to food essentials. The Research Corporation of New York has given $3,000, which will be used during the summer in the work of finding mutant strains not now available. The Nutrition Foundation, Inc., has renewed a grant of $6,000 to provide four fellowships for work in developing specific microbiologic assays, primarily for amino acids.

ANNOUNCEMENT is made that Mead Johnson and Company has renewed the arrangements for a period of five years whereby the annual award of $1,000 will be given for research dealing with vitamin B complex. The recipient of this award will be chosen by a committee of judges of the American Institute of Nutrition.

IT is reported in *The New York Times* that trustees of the Wisconsin Alumni Research Foundation have decided to ask the Ninth Circuit Court of Appeals at San Francisco to re-study a ruling declaring that valuable patents covering the manufacture of Vitamin D are invalid. If the court does not reverse its ruling, the foundation will ask the United States Supreme Court for a review.

A CABLE to *The New York Times* states that according to Professor Eligio Ocana Vieto, first secretary to the Ministry of Education of Panama, the sum of $4,000 will be contributed monthly by the National Government of Panama for the organization and maintenance of an Inter-American University. This, it is said, will provide for five professorships and twenty scholarships offered by the Government to students of the American Continent. The university will be opened on September 27, coinciding with the opening of the Congress of the Ministers of Education of American Countries. The University of Notre Dame, Indiana, has offered to endow a chair in philosophy under a professor who would go to Panama every year.

THE daily press, quoting from an article in the Stockholm newspaper *Svenska Dagbladet,* states that the value of the Nobel Prizes in 1943 will be 123,690 kroner each ($30,922 at par). The value in 1942 was 131,891 kroner (about $32,972) each and, in 1941, 131,496 kroner (about $32,874).

DISCUSSION

CENSUS AREAS FOR THE UNITED STATES, 1940

FOR a decade Ex-Governor C. S. Osborn, of Michigan, and his daughter, Stellanova Osborn, have, with unbelievable endurance, pursued the Census Bureau, the Library of Congress, the Geological Survey, the General Land Office and even the American Geographical Society to have them "give back to Michigan" the water area of the adjoining Great Lakes which these agencies, one may be surprised to learn, never denied her. After much indecision the guilt for this deed finally has been fixed on the Census Bureau and, because SCIENCE chooses to publish the Osborn viewpoint, we wish to reply, although this brief statement does not do justice to the voluminous correspondence with the Osborns and their many staunch Michigan friends.

As might be expected, the Census Bureau and the principal map-making agencies of the Federal Government have not always been consistent in their manner of publishing State areas during the nearly one hundred years of the history of area measurement in the United States. The process has been evolutionary with the development of techniques, maps and needs. The areas published by the General Land Office during the second and third quarters of the nineteenth century excluded large water bodies such as the Great Lakes. Henry Gannett, geographer of the Census on loan from the Geological Survey, in 1881 published the first basic area measurements of the States and counties of the United States. He gave "gross areas" for the States and included the area of Chesapeake and Delaware Bays with the adjoining States but omitted all reference to the subdivision of that portion of the Great Lakes area under the jurisdiction of the United States. This manner of presentation was retained for each decennial census until 1906, when Gannett thought better of his omissions and listed, below his main table, the several States and the amount of Great Lakes water area "contained" by each. This method of presentation was retained by Gannett as well as by C. S. Sloane, who succeeded him as geographer of the Census, and Frank Bond, of the General Land Office, on those rare occasions when water areas were even published, until the current remeasurement for the Census of 1940.

It is incorrect to suppose that the latest remeasurement of the United States represents a slavish adherence to a traditional form of presentation. The presentation used was the outgrowth of extended discussion with professionally qualified cartographers, geographers, geodesists of the Federal map-making agencies and private scientific organizations. A special committee of the National Research Council gave consideration to this matter and a quotation from the report of this committee, dated May 3, 1941, is significant:

In the interest of keeping our statistics of area upon the basis usual in foreign countries it was concluded that the Great Lakes areas, Long Island Sound, Delaware Bay, Chesapeake Bay, Puget Sound, and the Straits of Juan de Fuca and Georgia, etc., should be excluded from the inland waters in the main table but presented in footnotes with the water areas of the several States.

The latest remeasurement of the United States represents a more basic departure from the past than the above decision might indicate. For the first time three fundamental definitions for land, inland water and water other than inland water were established. The application of these mutually exclusive definitions makes it possible for any one to duplicate the outer limits established for the United States and solves the vexatious problem, among others, of how to handle the hundreds of islands off the coasts of Maine and Florida. Finally, as facts that Mr. Osborn failed to note, not only does Map I, "Limits of the United States," contained in the Census publication "Areas of the United States: 1940," show that the current measurements were made to the International Boundary, but Table IV lists the Great Lakes area contained within each State. This gives full recognition to the fact that the Great Lakes to the International Boundary are under the legal jurisdiction of the United States and the adjoining States.

It is true, and properly so, that the Census Bureau is primarily a statistical agency. The funds which it spends are for collecting, analyzing and publishing statistics covering a wide range of subjects. The fact that Census areas have been vested with official, quasi-legal authority, over and above their service to statistics, is an evolution over which the Census Bureau has had no control. The U. S. General Land Office has the authority to make surveys and area determinations of a highly accurate legal character, based on actual field work. As for Census areas, at present they are as accurate as is feasible with national coverage on a map scale of 1: 500,000, using geodetic tables for 30-minute quadrilaterals of latitude and longitude and careful planimeter measurements. Census areas will undergo revision each decade as improved, larger-scale maps are produced. It would be folly indeed if through the suggestion of Ex-Governor Osborn, Michigan should seek to legalize and constitutionally adopt a Census area for its State (with the Great Lakes area to the International Boundary included), when under the circumstances of measurement from the maps available, a gross error of one per cent. is to be expected, and future revisions are a certainty.

The areas to which Census statistics pertain are almost without exception land areas. The manner in which areas serve the census function is to enable users of statistical data to compute square mile densities for inter-area comparison. Small bodies of inland water too partake of a character analogous to land area from the statistical standpoint. But, in order not to be misleading statistically, it is considered appropriate to exclude large water bodies from inland water. For one thing, imagine the confusion of attempting to divide Lake Michigan among the adjoining counties of the four abutting States, and then to further subdivide this water among the minor civil divisions of these counties. Yet, if the distinction between "inland water" and "water other than inland water" (the Great Lakes and other large bodies of water) had not been made this procedure would have been required, no matter how ridiculously impracticable. Furthermore, it seems appropriate to avoid publishing areas in such a manner as to arouse a storm of legal and political controversy, yes, and manifestations of State patriotism! There is an American phobia for bigness. Michigan with her Great Lakes water area expands from 58,216 to 96,791 square miles; from the State listed as 21st in size to that of 9th in size; from the second largest State east of the Mississippi to by far the largest. These matters might seem trivial, but many a tempest has started in just such a teapot. Might not other States, Georgia, for instance, insist that the Census remeasure their areas and force the inclusion of coastal water areas to which they feel they have a legal claim. Where might this indoor sport lead? We believe the Census is right in avoiding such hair-splitting arduous labor. For those who do not believe that such controversies are latent, here are some of the facts and some of the fiction in the case:

California claims jurisdiction over all Pacific waters lying within 3 English miles of her coast; Oregon claims jurisdiction over a similar strip of the Pacific Ocean, one marine league in width between latitude 42° north and the mouth of the Columbia River; Texas claims jurisdiction over a strip of Gulf water 3 leagues in width, adjacent to her coast and between the Rio Grande and the Sabine River; the counties of New Jersey fronting upon the sea-coast extend, by statute, 3 nautical miles from the shore line; and Louisiana has passed legislation claiming a 27-mile limit. The remaining 16 states bordering the Pacific or Atlantic Oceans or the Gulf of Mexico either make varying claims or have entered no claims whatever to territorial waters. No certainty in international law exists relative to the limits of the territorial sea and there has been wide divergence of opinion. The United States, for fishing rights, uses a 3-mile limit and the revenue laws pushed the line for customs waters out to 4 leagues from the coast. During the prohibition era, jurisdiction was extended to a 12-mile

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.