

This little animal will long grace our forests. His only enemy, the fisher, is all but extinct, and the uninviting barrens he loves will never tempt the settler. Seen either winter or summer, his bristly figure accords well with the scene. On a hot August day when crag and moss and rampike, with dwarfed pine on our barren ridges are crackling in the sun's heat, there is nothing drier, nothing so arid as himself, making us think as he does of his African cousin. Or, again, how appropriate to the scene he looks tracking the snow wastes, or sheltering in some snow-loaded spruce, how like a part of the tree he looks, how hard, how spiny, how regardless of the storm that rages over his insensible back, as it does over the insensible tree on which he cowers for shelter.

NOTE.—Of all known animals the porcupine is most infested by tape worm. The intestines are completely filled by them, and this in numerous instances. It is of a different species to the human variety.

ART. VIII. NOTES ON THE MARINE ZOOLOGY OF NOVA SCOTIA. BY J. MATTHEW JONES, F. L. S.

(*Read April, 1870.*)

I HAVE chosen the above title for the paper I have to bring before the Institute in order that it may be understood that I do not pretend to offer a complete paper on so extensive a subject as the marine zoology of our coast, but merely scattered notes and observations in regard to the several species belonging to separate families and genera, which from time to time I have an opportunity of collecting and identifying. It is better thus to publish these desultory facts as they become known to me than to await the completion of an extended systematic list which can only be consummated by the observations and collections of several years; and more particularly for the reason that the present knowledge of the geographical distribution of marine forms on the north eastern coast of America especially in this northern latitude may be extended with the least delay, for it may be said with truth that the shores of our Province are almost untouched ground. When sufficient species are collected a synopsis may be made, but until that event is accomplished, I will (D. V.) proceed with a system of occasional notes.

DESCRIPTION OF HALIFAX HARBOUR.

The harbour of Halifax is situate in Lat. $44^{\circ} 39' 38''$ N., and Long. $63. 35. 10.$ W. It lies nearly N. W. and S. E., and is acknowledged to form the finest harbour on the east coast of North America. At its entrance it is about three nautical miles wide, taking Chebucto Head on its west side, and Hartland Point on the east as the two points. On its western side it is deep even to a few feet from the shore, having some three or four fathoms water quite close in. Nearly in the centre of the harbour, and sheltering its upper portion from the heavy "south-easters," lies Macnab's Island about one mile and a half in length by three quarters of a mile in breadth at its northern end, and becoming a narrow point at its southern termination which points out to sea. Between this larger island and the eastern side of the harbour lies another island, about half a mile in length and a quarter of a mile wide, known as Lawlor's Island. These two islands have been the means of causing a change in the depth and bottom of the harbour along its eastern side as far as Fort Clarence, and therefore a difference in the marine fauna.

Nearly opposite the north west end of Macnab's Island on the west shore, a narrow inlet about a mile and three quarters in length by a quarter in breadth runs up. It is known as the North West Arm and is a deep channel lying between high banks. It has from six to nine fathoms water in its centre from the entrance to a spot called "Melville Island" near the head. From the north end of Macnab's Island the harbour contracts, especially at a place called "The Narrows," where it is only some four hundred yards wide, but it opens again into a large expanse known as "Bedford Basin," a sheet of water about eight miles long by two and a half at its widest part. This basin is funnel shaped, the bottom gradually sloping from all sides to the centre which has a depth of about forty fathoms. Such is a short and rough description of the principal features of the harbour of Halifax. We will now proceed to describe the nature of its bottom.

At its mouth where it lies exposed to the full swell of the Atlantic, the ground is rock and sand with a general depth of from twenty to twenty-five fathoms, save here and there where groups of rocks form shoals at a depth of four or five fathoms. From the

outermost shoals known as Portuguese, and Rock Head, Shoals, to the east side the depth is about nine to eleven fathoms, with a more rocky bottom until within a short space of the shore where it shallows rapidly to three fathoms and less. Approaching Macnab and Lawlor islands, we find the ground gradually exhibiting the effect of these barriers in the accumulated mass of sand and gravel off their southern edges, where bars are formed having only one to one fathom and a half at low water. Between Macnab's Island and the eastern shore the channel called "The Eastern Passage" is nowhere deeper than eleven and generally not more than six fathoms with a bottom of deep sandy mud. The main channel of the harbour from abreast of the south end of Macnab's Island, and being to the westward of that island, all the way up to the "Narrows," has a bottom of sandy mud, (but nothing like so thick as that of the Eastern Passage) sprinkled here and there with rocky ledges. Bedford Basin presents a varied bottom of rock, gravel, and sandy mud; while at its deepest part in the centre it is either very hard sand or smooth rock, for the dredge meets with no resistance and brings up scarcely a form of any kind.

Boltenia clavata, Fabr.

One of the most singular in form of the marine invertebrates is the *Boltenia* a tunicate mollusk growing on a lengthened stem, in some cases no stouter than a grass stalk. This genus appears to have been but little studied, for although I have consulted several leading works on the Mollusca, I have gained scarcely any knowledge of its anatomy. All the authors who mention it, agree that it is furnished with an elongated peduncle or stalk, whose base is fastened to a rock or other suitable anchorage, but none offer an opinion as to the use and true nature of the peduncle on which the ascidian grows like a pear depending upon a branch. Gould, who describes four species, and is more explicit than other authors, only gives the following particulars regarding *Boltenia clavata*. "This is a most curious object and greatly resembles in shape the flower of the Ladies' Slipper (*Cypripedium*) on its stalk. It has a kidney shaped body, of a wrinkled, leathery structure, about two inches long and one in width, suddenly narrowing at the top into a small stalk not larger than a crow quill, and from six to twelve

inches in length. It has two cross-shaped orifices, nearly an inch apart. It is attached by its stalk to stones in deep water, whence it is occasionally hooked up by the fishermen, or driven on shore by storms. Its surface is usually loaded with marine plants, zoophytes, &c." Dr. Stimpson in his "Invertebrata of Grand Manan," thus describes the same species—"It is very distinct from *B. rubra*, being uniformly of a fine yellowish white colour, with a smooth velvety surface. It inhabits rocks in deep water, never occurring in less than fourteen fathoms." The first author who noticed it was the talented Fabricius, and he describes the species under the name of *Ascidia clavata* in his *Fauna Groenlandica* published as far back as 1780. New discoveries, however, having brought to light other species of this stalked ascidian, it was considered advisable to form a special genus for them, and MacLeay in his excellent memoir published in the XIV. volume of the Transactions of the Linnean Society gave the name *Boltenia*, after Dr. Bolten, and described this species as *B. reniformis*, doubtless from its being somewhat kidney shaped. Fabricius's specific name, however, which was not a bad one, (meaning, "a hard fleshy knob",) is that now claimed for it under the late law of Zoological nomenclature, which rules that the first specific name given to a form, if it be not absurd, shall be retained, leaving it optional for monographers to class such species in new genera whenever the discoveries of science prove such want.

On carefully examining a specimen in my collection preserved in alcohol taken on our coast I am enabled to offer the following particulars:—

Length of sac.....	2 inches 2 lines.
Breadth of sac.....	1 inch 5 lines.
Length of peduncle.....	9 inches.

On opening the peduncle from sac to base I found it hollow the entire length, excepting perhaps half an inch immediate to the root itself, which is composed entirely of fibrous cords traversing and interlacing each other, and in some parts forming a solid mass particularly at the peduncular base. On careful search I could discover no communication between this hollow stem and the sac. Traversing what may be termed the dorsal region of the peduncle I found a fibrous or muscular cord continuous throughout its

length, evidently serving the purpose of a vertebral column,* but singular enough I found a communication between this muscular column and the sac, being able to push a very slender wire about half an inch from the sac down it, but although I tried force it would pass no further. There may have been a stricture in the passage, or it may have been a natural termination to so short a channel; if the latter be the case I am puzzled to make out of what use such a short channel can be. As regards the use of the muscular column, it is probable that it can be stiffened or relaxed at the will of the animal and that in either case to enable the creature to bend its sac to the surrounding sea bottom, or keep erect. The peduncle is wholly ramified by muscular cords which evidently give it its peculiar toughness. The sac also is of a leathery consistence but more delicate in appearance, although thicker and equally tough.

On the stem of one of my specimens, which was kindly given me by Lieut. Worgan, of H. M. S. "Wolverine," having been brought up while sounding in about 100 fathoms, 80 miles east of Cape Breton, there exists an abundant parasitic growth, among which a polyzoan of the genus *Cellepora* is very prominent encrusting the stem and adhering to the sea weed which also clothes it. Minute specimens of *Saxicava rugosa* are enclosed here and there in the cellepore mass, and at intervals a small and handsome coralline occurs. I also obtained several rhizopods on searching the parasite growth with the lens, all belonging apparently to one genus the *Nonionina* of D'orb. Judging from the the three specimens of *Boltenia* in my collection, I imagine that the growth of parasites exists in greater or less profusion according to the age of the animal, as the peduncle of Lieut. Worgan's example had become hardened and woody, doubtless from age, and the *cellepora* which formed a complete crust around it, had at the base died, and its surface was smoothed precisely as I have found aged coral dead and worn by time at the base of a recent growth in the Bermudian waters.

The geographical distribution of *B. clavata* on the east coast of America, appears to extend from New York to the Arctic.

* It may be well to state that while examining this specimen, I knew nothing whatever of the discoveries of Kowalevsky and Kupffer.

Regions, as it has been taken off the New York shore; on that of Massachusetts; at Grand Manan, Bay of Fundy; in the Straits of Belle-isle, Labrador; and in Greenland. From our coast I have the Cape Breton specimen, and one, kindly given by my friend the Rev. J. Ambrose, taken near Margaret's Bay, which has afforded me the descriptive particulars above.

Mr. Ambrose also recently brought me a very fresh specimen of what I think will prove another species of this genus, *B. rubra*, as it corresponds in size and other particulars. The sac before immersion in alcohol was of a brilliant crimson, which soon changed in the spirit to a dull brown, and in time will turn white.

Star Fish, (*Uraster rubens*, Lin.)

The next form to be treated of in these scattered notes is the *Star Fish*, than which none other perhaps is better known to the fisherman and dredger. Several species are known on every coast, and in every clime; those which are more robust in form preferring the shallow waters of the littoral zone, while others again are only found in deeper water where the bottom they feed upon is less agitated and more suited to their graceful and brittle forms. Of the former we have the common star fish, or "cross-fish" of the fishermen (*Uraster rubens*, Lin.) so common indeed, that no particular description need be given of it. But there are some points in connection with its appearance which are not generally known and therefore may be worth noticing. In the first place it is usually found with five rays (which I may state is the character of most species of star-fishes) but not unfrequently with six, and in some instances it is found with one of the rays forked; and in a closely allied species which I found in the Bermudian waters one limb was divided into three smaller ones. Another singular character of this species, which is held in common by other members of the genus, is a curious wart-like process to be found on the dorsal surface, between the dorsal fork of two rays. It is precisely like a male madreporic coral, and under the microscope presents the same sutural aspect as the fungoid corals. It is named in consequence the *madreporic tubercle*, and it is connected with the interior of the animal, but its real use has not been satisfactorily determined.

Specimens of *Uraster rubens* may be obtained of all sizes from the size of a sixpence up to those of a foot in diameter.

Limnoria ——— ?

Another marine invertebrate whose existence in Halifax harbour, I may say I have the sorrow to make known to you, is one of the most destructive creatures to wood work under water, known. It is the same species or very closely allied to the *Limnoria terebrans* of the European coast. This little creature, scarcely larger than a cress seed will, when at work with hundreds and thousands of its race, as is usually the case, soon make short work of wharf piles, and wherever it exists it would be utterly useless to place wood work under water if it is intended to last for any time. It would be far cheaper in the end to build a stone wharf, and certainly more satisfactory, for every log immersed in this harbour, *unless it be of some wood which the Limnoria will not attack* must ere long begin to decay under the attacks of this horrible pest. The creature itself under the lens appears very like the wood-louse in form, is of a greyish colour and has two black eyes. It was Stevenson the engineer who first made its ravages known, for he found it very destructive to the wood work necessary in laying the foundations of the Bell Rock Lighthouse, which it permeated in every direction. It is known in the French harbours also as an intensely destructive agent wherever submerged wood occurs. It enters the wood for a depth of at least two inches boring (as you will perceive by the specimen I exhibit) in every direction. So great is their destructive power and so rapid, that three inch fir or pine planking nailed on the north pier of Bridlington Bay, Yorkshire, has been eaten away in *the space of three years* to half an inch in thickness. It is therefore perhaps as well to make known its occurrence in Halifax harbour. The specimen of wood I exhibit bored by these creatures I obtained, after a heavy south east gale, on the Fishmarket Wharf, from a large pile lying high and dry literally honey-combed by these creatures. On passing by each wharf in a boat at low water you will readily perceive the great ravages these creatures make among the piles, which about half way between high and low water mark are eaten completely in, presenting the appearance of an hour glass.