calvert. Transactions at the meteorological meeting in London.

November 28, 1928

C. F. Marvin. Present status of calendar reform.

H. H. Kimball. A sunspot cycle of solar-constant values.

December 12, 1928

H. C. Willett. Some aspects of air-mass analysis.

January 9, 1929

O. L. Fassig. The hurricane of September, 1928.

January 23, 1929

H. C. Frankenfield. Discussion of the Mississippi River flood-control problem.

A. J. Henry. Monthly charts of pressure anomaly.

February 6, 1929

F. E. Matthes.* Some unusual forms of snow and ice.

February 20, 1929

F. G. Tingley. Load lines and other measures for safety at sea.

March 6, 1929

H. H. Kimball and W. J. Humphreys. Measurements of the amount of ozone in the earth's atmosphere and the altitude at which it is found.

March 20, 1929

W. J. Humphreys. Rainbows.

April 3, 1929

C. F. Marvin. Accumulated sums of departures as an index to climatic changes.

April 17, 1929

I. F. Hand. An investigation of the contamination of the atmosphere by an industrial plant.

A. J. Henry, H. C. Frankenfield, and R. H. Weightman. Discussion of the nomenclature of cyclones.

April 29, 1929

W. E. Hurd. (a) Northers of the Gulf of Tehuantepec.

(b) Tropical cyclones of southeastern North Pacific.

C. F. Brooks.* The 11-year period in San Diego rainfall.

May 13, 1929

C. F. Brooks.* Further studies of Gulf Stream temperatures and current in the Straits of Florida.

Meteorology. By David Brunt. 112 pages, 19 illustrations.—It is a rare pleasure to find an elementary work on any science that one can unreservedly recommend. This book by an important official in the meteorological office, London, affords that pleasure. It covers the entire range of meteorology, except the optical phenomena, about as fully, perhaps, as the average person cares to know it. There are no mathematical equations, and no attempt to discuss things that require for their elucidation this type of formal logic. Nevertheless, Dr. Brunt evidently assumes that his readers already have some knowledge and want more, for he writes as one scholar to another and not, as so many authors of popular science do, as a romancer to blockheads.

Each of the 11 chapters is excellent, but the one that treats of that most difficult subject, the Origin of Cyclonic Depressions, is so exceptionally good as to deserve especial mention.—*W. J. Humphreys.*

The past cold winter and the possibility of long-range weather forecasting,¹ by W. J. Pettersson.—Modern meteorology has made notable advances in forecasting the weather of the next day, but when it attempts to predict the weather for more than a week ahead, the percentage of successes does not exceed 50 at the most. One reason for this failure is to be found in the refusal of the modern meteorologist adequately to take into account in the problem of weather prediction of direct terrestrial influences, such as that of the physical state of the surface waters of the oceans, even though he may be ready enough to take such an influence into account when dealing with one of those aerodynamical problems—for example, the life history of an Atlantic "depression"—which he regards as lying within his particular province. Another reason is his neglect of the "Polar-front" theory of Professor Bjerknæs, one of the greatest authorities on aerodynamics and hydrodynamics.

Professor Bjerknæs regards the polar regions as caps of cold air maintained largely in consequence of the local accumulations of ice and snow, offering a kind of cold circular wall facing the warmer winds of temperate latitudes. He considers that in conjunction with the strongly heated equatorial regions, they set up a circulation which brings warm air aloft from the equator to the pole, there to be cooled and to sink, weighed down by its increasing density, until it is absorbed into the polar cap; that these reservoirs of cold air at the poles are constantly discharging their accumulated air toward the equator along the earth, in accordance with "impulses" supplied by the region of low barometer around the equator; that the trade winds represent successful at-

¹ Reprinted from NATURE, London, May 25, 1929.

tempts on the part of such accumulations of polar air to reach the region of equatorial calms. He supposes, further, that the cyclones of the north Atlantic arise through the mixing of the cold and warm air masses along the margin of the polar cap (the so-called "polar front").

It is clear that a great simplifying theory such as this offers a basis for long-range forecasting of the weather in our latitudes. If we accept the theory, it is not difficult to see that the general character of the weather over long periods may follow changes in the extent and shape of the region of cold sea, for the polar caps must, in the long run, coincide with the regions of coldest water. For example, the presence of a tongue of warm water projecting into Arctic regions, such as the so-called Gulf stream of the north Atlantic, will push this boundary back toward the pole, and cause contrasts such as are offered in winter by the cold climate of Labrador and the relatively mild climate of Iceland.

We may consider now whether the past severe winter can not be connected with some modification of the normal temperature of the seas within the area of exceptional cold. The immediate cause of the severe weather has clearly been the persistence of northerly and easterly winds over Russia and central Europe circulating round an "anticyclone" or region of high barometer over Scandinavia and Finland; which anticyclone has generally been separated from the area of high pressure that normally covers Siberia in winter by a region of relatively low pressure over Russia. Now Professor Witting found in the Baltic in the summer of 1927 a layer of cold water at a depth of about 10 fathoms, beneath the very warm surface water, heated by the sun, having altogether a volume much greater than that of a whole normal year's outflow from the Baltic into the North Sea, and having a temperature about 10° F. lower than the average. The surface waters of the Baltic are derived ultimately from the mixing of the river water with that finally ascending from such deeper layers, and this cold water might well chill their surface water, and the air in contact with them, for two years or more, in accordance with the time that the water might be expected to take in passing away along the Norwegian coast. Such chilling would cause the anticyclones which are so apt to form over Scandinavia to be more than usually persistent, as has been the case this winter. In this way the action of the cold water, which is far too small to produce directly a degree of cold such as has been observed, may do so indirectly through the agency of the wind, and the resulting accu-

mulations of ice and snow will carry the process still further.

It seems clear that if the action of a single sea such as the Baltic can be so great, there is a great field open for international cooperation in the systematic study of the physical states not only of the Baltic but also of all the seas and oceans in and around Europe, including the Caspian and the Black Sea. This should be done once a year, if not twice, and the results should be published quickly, so as to be available for long-period weather forecasting. This was in fact the policy of the International Council for the Exploration of the Sea before the war. It is hoped that the remarks that I have made will show that permanently to abandon such a scheme may be to throw away the opportunities of saving millions of pounds that would be afforded by the prediction, in good time, of winters such as that of 1928-29.

June lake levels.—According to a report of the United States lake survey the lake levels for the current June are higher than a year ago by the following amounts:

Superior, 0.26 foot higher than in June 1928.

Huron, Mich., 2.08 feet higher than in June 1928.

Erie, 1.88 feet higher than in June 1928.

Ontario, 1.87 feet higher than in June 1928.

Meteorological summary for Chile, May, 1929 (by J. Bustos Navarrete, Observatorio del Salto, Santiago, Chile.)—The rainy season began in central Chile in this month, but precipitation was not frequent. The Pacific atmospheric circulation was particularly active in the first and third decades.

The important anticyclonic centers that were accompanied by fine, cold weather were charted as follows: 5th to 6th, moving from central Chile toward Argentina; 9th to 12th and 14th to 19th, passing from Chiloe to the northern part of Argentina, and 25th to 30th, forming over the Juan Fernandez Islands, recurving toward the south near Chiloe, and later passing over Cordoba.

There were three important depressions attended by unsettled weather, wind, and rain during the periods 3d to 5th, 6th to 8th, and 23d to 25th. The first of these brought the first rain of the season in the central region on the 4th, the second crossed the extreme southern (austral) region, and the third caused general rains in the southern and central regions and snows on the cordilleras.

Monthly totals of precipitation were as follows: Region of Santiago about 2.40 inches, region of Concepcion about 6.70 inches, and region of Valdivia between 6.70 and 9.40 inches.—*Translated by W. W. R.*