limit and beyond, whereas now we are speaking of the limits of the Western Hemisphere. Russia claims a 12-mile limit, Italy a 6-mile limit, Norway and Sweden 4 marine miles and the United Kingdom 3 miles, and none of these powers agree on the manner in which their limits should be applied to the irregular shore line or embayments of their countries.

To be sure, some day these and all other problems of a kindred nature may be solved. But these are assignments for the Attorney General's Office, the Supreme Court and the State Department and are far afield for a statistical agency like the Census Bureau!

One further point needs clarification. It is true that the Canadian Census included the water area of the Great Lakes to the International Boundary in the total for the Province of Ontario. Canada is entitled to any manner of presentation which it may choose. However, the principal work of area measurement has been done in Europe and in the United States. Area measurement in Europe has not included the Caspian, Aral and White Seas, and the Sea of Azov in the total area of Russia; the various portions of the Baltic Sea have not been included within the total for Germany, Denmark, Sweden and Finland; the Sea of Marmara is not included in the total area of Turkey; and the Mediterranean and Black Seas are not treated as inland water, although their character certainly is inland or landlocked. T. Willers in *Petermanns Mitteilungen,* Ergänzungsheft Nr. 170, 1911, gives additional detail. The treatment of The Netherlands on page 1145 of the Statesman's Year-Book, 1940, is indicative of standard treatment.

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RIBOFLAVIN-VITAMIN B_2 IN SOIL[1]

LAST year while studying the occurrence of vitamins in fungi, on which a brief report was published in the June 16, 1942, issue of SCIENCE, the question was raised as to whether there was a possibility of finding vitamins in soil. Most of the molds studied, such as species of Aspergillus, Penicillium and Fusarium, gave positive tests for thiamin and riboflavin. Having cultured many soils in our mycology and soils laboratories and finding species of these genera in practically every culture, it seemed worth while to investigate whether soils contained vitamins. To date these investigations have been mostly confined to qualitative tests for vitamins B_2 or riboflavin.

Soil extracts were obtained by placing 25 grams of soil in a 250 ml Erlenmeyer flask, then adding 150 ml of 0.25 N sulfuric acid; this was attached to a digesting apparatus or autoclaved for an hour and the resulting solution decanted. All operations had to be carried on in a darkened room due to the fact that riboflavin breaks down in presence of light.

After the extract was obtained the following tests were applied to determine the presence of B_2-riboflavin.

(1) The method proposed by H. Kahler and E. P. Davis[2] where the B_2 is destroyed in solution by adding NaOH until a solution pH of 11 is reached. Our soil extracts, when adjusted by concentrating or diluting to read about 100 on the fluorophotometer and adding sufficient alkali to destroy the riboflavin, would drop to a reading of 30 to 40.

(2) The microbiological method used of determining riboflavin was outlined in the *Journal of the Association of Official Agricultural Chemists,* for May, 1941. Our *Lactobacillus casei* culture (Type 7469) was obtained from the America Type Culture Collection last summer. Quantitative tests were set up comparing the soil extracts with known amounts of riboflavin, and check sets without riboflavin. This biological method gave positive tests for this vitamin from many local soils.

From the work done at present, we believe that occurrence of B_2 is correlated with the amount of organic matter in the soil. Whether the vitamin comes from the breakdown of plant tissues or whether it is synthesized by fungi, or from both, remains to be determined.

The fact that vitamins are present in the soil does not mean that these vitamins are used in plant growth. We might have a system operating, comparable to the nitrogen cycle with its involved stages; also it seemed quite possible that plant roots might not be able to absorb the riboflavin molecule from the soil solution.

We decided to see if we could obtain any information regarding the question as to whether plant roots absorb the vitamin molecule. To do this, greenhouse plants from the species available were selected in pairs. The two plants used in each case were as nearly identical as possible. These were taken to the dark room and the tops removed, leaving stems about one half inch tall to which were attached pipettes by using rubber tubing long enough to make connections. One plant of each pair was watered with a 25,000 to 1 concentration of riboflavin and the other member of each pair was given distilled water. The root sap was collected in the pipettes and was tested by the *L. casei* biotest mentioned above for riboflavin. These results when subjected to statistical analysis agreed that the plant roots watered with riboflavin solution produced root sap that contained several times the riboflavin found in the root sap where distilled water was used.

[1] I gratefully acknowledge indebtedness to Edwin Schmidt and Beth Booth for assistance in carrying on various phases of these studies.

[2] H. Kahler and E. P. Davis, *Proc. Soc. Exp. Biol. Med.,* 44: 604, 1940.

The plants used for this determination were tomato, tobacco, fuchsia and carrots.

The studies made to date indicate that certain vitamins, particularly B_2 or riboflavin, are present in the soil and that some plants take up vitamins from this source as they absorb essential mineral elements.

If any of our crop plants supplement their synthesized vitamins with vitamins from the soil at different growth stages the presence or absence of vitamins in the soil immediately becomes a vital factor in crop production and soils management.

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APPARENT TIME ACCELERATION WITH AGE OF THE INDIVIDUAL

THE apparent acceleration of time as one grows older seems a rather universal experience. All of us can recall what a long time a year used to seem when we were young children and how, as we grew older, the years seemed to pass faster. Even then, a year during our twenties was apparently a much longer space of time than a year in our forties, and as we approach sixty, a year seems much shorter still.

I have often heard questions raised as to the cause of this apparent acceleration of time with age. At one such discussion many years ago, I suggested that the reason might lie in that elapsed time as measured by the recollection of an individual seemed long or short according to what relationship it had to the individual's total time experience. For instance, at the age of eight, when our memory might go back over four years, a year would represent 25 per cent. of our total remembered time experience and hence seem like a very long time; at the age of twelve, memory may go back over eight years and one year would represent 12½ per cent. of total remembered time experience and could therefore appear to be only half as long as a year did at the age of eight. Similarly, at the age of fifteen, a year would be likely to represent only about 10 per cent. of remembered time and seem still shorter. At the age of 25 it would represent only about 5 per cent. of remembered time and hence seem only half as long as at the age of 15 and possibly one fifth as long as at the age of eight. At the age of 45 to 50, it would represent about 2½ per cent. of remembered time and at the age of 60 only 2 per cent. or less. Thus, as the years roll by, time would seem to be accelerating in speed. Off and on, since then, when such a matter would come up in conversation, I have offered this theory as a possible explanation of this experience, which I believe is quite general. Its reception by scientific friends has encouraged me finally to submit it for wider consideration.

F. W. NITARDY

SCIENTIFIC BOOKS

STRATIGRAPHY

Stratigraphy of the Eastern and Central United States. By CHARLES SCHUCHERT. xvii + 1,013 pp. 4 plates. 123 figs. 78 correlation charts. New York: John Wiley and Sons, Inc. 1943. $15.00.

THIS encyclopedic work by the late Professor Charles Schuchert, of Yale University, is the second volume of three in the series bearing the general title, "Historical Geology of North America." The first volume, "Historical Geology of the Antillean-Caribbean Region, or the Lands Bordering the Gulf of Mexico and the Caribbean Sea," was published in 1935. The third volume, dealing with the stratigraphy of Greater Acadia, eastern, central and Arctic Canada, the Arctic Archipelago and Greenland, was in essentially complete typescript at the time of Professor Schuchert's death and will be published in due time.

Together, the three volumes are designed to document an "Atlas of American Paleogeography," which is to be issued as a part of volume three in the series. They are the product of almost forty years of painstaking examination and correlation of published geological studies supplemented by years of careful field work, particularly within the areas involved in the present volume.

Following a concise and valuable introductory chapter on "Stratigraphic and Time Terms and their Grouping," this volume is divided into eight parts, as follows:

"Part I. The New York Standard." This discussion includes the Paleozoic formations of the State except the "much deformed and much metamorphosed Cambro-Ordovician area of the Taconic Mountains of the Hudson-Champlain valleys." This region is considered to be "in reality . . . but the western margin of Greater Acadia" and will be described in volume III.

"Part II. The States Athwart the Appalachian Geosyncline." Following an introductory statement on the Appalachian geosyncline, the discussion includes the Paleozoic and, generally, the Lower Mesozoic sequences of Pennsylvania, New Jersey, Maryland, Virginia, West Virginia, eastern Tennessee, North and South Carolina, Georgia, Alabama and Mississippi.

"Part III. The Atlantic Coastal Plain." Complet-