

# The Canadian Journal.

TORONTO, NOVEMBER, 1853.

The Annual Report of the Superintendent of the Coast Survey, [U. S.] Showing the Progress of that work during the year 1851, pp. 558, accompanied by a Quarto Volume, Map and Chart.

This Report with its voluminous appendices, contains a variety of official documents relating to the Coast Survey of the United States, many of which have no interest for the general reader, while others will attract universal attention. The extracts from the report of Professor Agassiz, to the Superintendent of the Coast Survey, on the examination of the Florida reefs, keys and coast, contain most interesting information respecting the formation, progress and decline of the coral reefs. A portion of these we subjoin.

On page 227 of the 1st Volume of this Journal will be found the elaborate report of George Mathiot, Electrotypist, on the electrotyping operations of the United States Coast Survey, which forms the concluding portions of this important and elaborate work.

## MODE OF FORMATION OF THE CORAL REEF.

The reefs of Florida as they have been described in the foregoing sketch of the topography of that state, and, indeed, the separate parts of each of these reefs, in their extensive range from north-east to south-west, present such varieties as will afford, when judiciously combined, a complete history of the whole process of their formation.

Here we have groups of living corals, beginning to expand at considerable depth, and forming isolated, disconnected patches, the first rudiments, as it were, of an extensive new reef. There we have a continuous range of similar corals in unbroken continuity for miles, or even hundreds of miles, rising at unequal heights nearly to the surface.

Here and there a few heads or large patches, or even extensive flats of corals, reach the level of low water mark, and may occasionally be seen above the surface of the waters, when the sea is more agitated than by the simple action of the tides. In other places coral sands or loose fragments of corals, larger or smaller boulders, detached from lower parts of the living reef, are thrown upon its dying summits, and there form accumulations of solid material, rising permanently above low water mark; collected sometimes in such quantities and at such heights as to remain dry, stretching their naked heads above high water.

In other places these accumulations of loose, dead materials have entirely covered the once living corals, as far as the eye can reach into the depth of the ocean: no sign of life is left, except perhaps here and there an isolated bunch of some of those species of corals which naturally grow scattered, or of those other organisms which congregate around or upon coral reefs; but the increase of the reef by the natural growth of the reef-building corals is at an end. Again, in other places, by the further accumulation of such loose materials, and the peculiar mode of aggregation which results from the action of the sea upon them, and which will be more fully explained hereafter, extensive islands are formed, ranging in the direction of the main land, which support them. Elsewhere we may find the whole extent

VOL. 2, No. 5, NOVEMBER, 1853.

of the reef thus covered, while, after a still more protracted accumulation, perhaps becomes united with some continental shore.

Now, it must be obvious, that from a comparison of so many separate stages of the growth of a coral reef, a correct insight may be obtained into the process of its formation; and, indeed, in thus alluding to the different localities which came under our own observation, we have already given a general history of its progress, which we now proceed to illustrate more in detail.

We would, however, first remark, that the extraordinary varieties which exist in the natural condition of different parts of the same reef, or of different reefs, when compared with each other, fully explain the discrepancies between the reports which have been obtained, respecting the reefs of Florida, prior to our investigations.

It had been stated that the reefs consisted solely of living corals; and, indeed, this report is true of the outer reef, which is called by all the inhabitants of Florida "*the reef*," *par excellence*, and is unfounded only with regard to those few islands which rise above the surface of the sea at Sand Key and the Sambos. Others, who had noticed only the larger accumulations of coral fragments which occur on the shores of some islands forming part of the Florida reef, had reported the islands to be formed of coral rocks; while some who had, perhaps, observed the extensive excavations made around Key West, have told us only of the existence of oolitic and compact rocks, almost destitute of corals or other remains of animal life; and from still other localities comes the opinion, that the rocks consist of nothing but more or less disintegrated shells, cemented together.

## ON ANIMAL LIFE.

\* \* \* \* \*

The fullness and variety of animal life is particularly obvious within the boundaries of coral fields, the natural limits assigned to the growth of these animals being those in which animals of other classes range in greater profusion, and the coral reefs themselves also affording very favourable circumstances for the display of numerous living forms. Hence the extraordinary assemblage of all classes of animals upon the reef, where, beside those particular kinds of corals which contribute largely to its formation, we find upon it, or on the foundation from which it rises, a great variety of other corals, which, though too insignificant in size to take a conspicuous part in building up these extensive accumulations of organic lime-work, add none the less their small share in the work, contributing especially to fill up the vacant spaces left by the more rapid and durable growth of the larger kinds. They are to the giants of the reef what the more slender parts are to the lords of the forest, adding the elegance and delicacy of slighter forms to the strength, power, and durability of their loftier companions.

But besides the stony corals, we find in the reef a great variety of soft polyps, either attached to the surface of dead corals, dead shells, or of the naked rocks, or boring into the coral sand and mud.

\* \* \* \* \*

Such are different species of area, the date-fish among the mollusca, and many worms, especially serpula among articulate, the agency of which in the formation of the keys will be described hereafter. All these animals and plants contribute, more or less, to augment the mass of solid materials which is accumulating upon the reef, and increase its size. Not only are the hard parts of shells, echinoderms, worms, or their broken fragments, heaped among the detritus of the corals, but occasionally even the bones of fishes and turtles, which are very numerous along the reef, may be found in the coral formations.