

21.—NOTES ON THE LOBSTER—*HOMARUS AMERICANUS*.

By A. C. SMITH.

I cannot learn of lobsters having been found on the coast of Labrador. In this province (New Brunswick) they are found as far north as the mouth of the Restigouche. Newfoundland lobsters are very much larger than those caught in New Brunswick or Nova Scotia. The lobsters known to fishermen on the coast of Nova Scotia are roughly distinguished into three kinds according to the nature of their feeding grounds—cove lobsters, coast lobsters, and deep-sea lobsters. There is no appreciable difference in size or structure, but chiefly in the coloring and composition of the shell, a circumstance which enables one to decide with tolerable accuracy where any given specimen has been caught. The cove lobster is chiefly found near the shores in small harbors and other sheltered places where the bottom is soft, and covered with a dense growth of sea-weed. Its shell is never so thick or firm as that of the other kinds, is generally of a dull, somber color, and contains a smaller proportion of calcareous matter. Consequently it yields quite readily to slight pressure, except near the claws. They are not in great demand because not fitted to stand the necessary handling, or to survive when packed in the wells of smacks.

In New Brunswick, as in the sister province, the coast lobster is the one sought after. This lobster has its haunts around the ledges of the coast, and in the deeper waters of open bays. Thickets of kelp on the bottom, and patches of other marine weeds, are favorite resorts for this kind, especially in early spring. Its shell is dark, mottled with green, and sometimes beautifully diversified near the under edges with a variety of hues. It is capable of considerable resistance, and serves effectually as a protection against the rocks, and against attacks. When plentiful they can be seen in great numbers when the water is clear and still, all crawling in one direction over some stretch of sandy bottom, and apparently migrating towards a more suitable locality. The deep-sea lobster rarely approaches within several miles of the coast. It is not much sought after by our fishermen, the water being too deep for the ordinary trap to be managed with profit. Cod-fishers sometimes pull them up on their hooks. When taken out of the water these lobsters soon become limp and torpid. The sunlight proves fatal to them in a few moments. Their shell is brittle, being composed largely of limy matter.

The natural food of the lobster consists of clams, mussels, and small shell-fish, for the crushing of which its two great claws are admirably adapted. The larger claw is furnished with what answers the purpose of molars in the higher animals, while the smaller one is thickly set with incisors, perhaps mostly used in dividing the softer portions of its prey; as the lobster never pursues anything capable of active flight,

prehension is certainly a secondary function of those claws. The only purpose they serve, besides that already described, is as weapons of defense or attack. The holes, scooped out from under shelving rocks, or excavated when the bottom is soft, often to a depth which is truly astonishing, are made in this manner. Having selected a spot, the lobster commences and carries out the operation solely by means of his tail, its great contractile power acting much the same as that of the human fingers would in a similar employment. The tail is slowly drawn up at first, taking as much of the mud as possible on its under side; then, when well under the body, a final, powerful jerk sends the mud or sand from out in front, and at the same time draws the lobster farther back into the cavity thus made, enabling him to get a better grasp for repeating the process over and over again, till by degrees he disappears from sight, and rests only when he finds his curious chamber sufficiently retired for safety or comfort. These holes are for the shelter of the lobster during the period of exuviation. As the shell of the lobster cannot increase in diameter, the creature soon grows too large for its coat, and some means must be provided to accommodate it to the increasing bulk of the body. This is effected by the yearly exuviation, or the throwing off of the old shell, and the formation of a new one. It should be remarked, however, *that full-grown lobsters are subject to no such change*. Professor Bell states that exuviation takes place annually until growth is completed, and alludes to his having seen the carapace of the living lobster covered with barnacles so large that several years must have been required for attaining their existing size. This statement of Professor Bell I have verified by observation. The season for casting the shell is generally from June to September. A lobster about to exuviate is readily detected by his sluggish movements and the dull red color of the membrane in his joints. He evidently feels sick, and sometimes takes refuge in mud-holes, sometimes under rocks, and often under a bunch of marine weeds. Usually in less than a week from the first indications, the process of working off the old integument is completed. It is extremely interesting to watch the performance. The shell inclosing the trunk splits down the back in a line always discernible as a faintly marked seam. It gradually falls apart, and is separated from the rings of the tail, but never from the covering of the legs or big claws, from which those appendages are slowly drawn, apparently with great pain and difficulty, and no wonder, since the bulk of the claw, immediately after its extraction, is out of all proportion to the diameter of the joint through which it is made to pass. But the fleshy part is very soft, almost semi-liquid, and can be compressed into small space. As the last act in the process, the lobster crawls forward feebly, leaving the shell of his tail behind him. For a few days he is almost incapable of motion, and not until his new shell, which is formed by a mucous exudation containing much cal-

careous matter, has assumed the normal hardness, is he reckoned fit for use as an article of food.

The faculty possessed by this curious crustacean for repairing injuries is very remarkable. Most curious of all is the power which the lobster has of casting off the entire arm when only the claw is wounded. This fact has never been sufficiently noticed. It would seem as if the new growth could only issue from the second joint from the body. Slight hurts received below that are commonly found healed over. When the injury is serious, the arm instantly snaps off at the second joint (where the diameter is the least), and this without any apparent effort on the part of the lobster—certainly not by “a violent muscular contraction, or by striking it against some hard body,” as gravely set down in some work on natural history. I am inclined to think it may be due to something akin to the electric shock characteristic of some species of fish.

Progression is effected by means of the legs proper, which grow from the thorax. It is always a slow and crawling motion, during which the fan-like processes of the tail are expanded but motionless, the large joints of the arms are at a sharp angle, the claws slightly elevated, held close to the head, in such a position as to offer the least possible resistance to the water. The tentacles are continually moving from side to side, and in advance, as if to make sure of the road. Should danger threaten him in front, he beats a retreat with astonishing rapidity. He is great on taking back-water, for which he is admirably fitted by nature.

That lobsters have a very acute sense of smell is clearly proved by their being attracted from a long distance to traps that are well baited. If the bait is such as to give off particles abundantly, however fine, lobsters may be observed nearly a mile away, in the direction towards which the tide runs, making for the place where the bait is deposited. Traps also that are attached to a trawl-line, sweeping with a steady current, are never fished so well as single traps set in the same locality but *across* the tide. The reason is obvious. In the one case the scent goes out in a narrow trail, as from a single trap; in the other it is widely diffused. The use of the little protuberances, one in each transverse rib of the abdomen, has not been ascertained. I have been led to believe that they act as *prods* to hold the small shell-fish on which the lobster preys, and to draw more surely from the mud. The lobster, as before described, digs with his tail, which very handily wraps the bivalve partly round as soon as reached. Thus the little horns on the extremity of the tail are directly opposed to those near the thorax, and the prize cannot easily slip from the grasp.

The season at which the female lobsters carry eggs varies very much on different parts of the coast. Lobsters in Connecticut are with eggs in April and May. In Nova Scotia they have been found with eggs, in which the embryos were just beginning to develop, early in September; and in New Brunswick the female lobsters are full of spawn

by 1st September, the majority depositing in October. A corresponding variation is noticed in the lobster of the European coast. The eggs of the lobster, when extruded, are coated with a viscous secretion which thickens into threads, and causes the eggs to adhere to each other and to the fine hairs with which the swimmerets of the abdomen are fringed. I took the pains to count the eggs of a medium-sized lobster, and found the number to be over thirteen thousand. On certain parts of our coast scarcely a male lobster is taken, the catch being all females. I believe these to be the spawning grounds. In one such place, on the inside of Shippegan Harbor, where there is shallow water, and where only *female* lobsters are caught, no less than *seven* lobster factories were in full operation last summer! In Nova Scotia lobster fishing begins one month earlier than in New Brunswick. Last year the proprietor of a factory in this province set his traps on the 20th of April, keeping them baited, but caught nothing until the night of the 5th of May, when the lobsters suddenly "struck in" as plentiful as at any time of the season. With us lobsters become scarce about the 20th of August. *To this rule there are exceptions.*

As to whether the lobster beds are being depleted by the yearly increasing fisheries I am not yet able to determine. Certain localities may give out by a constant drain. Muddy bottoms, I believe, are not so well adapted for the breeding of the lobster as rocky coasts, the spawn being more liable to destruction by other fishes. The fisheries of Maine have failed, perhaps owing largely to this fact, though the business was prosecuted too extravagantly for many years. The following letter is from A. T. R. Freeman, a prominent dealer in Southwest Harbor, Me., and dated November 29, 1884:

"Replying to your letter of inquiry, bearing date of the 17th instant, I would say that the views of those interested in the lobster business here are so varied that it is difficult to arrive at a correct conclusion as to the cause of the decrease in lobsters. That they were becoming scarce was certain until the last lobster law was passed, providing for a close season between July 15 and November 1—covering the spawning season—and prohibiting the catching of any less than 9 inches in length during the rest of the year. I think the protection during the spawning season the most essential. Since the passing of this law, lobsters are on the increase; our fishermen report them in abundance again. It has been demonstrated that they are a school fish, similar in this respect to the herring and mackerel. They are more plentiful some seasons than at others."

I cannot ascertain that any deterioration in size or numbers has yet been noticed in Nova Scotia. A prominent lobster packer, who has fished for many years on our own coast, assures me that "lobsters are as plentiful as ever, but are *much smaller* than formerly." The supply of lobsters sent to market—chiefly to London—from the coasts of all parts of Britain has of late years greatly fallen off from over-fishing.

With reference to the quantity packed in the maritime provinces annually, I have ascertained that the product of 1884 will, in New Brunswick, exceed that of the previous year by 1,000,000 cans, that of Nova Scotia by 500,000, and Prince Edward Island by 500,000. Cases in which the lobsters are packed are made uniform to contain 48 cans. In New Brunswick five lobsters are *now* required to fill a pound can. From these facts there is only one reasonable conclusion to be drawn—that unless the lobster fishing is prosecuted under certain necessary restrictions—in our own province, at least—this valuable crustacean must soon be exterminated.

NATURAL HISTORY SOCIETY,

*St. John, N. B., January, 1885.*

**22.—REPORT ON THE POLLUTION OF THE POTOMAC RIVER BY THE DISCHARGE OF WASTE PRODUCTS FROM GAS MANUFACTURE.**

**By MARSHALL McDONALD.**

In compliance with instructions, based upon the request of Commissioner Edmonds, I proceeded on Saturday to make an examination of the river along the Georgetown front, with the view of determining:

1. The amount and nature of the waste products discharged into the river from the factories of the Washington Gas Company, and the establishments employed in converting their residual products into ammonia, &c.

2. The probable influence of such discharges in affecting unfavorably the conditions of life in the water.

I beg, respectfully, to report as follows:

(A) The waste products from the Georgetown gas works are all discharged, I am informed, into Rock Creek; no arrangements having been made by this company for the further conversion of any into useful matter.

(B) The establishment engaged in the conversion of the coal tar product from the Washington gas works discharges also a certain amount of waste into Rock Creek near its mouth. This discharge consists of water carrying in suspension a dark oily substance, which passes into Rock Creek either floating or in suspension; but seems to sink below the surface a short distance from the point of discharge. The amount of discharge from this source is probably 30 or 40 gallons a minute.

(C) I was unable to get information in regard to the nature and amount of product discharged from the ammonia works, the pipe leading into the river being carried down below low water mark.

(D) The main discharge into the river is, however, from the regenerators employed in the establishment for the manufacture of gas from oil; this gas being employed as an enricher of the gas derived from