

TRANSACTIONS
OF THE
Nova-Scotian Institute of Natural Science.

ART. I. CONTRIBUTIONS TO THE NATURAL HISTORY OF THE
BERMUDAS. BY J. MATTHEW JONES, F.L.S.

(Read November 4, 1867.)

CORALLIARIA.

THE Bermudas afford the naturalist an opportunity of speculating upon the effects of ocean currents, and the influence they possess in changing the character of an island group, to one almost distinct from that natural to it; because, if uninfluenced by the warm waters of the Gulf Stream, there is no doubt that the marine fauna of these islands would, in a great measure, coincide with that of the coast of Carolina, lying in the same latitude; but how different is the case. Here, in latitude $32^{\circ} 15' N.$, at a distance of about six hundred nautical miles from the American coast, lie a few little islands, begirt by coral reefs, which extend out to sea even to a distance of ten or twelve miles in some directions, and the various species of coral polyps raise their branched or massive forms, and thrive as luxuriantly, as if placed in their more congenial home within the heated waters of the tropics; while on that adjacent coast, they are unknown above latitude $26^{\circ} N.$; and this phenomenon is rendered still more remarkable when we take into consideration the fact of the Bermudas being the most northerly station

in the Atlantic at which the reef building polyyps raise their structures. Dana, in his valuable work on coral reefs and islands, has shewn that the growth of coral reefs depends particularly on the temperature of the ocean, the character of coasts as regards depth of water, nature of the shores, presence of streams, and other conditions, especially liability of exposure to destructive agents.

Now, the Bermudas lying as they do on the outer or eastern edge of the Gulf Stream, are laved by its waters highly charged with animal life brought from the Caribbean Sea; and, as it is to the eastern edge of the stream that all drift matter inclines, so do the Bermudas gain no ordinary share of foreign forms, which are rarely, if ever, observed on the adjacent coast, even at a much lower latitude. These islands also, protected as they are from the influence of colder northerly currents by the vast body of heated water which flows past, present a fruitful field for marine organisms requiring an almost tropical heat for their perfect development; and thus it is that we find the reef building corals growing so well in an extreme northern latitude, where the temperature of the air during the months of January and February, sometimes falls as low as twenty degrees below the temperature of the ocean required for the growth of reef building corals.

This question regarding the proper temperature required for the development of reef corals, is still open for determination, for although 64° is named as the probable mean temperature of the seas in which such corals grow, it is by no means improbable that the shallow tidal pools, situate between tidal marks, on the shores of the Bermudas, which generally contain corals of the same species as those on the reefs, have the water they contain of a much lower temperature when cold northerly winds are blowing for two or three days in succession; reducing the air temperature so low that frost occasionally occurs, although very rarely, and ice has been observed the thickness of half a crown. It is also generally supposed that corals of the genera *Astræa* and *Mæandrina* grow better in the warmest waters; but on the Bermuda reefs members of these genera are met with of an amazing size, especially the well known "brainstone" (*Mæandrina cere-*

briformis). Again in the rock pools an astroid form *Siderastroæa radians* is more common than any other, and appears to thrive well, although as before stated the temperature of the water of these tidal pools must be low at times.

The barrier reef forms a perfect belt all around the islands, running along the southern shore of the group at a distance of less than half a mile; while, on the northern shore it is distant some twelve miles. At the lowest tides this reef shows in places above the breakers, and presents a mass of corals, gorgonias, and sea weeds, with the exception of certain patches grown over and rendered imperishable by incrusting serpulæ and nullipores.

In regard to the growth of the Bermuda reefs I cannot acquiesce in the opinion of some naturalists, that all coral reefs require a very lengthened period to grow in. It is doubtless true that some species of polyps secrete their calcareous framework slowly, but there are others such as the *Millepora alcicornis* and *Oculina diffusa* which personal observation allows me to establish as instances of rapid growth, and as the *Millepora* in question is by far the most common form on the Bermuda reefs, and which in many parts are almost entirely composed of it, we may conclude that these barrier reefs at least, present an example of a more rapid development than is usually granted to such formations.

The reef building corals proper may be said to comprise eight species, yet there is another smaller form, *Mycedium fragile*, which is by no means uncommon, and contributes to the general mass, and on close investigation I have little doubt but that other minor forms may be found.

I am indebted to Professor Verrill, of Yale College, New-haven, United States, for identifying several species.

Or. ZOANTHARIA.

Fam. ASTREIDÆ.

Gen. *Isophyllia*.

Isophyllia dipsacea, Dana.

This may be considered the most common coral on the reefs

and shores of the Bermudas, occurring in all places where the tide ebbs and flows. Cabinet specimens are easily obtained in the little tidal pools between high and low water mark; a long chisel and a mallet, enabling the collector to remove them without difficulty. Individual polyp cells may be obtained resting alone before becoming enlarged by the budding process, or masses of several adhering together. Large specimens are to be seen in about one and a half fathoms at the south-west corner of Harris's Bay at low water. This coral grows well in shoal water and is found within a foot of the surface. It is very common about the islands of the Great Sound, and also about Trunk Island in Harrington Sound.

Gen. *Mæandrina*.

Mæandrina cerebriformis, Lam.

Mæandrites costis latis, Gualt.

Madrepora labyrinthiformis, Linn.

“ *mæandrites*, Pallas.

Lapis corallinus, Seba.

Platygyra cerebriformis, Ehren.

Diploria cerebriformis, Mil. Edw.

This beautiful coral which is known to collectors as the “brainstone” is common among the Bermuda reefs, growing to a very large size: sometimes three feet in diameter. Cabinet specimens of six inches diameter are more easy to collect, for it requires great leverage to detach the larger specimens from their foundations; without taking into consideration their weight, which is immense. Very large, perfect, and well cleaned specimens are highly appreciated in the English and Continental museums, few of which really possess fine examples of this coral. On breaking open a large specimen, the interior will be found to be tunnelled through in places by the *Lithophaga lithophagus*. It cannot be considered a shallow water species for I have never observed it growing at a lesser depth than about four feet from the surface. Some fine specimens may be seen about the centre of Harris's Bay, and other parts of the

south shore within the barrier reef. In some instances the brainstone forms around the horny trunk of a *Gorgonia*, and I have a specimen in my collection thus attached to the palmate *G. flabellum*.

Gen. *Siderastræa*.

Siderastræa radians, Verrill.

This species exists in great abundance, and may be found in all positions; coating the reefs or shore rock, either in large masses, or just commencing a colony, with only a few polyp cells collected together, not larger on the surface than an inch diameter. It is an extremely beautiful coral when the calcareous mass, having been thoroughly cleaned, is viewed under a microscope of ordinary power, presenting a kind of tessellated star work. The mass is not thick, and in the case of small specimens I have collected, the coat does not exceed two-tenths of an inch. The polyp cells are irregular in form, some being circular, others oval, and in places prolonged cuts occur. It grows well in shallow water, and may be seen in the tidal pools within six inches of the surface.

Fam. OCULINIDÆ.

Gen. *Oculina*.

Oculina diffusa, Lam.

This elegant species is very common and may be found growing in large bushy masses on the reefs; but fine cabinet specimens may be obtained by searching about the small cavernous recesses about low water mark. It is known to the fishermen under the name of "star coral." It varies in form according to the position in which it grows; some specimens having the branches wider apart, while others present quite a

scrubby appearance. Although as a rule it is generally arborescent, yet I have examples in my collection where it has assumed the habit of incrustation both upon a piece of coal, and the neck of a common wine bottle. This character, however, is clearly exceptional, for it continues but for a short space ere it rises into the usual branched form. The polyps are in colour of a dull greenish hue, and the appearance of a specimen of this coral when fresh from its native element is anything but prepossessing; and it is only when properly cleaned and prepared for the cabinet that it presents the delicate and beautiful formation, which renders it so valuable in the estimation of collectors.

Oculina varicosa, Les.

This splendid coral is by no means common, at least not with the polyp cells highly protuberant. The finest specimens are obtained on the north reef, and sometimes the handsome *spondylus* is found adhering to their bases. When well cleaned and prepared for the cabinet I know of no more delicate and beautiful looking coral. It is very rare in collections. The branches of this species are much thicker and more separate than those of the preceding species, and are frequently entwined by the smaller *serpulæ*.

Oculina Valenciennesii, Edw.

This form is not common, and I have rarely found it in large masses. The mammiform nature of the polyp cells at once characterize it as a very marked variety from the two former species. In some cases the cells are also depressed, and even recedent, and these characters may be found combined on one stem. It tapers strongly from the base to the apex of the branches, which are unusually erect, and without lateral shoots until within a short distance of their apical terminations.

It is a fact perhaps worthy of note that these three species of Bermuda oculinas begin to decay at their bases as they grow

upwards. This condition probably arises from the attacks of parasites, for I invariably find all specimens more or less coated on the decayed parts with serpulæ, sponges, and minute marine forms. Milne Edwards gives Ceylon as a habitat for this species, so I presume it has a wide geographical range.

Fam. FUNGIDÆ.

Gen. Mycedium.

Mycedium fragile, Dana.
Leptoseris fragilis, Edw.

This delicate and pretty coral is not uncommon. It generally grows in thin plates, but occasionally assumes a cup form; and I have examples growing around the stems of other corals. It is found under overhanging rock on the reefs and on the shore about low water mark, and looks *in situ* like a fungus growing under a log. When viewed under the microscope it presents a series of frills, with polyp cells, situate along the line of frill. A specimen of this coral in my collection has one of the highest coloured spondyli growing upon it that I have ever seen. Major General Nelson, R.E., who was quartered at Bermuda several years ago, and is the author of a very valuable paper in the Transactions of the Geological Society of London, upon the formation of the group, aptly terms it the "pancake coral."

Fam. PORITIDÆ.

Gen. Porites.

Porites clavaria, Edw.
Madrepora porites, Pallas.
Porites conglomerata, Lam.

This species is well known to the fishermen as "rock coral. It is very common, and forms a considerable portion of the reefs.

Although usually arborescent in growth, it is nevertheless frequently seen coating the reef in large patches like the astroid corals. The thickness of the coat is about the same as that of *Siderastræ radians*. The polyp mass when *in situ* is of a brownish yellow colour. It grows well within eighteen inches of the surface at low water.

Fam. MILLEPORIDÆ.

Gen. Millepora.

Millepora alcicornis, Edw.

“ *ramosa*, Id.

Madrepora palmata, Lam.

“ *muricata*, var., Esper.

“ *alces*, Dana.

Palmipora tuberculata, Duch.

This species is so various in its growth, that naturalists who have never had an opportunity of seeing it *in situ*, are prone to separate the different varieties, and class them as so many species. This is hardly to be wondered at, when we consider the very great dissimilarity which exists between the several varieties, as regards form of growth. It may be procured branched like the *oculinas*; flattened like a board; or coating the reef rocks; in fact, there is hardly a shape that it will not take according to the necessities of its situation. It is of rapid growth, and will in a short time coat over shells and firmly fix them in the coral mass; and it is curious to observe how these shells have managed to secure the right of opening one of their valves, which although perfectly covered with the coral, has, nevertheless, escaped having its opening closed by the calcareous secretion, and lives in this prison as well as if moored to the shore rock. It is known to the fishermen under the several names of “hen coral,” when feathery in shape; “finger coral,” when digitated; and “fan coral” when flattened and palmate.

The following list of *Gorgoniæ* includes all the species at present known to inhabit the Bermuda waters:—

Or. ALCYONARIA.

Fam. GORGONIDÆ.

Gen. Gorgonia.

Gorgonia flabellum.

This species, known to the inhabitants as the “sea fan,” is very common on the reefs, where it may be seen at low water waving its palmate fronds to the action of the surf. In form it is usually rounded, presenting a partially circular frame of network much compressed. Although it generally grows in one palmate frond, with a few small fronds sprouting out from, and at right angles with the main stem,—yet it is not uncommon to find specimens with several flabels growing from the same root; and on looking down into the clear waters of the ’Mudian shore this variety presents the appearance of a large cabbage with its leaves much expanded. The sea fan, when first taken from the water, is of a lovely dark purple, and although it fades if exposed to the sun’s rays or too great a display of light, yet if kept in the shade, or in a darkened room, the purple remains for a long period. In Castle Harbour this species is abundant, and frequently does the boat of the collector brush through the bending plumes of this curious form as it passes over the raised coral patches which dot the shallow waters of that pretty land-locked bay. Small portions of this gorgon, when cleared of the external bark, are used by Bermudian cooks for skimming off impurities when boiling food, its sieve-like meshes acting as a strainer. These pieces are called “huskers.”

Gen. Plexaura.

Plexaura crassa, Lamour.

The bark of this species on being dried becomes very friable, and falls off whenever the specimen is handled. The well-known "sea rods" which are made by the colored people, and sold for riding whips, are manufactured from the horny and flexible stems of this species, which are laced together and highly polished.

Plexaura flexuosa, Lx.

This handsome species which is named the "sea feather" or "prince's plume" from its resemblance *in situ* to a plume of feathers waving with the motion of the water, is not uncommon. The bark when the specimen is dried is much more tenacious than that of the latter species, as some examples which I have had in my collection for seven years are now as firm and fresh to all appearance, as they were when I collected them. It makes a good barometer, becoming moist before rainy weather, and dry when fine weather is to succeed. The footing which all the gorgoniæ have upon the reef rocks must be very firm, for the strain which takes place when the long branches are dashed about by the waves in stormy weather is enough to tear away every object off the reefs.

Gen. Pterogorgia.

Pterogorgia Americana, Ehr.

This species is found in the same situations as the latter. Its stems are more robust than those of the other species, and the root is generally very firmly fixed to the reef rock. The back in dried specimens becomes very friable.