proper explanation and offers further insight into the general oceanographical problem. From the standpoint of the fisheries, if an established cyclic phenomenon can be correlated with a cyclic change in the nature of a fishery, a method of forecasting is at the disposal of those concerned.

The cyclic nature of the transgressions as elucidated by Le Danois (*loc. cit.*) is indicated in Fig. 1, wherein

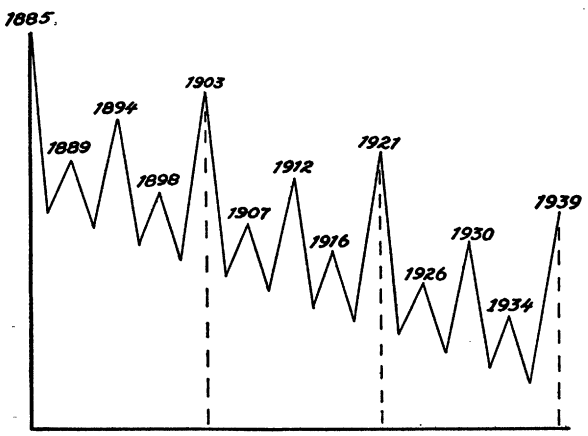


FIG. 1. Diagram (after Le Danois), illustrating magnitude and periodicity of transgressions.

the magnitude and periodicity of the various components (aside from an annual one) are illustrated as follows: (1) A transgression with a period of 111 years and whose maximum, according to Le Danois, occurred last in 1885; (2) a transgression with a period of 18½ years and whose maximum occurred last in 1921; (3) a transgression with a period of 9¼ years and whose maximum occurred last in 1930; and (4) a transgression with a period of 4½ years whose maximum occurred last in 1934.

Oceanographical investigations by the governments of Newfoundland[4] and France[5] have indicated the importance of these transgressions to the cod fishery of the Grand Banks. The Biological Board of Canada[6] has been concerned with an investigation of the waters of the Scotian shelf for the past few years (1932 to date). An invasion of marginal waters over the Scotian shelf occurred in 1934,[7] and the importance of such invasions to the general oceanographical problem was strikingly apparent.

As the year 1939 is approached, according to the theoretical considerations herein presented (see graph), transgressions of somewhat greater magnitude will take place. An organized effort on the part of various oceanographical investigators on the Atlantic coast might be the means of assessing the importance of the theory of transgressions to North American Atlantic waters.

Our observations of 1934, on the Scotian shelf, offer some further confirmation of the considerations of Le Danois (*loc. cit.*) with reference to the effect of these transgressions over the continental plateau. Bottom waters of higher temperatures and salinities (as compared to observations in the years 1932, 1933 and 1935) invaded the area during the summer months. This invasion by bottom waters culminated in a flooding of the area in late autumn by surface waters of comparatively high temperature and salinity. The distribution of these surface waters of comparatively high temperature and salinity was seemingly determined, to some extent, by the submarine physiography of the Scotian shelf.

As a matter of interest, it might be recorded here that the disaster to the tilefish in the Gulf of Maine (as recorded by Bigelow and Welsh[8]) occurred in 1882, just three years previous to the theoretical date of the transgression of the greatest amplitude within the past fifty years. According to Bigelow and Welsh (*loc. cit.*), the disaster to the tilefish is generally ascribed to a sudden but only temporary flooding of the bottom along the warm zone (inhabited by the tilefish north of Delaware Bay) by abnormally cold water. It is readily conceded that a transgression may have been responsible for the displacement of a cold body of water from the northeast to the area referred to.

H. B. HACHEY

ATLANTIC BIOLOGICAL STATION,
ST. ANDREWS, N. B.

## TERTIARY FLORAS

IN the *Journal of Paleontology*, October, 1935, Mr. R. W. Brown refers to the "close relationship between the Green River flora and that of the Florissant lake beds." The Green River is considered to be Eocene, the Florissant beds Miocene. The relationship referred to has been noticed before, and I only allude to the matter now in order to beg the paleobotanists to consider the evidence afforded by the insects. With regard to the relationships of the Tertiary plants, it must be remembered that the generic types are very constant over vast periods of time. The Florissant flora is very similar indeed to that now living, but many of the genera no longer exist in Colorado. Yet the Florissant insects, very numerous in species, show many distinctive features and constitute an essen-

[4] H. Thompson and A. M. Wilson, *Newfoundland Ann. Rep. Fish. Research Lab.* (1934), 15–19, 1935. H. Thompson, *ibid.*, 23–31, 1935.

[5] Ed. Le Danois, *Proc. N. American Council on Fish. Invest.* (1921–30), No. 1: 35–56, 1932.

[6] H. B. Hachey, *Prog. Rep. (Atl.) Biol. Bd. Canad.*, No. 16, 1935.

[7] A. H. Leim and H. B. Hachey, *Trans. Amer. Fish. Soc.* (in press).

[8] Henry B. Bigelow and William W. Welsh, *Bull, U. S. Bur. Fish.*, 40: part 1: 1924.

tially different fauna from that now living in North America. The Green River insects, also numerous, are strikingly different, for the most part, from those of Florissant. By a sort of paradox, the similarity of the floras lends weight to the differences in the insects. Were the floras quite different, it might be argued that they represented different altitudes or climates and could therefore be contemporaneous, for anything known to the contrary. But since the floras show so many resemblances, it appears probable that the climatic differences were not sufficiently marked to account for the differences in the insects, which must then be ascribed in large part to a considerable time interval.

In general, it must be said that insects are extremely valuable as time-markers, although their evolution in family and generic characters is very slow. They have much better characters than leaves, and the fluctuations of the insect populations have been very marked. Also many genera have died out, and their presence or absence thus becomes significant. Formerly, it could be objected that too few localities for fossil insects were known, but new ones are constantly being discovered, and the whole subject is rapidly assuming such importance that the general paleontologists can not afford to neglect it.

T. D. A. COCKERELL

UNIVERSITY OF COLORADO

## THE ISOTOPIC FRACTIONATION OF WATER BY PHYSIOLOGICAL PROCESSES

UNDER the above title Washburn and Smith[1] published in this journal some data for the density of highly purified water obtained in the combustion of dry willow tree (*Salix nigra*) wood and of water from the sap of the same. The sap water was 2.8 p.p.m. heavier than normal and the water from the dry wood combustion, 3.2 p.p.m. heavier than normal. This excess density was attributed to an isotopic fractionation of hydrogen in the direction of a preferential selection of deuterium.

It is now known that oxygen of the air has a slightly higher atomic weight than the oxygen combined in Lake Michigan water[2] so that a correction of −6.0 p.p.m. should be applied to Washburn and Smith's value for the density of their dry wood water (assuming that Potomac River and Lake Michigan water have the same density). The resulting value is −2.8 p.p.m., which indicates a preferential rejection rather than a preferential selection of deuterium. However, this value of −2.8 p.p.m. is still subject to some uncertainty;[3] hence more work should be done before the conclusion can be reached that deuterium is preferentially rejected in physiological processes. Mr. R. B. Gibney of this laboratory is at present investigating the whole question.

The datum for the density of the sap water may be subject to an uncertainty involved in the fractionation of the isotopes of water during partial condensation of its vapor;[4] here again, then, it is impossible to conclude definitely that any physiological fractionation of hydrogen occurs.

MALCOLM DOLE

NORTHWESTERN UNIVERSITY

## APROPOS THE NAZI EDICTS

PROBABLY no single chemist has contributed more to the advancement of world chemistry and to the chemical industry of Germany than did Adolph von Baeyer, 1835–1917. In his laboratories indigo was first synthesized.

Among his outstanding pupils were, to mention only a few, Emil Fischer, Claisen, Curtius, W. H. Perkin, Jr., Büchner, Willstätter, Vanino, Wieland, Graf Schwerin, Holleman, Nef, Gomberg, Walden, W. A. Noyes and Ipatjew. Baeyer's father was a German, his mother, Eugenie, was a Jewess, and Emil Fischer[1] writes: "Er vereinte die guten charaktereigenschaften und Fähigkeiten der germanischen und semitischen Rasse."

ROSS AIKEN GORTNER

UNIVERSITY OF MINNESOTA

# QUOTATIONS

## A TRIBUTE TO PAVLOV

IN the obituary notice of Professor Pavlov in the *British Medical Journal* mention will no doubt be made of the International Physiological Congress which was held in Leningrad and Moscow last August under his presidency. It was Pavlov's immense prestige and the deep affection which physiologists, the world over, had for him which made the acceptance of an invitation to the Soviet Union possible. It was Pavlov's prestige and that affection, together with the mixture of playfulness, sternness, impatience, devotion, and simplicity, which formed his character, that

[1] E. W. Washburn and E. R. Smith, SCIENCE, 79: 188, 454, 1934.

[2] M. Dole, *Jour. Chem. Phys.*, in press; *Jour. Am. Chem. Soc.*, 57: 2731, 1935.

[3] See a discussion of uncertainties involved in this work by M. Dole, *Jour. Am. Chem. Soc.*, in press.

[4] M. Dole, *Jour. Chem. Phys.*, 2: 548, 1934.

[1] *Vossische Zeitung*, No. 429, August 23, 1917; cited by Bugge in "Das Buch der grossen Chemiker," Vol. 2, p. 323, Berlin, 1930.