AGASSIZ (A.)

With the Compliments of the Author.

BIOGRAPHICAL SKETCH

OF

LOUIS FRANÇOIS DE POURTALÈS.

BY

ALEXANDER AGASSIZ.

[Reprinted from the Proceedings of the American Academy of Arts and Sciences.]

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Louis F. de Pourtalès was born in Neuchâtel on the 4th of March, 1824, and died at Beverly Farms, on the 17th of July, 1880, in the fifty-seventh year of his age, sinking after a severe illness under an internal malady. The blow fell the more heavily upon his family and friends and upon his scientific colleagues, because his fine constitution, combined with a manly vigor of body and mind, had seemed to defy disease and to promise years of activity.

Educated as an engineer, he showed from boyhood a predilection for natural history. He was a favorite student of Professor Agassiz, and when only a lad of seventeen had shared his labors on the glacier of the Aar, being one of the party of Alpine explorers who, in 1840, made their home under the famous boulder known as the Hotel des Neuchâtelois. When his friend and teacher came to America in 1847, he accompanied him, and remained for some time with the little band of naturalists who, first at East Boston and subsequently at Cambridge, shared his labors. In 1848 Pourtalès entered the United States Coast Survey, where his ability and indefatigable industry were at once recognized, and he remained attached to that branch of our public service for many years.

In 1851 he was engaged as assistant on the triangulation of the Florida Reef. While there he collected a number of Gephyreans and Holothurians which he described in the Proceedings of the American Association for the Advancement of Science, together with a number of species observed by him while living at East Boston and assisting Professor Agassiz in the preparation of his text-book on Zoölogy, afterwards published by him in conjunction with Dr. Gould. For this text-book Pourtalès prepared the greater number of the drawings. These descriptions and those of Dr. Gould and Dr. Stimpson

formed for a long time the only literature of the large number of Annelids and Holothurians, now so well known through the investigations of the Fish Commission along the Atlantic coast of the United States.

Thus prepared, Pourtalès became deeply interested in everything relating to the study of the bed of the ocean. Thanks to the enlightened support of the then Superintendent of the Coast Survey, Professor Bache, and of his successors, Professor Peirce and Captain Patterson, he was enabled to devote his talents and industry to the comparatively new field of "Thalassography" and the biological investigations related to it. So interesting and valuable were the results obtained, not only as an aid to navigation, but in their wider bearing on the history of the Gulf Stream and on the distribution of animal life at great depths, that in 1866 he was sent out by Professor Peirce, then Superintendent of the Coast Survey, to continue these investigations on a larger scale. The large collections of samples of sea-bottom accumulated by the different hydrographic expeditions of the United States Coast Survey were carefully examined by him; and the results, accompanied by a chart of the sea-bottom on the east coast of the United States, were published in Petermann's "Mittheilungen," in advance of their appearance in the Coast Survey Reports.

From 1854 until his resignation as Assistant in the United States Coast Survey, Mr. Pourtalès had charge of the field and office work of the Tidal Division. His reports to the Superintendent of the United States Coast Survey, incorporated in the annual Reports, short as they are, show the amount and value of his work. In addition to this tidal work, he was also at times assigned to special duty, as, for instance, at the magnetic station at Eastport. Previously to taking charge of the Tidal Division, he had been acting under the more direct supervision of the Superintendent of the Coast Survey, either in connection with the tidal work or the calculation of longitudes.

While in Florida his attention was drawn to the habits of the Foraminifera, then little known, and his first papers on this subject were read at the meeting of the American Association for the Advancement of Science for 1850. They at once attracted attention, and after the death of Professor Baily of West Point the larger series of samples from the sea-bottoms, collected by the officers of the Coast Survey, were submitted to him for examination. At that time the opinion of Forbes, that the depths of the sea were absolutely barren of life, was

still generally accepted. Sharing this view with other naturalists, Pourtalès was nevertheless led to reconsider it in connection with his observations on his Foraminifera, many of which had been brought up from depths far below that considered by Forbes to be the limit of life. Did they belong there, or was their natural habitat, like that of others of their kind,* nearer the surface; and had they simply dropped to the bottom after death, or been gradually washed down from the reefs by the current? This question is discussed with much keenness of observation in his report on the Foraminifera collected by Craven and Maffitt. He inclined to believe that they actually lived where they were found, because the greater number of individuals in these specimens are brought up in perfect condition, notwithstanding the extreme delicacy of their shells. The faint pink color of the Globigerinæ, for instance, could scarcely be preserved had the specimens been transported from a distance, and the best argument in favor of their deeper habitat is found in the fact that the same species are found uninjured (and at great depths) as far north as New Jersey. It is, however, still most perplexing that the same species are also found living near Cuba and elsewhere in the West Indies under very different conditions of light and temperature.

He clearly saw that our ideas of the bathymetrical distribution of the higher Invertebrates were to be greatly modified; for he says in one part of the report: "There are some delicate shells of mollusks from depths beyond five hundred fathoms where they were certainly living." He also called attention to the existence of green sand as one of the characteristic deep-sea formations of the present day. "A mixture in about equal proportions of Globigerinæ and black sand — probably green sand." In concluding he called attention to the importance for geologists of a knowledge of the habitat and distribution of Foraminifera, on account of their large share in the formation of rocks, at least in the Cretaceous and Tertiary periods.

While examining the samples of bottom collected by Commander Sands, he made the discovery that many specimens of Orbulina contained a young Globigerina, more or less developed, so that the two genera must be considered as probably two stages of alternate generation. He was also able, in some of the specimens collected by Commander Sands, to trace the successive changes of the Foraminifera

* Mr. Pourtalès, in 1867, observed a species of Globigerina floating on the surface off Havana.

into green sand, from the most fresh-looking Foraminifera of various species until all trace of their origin was apparently lost.

In 1858 he gave a general report of his work on the Foraminifera of the bottoms collected by the various Gulf Stream expeditions up to that time. This was by no means the close of his studies in this direction, for he continued as a part of his duties of Assistant on the Coast Survey to have charge of the collection of bottom deposits. The general results of his studies he published in Petermann's "Geographische Mittheilungen" for 1871, with a map showing the geographical and bathymetrical distribution of the different bottoms on the east coast of the Atlantic. Fitted as he was both by taste and early training for zoölogical studies, it was natural that the Coast Survey should look to him for an expansion of its biological work, and in 1867 he was assigned to the Coast Survey steamer Corwin in order to make such biological collections as would tend to elucidate the fauna of the bottom of the Gulf Stream between the Florida Keys and Cuba. The breaking out of yellow-fever on board the steamer after a few casts had been taken put a stop to all further work for that season. But early in 1868 the campaign was opened again with such success, Acting Master Platt, U. S. N., commanding the Coast Survey steamer Corwin, that Mr. Pourtalès induced Professor Agassiz, who had become greatly interested in the extraordinary results of the second expedition, to join him in the Bibb for the third cruise in 1869. The second expedition, from the brilliant results obtained, may be said to have awakened general interest in the subject of the bathymetrical distribution of animal life. The discovery alone of the great range in depth of Rhizocrinus from the Straits of Florida to the Loffoden Islands opened a field of investigation, dimly foreshadowed, it is true, by the earlier dredgings of the older and younger Sars, and the wider bearing of which Lovén had anticipated in a paper read before a meeting of the Scandinavian naturalists as early as 1863.

In the Coast Survey Reports for 1867 and 1868 are to be found Pourtalès's first reports on the fauna of the Gulf Stream in the Straits of Florida. These reports were published with greater biological detail in the first volume of the Bulletins of the Museum of Comparative Zoölogy for 1867 and 1868.

The large and valuable collections made by Mr. Pourtalès in the Gulf Stream, as well as those made under his direction on board the Hassler, were deposited at the Museum of Comparative Zoölogy,

Cambridge, and thence distributed as rapidly as possible to be worked up by specialists throughout the scientific world. To these were afterward added the results of the three Blake expeditions, which were indeed the natural continuation of the work initiated by Pourtalès. The collections thus sown broadcast have already borne a rich harvest in special reports upon Echinoderms, Corals, Crinoids, Foraminifera, Sponges, Annelids, Hydroids, Bryozoa, Mollusks, and Crustacea, prepared by the most eminent investigators of America and Europe, and published principally in the Bulletins of the Museum. They form a part of that series of international monographs to which Sir Wyville Thomson, following the liberal policy adopted and advised by the Director of the Museum, is making such generous contributions through the collections of the Challenger.

An examination of the characteristic deep-sea Echinoderms, Sponges, and Corals showed at once the ancient characters of the types; while the similarity of the genera of Echini to those of the chalk, the discovery of representatives of the Infulasteridæ (Pourtalesia),* of Salenia, of Hemipedina, Conoclypus, and others, led the way to the theories of Thomson regarding the great antiquity of these forms and to the modern theories as to the formation of the chalk. The old view of Guyot and of Dana upon the great antiquity of continents and of oceanic basins received also a strong support from the data obtained in Mr. Pourtalès's dredgings. The specimens of bottom showed conclusively that we had not had, in former geological times, any deposits strictly corresponding to those now forming at the bottom of the ocean in great depths.

Mr. Pourtalès was indeed the pioneer of deep-sea dredging in America, and he lived long enough to see that these earlier expeditions had paved the way not only for similar English, French, and Scandinavian researches, but had led in this country to the Hassler and finally to the Blake expeditions under the auspices of the Hon. Carlile Patterson, the present Superintendent of our Coast Survey. On the Hassler Expedition, from Massachusetts Bay through the Straits of Magellan to California, he had entire charge of the dredging operations. Owing to circumstances beyond his control, the deep-sea explorations of that expedition were not as successful as he anticipated.

* This genus is the representative of the most interesting family of Echini brought to light by deep-sea dredging: it was named in honor of Pourtalès in 1869.

At the death of his father, Mr. Pourtalès was left in an independent position, which allowed him to devote himself more completely than ever to his zoölogical studies. He resigned his official connection with the Coast Survey, and returned to Cambridge, where he became thenceforth identified with the progress of the Museum of Comparative Zoölogy. To Professor Agassiz his presence there was invaluable. In youth one of his favorite pupils, throughout life his friend and colleague, he now became the support of his failing strength.

Mr. Pourtalès reserved to himself the corals, Halcyonarians, Holothurians, and Crinoids, of the different deep-sea dredging expeditions with which he was connected. A number of his papers on the deep-sea corals of Florida, of the Caribbean Sea, and of the Gulf of Mexico, have appeared in the Museum publications. The Crinoid memoirs published by him relate to a few new species of Comatulæ, and to the interesting genera Rhizocrinus and Holopus.

At the time of his death Mr. Pourtalès was engaged in the study of the Holothurians and the magnificent collection of Halcyonarians of the Blake. Unfortunately he had not advanced far enough in his preliminary work to make its completion possible; so that the Holothurians of the Blake will now be worked up with those of the Challenger, while the Halcyonarians must be left undetermined for the present, the Antipatharia alone having been finished.

His largest and most important work is his monograph on the deep-sea corals, published as one of the illustrated catalogues of the Museum of Comparative Zoölogy. This was published in 1871, and in it he describes the corals he collected in the years 1867–1869, while on the Coast Survey expeditions to explore the Gulf Stream. As an introduction to the memoir, we find a short *résumé* of the conditions of the floor of the Gulf Stream between Cuba, the Bahamas, and the Florida Keys, and a map with sections and other details showing the ground covered by the dredgings of Mr. Pourtalès. Throughout the memoir there are scattered most important general remarks on the affinities of the different families, the most interesting of which are those on the Rugosa and the Stylasteridæ. He also wrote for Appleton's Cyclopædia a number of articles on the Atlantic, Indian, and Pacific Oceans, on the Polar Seas, the Galapagos, the Straits of Magellan, Juan Fernandez, and Deep-sea Dredging.

The titles of his memoirs indicate the range of his learning and his untiring industry. His devotion to science was boundless. A model

worker, so quiet that his enthusiasm was known only to those who watched his steadfast labor, he toiled on year after year without a thought of self, wholly engrossed in his search after truth. He never entered into a single scientific controversy, nor even asserted or defended his claims to discoveries of his own which had escaped attention. But while modest to a fault, and absolutely careless of his own position, he could rebuke in a peculiarly effective though always courteous manner ignorant pretensions or an assumption of infallibility.

Appointed keeper of the Museum of Comparative Zoölogy after the death of Professor Agassiz, he devoted a large part of his time to the administration of the Museum affairs. Always at his post, he passed from his original investigations to practical details, carrying out plans which he had himself helped to initiate for the growth of the institution. As he had been the devoted friend of Professor Agassiz, he became to his son a wise and affectionate counsellor, without whose help in the last ten years the Museum could not have taken the place it now occupies.

If he did not live to see the realization of his scientific hopes, he lived at least long enough to feel that their fulfilment is only a matter of time. He has followed Wyman and Agassiz, and like them has left his fairest monument in the work he has accomplished and the example he leaves to his successors.

Cambridge, Mass., February, 1881.

The following are the principal publications of Mr. Pourtalès: —

1850. On the Distribution of Foraminifera on the Coast of New Jersey, as shown by the Off-shore Soundings of the Coast Survey. Proc. Amer. Assoc. for Adv. of Sc., Charleston meeting, 1850.

On the Order of Succession of Parts in Foraminifera. Proc. Amer. Assoc. for Adv. of Sc., Charleston meeting, 1850. Also Amer. Journ. of Sc. and Arts, 2d series, Vol. II. 1851.

1851. On the Holothuridæ of the Atlantic Coast of the United States. Proc. Amer. Assoc. for Adv. of Sc., 1851, p. 8.

A paper read in 1847 at meeting of Assoc. of Amer. Geol. and Nat. at Boston.

1851. On the Gephyrea of the Atlantic Coast of the United States. Proc. Amer. Assoc. for Adv. of Sc., 1851, p. 39.

1853. Extract from Letters of L. F. Pourtalès, Assistant in the Coast Survey to the Superintendent upon the Examination of Specimens of Bottom obtained in the Exploration of the Gulf Stream by Lieutenants-Commanding T. A. M. Craven and J. N. Maffitt, U. S. N. Coast Survey Report for 1853, and Proc. Amer. Assoc. for Adv. of Sc., Cleveland meeting, 1853.

1854. Tidal Reports.

1858. Report of Assistant L. F. Pourtalès on the Progress made in the Microscopical Examination of Specimens of Bottom from Deep-Sea Soundings. Coast Survey Report for 1858.

1858. On the Genera Orbulina and Globigerina. By L. F. Pourtalès. Amer. Journ. of Sc. and Arts, 2d series, Vol. XXXVI. 1858.

1867. Report on the Fauna of the Gulf Stream in the Straits of Florida. By L. F. Pourtalès. Coast Survey Report for 1867.

Contributions to the Fauna of the Gulf Stream at great Depths. By L. F. Pourtalès, Assistant U. S. Coast Survey. Bull. Mus. Comp. Zoöl., Vol. I. No. 6. Cambridge, 1867. pp. 18.

1868. Contributions to the Fauna of the Gulf Stream at Great Depths (2d series). By L. F. Pourtalès, Assistant U. S. Coast Survey. Bull. Mus. Comp. Zoöl., Vol. I. No. 7. Cambridge, 1868. pp. 22.

1868. Report of Assistant L. F. Pourtalès on Dredgings made in the Sea near the Florida Reef. Coast Survey Report for 1868.

1869. The Gulf Stream. Characteristics of the Atlantic Sea-Bottom off the Coast of the United States. By L. F. Pourtalès. Coast Survey Report for 1869.

1869. List of the Crinoids obtained on the Coasts of Florida and Cuba by the U. S. Coast Survey Gulf Stream Expeditions in 1867, 1868, and 1869. By L. F. Pourtalès, Assistant U. S. Coast Survey. Bull. Mus. Comp. Zoöl., Vol. I. No. 11. Cambridge, 1869. pp. 4.

1869. List of Holothuridæ from the Deep-Sea Dredgings of the United States Coast Survey. By L. F. Pourtalès, Assistant U. S. Coast Survey. Bull. Mus. Comp. Zoöl., Vol. I. No. 12. Cambridge, 1869. pp. 3.

1870. Der Boden des Golfstromes und der Atlantischen Küste Nord Amerika's. Von L. F. Pourtalès. Petermann's Geograph. Mittheilungen, 1870. Heft XI. pp. 5. 1 map.

1871. Deep-Sea Corals. By L. F. Pourtalès, Assistant U. S. Coast Survey. Illustrated Catalogue of the Mus. Comp. Zoöl., Vol. II. No. 4. (Memoirs, Vol. II. No. 4.) Cambridge, 1871. pp. 93. Pls. 8.

1874. The Zoölogical Results of the Hassler Expedition. I. Echini, Crinoids, and Corals. By Alexander Agassiz and L. F. Pourtalès. pp. 54. 15 woodcuts. Pls. 10. II. Ophiuridæ and Astrophytidæ, including those dredged by the late Dr. Stimpson. By Theodore Lyman. Illust. Cat. Mus. Comp. Zoöl., No. 8. (Memoirs, Vol. IV.) Cambridge, 1874. pp. 34. 4 woodcuts. Pls. 5.

1875. Corals at the Galapagos Islands. By L. F. Pourtalès. Amer. Journ. of Sc. and Arts, 3d series. Vol. X. 1875.

1876. Recent Corals from Tilibiche, Peru. By Alexander Agassiz and L. F. Pourtalès. pp. 4. 1 plate. March, 1876.

1878. Reports on the Dredging Operations U. S. Coast Survey Steamer "Blake." II. Echini. By A. Agassiz. — Corals and Crinoids. By L. F. Pourtalès. — Ophiurans. By T. Lyman. — pp. 58. 11 plates. December, 14, 1878.

1880. Report on the Results of Dredging, etc. VI. Report on the Corals and Antipatharia. By L. F. Pourtalès. pp. 26. 3 plates. February, 1880.

1880. Report on the Florida Reefs. By Louis Agassiz. Accompanied by Illustrations of Florida Corals, from drawings by A. Sonrel, Burkhardt, A. Agassiz, and Roetter. With an Explanation of the Plates, by L. F. Pourtalès. Published by permission of A. D. Bache and Carlile P. Patterson, Superintendent of the U. S. Coast Survey. pp. 61. 23 plates. May, 1880.

In Appleton's Encyclopædia the following articles : —

Atlantic Ocean, Vol. II. — Dredging (Deep-Sea), Vol. VI. — Galapagos, Vol. VII. — Indian Ocean, Vol. IX. — Juan Fernandez, Vol. IX. — Magellan, Straits of, Vol. X. — Mediterranean Sea, Vol. XI. — Pacific Ocean, Vol. XII. — Polar Seas (geography), Vol. XIII.