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by

Edith Stevens

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The Significance of Diatoms as food for Oysters

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Edith Stevens Ph.D.

The original purpose of this work was to determine the role of plankton as food for oysters with special reference to their part in the fattening process. It is known that certain locations are more desirable for this process than others but the reasons are not definitely known. As with many investigations the original problem proved to be too great in scope with which to begin and the summer's work has narrowed to a comparison of the diatom content of the alimentary canal of these oysters found in the Ladysmith and Crescent areas.

A knowledge of the diatoms of the two regions seemed to be necessary for a beginning, thus the greater portion of the time has been spent in learning and classifying those commonly found in the plankton and in the oyster.

The Japanese oyster (Ostrea gigas), the eastern oyster (Ostrea virginica) and the oyster (Ostrea lurida) native to this west coast, were used. These were collected from the oyster flats at Ladysmith and from the float at Crescent.

The liquid content of the mantle cavities was kept and preserved as was the material from the digestive tracts. The latter material was removed ordinarily by dissection - this proved to be the most satisfactory. Some of the liquid was left untreated in order to determine the protoplasmic content of the diatoms before their entry into the digestive cavities. The remainder was treated with hot nitric acid. A portion of the contents of the digestive canal was treated and some was left without treatment. Permanent slides were made from the liquid and from the digested material of each species of diatoms found and on which slides they appeared. These slides will serve as a means

of checking the identifications. The species found are indicated in the table below. Later there will be recheck of the species and the comparative number of individuals indicated. The mark # indicates presence of a diatom.

Diatoms	<u>Ladysmith</u>			<u>Crescent</u>		
	Native	Jap.	Va.	Native	Jap.	Va.
<i>Acanthodes brevipes</i>						
" <i>longipes</i>		#	#			
" <i>subsessilis</i>			#			
<i>Actinoptychus undulatus</i>	#					
<i>Amorpha coffaeiformis</i>	#	#	#	#	#	#
" <i>salina</i>	#					
" <i>sp?</i>	#					
<i>Arachnoidiscus ehrenbergii</i>					#	
<i>Auliscus sculptus</i>	#			#	#	#
<i>Aulicodiscus oregonus</i>	#					
<i>Biddulphia aurita</i>	#	#		#	#	#
<i>Biddulphia alternans</i>					#	#
" <i>rhombus</i>	#	#				
" <i>roperiana</i>						#
<i>Camplyodiscus</i>						
<i>Chaetoceros diadema</i> (spore)					#	
" <i>decipiens</i>				#		#
" <i>laciniatus</i>				#		
" <i>radicans</i>				#	#	
" <i>similis</i>				#		

	<u>Ladysmith</u>			<u>Crescent</u>		
	Native	Jap.	Va.	Native	Jap.	Va.
<i>Chaetoceros socialis</i>				#	#	#
<i>Cocconeis scutellum</i>	#	#	#	#	#	#
" <i>pseudomargina</i>			#	#		
<i>Coscinodiscus curvatus</i>	#	#				#
" <i>excentricus</i>					#	#
" <i>radiatus</i>	#		#			
" <i>subtilis</i>					#	
" <i>wallesii</i>			#		#	
<i>Cyclotella operculata</i>	#					
" <i>striata</i>		#				
<i>Diploneis crabro</i>					#	#
<i>Ditylum urtricatum</i>				#	#	#
<i>Epithemia musculus</i>			#	#		
" <i>zebra</i>						
<i>Frustulia rhomboides</i>	#					
<i>Gomphonema geranatum</i>						#
<i>Grammatophora marina</i>	#	#	#	#	#	#
<i>Homeocladia filiformis</i>		#		#		#
<i>Hyalodiscus laevis</i>						#
" <i>subtilis</i>		#		#	#	#
<i>Licomorpha gracilis</i>	#	#				
" <i>paradoxa</i>	#	#				
<i>Mastogloia exigua</i>				#		
<i>Melosira borreri</i>	#					
" <i>juergensi</i>		#	#	#	#	#
" <i>moniliformis</i>	#	#			#	#

	Ladysmith			Crescent		
	Native	Jap.	Va.	Native	Jap.	Va.
Melosira nummuloides	#	#	#	#	#	#
" sulcata		#	#	#	#	#
Navicula brevis						#
" cyprinus			#	#	#	#
" distans						
" lyra	#			#	#	#
" pretexa	#					
" punctulata var. (marina)					#	
Nitzschia acuminata					#	#
" coarctata	#					
" paxillifer	#	#	#	#		
" longissima		#				
" marcilena		#				
" sigma		#				
Plagiogramma pulchellum						#
" sp?				#		
Pleurosigma balticum	#	#		#	#	
" sp?			#			
Rhabdonema arcuatum			#			
Rhoicosphenia curvata	#			#	#	#
Skeletonema costatum	#	#	#	#	#	#
Striatella unipunctata	#					
Surirella gemma	#					
" fastuosa	#	#	#			
" mexicana	#					
" ovalis						#

	<u>Ladysmith</u>			<u>Crescent</u>		
	Native	Jap.	Va.	Native	Jap.	Va.
<i>Surirella ovata</i>		#				
<i>Stauroneis gracilis</i>				#		
<i>Triceratum artica</i>	#					
<i>Thalassiora baltica</i>				#		
" <i>decipiens</i>				#		

Many more diatoms than the 80 indicated in this table, were present and some of them occurred frequently but the means of identification was not available. The most comprehensive work which is by Van Heurck was not to be obtained although there is still a hope that it may be obtained from the Congressional Library in Washington D.C. The references used for these identifications were:

- (a) Wollé, Diatomaceae of North America (Comprehensive)
- (b) LeBour, the Plankton Diatoms of Northern Seas (Not comprehensive)
- (c) Boyer, the Diatomaceae of Philadelphia and Vicinity (Good)
- (d) Gran & Angst, Plankton Diatoms of Puget Sound
- (e) Bailey & MacKey, Diatoms of Vancouver Island (useful for checking)

Upon the examination of the plankton tows obtained from Ladysmith and Crescent it was found that many of the diatoms present in them were not present in any quantity in the digestive tracts. Many of those present in the tract were shore forms, more adapted to shallow waters and waters freshened by streams or rains. These include *Acanthes*, *Biddulphia*, *Cocconeis*, *Hyalodiscus navicula*, etc. This fact may be tied up with the fact that the shallow water is better for fattening. The oysters yield some forms not frequently found.

Of the diatoms found within the mantle cavity, not more than half seem to have any protoplasmic content. This appearance may be partly due to the

preservative. Staining with some proteoplasmic stain would soon settle the question and this staining will be done. Many of the diatoms found here were in fragments and protoplasm was not present. My thought now is that not more than half of the diatoms that enter the digestive canal contain protoplasm and could be used for food. The mere presence of the tests does not prove that the diatoms are used for food for many particles of sand are also present and these are surely not used. An occasional diatom with contents was found within the alimentary canal. Its presence may have been due to faulty technic or it may have gone through the canal and not have been affected by the digestive enzymes.

In the examination of the liquid within the mantle cavity few animals were observed and these were for the most part forms belonging to the Radiolaria. If animals were taken into the canal and these animals were without some kind of protective covering I cannot see how one would be able to detect their presence.