

**RESULTS OF AN EXAMINATION
OF SYRIAN MOLLUSCAN
FOSSILS, CHIEFLY FROM THE
RANGE OF MOUNT LEBANON**

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Results of an Examination of Syrian Molluscan Fossils, Chiefly from the Range of Mount Lebanon by Charles E. Hamlin

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BY HEMPHILL.

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Compliments of

CHARLES E. HAMLIN.

SYRIAN MOLLUSCAN FOSSILS,

CHIEFLY FROM THE RANGE OF MOUNT LEBANON.

By CHARLES E. HAMLIN.

WITH SIX PLATES.

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INTRODUCTION.

By the favor of Rev. SELAH MERRILL, D.D., during the years 1875-77 Archæologist of the American Palestine Exploration Society, and now United States Consul at Jerusalem, the Museum of Comparative Zoölogy has recently become possessed of two small collections of Syrian molluscan fossils, chiefly from the range of Mount Lebanon. The one was made by Dr. Merrill himself, while prosecuting his work of exploration; the other, by Mrs. Bird, wife of Rev. William Bird, a missionary of the American Board of Commissioners for Foreign Missions, who with his family has been for many years stationed at Abeh, fifteen miles southeast of Beirut and among the mountains. As a large proportion of these fossils belong to species hitherto undescribed, and as others, of species already named, are better specimens of the same than those which were the basis of the original figures and descriptions, it has seemed desirable that the collections should be studied, and the results of the examination published.

Among the stores of the Museum of Comparative Zoölogy, a third small collection of fossil shells has been found, which is understood to be from "Lebanon," and to have been forwarded, perhaps presented, in 1866, by Rev. W. M. Thomson, D. D., author of the well-known work, "The Land and the Book,"—for more than thirty years missionary in Syria, and at the date specified acting United States Consul at Beirut. The material for investigation thus furnished has been increased, through the kindness of the officers of the Congregational House in Boston, by the loan of some interesting specimens, labelled "Mount Lebanon," which are preserved in the Museum of the American Board.

Unfortunately, however, as is usual with collections made by other than experienced or professional hands, notes are wanting of the exact localities with a few exceptions, and of the nature and position of the strata without exception, from which the fossils of the several lots were taken. This deficiency renders it necessary to state here how far the localities represented by the different collections can be identified.

Dr. Merrill's collection was put into my hands by himself, bearing labels to distinguish specimens found at points outside of the district where the greater part were procured, and for the rest a written statement was made, at my request, that "almost all the

specimens came from the vicinity of Beirût, Abeih, Dog River (Nahr el Kelb) a few miles north of Beirût, and the mountains between this river and the Cedars, a mountainous district which extends more than twenty and not over thirty miles north and south, with Beirût and Dog River as a centre." To this portion of country I shall refer for convenience, in the following pages, as the Beirût district.

The Bird collection was received also from Dr. Merrill in person, with the oral statement that, as he understood, it was gathered at Abeih and in its vicinity. The fact that some of the shells are of species already recorded as from that locality, and that the rock material which makes up the fossils, adheres to them, or fills their interiors, is such as is known to characterize the richly fossiliferous strata of Abeih, constitutes strong internal evidence that most of the specimens are actually from the place from which they are said to come. Yet under the title Jurassic Ammonites (pages 9, 10) reasons are given for the conclusion that the three species from the Bird collection there named could not have come from Abeih, where only Cretaceous strata are known to occur, but must have been taken from beds older than the Cretaceous, such as in all Syria, so far as at present traced, are restricted to one narrow area, lying entirely without the circle of Beirût, and upon the slope of Mount Hermon.

Of the Thomson and Congregational House collections it can only be affirmed that they are from "Lebanon," but the testimony of the specimens themselves goes to make it very highly probable that all of them had their origin within what we have termed the Beirût district.

Of the fossils brought together from these different sources, as in the case of all other collections from the same region of which any accounts have been published, it is mainly the Gasteropods that have been preserved in any considerable degree of completeness. Such specimens characterize the Bird collection, made up principally of choice things selected apparently under the guidance of a taste which rejected whatever was displeasing to the eye. But of the greater number of Lamellibranchs, interior casts alone occur; and taking into account the like condition of things in other collections from the same strata, and the nature of the beds in which they are enclosed, the probability seems very small that of certain genera better representatives will ever be discovered.

In dealing with such specimens, one is at once confronted with the question how far it is useful — not to say *allowable* — to attempt the description of species from well-preserved casts which bear positive generic characters, but exhibit few of the superficial markings upon which the distinctions of species largely depend. While settling for himself this question, the student is likely to remember the censure which has been unsparingly visited upon several eminent palæontologists for presuming to confer specific names upon casts denuded of their tests, nor will he forget that later investigation has in signal instances justified their action.

The question is, perhaps, one of more interest in the study of molluscan fossils of the Cretaceous period, than with reference to those of any other. For while, for example, in determining the Cretaceous shells of Southern India and those of California and the Upper

Missouri country, Stoliczka in the first case, and Meek and Gabb in the others, had sufficient supplies of excellent material, able investigators have not seldom been reduced to the alternative of drawing conclusions from bad material, or of reaching no conclusions at all. This consideration, it seems to us, has not had due weight in forming the verdict which has been pronounced upon the work of Conrad as the first describer of Syrian fossil shells in any considerable number. The collections of the Lynch Palestine Expedition, and the other material which fell into Conrad's hands, were of very inferior quality; and if he were to name species, he was compelled to find them upon imperfect specimens, for he seems to have had no others. It was his further misfortune that the descriptions published in the Official Report of the expedition are meagre beyond the habit of their author, and that his figures, through fault of the artist, were poorly executed. From these several causes has resulted uncertainty concerning the identity of some of his species, and respecting the validity of others.

The Swiss Cretaceous Mollusca, described by Pictet and Campiche, afford a case not unlike that with which Conrad had to deal. These authors have been justly criticised for naming from casts so many species of the *Veneridae*, a family in which the shells have often at the beaks and margins such thickness that it is impossible from the cast to reconstruct the exterior. But familiarity with the large Campiche collection (now in the Museum of Comparative Zoology) of molluscan fossils from the Cretaceous of Sainte-Croix, in which scores of specimens of the same species are but repetitions of like defective casts, obliges me to think that, if species are to be discriminated in the fossils of that locality, it must be by means of imperfect casts, for, with few exceptions, better examples are unknown.

Again, in his *Études Critiques sur les Mollusques Fossiles*,—*Monographie des Myes*,—the late Professor Agassiz instituted, chiefly upon the basis of naked casts taken from the Swiss Cretaceous strata, a series of new genera and species, of which the major part has stood the test of later discovery and criticism. That distinguished observer saw that in the family of *Myida* as limited by him (since in large part transferred to the *Pholadomyida* and *Anatynida*) the casts of his new genera indicated unmistakably that the shell must have been very thin, and that it was safe from the casts to infer the superficial character of the shells themselves, and that "those features, which are included in the terms *general figure and ornaments of surface*, acquire in the *Myida* [so limited] an increased degree of importance from their invariable persistence and distinctness of design, in a similar ratio that the hinges and their characters have degenerated in value." (Morris and Lycett, Mollusca from the Great Oolite, Part II, p. 99.)

So too among Gasteropoda, by the introduction of the genus *Tylostoma* Sharpe relieved that of *Natica* from a burden impossible longer to be borne, and to-day are accepted as valid, not only the genus, but the species, which he founded thirty-five years since on no other basis than casts from the Cretaceous strata of Portugal, of which he says: "Few of the specimens found retain any portion of the shell, and in no instance was I fortunate enough to find a shell perfectly preserved, so that the specific descriptions are necessarily

imperfect." (Quarterly Journal of the Geological Society of London, V, p. 376, 1849.) And, in general, where better material cannot be obtained, if species are named with proper care and discrimination from casts distinctly recognizable as to their genera, well preserved, and possessing some striking and characteristic features, due regard being had to the nature of the test in the group to which they belong, it would seem that such species may be useful in studying the relations of the different beds in which they occur.

The foregoing remarks, however, have been suggested by general considerations more than by the demands of the work here recorded, as will appear from the following statement. Of the fossils subjected to examination, the most obscure casts, Gasteropods as well as Lamellibranchs, whose generic relations cannot be affirmed with certainty, are passed over without notice, except two species which are simply figured and referred to as indeterminate. Fourteen species of Gasteropods are described as new, of which all the specimens used for the descriptions and figures, retain the shell, and generally in satisfactory condition. Of sixteen new Lamellibranchs, ten species are described and figured from specimens bearing the shell, and of the other six, based upon casts, three are species of the thin-shelled *Pholadomyida* and *Anatinida*, and concerning only one of the three remaining can there be any doubt, if specimens of the species shall be found hereafter with the test preserved, that both shell and cast can be readily identified as of the same species, thus involving neither confusion nor unnecessary change in specific names. We have to regret the disadvantage under which we have labored,—shared with many predecessors in paleontological study,—of having been obliged in some instances to describe a species from a solitary example.

Age of the Strata from which the Fossils were derived.

Botta's *Observations sur le Liban et l'Anti-Liban*, published in 1833 (Mémoires de la Société Géologique de France, I, pp. 135-160), give the results of the first geological exploration of the region to which they relate. The sections in detail, and the geological plan, which accompany this excellent memoir, are still regarded as giving a correct idea of the actual succession of formations in the mountain chains. But concerning the age of those formations a change of opinion has followed upon later investigations. The rocks and fossils collected by Botta were submitted to Ami Boué, a learned geologist of his time and secretary of the Geological Society of France. Having made a comparative study of the specimens, with the aid of European collections, Boué came to the conclusion that the three *terrains* of Lebanon recognized by Botta correspond to the Upper Jurassic, the Greensand, and the Lower Chalk of European systems.

In 1837 Heinrich von Schubert and Professor Roth visited Palestine, made a great number of geological observations, and described various fossil beds in the Lebanon and Anti-Lebanon ranges. Roth took back with him to Germany many fossils. About the same time Russegger, an Austrian Councillor of Mines, made extensive journeys in Egypt, the Soudan, and Syria, including Lebanon and Anti-Lebanon. His opinions for a time were widely adopted, but were afterward discarded, and call for no further notice.

In 1848 occurred the "United States Expedition to Explore the Dead Sea and the River Jordan," of which the Official Report by the commander of the expedition, Lieutenant Lynch, was published in 1852. This report includes that of Dr. Anderson upon the Geology, and that of Mr. Conrad upon the Palaeontology, of the parts explored. Besides the shells collected by the expedition, Conrad described some others from the same region which were furnished by individuals. He made by far the larger number to be Jurassic forms, and the rest Cretaceous. His determinations are considered as having misled Dr. Anderson in his decisions upon the geology of the country.

In 1864 the Duc de Laynes accomplished his Geological Exploration of the Dead Sea, accompanied by Louis Lartet as geologist, who during the next two years published his observations in several papers, printed in the Bulletin de la Société Géologique and the Comptes Rendus; and from 1869-72 appeared in the Annales des Sciences Géologiques his *Essai sur la Géologie de la Palestine et des Contrées avoisinantes*. There followed, in 1875, a folio volume, which includes his earlier memoirs, revised and enlarged. In the chapter devoted to the Paleontology of the Cretaceous formation is a list of molluscan fossils previously known from Palestine and Lebanon, and several new species are described and figured.

In 1867 Professor Oscar Fraas, of Stuttgart, published an important work, being Part I of his *Aus dem Orient*, the record of geological observations made by him in Egypt, the Sinaitic peninsula, and the environs of Jerusalem. In 1877 his *Jurassichten am Hermon* was issued, in the Jahrbuch für Mineralogie, etc., pp. 17-30, and the next year *Geologische Beobachtungen am Libanon*, or Part II of *Aus dem Orient*. The two parts taken together supply a full catalogue of all molluscan fossils known from Syria up to 1878, including, besides Conrad's recognizable species, European species of Lamarck, Sowerby, d'Orbigny, and others, as well as a considerable number described by Fraas himself. That part of the list found in Part I had been quoted in Lartet's folio of 1875. On comparing the lists of Conrad, Lartet, and Fraas, it will be seen that the number of new species from Syria, published since the date of Conrad's report, is not large. Of those described by Fraas, sometimes too briefly for ready identification, only very few seem to have been figured.

The most important consequence of the labors of Lartet and Fraas is the change of view which they have brought about with respect to the age of the stratified rocks of Palestine and the Lebanon region. It is now an established fact, that the great Cretaceous system which, stretching in Northern Africa through Morocco and thence eastward to Egypt, and southward into the Sahara and the Libyan Desert, crosses over into the peninsula of Sinai, spreads also over the greater part of Palestine and the ranges of Lebanon and Anti-Lebanon, and probably prevails east of the Jordan and the Dead Sea, in Gilead, Moab, and Idumaea. The earlier explorers seem to have been misled by the strong external resemblance of the light-colored limestones which they observed in Palestine to the rocks of the White Jura of Europe, and therefore regarded them as Jurassic.

In all Palestine proper, the Lebanon range, Cule-Syria (the Bükaa), and the Jordan valley southward to Akabah, there had been found up to 1878, upon the authority of