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IX. *Notes of Diatomaceæ found in the stomachs of certain Mollusca.* By GEORGE DICKIE, M.D., Lecturer on Botany in the University and King's College of Aberdeen.

READ 9TH MARCH 1848.

PROFESSOR E. FORBES has remarked that the stomachs of fishes are often zoological treasures. The Haddock is a great conchologist; the Cod is more devoted to the Echinodermata, having a great taste for that tribe.

Certain Mollusca are equally indefatigable collectors of *Diatomaceæ*; they have been found in the stomachs of the Oyster, Clam, &c.; and Dr. Hooker in the 'Botany of the Antarctic Voyage' states, that the stomachs of *Salpæ* and other (especially of the naked) Mollusca invariably contain *Diatomaceæ*, sometimes several species. These *Salpæ* were washed up in masses on the pack ice, and in decay they left the snow covered with animal matter impregnated as it were with *Diatomaceæ*. He found that the contents of the stomach of every *Salpa*, between the latitudes of the North Tropic and 80° South, invariably contained the remains of these minute plants. *Dictyocha aculeata* was universally observed in the stomachs of those found off Victoria Barrier. Mr. Lee has found them abundant in the stomach of the common Barnacle.

The following notes of species detected in the stomachs of different species of *Ascidia* and of the freshwater Mussel (*Mya margaritifera*, L.) may be worthy of record. They do not appear to have the same discrimination as to their prey which the fishes would seem to exercise, every object, whatever be its nature, coming within the sphere of the currents produced by the cilia, is swallowed, provided its size be not too great. The *Ascidia* examined were from depths varying from twenty-five to thirty fathoms, and five to six miles from land.

A time was when there would have been some hesitation in offering to the Society such a communication as the present, owing to the conviction that some of the organisms to which it has reference really belonged to the animal kingdom. The very important discovery made by Mr. Thwaites, that they present examples of conjugation like *Zygnema*, &c., leaves their true na-

ture no longer a doubtful question. There may still be some dispute respecting the position occupied by such forms as *Coscinodiscus*, *Actinoptychus*, &c. ; but if it be admitted, and there seems no reason for hesitation, that such genera as *Meloseira* and its allies are true plants, it will not be difficult to understand also the nature of those just mentioned, the transition from the one to the other being obvious.

Diatomaceæ found in the stomachs of different species of *Ascidia* :—

<i>Eunotieæ.</i>	<i>Cymbelleæ.</i>
Epithemia Sorex, Kg. ? .	Cymbella maculata, Kg.
<i>Fragilarieæ.</i>	<i>Gomphonemeæ.</i>
Fragilaria pectinalis, Ehr.	Gomphonema pohliæforme, Kg.
Diatoma flocculosum, Ag.	<i>Naviculeæ.</i>
<i>Meloseireæ.</i>	Navicula Hippocampus, Ehr.
Meloseira sulcata, Kg. ?	Ceratoneis Closterium, Ehr.
M. Jurgensii, Ag. ?	<i>Coscinodisceæ.</i>
<i>Surirelleæ.</i>	Coscinodiscus Patina, Ehr.
Surirella ?	C. lineatus, Ehr.
Synedra lævis, Ehr.	C. eccentricus, Ehr.
<i>Cocconeoidæ.</i>	Actinocyclus undulatus, Bailey.
Cocconeis Pediculus, Ehr.	Actinoptychus senarius, Ehr.
Doryphora amphiceros, Kg.	<i>Actinisceæ.</i>
<i>Achnantheæ.</i>	Dictyocha gracilis, Kg.
Achnanthes longipes, Ag.	

This list will afford some idea of the nature of the deposits going on in the Aberdeen bay at the depth and distance from land already mentioned.

The following species were evidently in a living state :—*Meloseira sulcata*, *M. Jurgensii*, *Synedra lævis*, *Navicula Hippocampus*, *Surirella* ?, *Coscinodiscus Patina*, *Actinoptychus senarius*, and they were also very common ; in this latter respect, however, they were not superior to the *Dictyocha* and *Doryphora*.

Of those enumerated, the following are usually met with in fresh water : *Fragilaria pectinalis*, *Diatoma flocculosum*, *Cocconeis Pediculus*, *Cymbella maculata* and *Gomphonema pohliæforme* ; they were also much less abundant than the others. Their presence is readily accounted for, when it is considered that two large rivers, the Dee and Don, besides numerous smaller streams, empty themselves into the bay. Mr. Thwaites informs me that he has found the *Meloseira sulcata* both in fresh and brackish water. Some of the species mentioned are not uncommon in the mud of our harbour.

Mixed up with the *Diatomaceæ* were numerous individuals belonging to two or three forms of Foraminifera, also spiculæ of

a species of *Grantia* and fragments of *Ulvæ*, with particles of silex in a finely divided state.

Some of those enumerated have a very extensive distribution : *Meloseira sulcata* has been found at Melville Island, and by Dr. Hooker at Victoria Barrier, where *Coscinodiscus eccentricus* and *C. lineatus* also occur. These and others are abundant in guano from Africa and Peru, and are now in myriads mixed with the soil of our fields, and their presence may perhaps at a future time be a puzzle to some assiduous Philomikros who may be ignorant of the history of British agriculture.

Although temperature may exercise little influence over the distribution of *Diatomaceæ*, it may not be irrelevant to record here that of the sea in the Aberdeen bay, as ascertained by Mr. James Stratton, whose observations were made occasionally from March 1845 to September 1846 inclusive. The mean temperature at a mean depth of 24·5 fathoms, four miles from land, is 47°·7 F., being nearly one degree higher than that of the air as observed in the vicinity of Aberdeen. The minimum took place in March, being 39°·5 F., exactly the mean temperature of the ocean according to Sir J. C. Ross.

The freshwater Mussel (*Mya margaritifera*, L.) is abundant in both the Dee and Don. The specimens in whose intestines the following *Diatomaceæ* occurred, were from the former river eighteen miles inland.

<i>Meridieæ.</i>	<i>Achnantheæ.</i>
<i>Meridion circulare</i> , Ag.	<i>Achnanthes minutissima</i> , Ehr.
<i>Fragilarieæ.</i>	<i>Cymbelleæ.</i>
<i>Fragilaria hyemalis</i> , Lyngb.	<i>Cymbella flexella</i> , Kütz.
<i>Diatoma flocculosum</i> , Ag.	<i>C. leptoceras</i> , Kütz.?
<i>D. tenue</i> , Ag.	<i>Cocconema cymbiforme</i> , Ehr.
<i>Meloseireæ.</i>	<i>Gomphonemeæ.</i>
<i>Meloseira distans</i> , Kütz.?	<i>Gomphonema geminatum</i> , Ag.
<i>Surirelleæ.</i>	<i>G. pohliæforme</i> , Kütz.
<i>Synedra capitata</i> , Ehr.	<i>G. minutum</i> , Ag.
<i>S. tenuis</i> , Kütz.	<i>Naviculeæ.</i>
<i>Cocconoidææ.</i>	<i>Navicula rhomboides</i> , Ehr.?
<i>Cocconeis Pediculus</i> , Ehr.	<i>N. cuspidata</i> , Kütz.
	<i>N. viridis</i> , Kütz.

Intermixed with these were spiculæ of *Spongilla*. Generally speaking the individuals of each species were of the minimum size, certainly far less than that usually attained. Of those brought within the sphere of the currents produced by the cilia, the smaller alone were swallowed. Of the species enumerated I have found the following on our mountains at heights varying from 2800 to 3800 feet : viz. *Meridion circulare*, *Diatoma floccu-*

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losum, *D. tenue*, *Meloseira distans*?, *Gomphonema pohliaforme*, *G. minutum*, *Navicula rhomboides*? and *N. viridis*. The *Meloseira* I have found to constitute a considerable proportion of the fine black mud found beneath patches of snow on Ben-na-Muich Dhu.