found in the reports of superintendents and school doctors, and measures the efficiency of the systems by the application of a few common-sense statistics and the principles of scientific management. He shows in a most convincing way the inefficiency of some of the methods in vogue and offers a plan which ought to be taken as a model until experience shall have given us something better.

The book reveals a broad grasp of the larger significance of educational hygiene, and points clearly to the many dangers of misplaced emphasis in this new but promising field of child welfare. It should be studied especially by school superintendents, school doctors, school nurses and social welfare workers.

The appearance of the book is somewhat marred by a rather unattractive make-up; and the author's style, while vigorous and interesting, is not always as direct and clear as one would like.

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Investigations in the Atlantic Ocean[1]

Measurements of the temperature and salinity of the surface water of the Atlantic Ocean have for many years been carried out by route steamers and other vessels traversing these waters. The necessity of systematically conducted investigations, of both hydrographic and biological character, not only at the surface, but also in deep water, is pointed out. Such a systematic investigation of the whole of the Atlantic Ocean must be regarded as one of the most important scientific and practical tasks of the future.

Pettersson and Drechsel were intrusted by the Central Bureau of the International Study of the Sea, with the task of drawing up a memorandum as to the ways and means by which an international reconnaissance of the Atlantic Ocean could be organized in the near future. These gentlemen have conferred with many of the leading authorities on oceanography in other countries.

The authors concluded, as the result of such conferences, that the matter could not be farthered by the ordinary discussions and resolutions on the part of learned societies. The only way was to seize the first favorable opportunity of commencing the investigations. The first trans-Atlantic hydrographical investigation would probably have to be made from ships in the naval service. Coastal seas could be studied only by real investigation steamers, specially fitted for fishery-biological work.

The following program was drawn up:

I. Investigation of Coastal Seas;

II. Transatlantic Investigation.

These investigations are to be carried out simultaneously, since in this way a more comprehensive view can be obtained of the actual condition of the Atlantic Ocean in summer and winter. After the general survey has been made, special investigations of individual questions can be taken up. To complete such investigations it is important that the countries bordering on the Atlantic Ocean should cooperate. Great Britain and the United States have already cooperated, and France and Canada should also participate. For the investigation of the coastal seas, the following program is suggested.

(*a*) Quarterly cruises to be made to the *northeastern part of the Atlantic water system,* from Iceland to Spitzbergen, including the North Sea, the Skagerack, the Cattegat and the Baltic.

(*b*) In reference to the Iceland-Faeroe-Wyville Thomson ridge, the Rockall channel and the mouth of the Channel, it is to be hoped that the former will be investigated by the Scottish, Danish and Norwegian commissions, and the mouth of the Channel by the Irish Fishery Department.

(*c*) In the sea east and west of Greenland the determination of the conditions with regard to ice is of prime importance. The Danish Meteorological Institute has already done good work in this field.

(*d*) We do not possess a single hydrographical section through the Labrador current, and

[1] Abstract of a report by Petterson and Drechsel. The address of Pettersson is: Professor Otto Pettersson, Holma i Brastad, Sweden.

yet this current plays such a prominent part in the water circulation of the Atlantic. Some observations are already being made in connection with the shipping interests.

(*e*) In reference to the Coastal Sea of North America, discussed under caption (*e*), it is pointed out that hydrographic observations should be obtained over the area extending 600 miles south 30° east of St. Johns, Newfoundland, returning directly to the Flemish Cape and thence to St. Johns. Also at other points on the "Grand Banks" and neighboring fishing grounds. It is also recommended that quarterly cruises be carried out in the months of February, May, August and November from Cape Lookout to the Bermudas and thence to Florida. Monthly observations should be made on section between southern Florida and Nassau, and between southern Florida and Havana; also in the Atlantic Ocean north of Cape Hatteras.

(*f*) The Newfoundland Bank and adjacent waters are both scientifically and practically the most interesting area for study, since it is here that we have the conflict between the Gulf Stream and the Labrador current. The bearing of the results obtained on the fishery question would be very direct and very important. The fact that the fishery on the Grand Banks is seasonal would indicate an annual periodicity in the hydrographical conditions. Ways and means are not yet worked out for connecting the study of the Newfoundland Banks with a future, general study of the North Atlantic Ocean.

(*g*) The Portuguese coast and the Plateau of the Azores can be investigated largely by the Portuguese, who are very much interested in the problem. With the permission of the Portuguese government, two cruisers can make quarterly cruises into these regions.

Transatlantic lines of investigation can be carried out only by direct government aid. To secure this cooperation on the part of the different governments, it is necessary to have a well-arranged program, and to select some "favorable opportunity" for carrying it out. The following program and opportunity are suggested.

The Program

The basin of the Atlantic is divided into two great hollows by a submarine ridge running out from the Cable Plateau. The eastern and western hollows have different hydrographical conditions. The simplest plan would be to draw the transatlantic line of investigation parallel with the degrees of latitude between America and Europe. The northernmost of the three sections should be studied approximately along the fifty-seventh degree of latitude. This would be comparatively simple. The depths of the Cable Plateau are only from 1,000 to 3,000 meters, and this section would cross all of the so-called "Gulf Stream Branches" in the north Atlantic.

The southern sections should be drawn not transversely, but diagonally. One should extend from the mouth of the Channel north of the Plateau of the Azores to the West Indies and the Caribbean Sea. The second should extend from the Straits of Gibraltar south of the Plateau of the Azores to Trinidad.

The study of those two sections would demand a complete equipment for oceanic deep-water soundings, and a staff experienced in such work on board large ships. The best time would be from December to February, since our knowledge of the condition of the sea is especially incomplete in winter.

The Opportunity

It appears opportune that the first Atlantic survey should be made with ships from the Navy, at a time when such vessels are sent out simultaneously from several European countries along the several routes indicated above. Such an opportunity will present itself at the opening of the Panama Canal in January, 1915. European countries will probably be represented by naval vessels, and scientific investigations could be made *en route,* without great expense or serious loss of time.

The Austrian and Italian vessels, coming through the Straits of Gibraltar, could study the southern section. Since a deep-sea sounding requires only about twelve hours, and a sounding of 1,000 meters only a few hours,

the scientific work would not lengthen the voyage more than a week.

The ships sent by the North Sea countries and by Russia, coming through the English channel, could study a section of the Atlantic north of the Plateau of the Azores. The opening of the Panama Canal, which should stand for universal traffic, would likewise form an epoch in the study of the sea, and introduce a future of international cooperation in the scientific activity of nations.

If this opportunity is neglected, it is not likely soon to come again. Experience has taught the difficulties involved in setting in motion an international undertaking of such dimensions; and the opinion is expressed that the time remaining would just about suffice for the diplomatic, scientific and technical preparations.

In preparing the above synopsis the words of the authors are frequently used.

H. C. Jones

SPECIAL ARTICLES

THE POOR NITRIFYING POWER OF SOILS A POSSIBLE CAUSE OF "DIE-BACK" (EXANTHEMA) IN LEMONS

The disease known as "die-back" in citrus trees has, for many years, worried the citrus growers of Florida and California in this country and has thus far baffled the efforts of the agricultural scientist to discover its cause. The writer has recently made some observations and experiments on several citrus soils bearing trees affected with "die-back," which lead him to believe that a poor nitrifying power on the part of the soil, with the ammonifying power remaining normal, may be the cause of the peculiar manifestations which are characteristic of the disease and which, for the purposes of this preliminary report, need not be described. The theory upon which I am working at the present time, looking toward the solution of this problem, is that in the absence of normal nitrification and in the presence of sufficient ammonification, the tree does not obtain a sufficient quantity of nitrate for its development and is sooner or later forced to assimilate ammonia compounds as produced by ammonifying organisms in the soil; or in the presence of a sufficient amount of bases in the soil even the ammonia may be set free, thus causing the plant to starve for want of nitrogen. While it is true that some plants can use ammonia compounds just as well as nitrates as a source of nitrogen and further, that some of them even prefer the ammonia compounds, as Kelley has shown is the case with rice, it is very possible that we have in the citrus tree, a plant which is deleteriously affected by ammonia compounds when it is forced to absorb them. As above explained, however, when a soil's power to fix and hold ammonia is very feeble, owing to the presence of bases in excess, a poor nitrifying power and a strong ammonifying power may mean nitrogen starvation for plants on that soil. The writer has examined and tested the nitrifying power of four citrus soils in various parts of California, on which trees were suffering from "die-back," and has found in every case a very slight nitrifying power or none at all. The tests were made by adding to soils, kept at optimum moisture conditions at a temperature of 26 to 28 degrees C. for approximately a month, both dried blood and sulfate of ammonia, but only slight or no increases of nitrates over the amount in sterile checks or dry soil were obtained. The dried blood was used also in varying quantities from 1 per cent. up to 5 per cent. of the dry weight of the soil, but the same results were obtained in all cases. In some of these soils, particularly, the ammonification of the blood proceeded so rapidly as to give an intense odor of ammonia when the Petri dish cover was raised from the tumbler in which the soil cultures were kept.

This theory of the writer's which inclines to account for the "die-back" by the fact that too much ammonia is assimilated by the tree under compulsion in the absence of nitrates, or, under certain circumstances, because ammonia is set free and therefore there is scarcely any nitrogen for the tree to assimilate, would also seem to be in part confirmed by the observations made by Florida investigators on the disease in question, in which it was noted that in all cases the application of organic