DETECTING OCEAN CURRENTS BY OBSERVING THEIR HYDROGEN-ION CONCENTRATION.

By ALFRED GOLDSBOROUGH MAYOR.

[Abstracted from Proceedings of the American Philosophical Society, Vol. 58, No. 2 pp. 150–160, 1919.]

The hydrogen-ion concentration of pure distilled water is about 10^{-7} grams per liter at 22° C. Sea water is alkaline, containing only about one-tenth this amount. The surface water of the equatorial drift of the Pacific contains a hydrogen-ion concentration of about 0.6021×0^{-8}; occasionally, however, there are found regions of water which is temporarily flowing eastward, and this is less alkaline, the concentration being sometimes as high as 0.83×10^{-8}. The easterly flowing water is also cooler, has a high oxygen content, and is strongly charged with CO_2 where as the tension of the CO_2 in the westward drift is about the same as that of the air above the sea. These easterly currents are due to upwelling of bottom water, due to local causes, such as the removal of the surface water by gusts in the trade winds.

The hydrogen-ion concentration is dependent chiefly upon the temperature, and not upon the salinity, of the water.

Similar studies support McEwen's theory of the upwelling of water along the abrupt slope of the Pacific coast of America, and Bigelow's demonstration of the same, but less marked, effect, off the shallow Atlantic seaboard.

In general, if no upwelling is taking place, the CO_2 of the sea water is always practically in balance with that in the air over the water; this balance is, in warm waters, brought about by the influence of photosynthesis by marine plants, and the escape of large quantities of CO_2 from the sea into the air is prevented, contrary to the opinions based upon the laboratory experiments of Henderson and Cohn. The colder surface waters of the globe are absorbing carbon dioxide, while the tropical regions are probably setting some of it free into the atmosphere, but on the whole a balance is probably maintained.

The detection of the sudden and marked change from alkaline water to relatively acid water when one encounters an easterly set in the tropical Pacific, or passes from a warm into a cold current, can be so easily made by means of the indicator thymolsulphonephthalein that this method may prove of value in navigation.

References to literature are given at the end of the paper.—*E. W. W.*

NOTES, ABSTRACTS AND REVIEWS.

ADDITIONAL NOTE ON THE INTERNATIONAL GEODETIC AND GEOPHYSICAL UNION.*

By Dr. L. A. BAUER.

The present convention is to continue for 12 years, beginning January 1, 1920, subject to renewal and modification at the end of this period. The general meetings are to take place every three years, when there will be opportunity for changes in organization or statutes as future experience may suggest. It will not be necessary for a Union to meet at the same place as the Council, or for all the various Unions to meet together. A section may, furthermore, call a special meeting when found necessary.

Objects of the International Geodetic and Geophysical Union.

The objects are stated in the official version, as follows:

1. To promote the study of problems concerned with the figure and physics of the earth.
2. To initiate and coordinate researches which depend upon international cooperation and to provide for their scientific discussion and publication.
3. To facilitate special researches such as the comparison of instruments used in different countries.

Section *c* (Meteorology), it was generally agreed, could usefully and effectively supplement, by confining its work to research and fundamental problems in meteorology, the functions and work of the prewar International Meteorological Committee. The latter, as it consisted of official weather bureau directors, necessarily had to concern itself, primarily, with administrative and official meteorological questions. In the unavoidable absence of the elected president, Sir Napier Shaw, no organization work was attempted except the passing of the two resolutions, to the following effect:

The hope is expressed—

(*a*) That there be appointed a Joint Committee of the International Astronomical Union and of the Section of Meteorology of the International Geodetic and Geophysical Union for investigational work on solar radiation;

(*b*) That international work in atmospheric electricity, as far as possible, be placed under the direction of a committee nominated partly by the Section of Terrestrial Magnetism and Electricity and partly by the Section of Meteorology.

With the organization of the Division of Foreign Relations of the National Research Council in Washington December 10 a means has been provided for active and well coordinated American effort in the international research organization.—ED.

* Complete notice is published in Terr. Mag. and Atmos. Elec., Sept. 1919, vol. 24, p. 105–112, and in Science, Oct. 31, 1919, p. 399–403. For previous notice see this REVIEW, July, 1919, pp. 449–450.

GOLD MEDAL TO PROF. HILDEBRANDSSON.

The Council of the Royal Meteorological Society has awarded the Symons memorial gold medal for 1920 to Prof. H. H. Hildebrandsson for distinguished work in connection with meteorological science.—Nature, London, November 27, 1919, page 340.

ATMOSPHERIC POLLUTION.[1]

[Abstract, reprinted from Science, New York, Nov. 28, 1919, p. 501.]

The advisory committee on atmospheric pollution has published its fourth report summing up the observations in the year 1917–18.

The full lists showing in detail the monthly deposit figures at various stations are not reproduced, inasmuch as these have been already published in the *Lancet;* but full returns from two stations, Newcastle and Malvern, are given; and these give the highest and lowest deposits.

Figures of total solids deposited monthly are given for all stations, 24 in number, the months being on a 30-day basis.

In many instances the rainfall as measured at these stations did not agree with the amount obtained by the official Meteorological Office gauges, but this is easily explained when it is remembered that the gauges of the committee are often on roofs and are thus elevated. The rainfall is given in millimeters, and it would be well if we in the United States would follow this example.

[1] Meteorological Office. Report on observations 1917–18. Advisory Committee on atmospheric pollution, London, 1919.

At a given London station the data for the half year, October to March, 1917–18, were:

Rainfall, 43 mm.; tar, 0.14 metric ton per square kilometer; carbonaceous matter other than tar, 2.18 tons; insoluble ash, 3.50; soluble ash, 4.15; or total solids, 11.41 tons. Of the soluble matter there were 1.46 tons of sulphate, 0.63 tons of chlorine, and 0.05 of ammonia.

No relationship can be discovered between the deposit of insoluble matter and the amount of rainfall. With the soluble matter, however, it is different, and in general it may be said to vary directly as the rainfall. The relation may be roughly expressed by the formula, $S = 0.058R + 2.5$, where R is the rainfall in mm. and S the deposit of soluble matter in tons per square kilometer. It is not suggested that this expression can be used to find the soluble deposit when the rainfall is known, but gives only the general nature of the relationship.

The report also contains the results of analysis of the rainfall at Georgetown, British Guiana, the nearest land in the direction of the prevailing east-northeast trade winds being the shore of Morocco, distant 3,000 nautical miles. There can be little doubt that the solids contained in the rain waters collected are those normal to the rains of the trade winds, with perhaps some derived from the coastal sea-spray.

The average results over the two years 1916 and 1917 were as follows:

	Solids in solution mg./liter.
Ca	7.95
Mg	3.44
K	2.77
Na	16.36
Al_2O_3	0.58
Fe_2O_3	1.97
SiO_2	0.20
Cl_2	33.93
SO_4	12.02
CO_3	9.78
NO_3	11.57
NH_4	0.12
	100.69

It is shown that 55 per cent of the solids in solution in the rainfall are cyclic sea salts, while 45 per cent must have been derived from atmospheric sources.

The report also contains an account of certain experiments made to determine the best method of measuring continuously the suspended impurity in the air.—*A. M.*

STUDY OF AEROLOGY IN THE AIR SERVICES.

[Reprinted from Aviation, New York, Nov. 15, 1919, p. 354.]

The Aerological School maintained at the Navy Air Station, Pensacola, Fla., will have an accession of 15 enlisted men to start the four months' prescribed course opening on December 1. Six of the students come from the Navy Air Service, three from the Marine Corps and six from the Army Air Service. The class of six with which the school opened is receiving training in aerology preliminary to taking the advanced course which will be maintained at the Weather Bureau in Washington, D. C.

AN INTERESTING OBSERVATION OF ATMOSPHERIC OZONE.

By HENRY I. BALDWIN.

[Dated: Saranac Lake, N. Y., Dec. 1, 1919.]

An interesting observation of ozone in nature was made by the writer on the summit of Haystack Mount (altitude 4918 feet), near Mount Marcy in the Adirondacks at 9:30 a. m., September 8, 1919. The wind at the time was from the west-southwest, having a velocity of approximately 35 miles per hour. The air temperature was probably about 60° F., although no instruments were available for taking observations. Wisps of fracto-stratus cloud were being blown across the rocky peak while 600 feet above were irregular masses of strato-cumulus. In these rapidly moving fragments of fracto-stratus clouds a very strong, pungent odor was perceptible, similar to that noticed near static machines and dynamos. Three hours earlier, that morning, several silent discharges had been seen in the clouds above the mountain, and then, at 3 p. m., a violent thunderstorm broke over the surrounding country.

The writer was at first inclined to believe the odor due to ozone liberated by electricity generated from friction of the clouds with the mountain. One author was found mentioning this as a cause of atmospheric ozone, but Prof. Humphreys's explanation is much more logical:

"There is no reason to expect the atmosphere to become electrified as a result of friction as it blows over mountain peaks, except, perhaps, when it is filled with heavy dust—when it is likely to be already considerably electrified."

"It often happens, however, that mountain peaks give off a great deal of silently discharged electricity, and this discharge may, at times and places, be sufficiently abundant to produce enough ozone and oxides of nitrogen (often mistaken for ozone), to be distinctly perceptible."

Since there was a negligible amount of dust present in this case, the ozone was formed in all probability by some form of electrical discharge which had taken place, or was taking place in the clouds. The effect may have been rendered more noticeable by moisture.

NITROGEN AND OTHER COMPOUNDS IN RAIN AND SNOW.

By J. E. TRIESCHMANN.

[Reprinted from Science Abstracts, Sect. A, Sept. 30, 1919, §1161.]

The paper summarises the results of an analysis of the impurities brought down in rain and snow at Mt. Vernon, Iowa, over a period of eight and one-half months. The town is small and without manufactories, so that there is no excessive local contamination. The precipitation (22¼ inches) supplied during the period 512 pounds of chlorine, 1.5 pounds of sulphates, and 5.3 pounds of nitrates per acre. The presence of the chlorine has been ascribed to salt particles carried from the Atlantic. The average part per million for free ammonia was 0.407; albuminoid ammonia, 0.366; nitrates, 0.255; and nitrites, 0.018. Rain was found to be richer in nitrogen contents than snow. [See also Abs. 146 (1919) to be reprinted in the next issue of the REVIEW.]—*J. S. Di[nes]*.

SIMPLE FORM OF APPARATUS FOR ESTIMATING THE OXYGEN CONTENT OF AIR FROM THE UPPER ATMOSPHERE.

By F. W. ASTON.

[Reprinted from Science Abstracts, Sect. A, Aug. 30, 1919, §1001.]

In the apparatus described a sample of about 10 cm. of air is drawn into a burette and by adjustment of a mercury column is compressed or expanded slightly so as to occupy a standard volume. The height of the mercury column is marked and the air then withdrawn and deoxidised by means of heated phosphorus. It is again