than in the whites, partly consequent upon a greater prevalence of venereal diseases among Negroes, on the other hand, act as compensating factors upon the live birth rate. In any final definitive treatment of the problem every possible effort will have to be made to disentangle the relative quantitative influence of these variables.

The analysis of the data is being continued.

RAYMOND PEARL
THE JOHNS HOPKINS UNIVERSITY

BIOELECTRICAL POTENTIAL IN HEAVY WATER

IN a recent review[1] of the biological effects of heavy water it was suggested that deuterium may modify physiological processes by altering bioelectrical potentials. This hypothesis is now supported by the following experiments on the potential difference across the skin of the frog.

Belly skin from a male frog was tied over the end of a short tube (internal diameter 1.5 cm) supported in a liter jar immersed in a thermostat at 26.2° C. Air at 26.2° C. was passed continuously through the jar. The electrodes consisted of cotton soaked in Ringer's solution fastened to chlorinated Ag wires leading to the usual potentiometer circuit (all readings were corrected for electrode potentials of a few millivolts). Ringer's solution containing 2 grams of glucose per liter and buffered to pH 8.2 was evaporated on a steam bath and redissolved in equivalent amounts of 96 per cent. heavy water or distilled water (controls). The cotton electrodes absorbed 1 cc of solution and 4 drops were placed on each side of the skin.

After a preliminary run in H_2O Ringer to establish the potential of the preparation the skin was carefully blotted and D_2O Ringer was added, including new cottons soaked in D_2O Ringer. Fig. 1 represents a typical experiment showing the striking fall in potential in heavy water (graph indicated by triangles). Control skins treated in the same way but changed to the fresh H_2O Ringer regained their original potential (graph indicated by circles). The falls in peak potential in four skins transferred to heavy water were: 46.6 to 21.2 mv; 90.2 to 34.4 mv; 83.3 to 25.5 mv; 38.2 to 20.8 mv.

The results indicate that the e.m.f. of the skin is produced by a continuous metabolic process,[2] for the reduction brought about by heavy water is too great to be explained by modification of a simple physical property such as electrolytic dissociation. It is clear that many of the physiological effects of heavy water may be essentially electrical. Similar experiments on the electrocardiogram of the frog are in progress.

T. CUNLIFFE BARNES
OSBORN ZOOLOGICAL LABORATORY
YALE UNIVERSITY

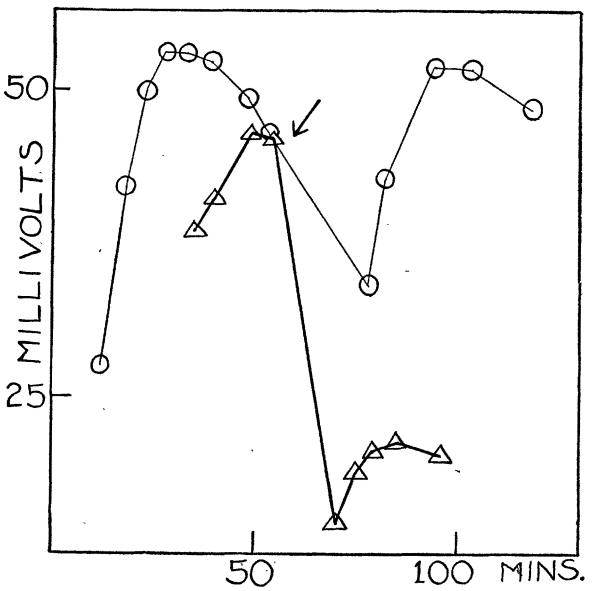

FIG. 1. Reduction of the potential of frog skin in heavy water. Ordinates: e.m.f. in millivolts (outside surface is negative). Abscissae: time in minutes after excision of skin. Circles: Control in H_2O Ringer. Triangles: skin transferred to D_2O Ringer (at arrow).

[1] T. C. Barnes and T. L. Jahn, *Quart. Rev. Biol.*, 9: 292, 1934.

[2] E. J. Lund, *Jour. Exp. Zool.*, 51: 265, 1928. For additional references *cf.* E. J. Boell and A. B. Taylor, *Jour. Cell. and Comp. Physiol.*, 3: 355, 1933; W. L. Francis, *Jour. Exp. Biol.*, 11: 35, 1934.

BOOKS RECEIVED

Archivos do Museu Nacional. Vol. XXXV, 1933. A Flora do Rio Cuminá. Pp. 206. 12 plates. *Boletim do Museu Nacional. Vol. X, 1934.* Pp. 151. Illustrated. *Vol. XI, No. 1, March, 1935.* Pp. 126. *Vol. XI, No. 2, June, 1935.* Pp. 120. Museum Nacional. Rio de Janeiro, Brazil.

Brooklyn Botanic Garden Record. Vol. XXV, No. 2. April, 1936. Twenty-fifth Annual Report. Pp. 206. Illustrated. Brooklyn Institute of Arts and Sciences.

COOK, SHERBURNE F. *Elementary Human Physiology.* Pp. xi + 539. 135 figures. $3.50. *Laboratory Manual in Elementary Human Physiology.* Pp. 76. Harper. $0.30.

CRONEIS, CAREY and WILLIAM C. KRUMBEIN. *Down to Earth: An Introduction to Geology.* Pp. xviii + 501. Illustrated. University of Chicago Press. $3.75.

PETERMANN, B. and KARL HAGGE. *Gewachsene Raumlehre.* Pp. viii + 165. 275 figures. Herder, Freiburg, Germany.

Science Reports of the Tôhoku Imperial University. First Series; (Mathematics, Physics, Chemistry). Vol. XXIV, No. 5. February, 1936. Pp. 242 + 8. 28 figures. 2 plates. Maruzen Company, Sendai, Japan.

SMYTH, NATHAN A. *Through Science to God.* Pp. 213. Macmillan. $2.50.

STEVENS, BLAMEY. *The Identity Theory.* Second edition, revised. Pp. xvi + 243. 29 figures. Sherratt and Hughes, Manchester, England. $2.00.

Texas Almanac and State Industrial Guide. 1936 Texas Centennial Edition. Pp. 512. Illustrated. The Dallas News. $0.65 postpaid.

Why We See Like Human Beings. Pp. 128. Illustrated. Better Vision Institute, Rockefeller Plaza, New York.