

**A CONTRIBUTION TO AMERICAN
THALASSOGRAPHY; THREE CRUISES OF THE
UNITED STATES COAST AND GEODETIC
SURVEY STEAMER "BLAKE", IN THE GULF OF
MEXICO, IN THE CARIBBEAN SEA, AND ALONG
THE ATLANTIC COAST OF THE UNITED STATES,
FROM 1877-80. VOL. II. [1888]**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649555727

A Contribution to American Thalassography; Three Cruises of the United States Coast and Geodetic Survey Steamer "Blake", in the Gulf of Mexico, in the Caribbean Sea, and Along the Atlantic Coast of the United States, from 1877-80. Vol. II. [1888] by Alexander Agassiz

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ALEXANDER AGASSIZ

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THREE CRUISES

OF THE

UNITED STATES COAST AND GEODETIC SURVEY

STEAMER "BLAKE"

IN THE GULF OF MEXICO, IN THE CARIBBEAN SEA, AND ALONG
THE ATLANTIC COAST OF THE UNITED STATES,
FROM 1877 TO 1880.

BY

ALEXANDER AGASSIZ.

IN TWO VOLUMES.

VOL. II.

BOSTON AND NEW YORK:
HOUGHTON, MIFFLIN AND COMPANY.
The Riverside Press, Cambridge.
1888.

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The Riverside Press, Cambridge :
Electrotyped and Printed by H. O. Houghton & Co.

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THREE CRUISES OF THE "BLAKE."

XIV.

THE WEST INDIAN FAUNA.

THE inhabitants of the abyssal realm as now known differ far more from the surface faunæ than the latter do from one another, one of the most striking characteristics of deep-sea life being the fact that there exists at the bottom of the ocean a fauna of almost exclusively animal feeders, which, in addition to preying upon one another, receive some of their food from the organic matter living on or near the surface of the sea and constantly falling to the bottom in a decaying condition. The deep-sea fishes, the mollusks, crustacea, and other groups, are nearly all carnivorous, no algæ being found growing at any depth.

Deep-sea forms are almost always killed in the process of hauling, either by rough handling or else by the heat of the surface water. We can scarcely hope ever to watch the habits of the deep-sea dwellers, and see them in their natural attitudes, and we must be satisfied to imagine what these are by analogy with their shallow-water allies, though many species of crustacea, echinoderms, polyps, and mollusks have been kept alive in a casing of ice by the naturalists of the United States Fish Commission. A similar attempt had been made on the "Blake" with some of the echinoderms, but they refused to be deluded for more than a few minutes by ice-cold water into the belief that they still lived in their normal condition.

Very frail deep-sea animals are often rapidly transferred to the surface from a region where they are subjected to a pressure of two tons or more, and it is not surprising that, after

having been thus drawn up from a depth of two or three miles, they should be in a very dilapidated condition. A number of the abyssal types among the fishes, mollusks, crustacea, echinoderms, and even rhizopods, are characterized by the looseness of their tissues, which allows the water to permeate every interstice, and to equalize the enormous pressure under which they live. When this pressure is removed, the fishes, with their flabby muscles, tender skins, and semi-cartilaginous skeletons, literally fall to pieces; they suffer from the decomposition and the dilatation of the air of the swimming bladder; the eyes are forced out of their sockets, and the scales fall off from the delicate skin. The mollusks present shapeless masses difficult of study. The crustacea seem to have been boiled, and their soft and thin shells resemble those of their shallow-water congeners just after moulting; many of the annelids and echinoderms look as if they had been digested by some of the larger deep-sea denizens, while the fragile types have lost their delicate appendages, or have become crushed in the ascent. Yet we know that a number of species of all these classes can thrive under differences of pressure due to such an extreme bathymetrical range as two thousand fathoms; but undoubtedly the individuals living at these enormous depths have found their way there very gradually, or ascend and descend from one level to another most leisurely, so as to become accustomed to differences in pressure.

Our information regarding the abyssal realms is far from complete, and our sketch of the natural history of the inhabitants of the floor of the ocean should be regarded only as a preliminary outline. Naturally, our knowledge of some of the groups is more extended than that of others, and the results obtained in any one case may differ radically from those reached by the study of less well known groups. As in the history of the fauna of any zoölogical province, our conclusions are constantly modified by the final results derived from a more careful study of some special case. There are of course certain rules applicable to all the inhabitants of the deeper regions, but they are few, and liable to constant modifications from our increasing knowledge.

In discussing the results of the "Blake" collections, I have availed myself most freely of the work done by other expeditions, as this is indeed essential for the proper understanding of the special facts examined. We are only on the threshold of our knowledge of the species and their exact distribution over the sea bottom; nevertheless the data of the various deep-sea expeditions seem to show that we know enough to form a general idea of the biological conditions under which these species exist, and that, judging from a few better known groups, our ideas are not likely to be materially modified by future researches.

This is especially the case with the West Indian fauna, and that of the east coast of the United States. We may safely assume that but little will hereafter be added to our notions of the association of the sponges, polyps, corals, echinoderms, crustacea, and mollusks, composing the West Indian deep-sea fauna, and making it in certain groups by far the richest in the world. The number of new forms from the West Indian region constitutes such a vast addition to our knowledge of the principal classes of invertebrates of that fauna as to revolutionize our ideas of geographical as well as of bathymetrical distribution.

No other region of the ocean bottom has yielded so abundant a harvest, and we have therefore no data elsewhere sufficiently complete for comparisons with regard to geographical distribution. But for ascertaining the bathymetrical distribution, and its bearing on the determination of the probable depth in which strata of former ages containing corals were deposited, the material at hand is of great importance.

I cannot give a better idea of the value of the collections brought together by the "Blake," than by contrasting the statistics of some of the groups before and after the Coast Survey explorations. I should state that the collections are as yet by no means fully worked out; but enough has been done, even in the groups least advanced, to show the wonderful richness of the collections, not only in new forms, but also in remarkable types of special interest.

Before the explorations of the "Blake" we knew nothing of the deep-sea fishes of the Caribbean Sea and of the Gulf of

Mexico. Less than fifty years ago there were not more than twenty known species of crustacea from the West Indian region. The "Blake" has added no less than forty new genera and 150 new species to those thus far described. Ten of the genera and nearly forty of the species belong to the well-known Brachyura, in spite of the fact that Stimpson and Milne-Edwards had, before the explorations made by the "Blake," apparently very fully worked out the species of this group from the dredgings of the "Hassler" and "Bibb"; sixteen genera and over sixty species belong to the less known Anomura; and there are fourteen genera and about fifty species of Macrura.

Among the mollusks the total number of littoral species recorded by Adams and D'Orbigny is 580, as compared with 461 collected by the "Blake." This number also includes 210 littoral species, while 251 are abyssal. The number of genera represented by the former is about 110, while some 98 genera are found in the "Blake" collection. These numbers are of course approximate.

The immense collections of echinoderms are peculiarly interesting. Of the deep-sea echinoderms the most striking are the Elaspoda, a new order of holothurians, established by Dr. Théel for the reception of these extraordinary and aberrant types, of which no less than fifty-two species were discovered by the "Challenger" expedition. Previous to that time three species of the group were known, one from the Kara Sea, and two subsequently found in the northern parts of the Atlantic by the Norwegian North Atlantic expedition. The "Blake" dredged about nine species of this remarkable order, three of which were unknown before.

There are now described eighty-three species of sea-urchins from the Caribbean fauna. Of these, eleven were added by the dredgings of Count Pourtales in the "Bibb" and "Hassler," nineteen were discovered by the "Blake," and thirteen species previously known from other districts were obtained for the first time in the Caribbean and adjoining seas by the Coast Survey expeditions, so that the list of species has been more than doubled by the dredgings made since 1876.

The "Blake" dredged fifty-four species of starfishes, of