deal in any way with the science of the earth's atmosphere; a book which has laid the whole scientific world under a debt of gratitude to its author, impossible to overestimate.

R. DeC. Ward

SPECIAL ARTICLES

EARTH MOVEMENTS AT LAKE VICTORIA IN CENTRAL EAST AFRICA

The profound significance for Central East Africa of the fall of Omdurman in 1898 has been strikingly brought out by subsequent scientific publications of the Egyptian Survey Department. Captain H. G. Lyons, late the eminent director general of that department, and now occupying the newly established chair of geography at the University of Glasgow, published in 1906 an extended monograph upon the Nile River and basin.[1] This volume, which is issued by the finance ministry, compels admiration as much by its exhaustiveness as by its orderly arrangement and lucid presentation of the facts. Through setting forth in a well-digested summary the scientific results secured by early and late explorers and scientific travelers, and by including a full bibliography of the geography and geology of the district, the work has been made authoritative and indispensable.

Those who have not already interested themselves in the region will be surprised to learn how many observing stations supplied with water gauges, have been established upon the Upper Nile and its tributaries, and of the almost continuous series of careful gauge readings extending over a full decade.

The very interesting conclusions on the basis of these readings, which were foreshadowed in the monograph above cited, are contained in a very recent report of the Survey Department.[2] The conclusion to which Captain Lyons is forced is that the gauges have registered oscillations of level of the ground about Lake Victoria. Upon the northern and northeastern shores of this lake three gauges were established—one at Entebbe on the northwest shore, another at Jinja on the north shore where the Nile leaves the lake, and one at the head at Kavirondo Gulf near the railway terminus on the northeast shore. Although all three gauges have been moved since they were first established, and though there are some gaps in the records, yet in the main it is true that daily gauge readings are available from three widely separated stations since September 30, 1898.

Study of the monthly averages of these readings has shown with much probability that in October, 1898, a sinking of the land at Entebbe began and continued during 1899. It was most marked during August and October of that year. At the end of 1900 and during the early months of 1901, a slight elevation seems to have occurred, though in May and June following a renewed sinking took place. This movement on the northwest shore of the lake seems not to have been participated in by the land farther to the eastward. These local movements, extending as they do over several months, can not be explained by wind effects.

From November, 1901, to February, 1902, the Jinja gauge curve was on the whole rising, while those at Entebbe and Kisumu were falling steadily. Again in December, 1902, the Jinja curve was steady, while those of Entebbe and Kisumu were rising, but in February, 1903, the case was reversed. Subsequent to these later dates the gauges have shown no noticeable discrepancies which could be attributed to a recurrence of oscillations of level until in 1908, when at Jinja the lake level fell 14 inches between February 5 and 19, the change of level at each of the other two stations being only an inch and a half.

To quote Captain Lyons, all the available information "points to the frequent and recent differential movement of great blocks of the country." Following Herrmann he states:

> The movements of upheaval have acted along NNE–SSW directions, and the intensity seems to

[1] "The Physiography of the Nile River and its Basin," Cairo, National Printing Department, 1906, pp. 411 and numerous maps.

[2] "The Rains of the Nile Basin and the Nile Flood of 1908," by Captain H. G. Lyons, F.R.S., Survey Department Paper No. 14, Cairo, 1909, pp. 69, pls. 8.

have been most marked in the southwestern part of the area, not far from the Virunga group of volcanoes of Lake Kivu. Five main blocks may be recognized which are separated by troughs; the islands of the western coast of the Victoria Lake present the first of these, while three others range one behind the other between the lake shore and Valley of the Kagera, and in the intervening troughs lie lakes, swamps or slowly flowing rivers; the fifth forms the Ruanda Plateau west of the Kagera. The edges of these blocks have as yet been but little modified by weathering, so that the latest movements would appear to be comparatively recent.

The formation of Victoria Lake is shown to be due to mutual adjustments among these earth blocks, separated as they are by great faults running in the directions N.–S., E.–W., NE.–SW., and in the area south of the lake also NW.–SE. Again quoting Lyons:

> Large masses, many kilometers long, have been raised, lowered or tilted, and in the valleys formed along the fracture lines, the main drainage lines of the district run. Lake Victoria itself is outlined by such fractures.

All writers seem to agree upon the dominance of block movements of the crust in determining the relief of Central East Africa, and it is therefore interesting to learn from these newer studies of the Nile Basin, that the great river itself between Korusko and Aswan (Assouan) wherever crystalline rocks occur in its neighborhood, takes directions parallel to the neighboring intrusive dikes.

While the region is one of earthquakes, the movements disclosed by the series of gauge readings would seem to be of the slower type, and it would be of great interest to know whether the main periods of change of level correspond in time to any subterranean rumblings such as are now being reported from so many unstable districts and are called *brontidi*. As compared with the crustal movements which are revealed by gauge readings within the Laurentian Lake district of North America, these African observations differ in being more rapid, and, further, in indicating reversals in the direction of movement. They similarly, however, point the moral that the sensitiveness of great inland bodies of water, when employed as precise levelling instruments, has never been properly appreciated.

WM. H. HOBBS

UNIVERSITY OF MICHIGAN,
ANN ARBOR,
January 29, 1910

THE FORTY-FIRST GENERAL MEETING OF THE AMERICAN CHEMICAL SOCIETY. II

DIVISION OF FERTILIZER CHEMISTRY

F. B. Carpenter, *Chairman*
J. E. Breckenridge, *Secretary*

The Direct Estimation of all Intensities of Hydrogen Ion Concentration by Means of Di-nitrohydrochinone: LAWRENCE J. HENDERSON.

The Nitrogen Thermometer from Zinc to Palladium: A. L. DAY and R. B. SOSMAN.

Laboratory Methods for Organic Nitrogen Availability: C. H. JONES.

The alkaline permanganate and pepsin methods for determining organic nitrogen availability as used in the Vermont Experiment Station laboratory are described. Results by these methods on fifty-one high- and low-grade animal and vegetable ammoniates now on the market are tabulated and briefly commented upon.

Both methods have been used at the Vermont Station on officially collected commercial fertilizers for the past twelve years. Tables were shown giving the results of this work.

The writer concludes that the alkaline permanganate method, while empirical, is nevertheless valuable to eliminate quickly from a large number of samples those of questionable availability which may then be tested by the longer pepsin process and qualitatively to show more in detail the nature of the nitrogen source.

The following papers are reported by title:

Influence of Chemistry on Agriculture: F. B. CARPENTER. (Chairman's address.)

Concerning After Effects of Certain Phosphates on Limed and Unlimed Lands: H. J. WHEELER.

New Method for Filtrating Insoluble Phosphoric Acid: R. H. FASH.

Facts Brought Out Regarding Uniform Analytical Methods for Phosphate Rock through the Recent Work of the National Fertilizer Association's Committee: C. F. HAGEDORN.

Neutralization of the Ammonium Citrate Solution: J. M. MCCANDLESS.

Note on the Determination of Phosphoric Acid by the Official Volumetric Method: F. B. CARPENTER.