

XV.—ON THE ARTIFICIAL PROPAGATION OF THE LOBSTER.*

[Translated from the Danish.]

There is one point in the natural history of the common lobster (*Homarus vulgaris*) which, till quite recently, has been but little known, although the lobster is one of those crustaceans whose anatomy and physiology have been studied most thoroughly, and that is the period of its development from the time it begins to lead an independent life. The roe which the female lobster carries under the back part of its body has been repeatedly examined as far as that stage where the fully-developed embryo is surrounded by the thin white of the egg; in examining the embryo it has been found that, as in other crustaceans, it is born as a being unlike the grown lobster, and that during its later development it undergoes metamorphoses.

Prof. G. O. Sars of Christiania has recently endeavored to throw more light on this comparatively dark period in the life of the lobster, and the results of his investigation are contained in his treatise "*Om Hummerens postembryonale Udvikling*," published in the Christiania "*Videnskabs-Selskabs Forhandling*" for 1874. He, as well as Prof. Sidney I. Smith in New Haven, who about the same time examined the development of the American lobster, (*Early Stages of the American Lobster*, with 5 plates, by Sidney I. Smith, from the Transactions of the Connecticut Academy, vol. ii,) has shown three larvæ-stages in the development of the lobster, and found that the young lobster after it is hatched spends the first portion of its life near the surface of the water, where it becomes an easy prey to its many enemies, as, especially during the period when it changes from a larvæ to its adult form, it is but little skilled in swimming.

While the investigations of two naturalists have thus yielded new and valuable contributions to the natural history of the lobster, interesting facts regarding the young lobster's mode of life have been discovered by other men.

Along that part of the Norwegian coast where the lobster-fisheries are carried on on a large scale, and where they become a source of considerable income to the inhabitants, there are ample opportunities for observing what an enormous number of young lobsters are destroyed every year, partly by their natural enemies, and partly by the strong wind from the sea which drives them on the coast, where they remain on dry land when the tide has gone out. Several men in the district

* Om Forsøg med kunstig Udclaekning af Hummer, ny række=new series, in "*Nordisk Tidsskrift for Fiskeri*," ny Række of Tidsskrift for Fiskeri, 2on Aargang, pp. 184-188, 1875.

of Stavanger, viz, Mr. Lorange, a civil engineer, Mr. Olsen, a teacher, and two merchants, Messrs. Andr. Hansen and H. Hansen, in 1873, united with a view to making experiments whether it would not be possible to protect the tender young of the lobster by hatching them in boxes or small basins, where they could find a place of refuge till they were so far developed as to take care of themselves. As these first experiments seemed to augur well, they received, at their request, aid from the Royal Society for the promotion of the Industries of Norway, (Kgl. Selskab for Norges Vel,) to enable them to continue their experiments in 1874.

For this purpose, they inclosed a sheet of water by building a strong wall at each end of a sound, between two small islands in the Veafjord, not far from Kopervig. This sheet of water was about 300 feet long and 30 feet broad; its bottom consisted partly of rough gravel and partly of rocks stretching along one of the sides, and its average depth was about 5 feet. Five hatching-boxes were then procured, of which one was placed in the inclosed water, three at Aakrehavn, and one at Kopervig. These boxes were made of cork, and were 5 feet long and 2 feet deep. Both at the bottom and at the sides, there was an opening of one-half inch between the boards, which was covered with strips of fine wire-gauze. The boxes at Aakrehavn were, moreover, furnished with a light roof, which, without excluding the light, prevented the boxes from being filled with fresh water during heavy rains. Only one of these three boxes was used for hatching; the two other ones being used for receiving the young ones as their number became too large for the hatching-boxes, and for making experiments whether the young lobster can be kept outside an inclosed sheet of water, which it might be difficult to procure in some places. Twenty-two female lobsters, having roe, were bought, of which three were placed in the inclosed sheet of water, and nineteen in the boxes, not all at the same time, however, but by degrees, just as it was possible to procure spawning lobsters.

Professor Rasch, president of the section for fisheries in the Royal Society for Furthering the Industries of Norway, made a report to the society on the hatching-experiments, accompanied by prepared specimens, showing the development of the young lobster on each day of the first week after the hatching, and during the fourth week. In this report, he says, that, in his opinion, the experiments have been made carefully and skillfully, and that thereby several facts regarding the natural history of the lobster have been made known, which hitherto were either entirely unknown or not sufficiently proved by experiments. These facts are—

a. That the young lobsters swimming near the surface of the water are killed by violent rain, which was successfully avoided by having the above-mentioned light roofs over the boxes;

b. That the older of the young lobsters, when their shears (claws) are developed, in their boxes attack and eat the younger ones which stay near the surface; the possibility of doing this was diminished by hav-

ing holes in the sides of the boxes large enough to let the larger of the young ones which stay deeper under the water slip out easily;

c. That the female lobsters which have roe under the back part of their body in June will have done hatching in September;

d. That the hatching from beginning to end occupies a period of about three weeks;

e. That the summer-hatching does not begin at the same time every year, (in 1873 it began on the 4th July, and in 1874 between the 17th and 26th of the same month,) which undoubtedly depends on the higher and lower temperature of the water;

f. That the newly-hatched young of the lobster keep closely together near the surface of the water, and because but little skilled in swimming become an easy prey to their enemies; and,

g. That the young lobsters begin to go toward the bottom when about three to four weeks old, and that there they soon assume their retrograde motion.

It was also shown that when the young lobsters have so far developed as to seek the bottom, they can escape their enemies with comparative ease, partly on account of their quicker motions and partly by hiding between the stones.

These experiments have, therefore, not only thrown considerable light on the natural history of the lobster, but they have also given practical hints how it may be possible to further the lobster-fisheries by adopting regulations for their protection, and by establishing in suitable localities hatching-places where the young can be protected during the first stages of their development. To keep the young lobsters in inclosed sheets of water till they are large enough to become salable will scarcely pay.

One of our largest exporters of lobsters on the western coast has tried to keep large quantities of grown lobsters in an inclosed sheet of water, feeding them and waiting for the time when it would be most profitable to ship them; but it soon became evident that the expenses were too great.

These experiments will be continued during the present year with the aid of the Royal Society for Furthering the Industries of Norway.

B.