ON THE CHEMICAL ECOLOGY OF LAKE TANGANIKA

CUNNINGTON,[1] in his summary of our present knowledge of the natural history of the Great Lakes of Central Africa, has emphasized the unique nature of Lake Tanganika. This lake is distinguished biologically on the one hand by the very large number of endemic species inhabiting it, and by the absence of certain widely distributed organisms on the other. The most noteworthy deficiency concerns the Cladocera, which are entirely lacking from its waters though present in the inflowing rivers.[1,2,3] A similar condition is met with in Lake Kivu.[4] Cunnington, on the basis of analyses given by Stappers,[5] suggests that the absence of Cladocera is due to the large quantity of magnesium present in the waters of the lake. Reference to the literature shows that numerous localities, containing considerably more magnesium than found by Stappers, support a Cladoceran fauna. Recently I have had the opportunity of examining a specimen (135 cc) of coastal surface water from Lake Tanganika which was very kindly collected for me by Dr. Rollin T. Chamberlin, of the University of Chicago. As a result of an examination of this sample and of certain experiments bearing on the problems of the lake the following data can now be presented.

Hydrogen ion concentration.—The pH value of Dr. Chamberlin's sample when opened was 8.7. On boiling, a faint precipitate of alkaline earth carbonates was produced at 9.1. Some decomposition of organic material may have occurred in the water while in the bottle, making it less alkaline than when in the lake. We may conclude that the surface waters of the lake have a pH value between 8.7 and 9.1, and that it probably lies nearer the former figure than the latter. The water therefore is alkaline, but not excessively so, as are some of the smaller Central African Lakes.[6]

Phosphorus content.—Phosphate present in solution after boiling was determined colorimetrically by the cerulomolybdic method; a value of 0.08 milligrams per liter of phosphorus was obtained. It was unfortunately not possible to determine "total" phosphorus, but since the water had been kept a long time before the determination this value probably more nearly approximates to the original "total" than "soluble" phosphorus. It is high when compared with the values for "total" phosphorus (.015–.040 milligrams per liter) obtained by Juday, Birge, Kemmerer and Robinson[7] for the surface waters of the Wisconsin Lakes but is low compared with the large amounts obtained in other alkaline localities, as the Transvaal pans examined by Hutchinson, Pickford and Schuurman[8] (*N. B.*, read .006 grms per liter P_2O_5 for .006 mgms per liter). It appears that at least the coastal waters of the lake do not suffer from a deficiency in this element.

Radioactivity.—In view of recent work on the production of mutations by irradiation it appeared possible that the very high endemicity of the fauna of the lake might be due to an unusual amount of radioactive material dissolved in the water. Gas boiled off from the water sample after it had been sealed for a month gave no indication of radioactivity when transferred to an emanation electroscope.

Toleration of magnesium salts by Cladocera.—Several species of Cladocera have been raised in cultures containing more magnesium than is indicated for Lake Tanganika by Stappers' analyses without ill effects. Moreover both *Daphnia magna* Straus and *D. longispina* O. F. M. have been cultured in solutions made up to contain all the salts of the lake and maintained at a pH of 8.5–8.9. It would appear therefore that other than chemical factors are responsible for the absence of this group from Lake Tanganika.

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1 Cunnington, *P. Z. S.*, 1920, p. 507.
2 Sars, *P. Z. S.*, 1909, p. 31.
3 Gurney, *P. Z. S.*, 1928, p. 317.
4 Brehm, Wiss. Erb. Deut. Zentr.-Afr.-Exp. 1907, 1908, iii., 1912, p. 167.
5 Stappers, Renseignements de l'Office Colonial, Bruxelles, 1914, p. 189.
6 Jenkin, *Nature*, 124: 574, October, 1929.
7 *Tr. Wisc. Acad.*, 23: 233.
8 *Nature*, 123: 832, June, 1929.

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