74.—ORGANIC MATTER IN THE BALTIC.

By Prof. V. HENSEN.

[Abstract of a paper read at the Sleswick-Holstein Physiological Association, January 12, 1885.]*

An investigation to determine the quantity of organic matter in the western portion of the Baltic, exclusive of the harbors and bays, has been in progress since August, 1884, at the request of the commission for the investigation of the German seas.

The theoretical basis for such an investigation is given in a paper on "The Occurrence and Quantity of Eggs of some Fish in the Baltic."† The investigation was based on the supposition that the constant shaking motion prevailing in the sea distributes all matter floating in its waters almost evenly, and that, on the other hand, the conditions of growth and increase for the various formations floating in the water (partly objectless and partly with no other object than to seek food) are everywhere the same in water of the same character.

Practical investigations have tended to prove the correctness of this theory. The distribution of matter was of course not absolutely even. A shaking process would bring about a close approach to even distribution, but could never make it perfect. Moreover, there was a lively exchange in the basin in question between the waters of the Cattegat and those of the Eastern Baltic, rendering the even distribution liable to constant disturbances. It appears, however, that when the steamer is anchored, and successive columns of water (of 3, 5, 7, &c., meters depth) are examined as to their contents, the entire quantity of organic matter and of individuals is approximately proportionate to the volume of water which has been examined; that therefore the distribution of matter in this portion of the Baltic, whose depth rarely exceeds 20 meters, corresponds approximately to this depth. In fishing a number of times in succession in a column of water of equal depth, while the current passes the anchored vessel, the catches will vary in quantity and numerical composition, but the differences do not exceed 50 per cent.

As far as could be ascertained, the catches in the Baltic between the Holstein shores and the nearest Danish islands would not vary 50 per cent from the average of the first catches referred to above. As there was sufficient agreement between the results obtained by continuous fishing near the surface, as the steamer pursued its course, and the results obtained at points where a halt was made, a tolerably correct idea of

* "*Sitzung des physiologischen Vereins, den 12. Januar* 1885." From *Mittheilungen für den Verein Schleswig-Holsteinischer Aerzte*, Part X, No. 7, 1885. Translated from the German by HERMAN JACOBSON.

† See Fish Commission Report, 1882, p. 427.

the contents of large sea areas may certainly be gained, provided the apparatus used is sufficiently accurate.

The importance of such investigations for the physiological knowledge of the sea is greater than may appear at first sight. The first question to be decided was one which had so far hardly been considered seriously, namely, whether the light of the sun exercises in the water of the sea the same germinating influence as in the air and on the land. By these investigations this question has been answered in the affirmative. In December, for example, there ha been found in 10 cubic meters of water more than 100,000,000 of plants dependent on sunlight (*Rhizosolenia alata*, 80,000,000; *Chætoceros*, 3 species, 62,000,000), all vigorously increasing, and this entire mass of plants had been produced in the course of about two months. Most of these plants sprouting in salt water belonged to the simplest products of the vegetable kingdom, and therefore appeared particularly adapted to decide general questions of generation.

Even among the animals living on the coast there are but few which live on firmly rooted plants, and it is an erroneous idea that during autumn and winter a sufficient quantity of particles was torn off, which floated in the sea and served as food for the copepods and other animals, for even in the Baltic the quantity of such floating matter was very small. The vast majority of marine animals (such as fungi, polyps, worms, ascidians, mussels, a great many snails, crustaceans, and higher animals) live, most of them directly and a few indirectly, on floating matter, which in its lower forms must, therefore, be considered as the animated original material of the life of the sea.

If we can believe that light, which as a fact exercises a generating influence in the sea, is used to the fullest extent possible, we arrive at a remarkable conclusion. As the organic beings in the sea need not protect themselves against lack of salt and moisture, they can be of lighter build and of a lower organization than land and freshwater animals. That they are of a lower organization can actually be shown. The conclusion would therefore be drawn that the same quantity of light must be able to bind together more carbon and nitrogen in the sea than on the land, and that in the sea more organic matter must be generated than on the land, provided not too much light is reflected from the surface of the sea.

The investigations made in the western part of the Baltic have shown that the quantity of matter floating in its waters is so great as to indicate an annual production not much smaller than that of an equal area of land. When it is considered that wherever animals are rooted to the bottom of the sea there must be floating matter to supply them with food, we feel inclined to the opinion that the quantity of organic and animated beings floating in the sea must be enormous.

It was not astonishing that this powerful generative activity had hitherto almost escaped our observations, as thus far no one has en-

deavored to ascertain the quantity of matter floating in the sea.* It was difficult to make such observations, because one formation passed away after a few months, to give way to others. No such accumulation of full-grown matter as is found everywhere on the land can, therefore, be looked for in the sea.

75.—HYDROGRAPHIC WORK OF THE ALBATROSS IN 1884.

By Lieut. SEATON SCHROEDER, U. S. N.

During the year 1884 the Albatross took 701 soundings, almost all of which were located with sufficient accuracy to give them hydrographic value. During the winter and spring the vessel was employed by the Navy Department in searching for reported dangers in the West Indies and on the way there, runnings lines of soundings across the Caribbean Sea and among some of the islands, noting currents carefully, and establishing the longitude of Cape San Antonio lighthouse, Cuba.

The following are the reported dangers over or near which the depths were found in the positions given:

Name.	Latitude.	Longitude.	Depth.
	° ′ ″	° ′ ″	*Fathoms.*
Orion Shoal	34 48 45	72 25 00	2,462
Ashton Shoal	33 50 20	71 42 00	2,953
Perseveranza Shoal	31 15 42	67 39 10	2,787
Mourand Shoal	24 55 14	65 13 07	3,006
Leighton Rock	17 39 30	73 22 15	2,490
Loos Shoal	17 48 00	73 34 15	2,369
Breakers	12 54 40	66 11 10	2,768
Vigia	12 10 30	66 11 00	2,707
Georgia Shoal*			17
Tribune Shoal	12 11 30	74 27 30	2,057
Powhatan Shoal	11 11 00	75 50 30	1,195
Doubtful	14 53 40	80 20 00	1,151
Sancho Pardo†			
Albatross Shoal	22 49 20	84 15 00	950
Vigia	23 06 00	83 03 45	625
Huntley	30 46 00	78 35 00	470

* Many soundings. † Off Cape San Antonio; many.

The soundings were such as to prove the non-existence of all except the Georgia Shoal, reported by Captain Holt, of the American brig Georgia, in 1867. An extensive search was made for this, resulting in the discovery of a bank a little to the southward of the reported position, in latitude 17° 36′ to 17° 44′ N. and longitude 75° 40′ to 75° 45′ W. The least water found by the Albatross was 17 fathoms.

One hundred soundings were taken off Cape San Antonio, and the shoal reported there may be expunged from the charts.

Six lines of soundings were run across the Caribbean Sea, four be-

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* The only person who has done something in this line is Murray, of the Challenger expedition.