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GEOLOGICAL SURVEY

No. 4

ON MESOZOIC FOSSILS

WASHINGTON
GOVERNMENT PRINTING OFFICE
1884

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From the above it will be seen that only the Annual Reports, which form parts of the reports of the Secretary of the Interior and are printed as executive documents, are available for gratuitous distribution. A number of these are furnished the Survey for its exchange list, but the bulk of them are supplied directly, through the document rooms of Congress, to members of the Senate and House. Except, therefore, in those cases in which an extra number is supplied to this office by special resolution, application must be made to members of Congress for the Annual Reports, as for all other executive documents.

Of these Annuals there have been already published:

I. First Annual Report to the Hon. Carl Schurz, by Clarence King. Washington, 1880. 8°. 79 pp. 1 map.—A preliminary report describing plan of organization and publications.

II. Report of the Director of the United States Geological Survey for 1880-'81, by J. W. Powell. Washington, 1882. 8°. lv, 568 pp. 61 pl. 1 map.

III. Third Annual Report of the United States Geological Survey, 1881-'82, by J. W. Powell. Washington, 1883. 8°. xviii, 564 pp. 67 pl. and maps.

IV. Fourth Annual Report of the United States Geological Survey, 1882-'83, by J. W. Powell. Washington, 1884. 8°. xii, 473 pp. 85 pl. and maps.

MONOGRAPHS.

The Monographs of the Survey are printed for the Survey alone, and can be distributed by it only through a fair exchange for books needed in its library, or through the sale of those copies over and above the number needed for such exchange. They are not for gratuitous distribution.

So far as already determined upon, the list of these Monographs is as follows:

I. The Precious Metals, by Clarence King. In preparation.

II. Tertiary History of the Grand Cañon District, with atlas, by Capt. C. E. Dutton. Published.

III. Geology of the Comstock Lode and Washoe District, with atlas, by George F. Becker. Published.

IV. Comstock Mining and Miners, by Eliot Lord. In press.

V. Copper-bearing Rocks of Lake Superior, by Prof. R. D. Irving. In press.

VI. Older Mesozoic Flora of Virginia, by Prof. Wm. M. Fontaine. In press.

VII. Silver-lead Deposits of Eureka, Nevada, by Joseph S. Curtis. In press.

VIII. Paleontology of the Eureka District, Nevada, by Charles D. Walcott. In press.

Geology and Mining Industry of Leadville, with atlas, by S. F. Emmons. In preparation.

Geology of the Eureka Mining District, Nevada, with atlas, by Arnold Hague. In preparation.

Coal of the United States, by Prof. R. Pumpelly. In preparation.

Iron in the United States, by Prof. R. Pumpelly. In preparation.

Lesser Metals and General Mining Resources, by Prof. R. Pumpelly. In preparation.

Lake Bonneville, by G. K. Gilbert. In preparation.

Dinocerata. A monograph on an extinct order of Ungulates, by Prof. O. C. Marsh. In press.

Sauropoda, by Prof. O. C. Marsh. In preparation.

Stegosauria, by Prof. O. C. Marsh. In preparation.

Of these monographs, Nos. II and III are published, viz:

II. Tertiary History of the Grand Cañon District, with atlas, by C. E. Dutton, Capt. U. S. A. 1882. 4°. 264 pp. 42 pl. and atlas of 26 double sheets folio. Price $10.12.

III. Geology of the Comstock Lode and Washoe District, with atlas, by G. F. Becker. 1883. 4°. XV, 422 pp. 7 pl. and atlas of 21 sheets folio. Price $11.

Nos. IV, V, VI, VII, and VIII are in press and will appear in quick succession. The others, to which numbers are not assigned, are in preparation.

BULLETINS.

The Bulletins of the survey will contain such papers relating to the general purpose of its work as do not properly come under the heads of ANNUAL REPORTS or MONOGRAPHS.

Each of these Bulletins will contain but one paper, and be complete in itself. They will, however, be numbered in a continuous series, and will in time be united into volumes of convenient size. To facilitate this each Bulletin will have two paginations, one proper to itself, and another which belongs to it as part of the volume.

Of this series of Bulletins there have already been published:

1. On Hypersthene-Andesite and on Triclinic Pyroxene in Augitic Rocks, by Whitman Cross, with a Geological Sketch of Buffalo Peaks, Colorado, by S. F. Emmons. Washington, 1883. 8°. 42 pp. 2 pl. Price 10 cents.

2. Gold and Silver Conversion Tables, by A. Williams, jr. Washington, 1883. 8°. 8 pp. Price 5 cents.

3. On the Fossil Faunas of the Upper Devonian along the meridian of 76° 30′, from Tompkins County, N. Y., to Bradford County, Pa., by Henry S. Williams. 1884. 8°. 36 pp. Price 5 cents.

4. On Mesozoic Fossils, by Charles A. White. 1884. 8°. 36 pp. 9 pl. Price 35 cents.

STATISTICAL PAPERS.

A fourth series of publications having special reference to the mineral resources of the United States is contemplated. Of that series the first has been published, viz: Mineral Resources of the United States, by Albert Williams, Jr. 1883. 8°. xviii, 813 pp. Price 50 cents.

Correspondence relating to the publications of the Survey, and all remittances, which must be by postal note or money-order, should be addressed to the

DIRECTOR OF THE UNITED STATES GEOLOGICAL SURVEY,
Washington, D. C.

WASHINGTON, D. C., *May* 1, 1884.

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J. W. POWELL DIRECTOR

ON

MESOZOIC FOSSILS

BY

CHARLES A. WHITE, M. D.

WASHINGTON
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CONTENTS.

ILLUSTRATIONS.

ON MESOZOIC FOSSILS.

By Charles A. White.

DESCRIPTION OF CERTAIN ABERRANT FORMS OF THE CHAMIDÆ FROM THE CRETACEOUS ROCKS OF TEXAS.

Although the Cretaceous strata of Texas have long been known to possess great and peculiar interest, comparatively little systematic study has yet been given to their paleontology; and their place in the Cretaceous series, especially that of the lower portion of the formation there, is not yet satisfactorily known. Indeed, the relation of the Cretaceous rocks of Texas to those of the other portions of the continent farther to the northward is yet doubtful; and as it is expected that parties of the United States Geological Survey will soon take up the systematic study of the geology of Texas, I shall not now attempt any general discussion of the subject. However, as this article is devoted to the description of certain forms, the like of which in North America have been found only in the Cretaceous rocks of Texas, it is proper that I should mention certain conspicuous differences between the fauna of the Texan Cretaceous and the faunas of the rocks of that period in all other parts of the continent, so far as they are yet known.

These faunal differences are so great that they are suggestive of a difference in the age of the strata containing the respective faunas; but still I suspect that they are due largely to climatic or other causes which have controlled the development and geographical distribution of species. The extent of these faunal differences can of course be fully shown only by a complete series of illustrations, such as can be prepared only after many years of paleontological labor. Therefore only the more striking examples will be mentioned. The Actinozoa are represented by a considerable number of species and genera in the Texan Cretaceous, while only a few traces of the whole class have yet been discovered in all the strata of that period to the northward. Several families of Echinoids are well represented in the Texan strata, while only two or three specimens, of one species, are yet known to exist in all the region to the northward. The Rudistæ are yet known only in the southern Cretaceous strata, where they are not uncommon. The same is true of the aberrant forms of the Chamidæ, such as are described in this article; for I do not regard the shell described by Conrad from the Upper Missouri River region under the name of * *Requienia senseni*, as belonging

*See Jour. Acad. Nat. Sci., Philad., Vol. II, p. 299.

to either that or any related genus. Certain genera also are represented in the southern, and not in the northern districts. Thus *Exogyra* and *Gryphæa* are abundantly represented in Texan and other southern Cretaceous strata, but they have not been found in rocks of that age north of about latitude 35°, in the interior part of the continent.

The fossils described in this article were collected by Mr. George Stolley from the vicinity of Austin, Tex., and sent by him to the Smithsonian Institution; and permission to use the same has been given by the Director of the United States National Museum. The three new forms herein described were found associated together; but the *Caprotina* (=*Requienia*) *texana* of Roemer was not found associated with them in the same layers. The collection containing the new forms is a very interesting one, but it is made up largely of those three species. A few examples of *Lucina*, *Cerithium*, and other mollusks were found associated with them, and also a species of *Cladophyllia*. The condition of preservation of these fossils is peculiar, nearly all of them being pseudomorphs in almost pure calcite. This condition, while it has preserved the form of the shells quite completely, has entirely obliterated the minute structure of the test which, in the species here described, it would be desirable to know.

Some diversity of opinion has prevailed among paleontologists as to the true zoological position of the forms which are described on the following pages, and other forms closely related to them; but it is now generally agreed that they have close affinities with the Chamidæ, to which family they are here referred. I think, however, that while they all ought to be placed near *Chama*, the forms which are usually ranged under the generic names *Diceras*, *Requienia*, *Monopleura*, *Caprotina*, &c., ought to be separated from the typical chamidæ as one or more groups or subfamilies.

Genus REQUIENIA Matheron.

REQUIENIA PATAGIATA (sp. nov.).

Plate I, Figs. 1–8; and Plate II, Figs. 1–4.

Shell, irregular in shape; test, moderately thick; left valve, much larger than the right, spiral, the spire being more or less distorted and much elevated, consisting of two or three volutions; the scar of attachment at the apex always present, but sometimes very small; the upper side of the spire flattened, broad; the under side regularly convex, meeting the flattened upper side at a distinct peripheral angle, which angle usually bears a prominent, thin, more or less wrinkled carina or fringe. Right valve more regular in shape than the left; the under side convex and the upper flattened, the two sides meeting at an angle similar to that of the left valve, but it is not quite so acute, and it is not fringed; the spire sometimes nearly flat, but usually more or less elevated, making about two volutions; ligamental groove narrow, and

having, especially upon the larger valve, somewhat the appearance of a spiral suture. Hinge strong, the principal tooth of the right valve being large and prominent. Surface marked by irregular lines and wrinkles of growth.

It is difficult to state the dimensions of a shell so irregular in shape as those of this species are; but the extreme measurement of an adult shell may be given as about 55 millimeters.

The irregular shape of the shell seems to be in a good degree the result of a natural habit of the mollusk, but it was in many cases evidently the result, in part, of the contact which it had with other substances. The beak of the left valve is usually distorted by reason of its early attachment to a foreign body; and shells of its own or other species were frequently attached to its surface, adding still further to its disfigurement. (Museum number, 12363.)

REQUIENIA TEXANA Roemer.

(Plate II, Figs. 5, 6, and 7.)

Caprotina texana Roemer, 1852; Kreidebildungen von Texas, page 80, Plate V, Figs. 2*a*, 2*b*, and 2*c*.

Shell very inequivalved, thin, smooth, subtriangular; the larger valve coiled to the right, the terminal volution forming a low, small coil; the upper side flattened, and marked by obsolete spiral lines which are crossed by slightly undulating lines of growth; outer side regularly convex, and marked by oblique lines of growth. The smaller valve suborbicular, carinated, concave; the umbo forming a small spiral of about one volution.

The foregoing description is a free translation of Professor Roemer's original description, and the three figures on Plate II are copies of his illustrations. The collection which Mr. Stolley sent to the Smithsonian from the region round about Austin, Tex., contained numerous examples of this species, but they have all suffered injury by pressure of the somewhat fragile shell. These specimens show that the species reached a considerably larger size than that which is indicated by Professor Roemer's figures; and also that the larger valve was usually, if not always, more or less distorted when fully grown. This species differs from *R. patagiata* in reaching usually a larger size, in having a less angular aspect, its test proportionally thinner, the spire of both valves less prominent, and in the peripheral angle being without a prominent fringe.

Other species which are probably referable to the section of the Chamidæ to which the shells herein described belong, are published by Roemer in his Kreidebildungen von Texas; but our collections do not at present contain any representatives of them. (Museum number, 12366.)

Genus MONOPLEURA Matheron.

MONOPLEURA MARCIDA (sp. nov.).

(Plate III and Plate IV.)

Shell irregular; right valve deeply elongate, sometimes slender, more or less distorted, and usually a little twisted; rudely subelliptical in transverse section; the somewhat flattened anterior side and gently convex posterior side connected by a more abrubt rounding above and below. Scar of attachment sometimes large, occasionally extending along a large part of one side of the valve, but sometimes it is very small; ligamental groove extending from the apex to the hinge margin, distinct, linear, its presence made more conspicuous by the greater elevation of its posterior than of its anterior border. Left valve flat or gently convex; more or less straightened on the anterior side, and otherwise conforming to the margin of the right valve. Surface of the left valve marked by concentric lines of growth, and by numerous radiating irregular raised lines; that of the right valve marked by more or less strong lamellations and lines of growth, and by occasional longitudinal lines, similar to those which mark the other valve. Hinge moderately strong; the two teeth and hinge plate of the left valve strong and prominent, and the tooth of the right valve correspondingly prominent. The individuals sometimes grew separately, but often in clusters, attached to some foreign body or to each other.

The largest right valve in the collection has an extreme length of 50 millimeters, and its greatest diameter at the margin 22 millimeters. (Museum number, 12364.)

MONOPLEURA PINGUISCULA (sp. nov.).

(Plate V.)

Shell very irregular; right valve deep, capacious, often distorted, and sometimes more or less twisted; transverse section of the valve rudely subelliptical; scar of attachment sometimes large, but often small; ligamental groove linear, extending from the apex to the hinge margin, sometimes distinct and sometimes obscure, sometimes nearly straight, and sometimes irregular and oblique. Left valve more or less strongly convex, its umbonal portion being prominent and strongly incurved, and projecting beyond the hinge line. Test thick and strong in the dorsal portion and thin in the ventral. Surface of both valves having a plain aspect, but in the case of each it is marked by more or less distinct concentric lines and undulations of growth, with occasional faint traces of radiating lines, but the latter are never so distinct as they are upon the left valve of *M. marcida*. Hinge strong; the tooth of the right valve large and prominent, and those of the left valve supported upon a strong plate.

The longest right valve in the collection measures about 50 millime-

ters, but the shape and dimensions of the shell are so variable that it is impracticable to give any precise measurements.

Compared with the preceding species, with which it is associated, this species is more robust, has a smoother aspect, the left valve is much more prominent and convex. The right valve is proportionally more capacious, and never has that slender, rough, and angular aspect which that of the other species presents. The general aspect of this species, especially as regards its convex and curved left valve, is much like that of some species of *Caprotina*, but the character of the surface of both valves and that of the hinge seem to agree essentially with *Monopleura*. All the specimens in the collection appear to have grown separately, and not in clusters, as *M. marcida* often did. (Museum number, 12365.)

ON A SMALL COLLECTION OF MESOZOIC FOSSILS COLLECTED IN ALASKA BY MR. W. H. DALL, OF THE UNITED STATES COAST SURVEY.

During the years 1840–'42, Ilia Wosnessensky, while making zoological collections along the west coast of North America, obtained also a few fossils from Alaska. These were published by Constantine Grewingk, in Verhandlungen der Russisch-Kaiserlichen Mineralogischen Gesellschaft zu St. Petersburg, for the years 1848 and 1849, pp. 344–347. Those which Wosnessensky obtained from the Bay of Katmai, on the southern coast of Alaska, Grewingk referred to the Jurassic; and some others, from Kodiak Island, he referred to the Tertiary. In the work presently to be noticed, Eichwald, however, declares the former to be of Neocomian, and the latter of Turonian age.

Alaska and the Aleutian Islands were visited during the years 1847–'52, by Peter Doroschin, a Russian mining engineer, who made some important collections of Mesozoic fossil mollusks from various localities in that region. Professor Eichwald, in 1872, published these fossils in St. Petersburg, together with other fossils which Doroschin had collected in the region of the Caspian Sea, the title of the work being, "Geognostisch-Palaeontologische Bemerkungen ueber die Halbinsel Mangischlak und die Aleutischen Insel." In that work, under the subtitle "Fossile Thiere des Neocom und Gault," pages 158–200, he describes sixty-two species of Mesozoic fossil mollusks from Alaska and the Aleutian Islands, and devotes sixteen plates to their illustration. It is this portion of Doroschin's collection that I propose to more especially refer to in this article, because I have now to consider a small collection of fossils from Alaska which probably came from the same formation. Eichwald is positive in his reference of this part of Doroschin's collection mainly to the Neocomian division of the Cretaceous, but in part to the Gault. He identifies certain species found in Alaska with some of those which have been long known in Russian strata, and which Keyserling referred to the Jurassic. Geologists have generally accepted this reference; but in the work on Alaskan fossils just referred to, Eichwald states that the Russian strata which bear the fossils alluded to are of Neocomian, and not of Jurassic age. He also regards the Russian and Alaskan strata which bear those fossils respectively as geologically equivalent, and makes at least one Alaskan species identical with a Russian one.

Prof. Jules Marcou* has called attention to the fact that there is a

* Explication d'une seconde edition de la Carte Géologique de la Terre: by Jules Marcou; pp. 121 and 137-140.

commingling of Jurassic and Lower Cretaceous types in both the Russian and Alaskan strata which have just been referred to; and that a similar condition of things exists in the island of Saghalin, and other portions of Northern Asia.

The Mesozoic collections which were made by Doroschin in Alaska are very important, but Eichwald's publication gives no comprehensive sketch of the geology of the Alaskan region. He refers some of the fossils from Chasik Island to the Gault, and some to the Neocomian; but he gives no description of two separate Mesozoic formations there. For want of definite information as to the geology of the region one cannot feel certain that all the fossils which Eichwald refers to the Neocomian really came from one and the same formation. If those fossils are all strictly of the same epoch, I think Eichwald's reference of them to the Neocomian is not unreasonable, because so many of those mollusks are of Cretaceous types; and yet Marcou's statement that there is a commingling of Jurassic and Neocomian types in those northern Mesozoic strata seems to be well supported. It has been thought by some paleontologists that *Aucella* is confined to Jurassic strata; but this genus is now known to exist in strata of undoubted Cretaceous age; and if the opinion of Eichwald is accepted, it will appear that *Aucella* is more characteristic of the Cretaceous than of Jurassic strata. At least it is plain that we cannot now rely upon the presence of that genus as affording any proof of the Jurassic age of the strata which contains it.

During the prosecution of his work upon the United States Coast and Geodetic Survey along the western coast of the Alaskan Peninsula in the year 1874, Mr. W. H. Dall made a collection of Mesozoic invertebrate fossils which are of the same age as, at least a part of, those which were collected by Doroschin. In his notes, Mr. Dall designates the locality at which they were discovered, as "Fossil Point, Port Möller"; and indicates its position as approximately in longitude 160° 31′ west; and latitude 45° 14′ north. The collection consists mainly of a species of *Aucella*, which is evidently identical with the forms which are figured on Eichwald's Plate XVII (*loc. cit.*); the specimens of which collection, like those of Doroschin's, are all in the condition of natural casts. The collection also contains a single valve of a species of *Cyprina*, and some fragments of a remarkably slender Belemnite. This collection is now the property of the United States National Museum; and permission to use it in the preparation of this article has been given by the Director of the Museum.

Two years previous to Mr. Dall's labors in Alaska, the same region was visited by M. Alph.-L. Pinart, who obtained some fossil shells of Mesozoic age upon the eastern side of the Alaskan peninsula. These fossils evidently came from the same formation that furnished the shells which are figured by Eichwald on his Plate XVII. M. Pinart, in his report, entitled "Voyages a la cote Nord-Ouest de l'Amerique," desig-

nates the two localities from which the fossils just mentioned were obtained, as "le baie d'Amakshak, pres Soutkhoum; et le baie de Nakkhalilik, pres du volcan Chigihinagak." The former locality is approximately in latitude 56° 50′; longitude 159° 40′ west; and the latter, in latitude 56° 58′; longitude 159° 10′ west.

The fossils which were collected by M. Pinart were discussed by M. P. Fischer, in the report just cited, under the subtitle, "Sur quelques Fossiles de l'Alaska," pages 33–36, Plate A. Only two species were obtained by Pinart from the localities just mentioned, one of which Fischer places under *Pholadomya* (*Homomya*), but he gives it no specific name. The other he refers to the *Aucella concentrica* of Fischer.

I am in some doubt as to whether Dall and Pinart collected from the same locality in any case, but I think it probable that Dall's locality on the western side of the Alaskan peninsula, and Pinart's localities on the eastern side, had all been previously visited by Doroschin. It is quite evident, however, that the strata from which they respectively collected specimens of *Aucella* all belong to one and the same horizon. If the Mesozoic collections of Dall and Pinart, and also that part of Doroschin's collection which Eichwald refers to the Neocomian, all really came from one and the same formation, the fauna thus represented has certainly much of Cretaceous, as well as of Jurassic character. This is true, even after excluding those species of Doroschin's collection which Eichwald refers to the Gault, and of course all that he refers to the Turonian. Still, this fauna has enough of Jurassic character, according to the views which have hitherto been generally entertained by paleontologists, to suggest that the strata which bear it occupy a transitional position, as indicated by Marcou. According to views now generally held by naturalists, transitional faunas ought to occur between all those which especially characterize each epoch respectively, and the suggestion of such a case for this Alaskan fauna seems to me to be reasonable.

Certain of the Cretaceous strata of Texas have been doubtfully referred to the Neocomian, but with this exception, no North American strata south of the northern limit of the United States have hitherto been referred to the lower division of the Cretaceous series, and a broad hiatus has appeared to exist between those northern strata and the lowest of the Cretaceous rocks yet known south of the limit just referred to. Within a few years past, however, the labors of Dr. George M. Dawson in the coast region of British Columbia, have brought to light some series of fossils which Mr. Whiteaves thinks prove the strata carrying them to be of the age of the Middle Cretaceous, and the upper part of the Neocomian. (See Trans. Roy. Soc. Canada, Sec. IV, 1882, p. 81.) Lately also, some Ammonites have been sent to the United States National Museum by Mr. James G. Swan, from Skonum Point, British Columbia, which are suggestive of the earliest Cretaceous, if not of Jurassic age, and they will doubtless be found to hold an important relation to the Cretaceous strata examined by Dr. Dawson, and

also to the Alaskan Mesozoic strata which bear the fossils described in this article. In fact, it seems now to be evident that it is along the west coast of North America, from California to Alaska, that we are to look for the lower portion of the Cretaceous series on this continent. While these northwestern strata seem to be certainly older than the oldest of the Cretaceous strata in all that broad region occupied by Dakota, Montana, Wyoming, Colorado, and Utah, it is nevertheless true that in all that great region, where the Cretaceous and Jurassic strata are both exposed, the former seems always to rest conformably upon the latter. This apparent conformability over so wide a region shows how cautious one ought to be in concluding that deposition has been continuous in all cases where there is perfect conformity of strata, even if it is of great extent.

A consideration of these Alaskan fossils would be much more interesting if we had a satisfactory knowledge of the stratigraphical geology of the region from which they were obtained. A sketch of the geology of the Alaskan Peninsula, which, although brief, is the best with which I am acquainted, is given by Mr. Dall in the American Journal of Science for July, 1882, pp. 67 and 68. This sketch shows the relations of the rock-formations of that peninsula to each other; and one may obtain from it also an indication of the formation from which the fossils described in this article were obtained.

MOLLUSCA.

Genus AUCELLA Keyserling.

AUCELLA CONCENTRICA Fischer (variety).

(Plate VI, Figs. 2–12.)

The different species of *Aucella* which have been recognized and published by various authors present so few salient characteristics which distinguish them from each other that, excepting a consideration of their general or average shape, a detailed description of any of them is necessarily hardly anything more than a repetition of generic characters. Such would certainly be the case in attempting to diagnose the form now under consideration. This form also varies so much in shape that an attempt to compare it with other published forms in that respect is also unsatisfactory. I therefore omit descriptive details, and give numerous figures, which illustrate some of the extreme shapes which this Alaskan shell assumes. The specimens which are figured on Plate VI are selected from the Alaskan collection of Mr. Dall, which has already been mentioned. A glance at these figures will show that they present almost as great a degree of variation among themselves as is usually found among the illustrations of the different species of *Aucella* which have hitherto been published by different

authors. If, for example, the specimens which are represented by Figs. 2 and 3, and 9 and 10, respectively, had been found alone and at different localities, I think few paleontologists would have hesitated to publish them as different species. The specimens are all in the condition of natural casts and molds, and therefore all the surface characteristics of the species are not shown. Fig. 12 is drawn from a gutta-percha cast, taken from a natural mold of part of a shell, and shows the strong, sharp, concentric ridges which marked the surface of the test. (The Museum record number of the type specimens is 12360.)

The numerous specimens of this collection show such a gradation of form among themselves that I cannot doubt that they are all properly referable to one and the same species. Comparing these specimens also with the figures of Alaskan forms of *Aucella* which are given by M. Fischer on his Plate A, and also with those given by Eichwald on Plate XVII (loc. cit.), I cannot doubt that they are all specifically identical with each other, nor that they all represent only one species. I have, however, some doubt as to which of the known European species of *Aucella* the Alaskan form ought to be referred to; but as it seems to agree more nearly with *A. concentrica* Fischer, I have designated it as a variety of that species.

Genus CYPRINA Lamarck.

CYPRINA? DALLII (sp. nov.).

(Plate VI, Fig. 1.)

Shell moderately large, and having the usual external aspect of *Cyprina*, as is shown by the figure on Plate VI.

The collection made by Mr. Dall contains only a single example of this form, and that is in the condition of a natural cast of the right valve. It is therefore too imperfect for satisfactory specific diagnosis, and it is named only for convenience in any future discussion of the fauna of which it forms a part. (The Museum catalogue number is 12362.)

Genus BELEMNITES Lamarck.

BELEMNITES MACRITATIS (sp. nov.).

(Plate VI, Figs. 13 and 14.)

The collection made by Mr. Dall contains some imperfect specimens of a remarkably slender Belemnite, imbedded in fragments of hard sandstone, together with some natural molds of a couple of more perfect examples. They are very slender, and taper gradually to a blunt point at the distal end. The extreme proximal end is unknown.

The very slender form of this species at first led me to suppose it to

be a species of the Pennatulid genus *Graphularia* of Edwards & Haime. It has, however, not only the usual radiate and concentric structure of *Belemnites*, but one of the examples shows plainly the cavity of the phragmocone, with a small bulb-cavity at its point. Another example shows a faint longitudinal groove along one side, such as is common in both *Belemnites* and *Belemnitella*. (Museum catalogue number, 12361.)

Dr. Eichwald, in the work already cited, describes three species of *Belemnites* from Chasik Island, and one from the Alaskan Peninsula; but the species here described differs materially from all of them in its small size and very slender form.

ON THE NAUTILOID GENUS ENCLIMATOCERAS HYATT, AND A DESCRIPTION OF THE TYPE SPECIES.

In the year 1880 Mr. E. O. Ulrich sent to the Smithsonian Institution a small collection of fossils which he had obtained from the Cretaceous strata near Little Rock, Ark. A part of these fossils were described by me in Vols. III and IV of Proceedings of the United States National Museum; but the Nautiloid shell now described was then only casually noticed. Its peculiarities were recognized at that time, and the specimens were laid aside with the hope that better material might be procured for study. Other specimens belonging to this or a closely related species were afterward collected by Mr. Lawrence C. Johnson from strata supposed to be of Cretaceous age, in Wilcox County, Alabama, but they are no more perfectly preserved than the Arkansas specimens.

Prof. Alpheus Hyatt having had in hand an exhaustive work on *Nautilus* and its allies, the Arkansas specimens were placed with him for examination. In a preliminary work of his, just published, he divides the genus *Nautilus* as it has been generally recognized, into numerous genera besides those previously proposed by other authors. To one of these groups he has given the generic name *Enclimatoceras*, and made the species here described the type of the genus. The following is his generic diagnosis, which he has also published in the Proceedings of the Boston Society of Natural History, Vol. XXII, 1884, p. 270.

Genus ENCLIMATOCERAS Hyatt.

"Enclimatoceras includes species of the Trias to the Tertiary, inclusive, which are connected by the outlines of their sutures. The whorls are involute from an early stage, and compressed. The abdomens are rounded, but become acute in many species. The sutures have prominent ventral saddles, flattened in species with rounded abdomens, and acute in those with acute abdomens; never divided by ventral lobes. The lateral lobes are deep, and the lateral saddles well marked. The ventral saddles in the young are broad, and closely resemble the ventrals of the *Hercoglossæ*, as do also the broad lateral saddles of the later larval stages in some species. There are no annular lobes at any stage in the Triassic, according to Mojsisovics. They do not seem to be present in some of the Jurassic and Cretaceous species, at least during the early stages, and are very small in some adults. The Triassic species are nearly related to *Grupoceras*, according to Mojsisovics' figures and descriptions in 'Das Gebirge um Hallstatt.' The siphon in this type is a little below the center in the young, though ventral in the adult; and this also agrees with the characteristics of *Enclimatoceras styriacus*, sp.

Mojsisovics, of the Trias, and *Grupoceras*. Nevertheless there is no ventral lobe at any stage; the annular lobe is absent in the Triassic forms, and young of later forms; and the siphon in two species is short-funneled, with connective walls, or ellipochoanoidal. Type, *Enclim.* (*Naut.*) *ulrichi* White."

ENCLIMATOCERAS (NAUTILUS) ULRICHI White.

(Plates VII, VIII, and IX.)

Shell moderately large; somewhat narrowly but regularly rounded upon the periphery in the adult state, and broadly rounded at the sides; whorls almost completely involute, the umbilici being very small; septa somewhat deeply concave; ventral saddles large, prominent, and regularly rounded; lateral lobes broad and moderately deep; lateral saddles prominent and narrow, and rounded at the outer end, and also becoming laterally prominent in the later formed septa of adult shells. The character of the surface is unknown, but it was apparently plain; and the test was moderately thin. In the young state the shell was more globose in form, and the septa were much less deeply lobed.

All the specimens which have yet come under my observation are in the condition of natural casts, and all are imperfect. The best one of these specimens is figured on Plates VII, VIII, and IX, together with a fragment showing the inner volutions. The outlines which are added to the figures represent the supposed outline of the aperture of the adult shell.

The diameter of the coil of the type specimen, when perfect, was apparently about 180 millimeters; the greatest transverse diameter about 125 millimeters. Some of the specimens already referred to, which were collected in Alabama by Mr. Johnson, indicate a considerably larger size.

In Vol. I of the Transactions of the Saint Louis Academy of Science Dr. Shumard described a form under the name of *Nautilus texanus*, but which he did not figure. Judging from his description, it seems to agree with the form here described, except for the material difference that it is marked by numerous flexuous transverse ribs, while the surface of our form is evidently plain. The difference between *E. ulrichi* and most of the other Cretaceous Nautiloid shells of the United States has now been made generic by Professor Hyatt, and specific comparisons are therefore unnecessary. The collection sent by Mr. Ulrich to the Smithsonian, containing the type specimens of this species, also contains representatives of numerous other species, but all of them, like these types, are imperfect. Among them are *Callianassa ulrichi* White, *Tubulosteum dickhauti* White, *Gryphæa pitcheri* Morton?, *Turritella*, *Anchura*, *Axinæa*, *Cucullæa*, &c.

The type specimens bear the Museum catalogue number 8349; and permission to use them in the preparation of this article has been given by the Director of the Museum.

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EXPLANATION OF PLATES.

PLATE I.

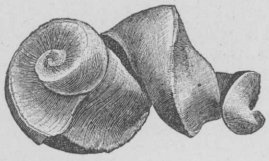
REQUIENIA PATAGIATA. (Page 6.)

FIGS. 1, 2, 3.—Three different views of one of the largest of the type specimens; both valves together.

FIGS. 4, 5.—Two views of a smaller example.

FIGS. 6, 7.—Two views of another example, showing the two valves partly separated.

FIG. 8.—A portion of a left valve, showing the hinge. All of natural size. For other figures of this species see Plate II.



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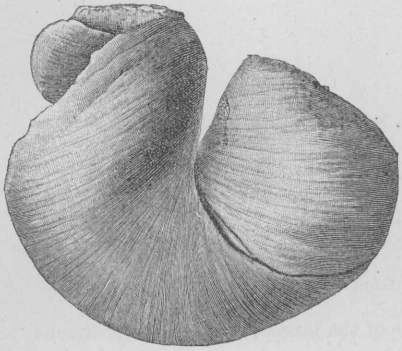

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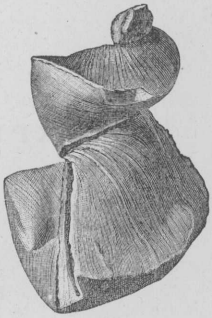

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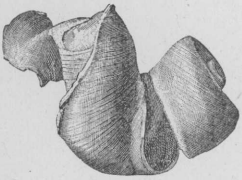

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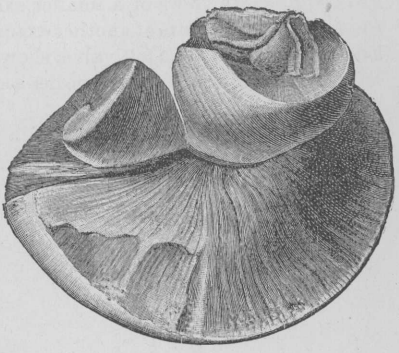

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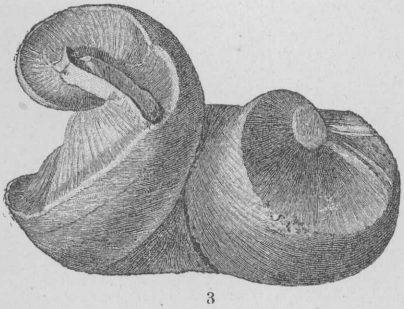

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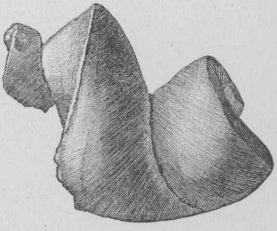

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REQUIENIA PATAGIATA.

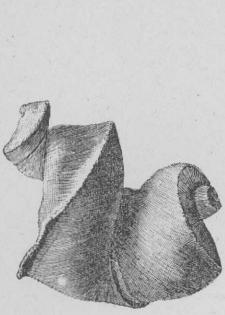
PLATE II.

REQUIENIA PATAGIATA. (Page 6.)

FIGS. 1, 2.—Two views of a small example; both valves together.
FIG. 3.—Upper view of a large and somewhat distorted example.
FIG. 4.—A similar view of a smaller distorted example. All of natural size. For other figures of this species see Plate I.

REQUIENIA TEXANA. (Page 7.)

FIG. 5.—Lateral view; the two valves together.
FIG. 6.—Upper view of the left valve.
FIG. 7.—Similar view of the right valve. Figures 5, 6, and 7 are after Roemer; all of natural size.



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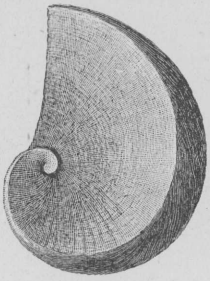

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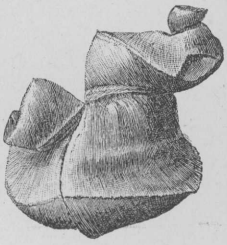

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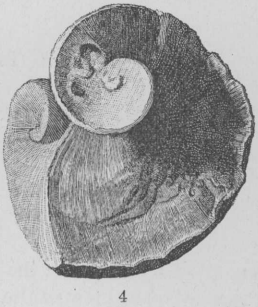

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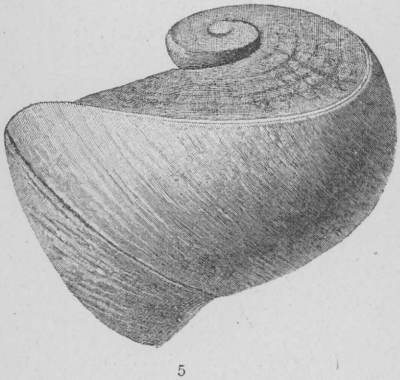

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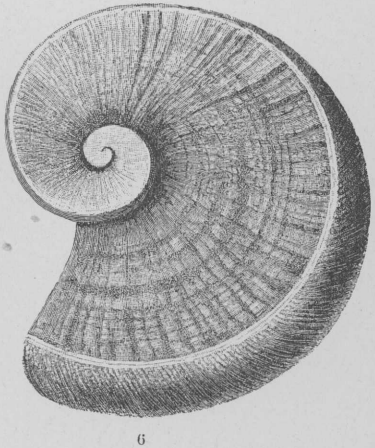

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REQUIENIA PATAGIATA—REQUIENIA TEXANA.

PLATE III.

MONOPLEURA MARCIDA. (Page 8.)

FIGS. 1, 2.—Opposite lateral views of a cluster of individuals, the larger ones being attached to a left valve of another example.

FIG. 3.—An upper view of the same example, showing the hinge of the largest right valve, and the left valves of the other members of the cluster in situ.

FIG. 4.—Inner surface of the left valve which forms the base of the cluster represented by Figs. 1, 2, and 3.

FIG. 5.—A separate example, showing both valves.

FIG. 6.—Another example, also showing both valves.

FIG. 7.—A right valve, showing the slender ligamental groove.

FIG. 8.—Another slender right valve, also showing the groove.

FIG. 9.—Interior view of the same example, showing the hinge.

FIG. 10.—A similar view of the hinge of another example, which is attached to a right valve of *Requienia patagiata*. All are of natural size. For other examples see Plate IV.

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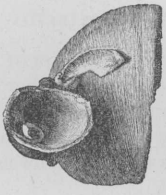

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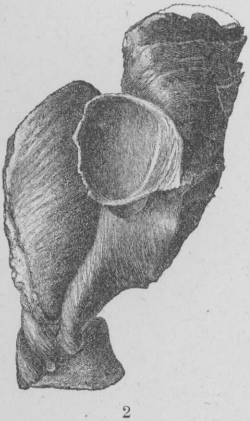

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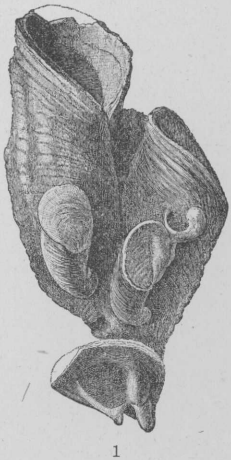

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MONOPLEURA MARCIDA.

PLATE IV.

MONOPLEURA MARCIDA. (Page 8.)

FIG. 1.—Lateral view; the right valve attached to a foreign body, and the left valve bearing two young examples of *Requienia patagiata*.

FIG. 2.—Lateral view of another example, the left valve bearing a young *Requienia*.

FIG. 3.—A similar view of another example, which also shows both valves.

FIGS. 4, 5.—Opposite views of a large distorted example; both valves together.

FIGS. 6, 7.—Opposite views of another example, also showing both valves.

FIGS. 8, 9.—Opposite views of a cluster of very young individuals attached to a corallite of *Cladophyllia*. All are of natural size. For other examples of this species see Plate III.

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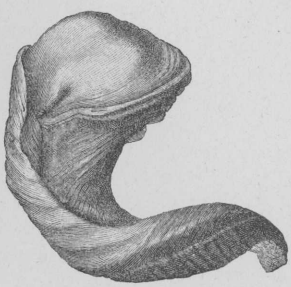

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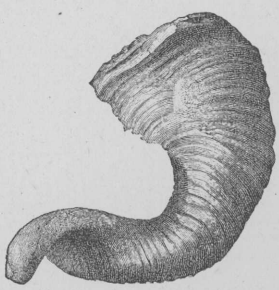

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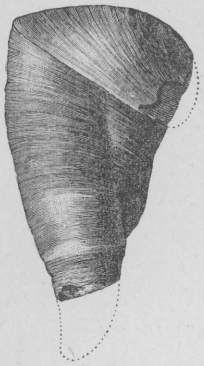
MONOPLEURA MARCIDA.

PLATE V.

MONOPLEURA PINGUISCULA. (Page 8.).

FIGS. 1, 2.—Opposite views of a large example, showing both valves.
FIGS. 3, 4.—Opposite views of a distorted example, showing both valves.
FIG 5.—Another example; the right valve much elongated.
FIG. 6.—Another example; the right valve much distorted.
FIG. 7.—Another example, showing the hinge-plate of the broken left valve.
FIG. 8.—A right valve, showing the hinge. All natural size.



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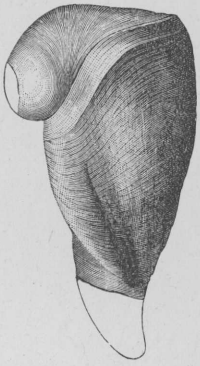

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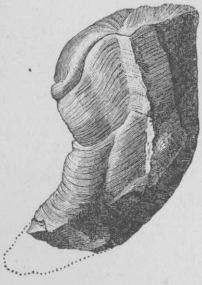

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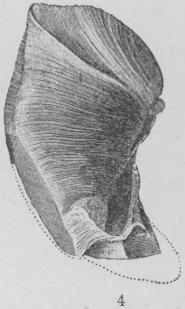

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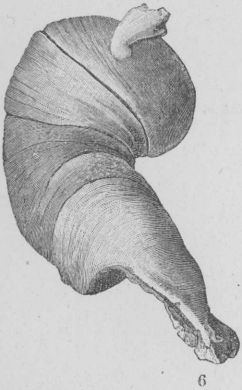

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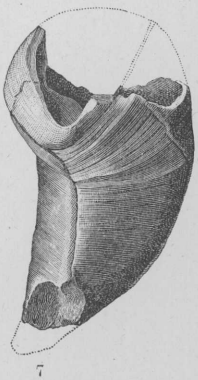

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MONOPLEURA PINGUISCULA.

PLATE VI.

CYPRINA? DALLII. (Page 14.)

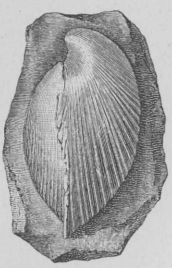
FIG. 1.—Lateral view of a natural cast of the interior of a right valve.

AUCELLA CONCENTRICA var. (Page 13.)

FIGS. 2, 3.—Two views of an internal cast of an adult example of normal shape.
FIGS. 4, 5.—Two views of another example, of smaller size.
FIGS. 6, 7.—Two views of still another similar example.
FIG. 8.—View of a left valve of one of the largest examples.
FIGS. 9, 10.—Two views of an unusually short and inflated example.
FIG. 11.—The left valve of another short example.
FIG. 12.—View of a gutta-percha cast from a natural mold of part of a shell, showing the concentric lamellations of the test. All of natural size.

BELEMNITES MACRITATIS. (Page 14.)

FIG. 13.—A fragment, showing the terminal portion of the phragmocone.
FIG. 14.—View of a gutta-percha cast of a natural mold. All of natural size.



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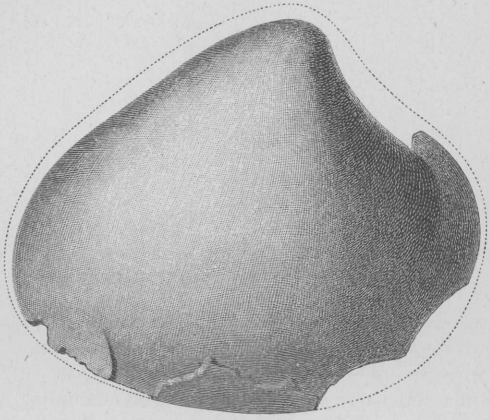

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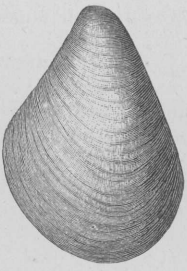

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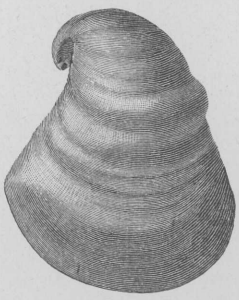

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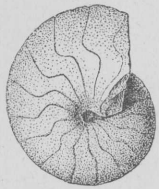
CYPRINA? DALLII, AUCELLA CONCENTRICA var., AND BELEMNITES MACRITATIS.

PLATE VII.

ENCLIMATOCERAS ULRICHI. (Page 17.)

FIG. 1.—Lateral view of the type specimen, four-fifths natural size.
FIGS. 2, 3.—Two views of a fragment, showing the inner volutions. For other figures see Plates VIII and IX.



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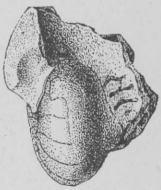

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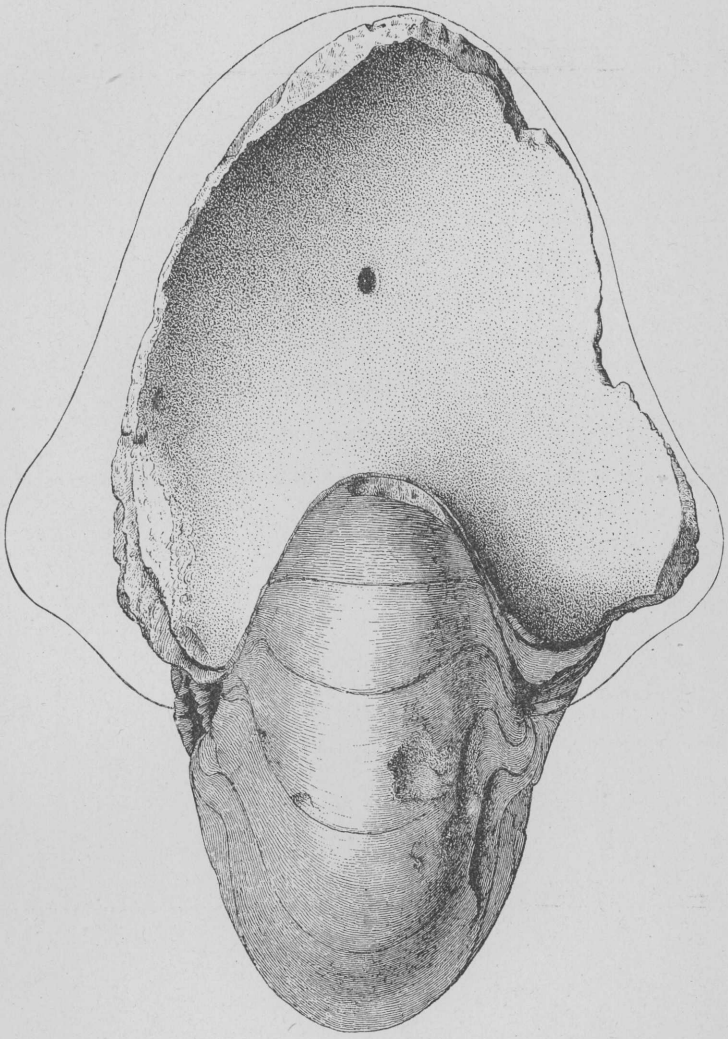
ENCLIMATOCERAS ULRICHI.

PLATE VIII.

ENCLIMATOCERAS ULRICHI. (Page 17.)

Front view of the type specimen, four-fifths natural size. For other figures see Plates VII and IX.

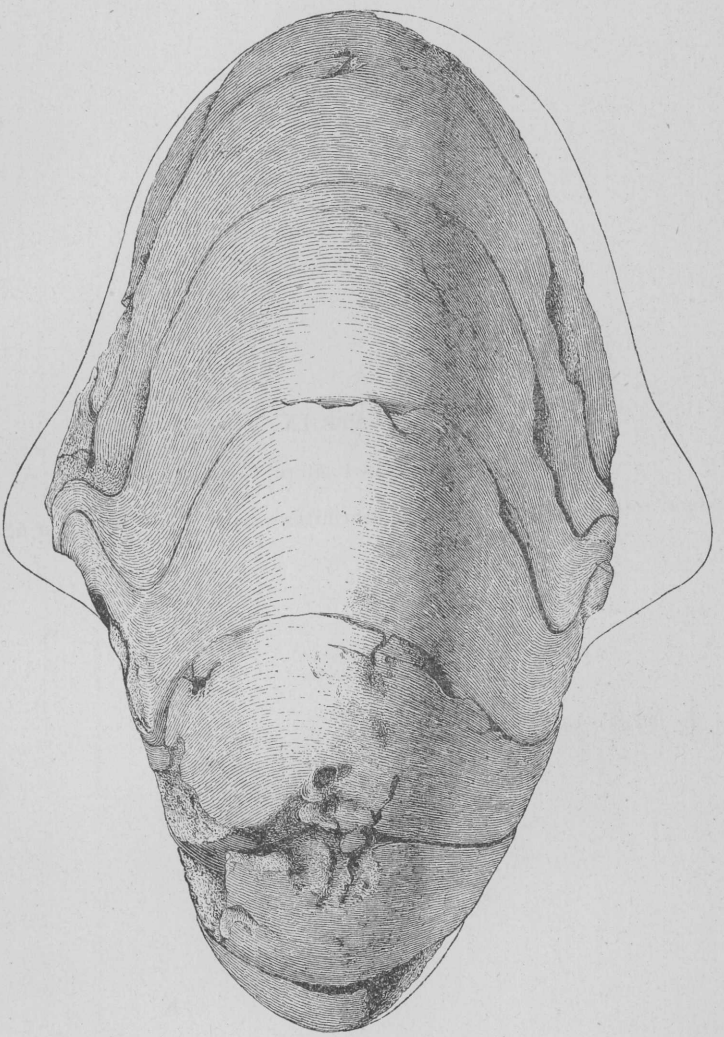


ENCLIMATOCERAS ULRICHI.

PLATE IX.

ENCLIMATOCERAS ULRICHI. (Page 17.)

Peripheral view of the type specimen, four-fifths natural size. For other figures see Plates VII and VIII.



ENCLIMATOCERAS ULRICHI.