

Vessels belonging to the port of Gloucester engaged in fishing June 1, 1885.

On the banks, for fresh halibut.....	41
On George's and Brown's, for halibut and cod.....	155
On Grand Banks, for codfish.....	33
On Western and Banquereau, for cod and halibut.....	51
On fishing grounds off the New England coast, ground fishing.....	34
On fishing grounds off the New England coast, lobster fishing.....	6
On halibut trips to Greenland and Iceland.....	11
On mackerel voyages, mostly now between Sandy Hook and No Man's Land....	140
Steamer, mackerel fishing.....	1
Total.....	472

Receipts of fish at Gloucester, Mass., in May, 1885.

From—	Fares.	Codfish.	Halibut.	Pollock.	Hako.	Cusk.	Haddock.	Mackerel.
		<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Barrels.</i>
George's Bank.....	135	2,452,000	92,450					
Northeast Shore.....	51	516,000		693,000			1,000	
Brown's Bank.....	39	1,256,000	33,600					
Western Bank.....	8	282,000	88,000					
Banquereau.....	16	3,600	428,000					
La Have Bank.....	4	49,000	16,000					
Grand Banks.....	2		58,000					
Nova Scotia, Cape shore.....	1	65,000						
Off Newfoundland*.....	1		65,000					
Banks†.....	5		127,000					
Mackerel trips south.....	21							5,579
Total.....	283	4,623,000	908,050	693,000	4,000	4,000	1,000	5,579

* Off Burgeo, 4 miles from shore.

† Off Sambro, and between La Have and Western Banks, on La Have Ridges.

Other receipts: From nets and traps in the harbor, 419 barrels of herring, from small boats fishing near shore, 14,000 pounds of codfish and 1 halibut. The latter weighed 193 pounds; was caught 5 miles from Eastern Point Light, Gloucester Harbor. Received from Grand Manan, 500 boxes smoked herring.

38.—ON THE RATE OF GROWTH OF THE COMMON CLAM, AND ON A MODE OF OBTAINING THE YOUNG OF THE GIANT CLAMS OF THE PACIFIC COAST FOR THE PURPOSE OF TRANSPLANTING.

By JOHN A. RYDER.

During the season of 1880 I made some observations on the development of the common clam (*Mya arenaria*, L.). These* were published in the report of T. B. Ferguson, a commissioner of fisheries of Maryland for 1881. It was there shown that (1) the spawning season extends from about the 10th of September to about the middle of October; (2) that the eggs and milt may be extracted from the surface of the visceral mass of the adults in the same way as from the oyster, and artificially impregnated; (3) that the early development was very similar to that

* Notes on some of the early stages of development of the clam, or mananose (*Mya arenaria*, L.). In Appendix A of the above-cited report, pp. 83-91, 11 figs.

of the oyster, polar globules being expelled in about the same position as in the egg of the latter, the cleavage being also very similar.

An important morphological point, namely, the precise mode of gastrulation of the embryos of this form was not definitely determined, but it is inferred that in this respect the developing embryo of the clam does not differ essentially from that of the oyster. The development of this mollusk was followed, at the time mentioned, as far as the swimming or veliger stage, beyond which it was found difficult to keep it alive by any means then at the command of the writer. Whether artificial methods of multiplying this form will ever be satisfactory seems very doubtful, but it is obvious that a very simple method may be found available for the purpose of obtaining the young of the clam for the purpose of transplanting the species to new localities to which it is a stranger. This conclusion is supported by the following data obtained in connection with experiments conducted at Saint Jerome's Creek Station in the course of the work at that place on the oyster. These incidental observations show that the animal grows quite rapidly in the course of a few months so that specimens from 1 inch to over 2 inches in length may be expected in about seven months after the spawning season is over, or during the next spring. This has been ascertained as follows:

During the month of February, 1884, a number of ponds were excavated at Saint Jerome's Creek in marsh land for the purpose of oyster culture. These, after serving their purpose for the latter object, were allowed to remain open to the outside water more or less during the autumn, or from September onwards, and it is presumed that in this way swimming embryos of the clam found their way into the inclosures from the outside. That such embryos could not have obtained access in any other way is proved by the fact that the ponds were dug out upon high ground where there had never been any clams before, so that the only possible way in which the young clams could get into the ponds must have been in the way described, the embryos evidently developing from eggs naturally spawned by the adults found buried in the sandy bottom of the channel feeding the ponds. The sexes are separate in *Mya*, or confined to distinct individuals, and the eggs measure about one five-hundredth of an inch in diameter, so that the veliger or swimming stage would be represented by a very small organism indeed. These embryos, after swimming about for some time, would then settle down upon the bottom, develop their characteristic siphon, and bury all but the tip of the latter in the sand. In this situation their growth must be quite as rapid, if not more rapid than that of the spat of the oyster, which, in the space of five months, may grow to the length of 2 inches. Such a rate of growth for the clam is indicated by the size of living specimens obtained from the bottoms of the ponds mentioned above, when the latter were deepened in May, 1885, or about seven months after the last spawning season of the species, which was in Oc-

tober, 1884. In the sandy earth excavated from the ponds, as described above, I found young clams very recently dead, the shells of which measured from $1\frac{1}{4}$ to $1\frac{7}{8}$ inches in length and from three-fourths to seven-eighths of an inch in width, indicating the existence, when the soft parts were entire, of animals ranging from 2 to over 3 inches in length, had the siphon been included in the measurement.

It is therefore clear that if boxes 18 inches or 2 feet square and 3 inches deep were filled with sand and placed on the bottom in the ponds or the open waters, that the embryo clams swimming about in the water during October would find a suitable nidus in which to burrow and grow. After an immersion of six or eight months these boxes could be raised and their contents examined to obtain the young animals, which could be removed from the sand without injury and repacked closer together, siphons upward, in other shallow boxes, which should be immersed in tanks of sea water kept cool in the refrigerating chambers of the transportation cars of the Fish Commission. In this way, if proper precautions were observed in repacking the young mollusks, so as to place them in the sand with the tip of the siphon just above the level of the sand, they could be transported for long distances by rail unharmed and in the living state for the purpose of restocking exhausted beds or areas where the creature had not before existed.

Dr. R. E. C. Stearns, to whom I have spoken of this method of obtaining the young of the common clam, is of the opinion that the young of the giant clams of the Pacific coast might be obtained in the same way. That is, if a number of the old ones could be dug up and replanted at low tide close together and a lot of boxes filled with sand, as described, placed close to such a group of adults during their spawning season, young individuals of either the huge *Schizothærus nuttallii*, or *Glycimeris generosa*, might be got to grow in such boxes. It is not very important that the spawning season of the species named be determined with exactness, for the reason that the boxes will last for several months, even if attacked by the *Teredo*. If the boxes were placed in position, say during the interval between June and September, it is probable that they would be in place in time for the spawning season of the large species named.

Great difficulty has been experienced in handling the giant clams so as not to injure the adults intended for transportation. Such difficulties would be overcome by the adoption of the above method. For an illustrated account of the great clams of the Pacific coast the reader is referred to an article by Dr. Stearns, published in the third volume of the Bulletin of the United States Fish Commission for 1883, (pp. 353-363), where their habitats and conditions of life are fully described, supplying the data needed in order to successfully institute the method of obtaining the young described above.

WASHINGTON, D. C., June 13, 1885.