A DICTIONARY

OF THE

FOSSILS OF PENNSYLVANIA

AND NEIGHBORING STATES

NAMED IN THE

REPORTS AND CATALOGUES OF THE SURVEY.

Compiled for the convenience of the citizens of the State

BY J. P. LESLEY, STATE GEOLOGIST.

3000 FIGURES, MOSTLY FACSIMILE COPIES OF THOSE PUBLISHED BY H. D ROGERS, HALL, CONRAD, VANUXEM, EMMONS, LOGAN, DAWSON, BILLINGS, MATTHEWS, HITCHCOCK, NEWBERRY, MEEK, COLLETT, WORTHEN, ROMINGER, D. D. OWEN, COX, LYON, SAFFORD, FONTAINE, LESQUEREUX, WOLCOTT, LEIDY, COPE, AND OTHERS, AND SOME NEW SPECIES, DRAWN AND DESCRIBED BY G. B. SIMPSON.

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LETTER OF TRANSMITTAL.

To His Excellency James A. Beaver, *Governor of Pennsylvania, ex-offico chairman of the Board of Commissioners of the Geological Survey of Pennsylvania :*

Sir: I have the honor to report, for the approval of the Board, this compilation of all the forms of animal and vegetable life hitherto seen in the geological formations of our State; both those collected by the assistant geologists of Professor H. D. Rogers, fifty years ago, and those collected by my respected colleagues since 1874. My task has been an arduous one, requiring more time and patience than I anticipated, and exhibiting a wealth of the State in genera and species of extinct plants and animals as great as its well-known wealth in minerals.

Although fossils have no money value in the exchanges of the world, they have a value superior to money in enlightening the intellect of a people by unfolding before their reverent attention the course of the divine creation of thousands of kinds of beings in the course of the many ages which preceded the creation of man.

We have in our State a nearly unbroken series of rock strata from the oldest to the newest, a pile of sediments nearly eighty thousand feet thick, one-half at least of which are filled with casts of the dead bodies of things once alive and flourishing, singly or in communities, now all extinct, leaving no descendants among the trees and shrubs, the shells and bugs and worms, the lizards, birds and beasts of present nature.

Those who please to speculate on the evolution of life, may amuse themselves with traces of resemblance, but they cannot find a single proof, however slight, for the actual hereditary descent of the living creatures of our age from those of preceding ages. From the dawn of time onward to the present time, each age has had its own special fauna and flora, its peculiar shapes of animal and plant, by which it and its rock strata can be recognized by the geologist. A knowledge of these peculiar animal and vegetable forms is in fact a part of the training of a good geologist in tracing outcrops and discovering the mineral resources of the Commonwealth; for every age produced also its own kind of minerals, so that fossils are a guide to the mining engineer, and especially so to the prospector.

When the geological survey of Pennsylvania was first ordered, its first business was well understood to be not scientific, but practical. It was to study and to find out all about the iron, coal, oil, gas and other mineral resources of the State; and then to inform the citizens of the State better about what they already knew more or less uncertainly or imperfectly, and discover for them what was still only suspected, or wholly unknown. This task the survey has faithfully and zealously performed for fifteen years; and its strictly practical character is acknowledged by those intelligent business men who are the the wealth-producers of the State. The farming population have not so strongly felt its value, because its advantages for them have been indirect, but none the less real. For it is plain to see that a geological survey carried on in a strictly practical spirit must necessarily benefit every man, woman and child in the Commonwealth. It is iron, coal, oil, gas and other minerals which build cities, towns, villages, furnaces and mills; and cities, towns, villages, furnaces and mills furnish to the farmer his principal market; thereby enhancing the value of his land; and upon this again depends the welfare of his wife and children. Even if the work of geologists were wholly confined to the mines and quarries, it would still be in the interest of the agricultural citizens of the State. But the geological survey has worked directly for the farmers of the State by informing them of what respecting their own fields they could never have found out by themselves. But as human beings breathe air without knowing it, so they obtain knowledge without being aware that it does not come directly from their own brains, but from the patient and often painful labor of those who specially devote themselves to the manufacture and distribution, that is, to the discovery and publication of knowledge.

It is said that the survey has cost the State nearly a million of dollars, counting in the publication of the reports; or, for the work itself a half a million; that is, a total cost of fifty cents in fifteen years, or three cents per annum, for each voter. The Legislature has appropriated for the survey an average of $35,000 per annum; a small outlay for so large and wealthy a State to obtain knowledge of so practical a kind,—knowledge which *must* be got somehow, and *must* be paid for somehow; either economically, by a State survey; or extravagantly, by unorganized, haphazard and wasteful methods.

Three years ago, in view of the fact that all the counties of the State, 67 in number, would soon be surveyed and reported upon, I began to prepare my final report or summary of the geology of Pennsylvania. In the course of this work I encountered a difficulty in the shape of the innumerable fossil forms which characterize the formations, and are recited in due order and place in the county reports. At first I supposed that I could deal with them by inserting wood cuts in the text, as has been done in so many other State final reports. But I found that this would swell the volume beyond all bounds, and make it useless for most citizens of the State. At the same time I was in receipt of many letters from quarrymen and prospectors in various counties asking for information respecting the strange forms which they noticed in the rocks. I had always realized that the survey would leave unperformed one of its necessary tasks if it did not fully explain the *fossil geology* of the State, as a supplement to its *mineral geology;* but the practical work of the survey was so heavy that any adequate report of its fossils had to be left to the very last. Mr. C. E. Hall, the curator of the museum, made indeed a special cabinet of fossils, and a catalogue of the same. Subsequently Prof. Stevenson, Prof. I. C. White and Prof. Claypole reported the fossils of their respective districts; and Mr. Carll and Dr. Randall made considerable collections of fossils as well as minerals in the Oil region. In this way a good foundation was laid. I then went through the whole series of the Reports of Progress, and made alphabetical card-catalogues of all fossil names, localities and formations, which had been reported. I then made similar catalogues of all fossils described by the New York geologists found in the same formations. Doing the same with the State Reports of Ohio, Indiana and Kentucky, I was led on from book to book in an ever-widening circle, until I had all the names of fossils discovered in the Canadian provinces. Thus I discovered that nineteenth-twentieths of our Pennsylvania forms had been figured and described in the reports of other States and Territories, some of them fifty years ago; many of them from specimens first found in Pennsylvania, and a few of them still peculiar to this State. During the last year I have had the collections of the survey carefully examined in detail by Mr. Simpson, the able assistant of our most distinguished American palæontologist, Prof. James Hall of Albany, who kindly himself passed judgment on difficult determinations, and a few new species being discovered, they were drawn and described by Mr. Simpson.

When it became a question of how the results of my preliminary work should be prepared for publication, I settled upon an alphabetical arrangement of it as the most convenient for the people of the State. What people want most are books of easy reference. By placing all the names of Pennsylvania fossils in alphabetical order, in the form of a glossary or dictionary, any name given in the Reports of Progress can be turned to at once and its meaning shown by a figure of the thing so named. My intention was to place its proper figure under every fossil name mentioned in the series of our Reports. In some good measure I have succeeded in doing this, borrowing published figures, old and new, from every available source, and having them electrotyped like woodcuts for insertion in the text. They are therefore all of them facsimiles; and those first published a long time ago have a double value: first, that of original drawings of the type specimens; secondly, that of drawings out of print, and most of them not to be obtained for love or money, and not to be even consulted except by persons who live in large cities, or at the older colleges and universities. Many of the older books can not be found even in large public libraries. To the public at large they are all of them practically inaccessible. By reproducing them in facsimile they will be distributed to the poorest inhabitants of the State, as far as an edition of the 4500 copies authorized by law will serve; and in a few years they will all get into the hands of just those who most want them and can make the best use of them.

Two classes of persons will value them most highly: the class of quarymen and assistant railroad engineers who spend the most of their time in breaking up the rocks and finding fossils; and the class of school teachers who need objects for the instruction of the young.

I have endeavored to furnish an example of what the people of a State have a right to demand of geologists and palæontologists to help them to understand what is usually written only for the learned.

Descriptions of fossils without figures are of no use to the unlearned. The Greek and Latin names given to fossils mean nothing to those who know only the English language. Costly illustrated books scattered about in libraries, public and private, are inaccessible to and unattainable by the people of a State. Even those who reside in cities know not where to find them. If by accident they now and then encounter one, they are not trained to its use, and can only in a helpless, listless mood of mind turn over pages written mostly in an unknown tongue, and plates of figures arranged in no comprehensible order, a confused jumble of unrelated objects, with no names attached to them, and their descriptions only to be found, by reference to an index, in some distant part of the book.

Geologists complain that people at large take no interest in fossils. Geologists have only themselves to blame for the fact, for they furnish the people with no helps for understanding fossils,—no primers or handbooks of primary instruction. Names mean nothing without pictures; and a picture tells nothing unless some explanation of it is subjoined. Even experts grow weary of the laborious references which they are compelled to make from figures grouped on plates at the end of a volume, to names and descriptions printed, indexed and tabled in different parts of the text. So inconvenient and wasteful a fashion of publication could only be justified by its cheapness; but considering the great first cost of drawing and printing the figures, the perfection of the art of photographic electrotyping, and the saving of space by indenting the cuts, there seems to be no excuse of this sort now for retaining the old style; and it is fatal to the only right service of such books, their easy consultation.

I have confidence that the Board will bear it in mind that this dictionary is prepared as one of the Reports of the Board to the Legislature of Pennsylvania for the use of the people of the State. If citizens of other states find it useful, well and good; but its contents have been selected with a single eye to the requirements of Pennsylvanians owning or consulting copies of the Reports of the Geological Survey, in which they find a multitude of fossil names which need explanation and illustration. Hence the lists of catalogued specimens in the State Collection which occur thoughout the book; and various corrections of unavoidable mistakes made in originally labelling many of the specimens; a kind of information of no use to foreign readers, unless they be professional geologists; but of the greatest interest to Pennsylvanians for giving them an idea of the abundance of fossil-collecting localities in the State, and directing them where to find them. Those who examine the Reports of Progress critically will perceive that I have been as economical as possible in reciting the details, while doing more than enough towards stating the case.

The reader will notice frequent references to an Appendix, especially in the first volume. This needs to be explained. My first copy was ready for the State printer nearly a year ago. Printing in fact began in the autumn of 1888, but was soon necessarily delayed by reports from other State officials. I hoped to have the first volume published during the session of the Legislature, but the printing of it was stopped entirely in the winter and spring by a mass of legislative documents requiring immediate attention. I employed the time in enlarging the work and in correspondence with fossil authorities in the United States and Canada, a list of whom will be found in front of the long list of Errata at the end of the volume. Thirty of my correspondents, to whom I sent duplicate proofs of each signature of sixteen pages, showed the greatest interest in the work, returning the duplicates with their corrections and additions, directing me to better figures, sending me fresher and better figures of their own, and, in fact, playing the most friendly and valuable rôle of critics, reviewers, and I might well say coëditors, to the extent of their ability as hard-worked and much-occupied men. I was continually finding gaps in my list and figures which I had missed.

But more than all this, I had made the mistake of believing what I was told of the capacity of the electrotype process, that it could not copy lithographic figures. I had confined myself therefore to selecting only the wood cuts, copper plates and medal-ruled figures, and had had such pencil drawings made of lithographic figures as seemed indispensable. Afterward I discovered by experimental trials, that the electrotype process was perfectly good for making facsimiles of lithographs, but it was then too late to introduce them into the book and they had to be referred to an Appendix, except such as were made in time for the last letters of the first volume. The rest found their proper places in the second volume.

Respecting the coal plant figures of Lesquereux, and Fontaine and White, published in the Coal Flora (Report P), and in Report PP, they were all *tinted* and could not be photographed for the electrotype. But I considered that they had already been published and distributed throughout the State, and were in easy reach of all who really wanted them. I was also fortunate in being permitted to use copies of many of them, published *as line engravings* by Dr. Collett in his Reports on the Geology of Indiana. As to Fontaine's Triassic plants, published by the United States Geological Survey, they too were tinted and unserviceable tc me, but I was most kindly allowed to have untinted proofs of them struck off in Washington from the original plates, and these were successfully electrotyped, as may be seen in the later pages of Vol 1, and throughout Vol. 2. Those whose names fall under earlier letters can only be given in the Appendix. These are but examples of some of the obstacles I have encountered. If the Legislature should see fit to use all the cuts which have accumulated for a second edition of this work, the Appendix would be fused back into the book to make it more useful.

Let it be kept in mind that the intent of this Report is simply to exhibit fossil forms which have been collected, or seen, or described, by the geologists of the survey, in Pennsylvania, and such other fossils found in the surrounding States, as have not yet been detected, but undoubtedly exist in Pennsylvania, and will surely be found in Pennsylvania by those who carefully and intelligently look for them. To these are added rarer and sometimes exquisitely beautiful forms found outside the State, but in formations which enter and underlie our State; for, these also will probably be discovered. All I have tried to do, is to show the citizens of our own Commonwealth the wonderful extinct creatures which lived and loved and were buried in the mud and sand deposits of that part of the ancient American ocean bed now represented by the emerged valleys and mountains of Pennsylvania.

My thanks are due first to the shades of the great dead, the fathers of American palæontology. Two of the most distinguished of them, Conrad and Vanuxem, being Pennsylvanians, I must mention first; then Emmons of New. York, Hitchcock of Massachusetts, David Dale Owen of the West, Worthen of Illinois, Meek of Washington, palæontologists whom I would gladly worship if I knew of any sacrifice that would reach them and give them pleasure. Perhaps the smoke of one of these volumes, burnt on an altar of unhewn stones "on which no hammer had been lifted," might make a sweet savor for their nostrils, of a genuine Solomonic kind. To the greater living any thanks must fall so far beneath the benefits they have bestowed on us as to become inaudible. If Virgil was deified by Rome for the gift of his Æneid, Leo Lesquereux should be canonized by Pennsylvania for that poem of poems, the Flora of the Coal. If Homer's Iliad is immortalized, James Hall's Palæontology of New York, a more sublime epic, will have a more genuine if not a longer immortality. It is dangerous enough to write the roll of living worthies in any branch of science, lest the order be misplaced, or names be overlooked; but I cannot go wrong in acknowledging our great indebtedness to men from whose treasuries of knowledge we are invited to help ourselves to what we need most. The books from which I have drawn the greater part of my matter are Logan's Geology of Canada, and Billing's fossils; Dawsons' Acadian Geology and Devonian Plants; Hitchcock's Ichthyology of Massachusetts; Emmons', Vanuxem's and Hall's Reports of 1842, 1843, on the Second, Third and Fourth districts of New York; Newberry's two rich volumes of the fossil fish, plants and shells of Ohio; Collett's three volumes of fossils in Indiana; Worthen's four volumes of fossils in Illinois; Owen's third volume, giving Cox's and Lyon's fossils of Kentucky; Safford's Tennessee; Fontaine's Triassic Flora of Virginia; Walcott's Cambrian fossils in the Bulletins of the U. S. Geological

Survey, Whitfield's Śpergen Hill fossils, etc., in the Bulletins of the American Museum of Natural History, New York. I have borrowed also from many other authorities; but all of them are credited in the several places which their names and figures occupy.

Periodicals and volumes published privately I have abstained from quoting, except Herr Zittell's invaluable Handbuch der Palæontologie, and then only such figures as Zittell himself had borrowed from American works, and for the purpose of bringing his great work to the attention of American students.

The reader will usually find the *authority* in the southwest corner of the cut; the *formation* (by number, from *I* to *XVII*) in the northwest corner; the *name* of the State survey, *volume*, *plate*, and *figure*, at the bottom, or in the other two corners; but the necessity for having the cut as small as possible, and the irregular shape of the fossil figures, made absolute uniformity impossible. Proof reading at the distance of a hundred miles involves typographical errors in spite of the greatest carefulness; and several of the figures went through the press at last upside down; but the fact can be recognized by the reversed lettering; in three cases figures have got under the wrong names, as noted in the errata.

Although the most of this book has been prepared and written by myself, I have received most valuable assistance from Mr. George B. Simpson, in indicating and verifying synonyms, and reëxamining and renaming specimens in the palæontologcal collection of the survey; also from Mr. Oliver B. Harden and Mr. Edward B. Harden, in carding some of the figures, and writing out references, and proof reading so far as their regular work in other department of the survey would permit. Besides the drawing of typical specimens of new species by Mr. Simpson, a number of copies of Prof. Hall's lithographic figures were made for me by Mr. F. Van Iterson, of Hoboken, N. J.

Copy for the whole of the second volume, N to Z, is ready for the printer.

Palæontological experts with large libraries and collections at their command will not value highly this local and partial compilation, whose author has no standing among them, and can give them no help in their arduous professional labours. But they will recognize the value of this book as a first experimental essay towards the construction and publication of what they will all confess to be a desideratum in geology, viz: a complete Encyclopedia of American Fossils, arranged alphabetically, every name furnished with figures, compiled not by one hand, but by the zealous coöperation of all good Palæontologists in America, for a thing that all need. It has been a dream of mine for twenty years. I could never make it a reality; but I have been fortunately able to make an experiment by which others can see how it can be done.

J. P. LESLEY.

PHILADELPHIA, *1008 Clinton street, August 18, 1889.*

DICTIONARY

OF

FOSSILS FOUND IN PENNSYLVANIA

AND ELSEWHERE.

Acantherpestes major. Meek & Worthen. A caterpillar (*Myriopod*) of the Coal Age, found in a nodule of the Mazon creek rocks in Illinois; from Zittel's Handbrick of Palæontology, Leipsig, 1885, Vol. 2, p. 728, fig. 897, *one-half the natural size ;* fig. *b*, of *natural size* showing the breathing holes in the belly ; fig. *c*, two of these holes *enlarged five* times. *XII.* Note, it belongs to the *Euphoberia* family of Scudder. See **Euphoberia armigera.** This family, including thick baggy kinds, some amphibious in their mode of life, their leaf-like legs or arms apparently adapted for locomotion in water as well on land, began in the Coal age. *XIII.*

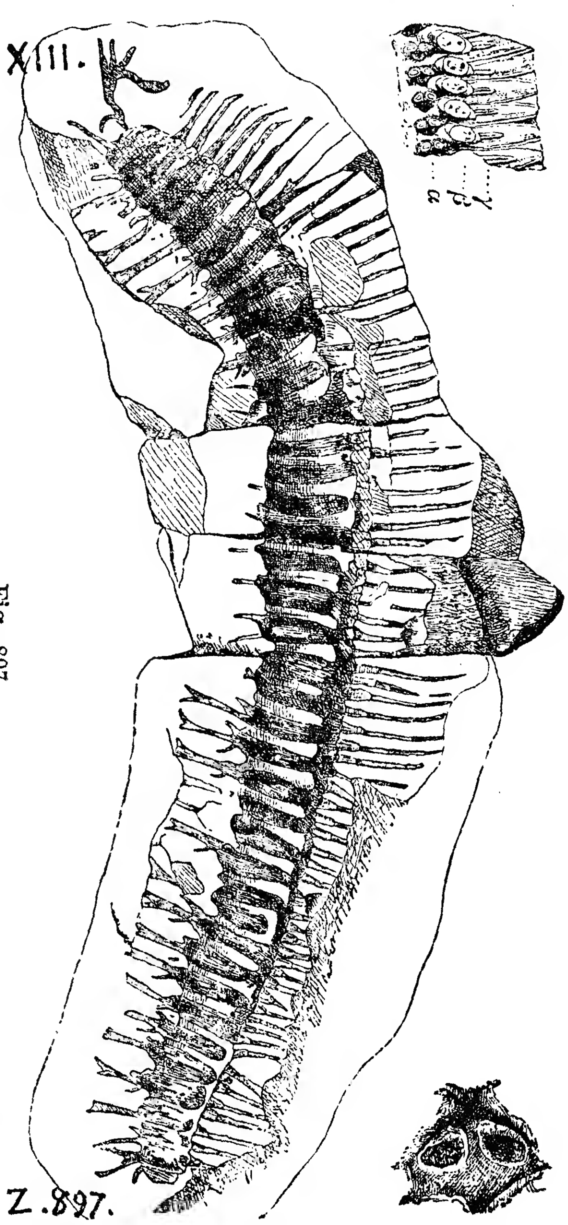
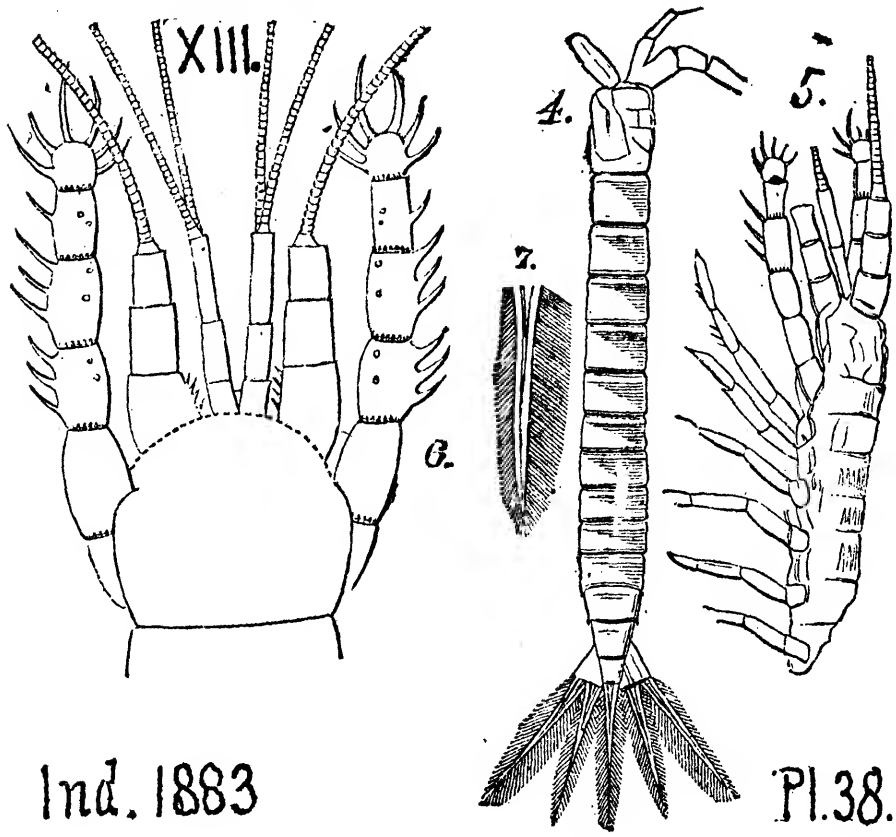


Fig. 897.
Acantherpestes major Meek u. Worth. Steinkohlenformation. Mazon Creek, Illinois.

Acanthotelson. *See Appendix.*

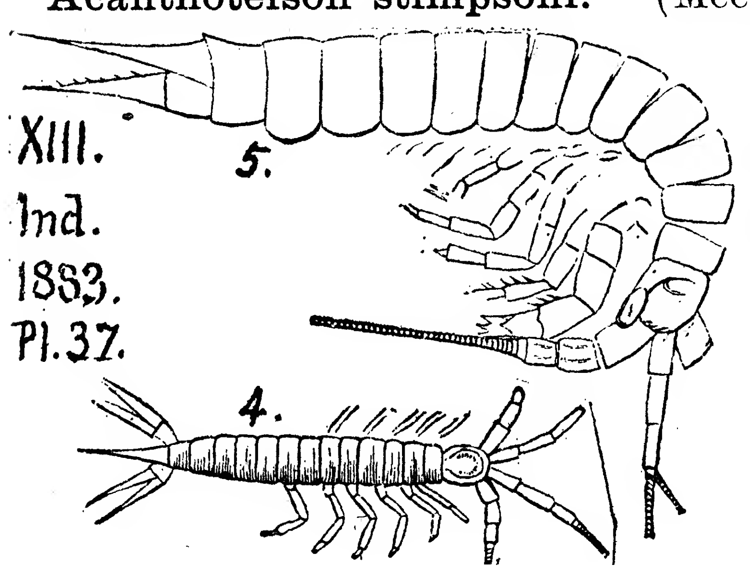
Acanthotelson eveni. (Meek & Worthen, Illinois Report 3,1868, p. 551; Am. Jour. Sci., Vol 46.) Collett's Indiana, 1883, page 176, plate 38, figs. 4, back, *natural size;* 5, another, crushed sidewise; 6, front legs and anteannæ *enlarged* in diagram; 7, a stylet *enlarged.*—



Many such fragments have been found in the Illinois Coal Measures, especially in the nodules found in great abundance on Mazon creek.

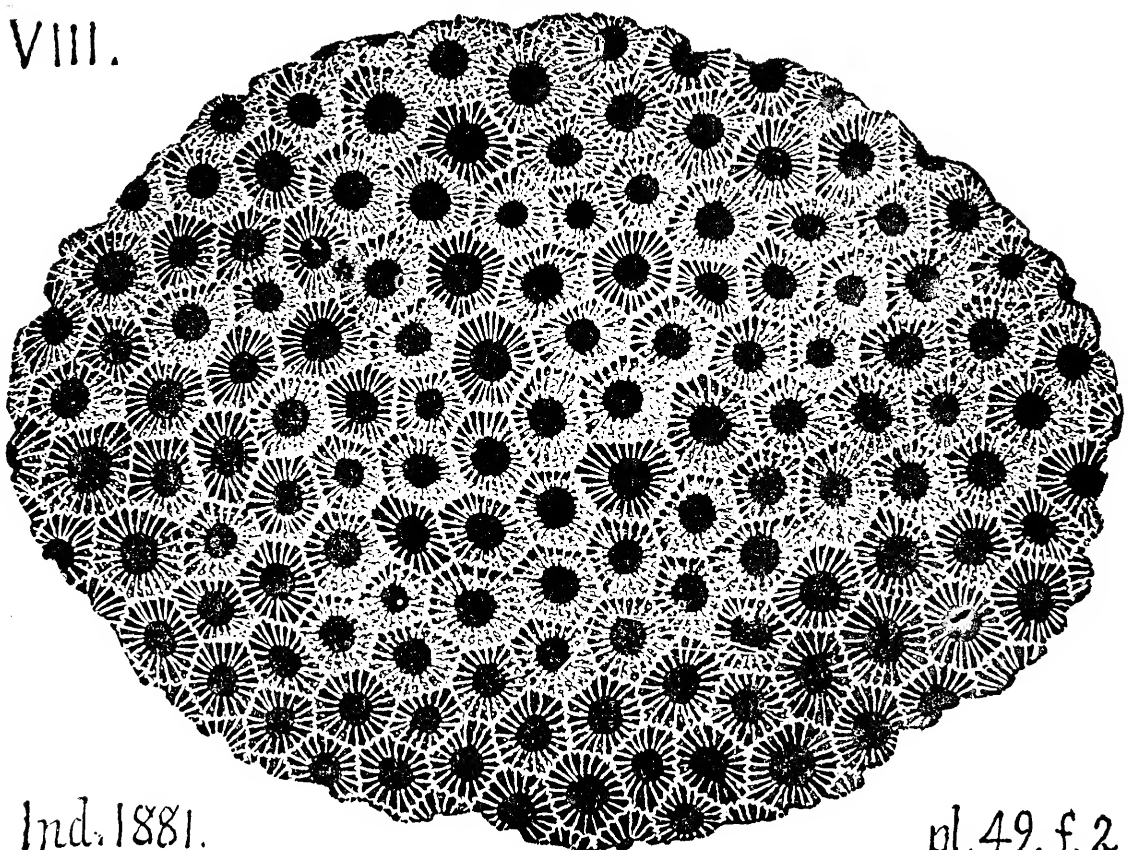
Acanthotelson inæqualis. *See* **Palæocaris typus.** *XIII.*

Acanthotelson stimpsoni. (Meek & Worthen, Illinois Report, Vol. 2, 1866, page 601, pl. 32.) Collett's Indiana of 1883, page 176, fig. 4. Back of small specimen, a *little enlarged;* fig. 5, another, *enlarged three times*, flattened sidewise. Found in Grundy county, Ill. Coal Measures, *XIII*.



Acervularia davidsoni. Edwards & Haime. From Col-

VIII.

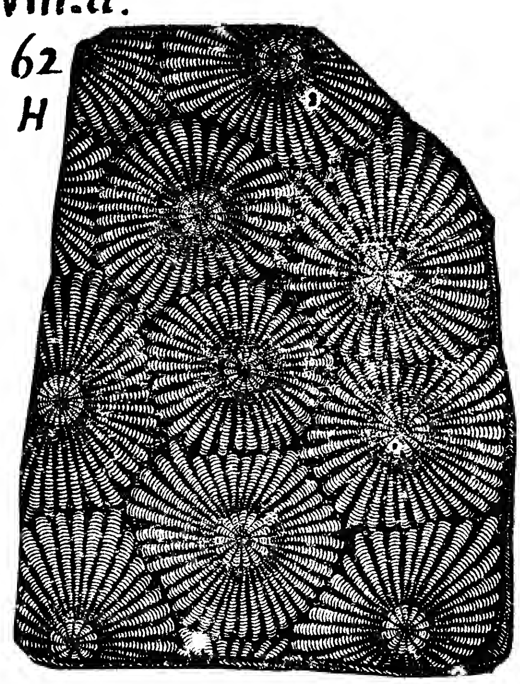


Ind. 1881. pl. 49. f. 2

lett's Indiana Report of 1881 (Van Cleve), page 386, plate 49, fig. 2. Upper view of corallum, showing calices of the corallites; sometimes the mass is a foot in diameter, usually much less. *VIII*, Devonian of Indiana; common in Michigan and Iowa.

Acervularia rugosa (*Astræa rugosa*), Hall, 1843, page 159, fig. 62. 2. *Cyathophyllum rugosum?* S. A. Miller's catalogue. Upper Helderberg (Onondaga) limestone, *VIII*, *a*.

VIII. a.
62
H

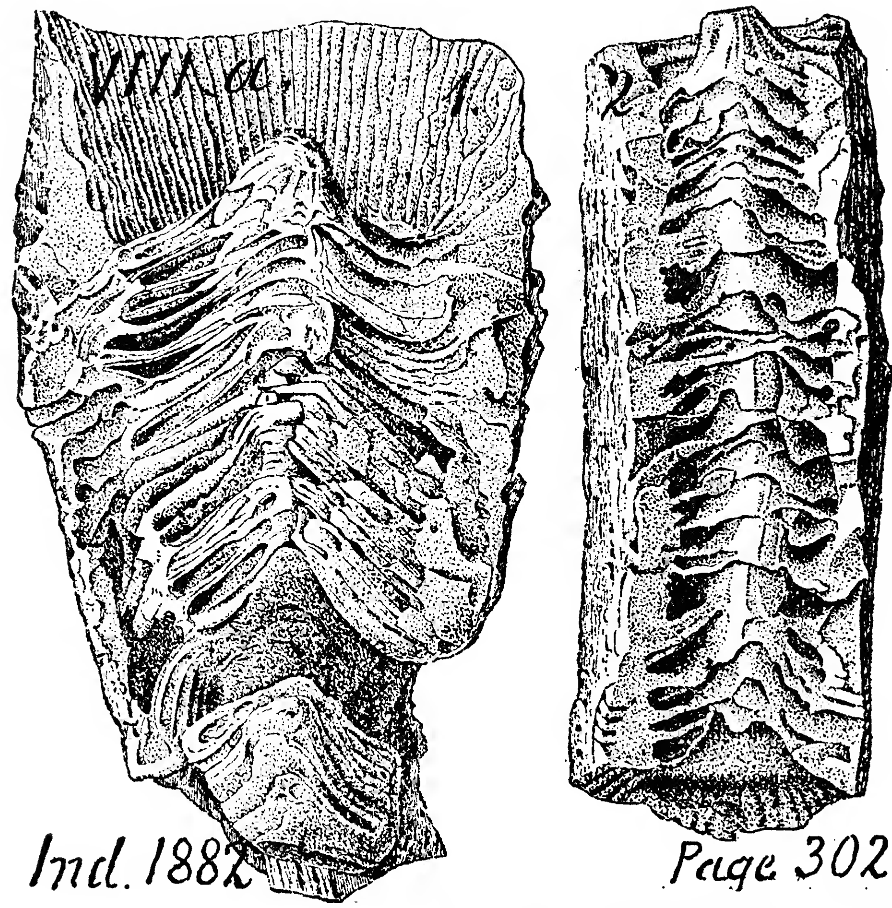


NOTE.—This is probably the *Acervularia* characteristic of the Lewistown limestone (VI) and abundant in the lowest beds (for 50 feet) in Huntingdon county, Pa., Report T, p. 41; also in the same beds overlying the Water lime beds, in the Aughwick valley section, Report T3, p. 126; also, C. E. Hall's collections of 1875 near Orbisonia.

Acroculia. *See* **Platyceras.**

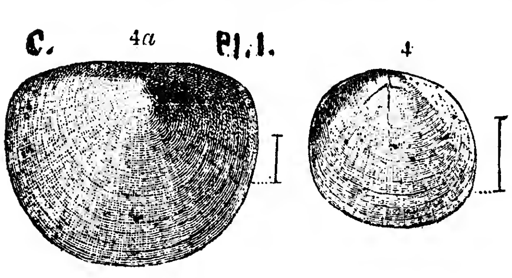
Acrolepis hortonensis. *See Appendix.*

Acrophyllum oneidaense (*Clisiophyllum oneidænse*, Billings, Can. Jour. 1859, page 128; Rominger, Foss. Coral. 1876.) Collett's Indiana of 1882, page 302, figs. 1, showing inside view part of the cup; fig. 2, of a weathered cylindrical form, showing the abrupt rise of the tabulæ toward the center. *VIII*, a Corniferous limestone of the Falls of the Ohio.



Acrophyllum oneidænse. *See* **Clisiophyllum oneidænse,** *VIII a.*

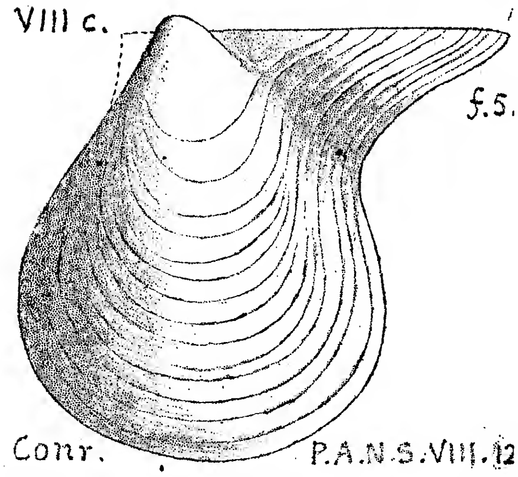
Acrothele matthewi (*Lingula matthewi.* Hartt). Walcott. Bulletin No. 10, U. S. G. S., page 15, plate 1, fig. 4, a dorsal valve, enlarged to two, and fig. 4 *a*, a supposed ventral valve, enlarged to four diameters. (See Acad. Geol. Dawson, 2d ed., p. 644, fig. 221.) L. C. Lower Cambrian (St. John = Welsh Menevian) formation, New Brunswick.



Actinoceras inops. *See Appendix.*

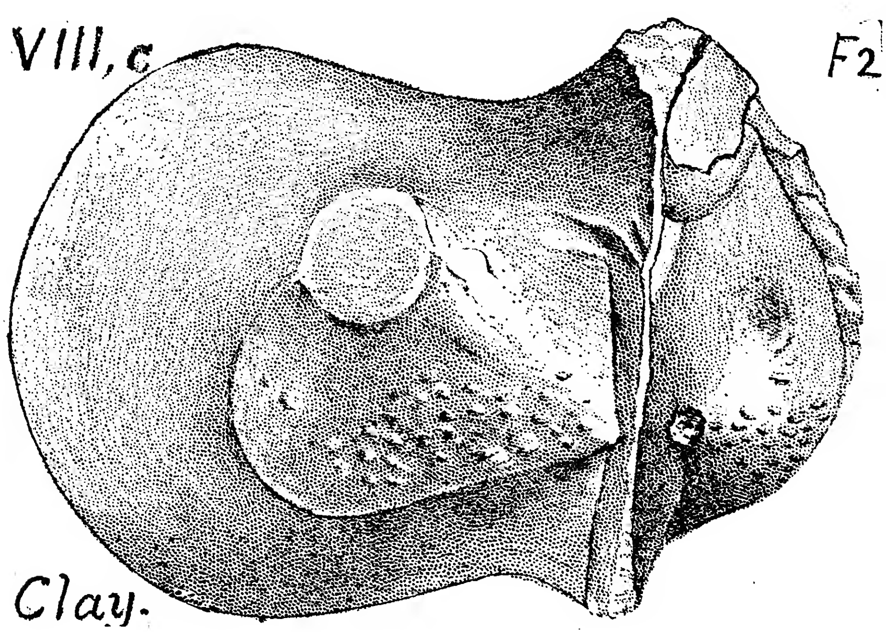
Actinocrinus eucharis. *See Appendix.*

Actinodesma erectum. (*Avicula erecta*, Conrad, 1842, Jour. Acad. Nat. Sci., Phila. Vol. 8, pl. 12, fig. 5. Redrawn by G. B. Simpson.—Hamilton group.)



Well preserved specimens found by J. J. Stevenson in the river gaps of Fayette and Westmoreland counties, Pa., and determined by Prof. James Hall, are especially interesting, as arguing the thinning out of the overlying Cattskill, and at the same time proving this fossil to have lived to the end of the Chemung age. See Report KKK, 1878, pp. 309, 311.

Actinodesma subrectum. (*Whitfield's Desc. New Spec, Foss., Ohio*). F2 Drawn by G. B. Simpson from specimen 59–B. 18, in Claypole's collections from Perry Co. Pa. See preface to Rt. F 2, page xiv. (It closely resembles *Glyptodesma erectum*, Hall, Pal. N. Y., Vol. V, part 1, plate 12, fig. 2,)—*VIII c*, Hamilton formation, Perry Co., Pa.

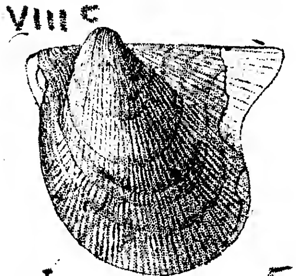


NOTE. In bottom bed of Hamilton middle shale, almost in contact with underlying sandstone, in railroad cut near Bedford Co. line, Cove Station, Huntingdon Co. Pa., I. C. White, Report T. 3, page 111.—In Claypoles's Perry Co. collections are the following examples of this fossil: 59-B-4 (3); 59-B-18 (5); 59-18 (2); 94-9 (1); 196-5 (3=14 specimens in all).

Actinodesma (*new and undetermined form*) in J. J. Stevenson's collections from the lowest strata visible in the anticlinal mountain gaps of Westmoreland and Fayette Counties, Pa. Report KKK, 1878, p.3 11, list No. 14.

Actinopteria birostrata. (Drawn from a specimen, so labelled, in Claypole's collections from Perry county, Pa. Not mentioned in lists of Preface to report F 2, p. xiv. *VIII e?* Hamilton? formation. Note.—Of Hall's nineteen species, only the following six have been recognised, as yet, in Pennsylvania.

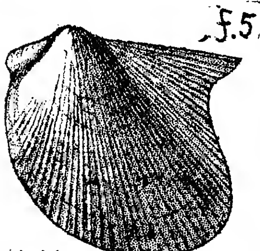
VIII c



Claypole. F.2.

Actinopteria boydii (*epsilon?*) Conrad. (Hall, Palæontology of New York, Vol. 5, part 1, page 123, plate 23, fig. 5, 6.) Note.—In the text Hall gives *A. epsilon* as figs. 4, 8, (5 and 6?) but in the plate lists *Actinoptera* (*sic*) *epsilon* as fig. 4, and *boydi* as figs. 5, 6. *VIII g.* Lower part of Chemung formation at Ithaca, N. Y.

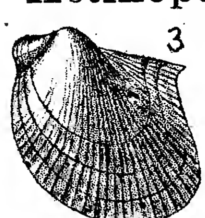
5



H. V, I. Pl.23.

Actinopteria delta. Hall, Palæont. New York, Vol. V. part 1, page 121, plate 23, fig. 3; fine concentric striæ on the shell, obscure on the cast — *VIII g.* Lower part of the Chemung formation at Ithaca, N. Y.

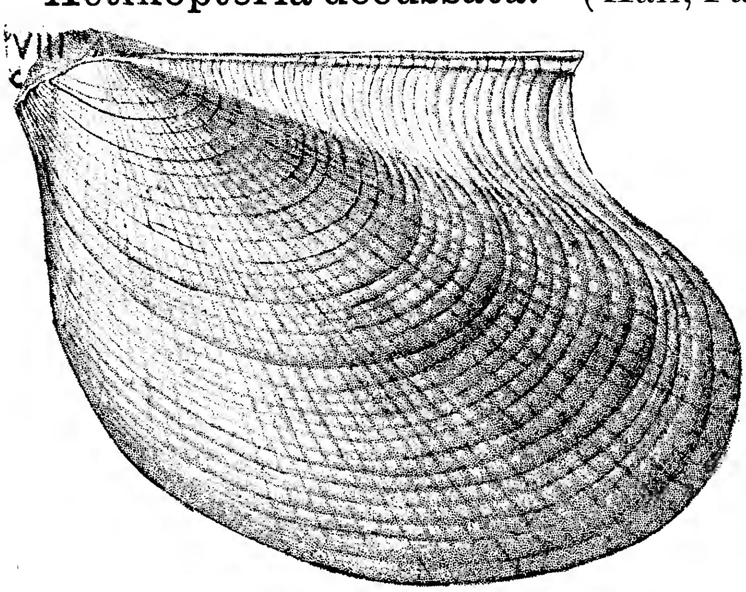
3



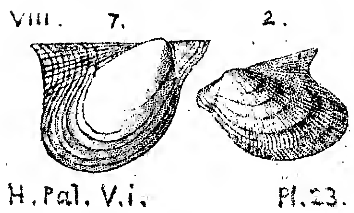
H. V, I. 23.

Actinopteria decussata. (Hall, Pal. Vol. V, part I, 1883. plate18,fig.11; Hamilton). Found by E. W. Claypole; 1 spec. 82, at Barnett's mills, in Hamilton upper slate, Perry county; and three specs. 13, at Mapleton, in Huntington county, Pa. See Cat. OOO; F 2; and T 3, page 109.— *VIII c*, Hamilton.

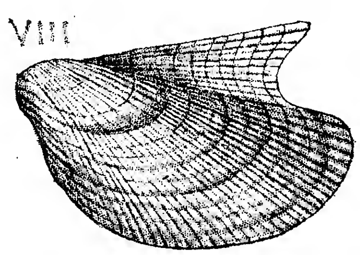
VIII c



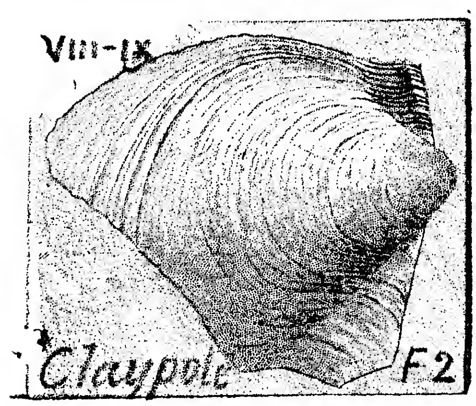
Actinopteria perstrialis. Hall, Palæontology New York, Vol. 5, part 1, page 118, plate 23, figs. 2, 7 and plate 84, fig. 12; differs from *A. tenuistriatus* as more oblique, with longer hinge line, and closer, stronger rays.—*VIII g*, lower part of Chemung, near Ithaca, N. Y. Claypole's Perry Co. collections (Catalogue in OOO), specimens 8 from station 37, $2\frac{1}{2}$ m. N. of Liverpool, in *VIII g*, Chemung; and specs. 19, 22–23, from station 57, Junkin's farm, 5 m. S. of New Bloomfield, *VIII–IX*, Chemung-Catskill beds.—NOTE—Perhaps *Leiorhynchus perstrialis ?*



Actinopteria subdecussata. Hall, Pal. Vol. V, part I, advanced sheets, 1883, plate 17, fig. 25.—VIII. Hamilton ? formation. Found by Claypole in Perry Co., Pa., two specs. 161, at stat. 5, Barrett's mills; and two specs. 19, at stat. 233, W. Roseburg, Saville township, in *VIII c*, Hamilton upper shales.

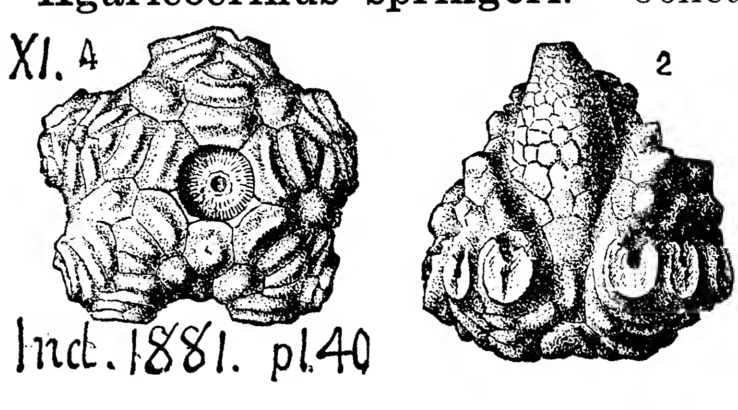


Actinopteria zeta. Drawn from specimen 13, from Station 71, near LeRoy, Bradford county, Pa., in E. W. Claypole's collection; see Cat. in Report OOO. *VIII–IX*, Chemung-Catskill passage beds. See Report F. 2, 1878, preface, page xv.—Note.—Hall gives the following species: Auriculata, doris, epsilon, eta, eximia, iota, kappa, leander, muricata, perobliqua, pusilla, tenuistriata, and theta.

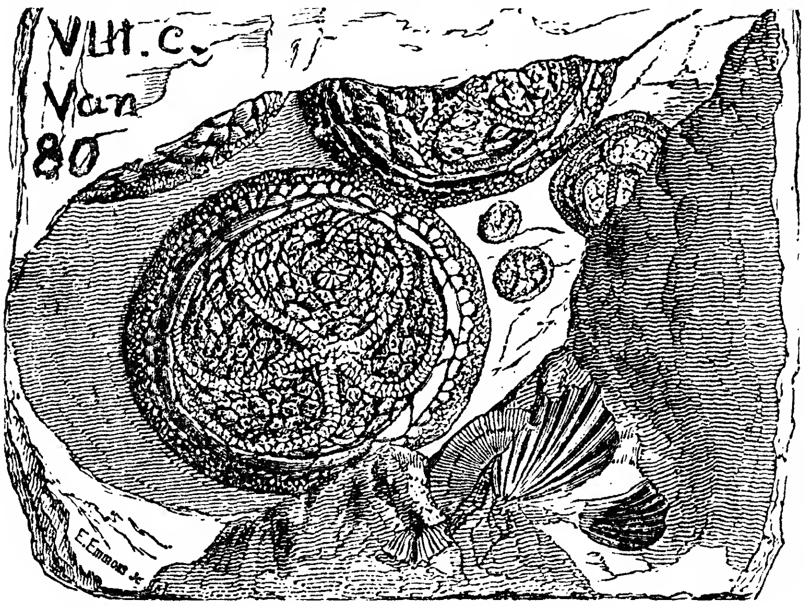


Adiantites bockschiana. See **Noggerathia bockschian,** *X.*

Agaricocrinus springeri. Collett, Indiana Report of 1881, page 363, plate 40, fig. 2, anal side view (spines broken off,) fig. 4, basal view. *XI.* Subcarboniferous (either Keokuk or St. Louis limestone.)

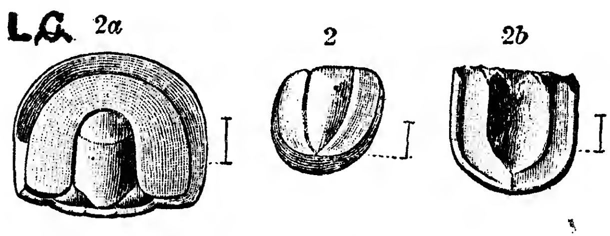


Agelacrinus hamiltonensis. Vanuxem, page 306, fig. 80.



Hamilton formation, *VIII*, c.—For another species of this curious and beautiful kind of early echinoderm corals, *Agelacrinus holbrooki*, see U. P. James, in Journal of the Cincinnati Soc. Nat. Hist., vol. x, No. 1, 1888.

Agnostus acadicus (*Agnostus similis*) Walcott. Bulletin No. 10, U. S. G. S., page 22, plate 2, fig. 2*a*, a head shield enlarged two diameters; and figs. 2, 2*b*, 2*c*, tail pieces (pygidia) enlarged three diameters.



(See Hartt's descriptions in Dawson's Acadian Geology, 2d ed. pp. 655, 656, 1868.—L. C. Lower Cambrian (Saint John) formation, New Brunswick. (c. *Agnostus cambrensis*, Hicks, Q. J. E. S. London, XXVII, 400, 1871; Menevian formation; also *Agnostus brevifrons*, Angelid, Pal. Scan. p. 6, 1852, in Norway rocks; also, *Agnostus interger*, Beyr. Sil. Syst. Bohême, I, p. 900, 1852.—White's *Agnostus interstrictus*, E. & S. W. 100th M. IV, p. 38, in Cambrian rocks, Utah, almost identical with it.)

Agnostus latus See **Beyrichia lata.** *V. a.*

Agnostus lobatus. See **Microdiscus lobatus.** See *Beyrichia lobata. See Appendix.*

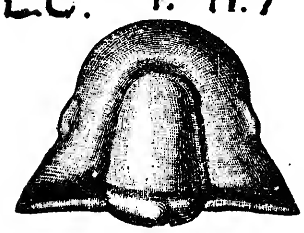
Agnostus nobilis. (From Ford's original figure, 1872, in Am. Jour. Sci. [3] III, 421, figs 1, 2.) Walcott, Bulletin 30, U. S. G. S page 150, plate 16, fig. 7. (Original specimen lost). M. C. Middle Cambrian limestone bed east of Troy, N. Y., containing also *Olenellus asaphoides*, *Agnostus lobatus*, *Obolella coelata*, and *Obolella desquamata.* (Compare Hall's *Agnostus parilis*, of the Wisconsin Potsdam formation, except in size.)

Agnostus similis. See **Agnostus acadicus.** L. C.

Agnostus——? reported by Prof. H. D. Rogers as found, with *Hemicrypterus*, and a small branching fucoid, in *V*, Clinton lower calcareous shale, 5 m. below Jersey Shore, in Lycoming county, Pa. Geol. Pa. 1858, Vol. 1, page 536; quoted also in Report T, page 43.

Agraulos quadrangularis. (*Arionellus quadrangularis.*)

L.C. 1. Pl.7



Walcott, Bulletin No. 10, U. S. G. S. page 48, plate 7, fig. 1; a head exclusive of the free cheeks, and of natural size, in Prof. Shaler's collection. (A smaller spec. in Mus. Bost. S. N. H. shows a small spine. See Ordway, Proc. B. S. N. H. VIII, 6, 1861.) L. C. Lower Cambrian (Braintree argillite) formation, S. Braintree, Mass., with *Paradoxides harlani.*

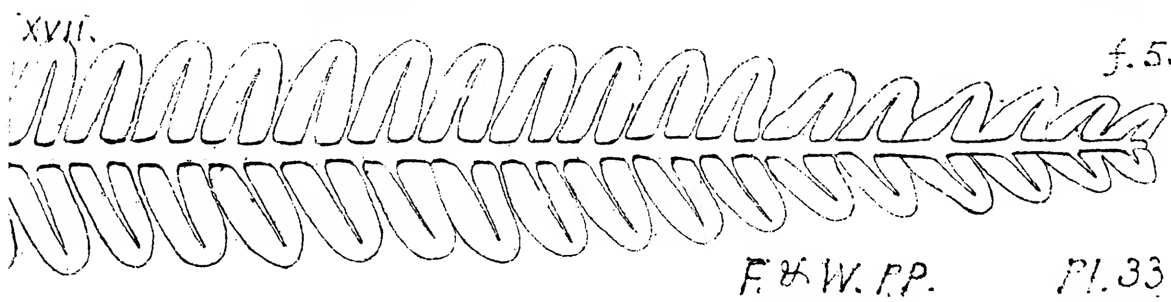
Alectorurus cincinnaticus. See **Spirophyton cincinnaticum.** *III b.*

Alethopteris, a genus of carboniferous ferns of many described European and American species. See Report P, on the Coal Flora of Pennsylvania, and the U. S. by Leo Lesquereux. Of the latter are: *A. ambigua*, from Pennsylvania; *bunburyi*, from Ohio; *coxana*, Kentucky; *distans*, Pa.; *falcata*, Ill.; *gibsoni*, Pa.; *grandifolia*, Ohio; *grandis*, N. S.; *halli*, Ill.; *helenæ*, Pa.; *holdeni*, Ohio; *hymenophylloides*, Ill.; *inflata*, Ill.; *lævis*, Pa.; *lanceolata*, Ill.; *lonchitica*, Pa.; *macrophylla*, Ohio; *massillonis*, Ill.; *maxima*, Ohio; *mazonana*, Ill.; *obscura*, Pa.; *oweni*, Arkansas; *pectinata*, Ill.; *pennsylvanica*, Pa.; *pluckeneti*, Pa. and Europe; *rugosa*, Pa.; *serlii*, Pa. and Europe; *serrula*, Pa.; *solida*, Ill.; *spinulosa*, Ill.; *stellata*, Ill.; all found in the roof shales of coal beds. *Alethopteris virginia* lived late in the Carboniferous Permian age, S. W. Pa. and W. Va.; *discrepans*, *ingens*, *perleyi*, are species found by Dawson in the much earlier Devonian rocks of Nova Scotia. *Alethopteris*, specimen 3126, Rept. O, with *sphenoptoris cristata*, came from the Bond vein mine, Alton, McKean Co., Pa., belonging in the Mercer group between the Upper and Middle Conglomerates, *XII c*, *XII b*. *Alethopteris* extraordinarily abundant in roof of

Bed B, Hunt. county, Pa. (*XIII*); T3, p. 61. *Alethopteris ambigua*, *lonchitica*, *nervosa*, *pluckeneti*, *serlii*, *sullivanti*, are all found in the roof of the Darlington coal bed (Kittanning group) in Beaver county, Pa., Rt. Q, p. 54. Good specimens of an *Alethopteris* are got from roof of Redstone coal, Monongahela series (*XV*), Report KK, p. 254. *Alethopteris virginia* is found over the Waynesburg coal (*XVII*), K, p. 59; PP.

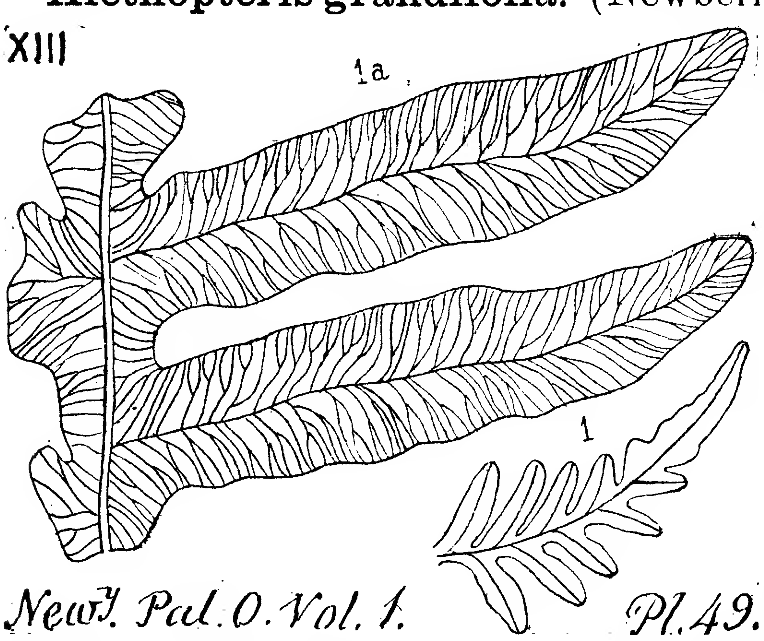
Alethopteris distans. See **Alethopteris lonchitica.** *XIII.*

Alethopteris gigas ? Geinitz. Fontaine & White's Flora,

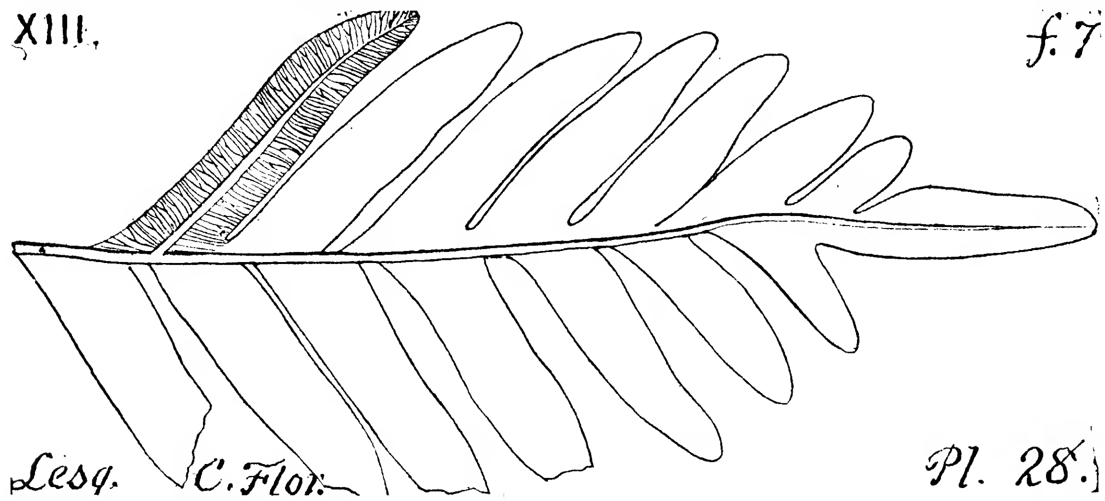


Rt. PP, 1880, page 89, plate 33, fig. 5, 6; found only in sandy shale (which does not preserve the side nerves) at Bellton, Marshall Co., W. Va., 500 feet above Pittsburgh bed.—*XVI*, *XVII*, upper coal measures.—Note. At Bellaire, O., larger, stouter specimens occur, 20 feet *below* the Pittsburg bed. *A. gigas* is an European *Permian* plant.

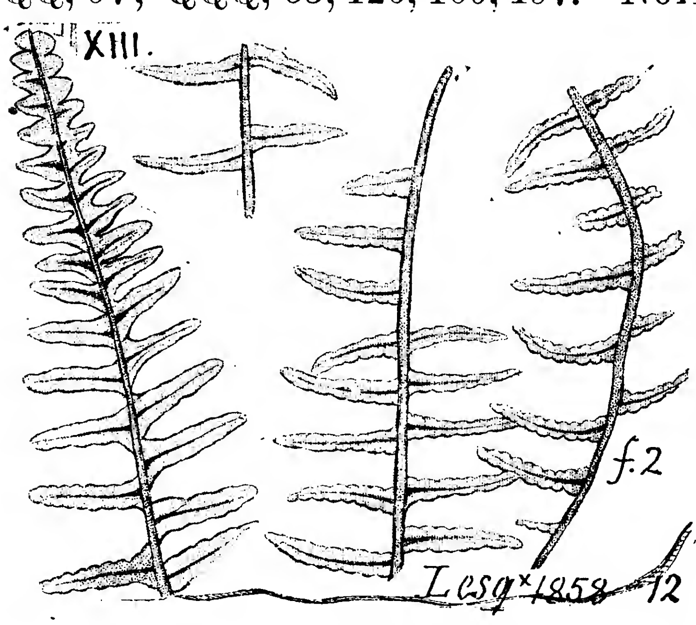
Alethopteris grandifolia. (Newberry 1873, Pal. Ohio, Vol. I, p. 384, plate 48, figs. 1, 2; 1*a* being two pinnules *much enlarged* to show the veins). Specimens in Pennsylvania collected from Sharon shales (low in formation *XII*) in Lawrence county, QQ, p. 97; and in Mercer county, from roof of Sharon coal bed, QQQ, pp. 53, 126, 160. In the Subconglomerate on New River at Quinnemont, W. Va. PP, p. 11.—*XII.* Ought to be found in the Lykens Valley and anthracite collieries.



Alethopteris longchitica. *Filicites lonchitica* of Sternberg,



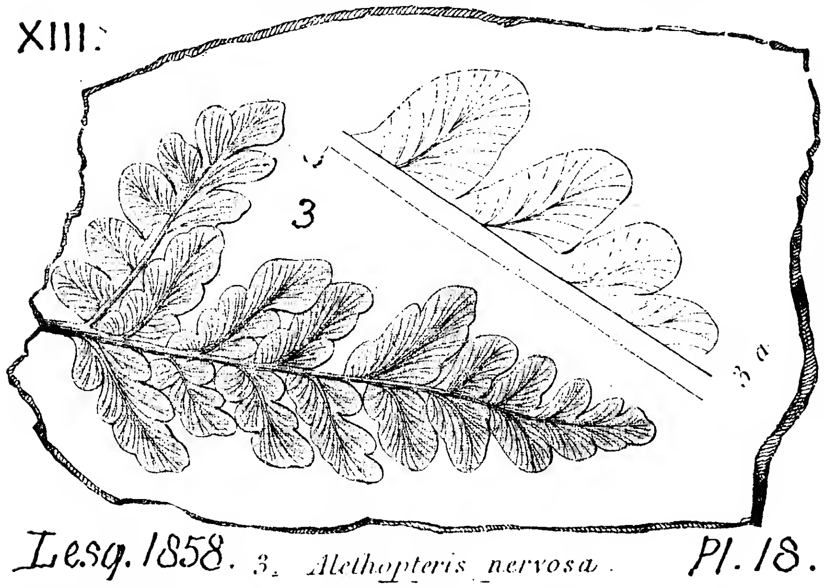
1824. Flora der Vorwelt; "adder's tongue fern.") Found by Lesquereux (Coal Flora, p. 887, pl. 28, fig 7), in the Sub-conglomerate; Conglomerate anthracite coals D. E. F.; Bituminous coals A, B, C; that is, it is one of the early ferns of the coal age, at least in America.—*XI*, *XII*, *XIII*.—I. C. White collected it from the Sharon shales (*XII*) in Lawrence and Mercer cos. Pa. QQ, 97; QQQ, 53, 126, 160, 197. NOTE. This fern has received many names: *Alethopteris lonchitidis*, *vulgatior*, *sternbergii*, *distans* (see Geol. Pa. 1858, pl. 12, F2), *Pecopteris lonchitica*, *urophylla*, *davreuxii*. Lesq. Coal Flora, page 177. *Alethopteris distans* was figured by Lesquereux in Geol. Pa. 1858, plate 12, F2, which is here added; but he



says (Geol. Pa. p. 865) that his specimens might be referred to other species. In *A. lonchitica* the shape, size and mode of attachment of the leaflets are extremely variable; but they are in general narrower and longer than those of other species, lance-shaped all the way to the pointed end, and differently veined. Three distinct varieties of this species are noted by Lesquereux.

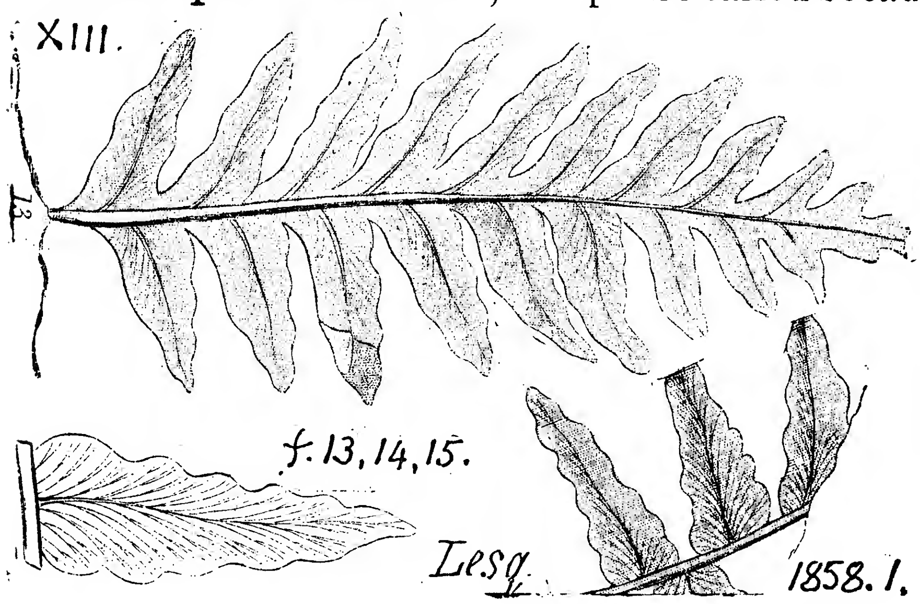
Alethopteris muricata. See **Pseudopecopteris muricata,** *XIII.*

Alethopteris nervosa. (*Pecopteris nervosa*, Brognt.) Lesquereux, Geol. Pa., 1858, plate 18, fig. 3, 3*a*. He does not redescribe or refigure it in Coal Flora, P, 1880, but alludes to it on p. 199, under *Pseudopecopteris subnervosa.*—Note that *Alethopteris nernervosa* is the European species. See Gœppart's Syst. Fil. Foss., p. 212.—*XIII.* Abundant in the Anthracite measures at Pottsville, Shamokin, &c., but is very variable; "sometimes the leaflets large and acute; sometimes near the top of the fronds the pinnæ are only pinnately lobed, with round, short, entire lobes, oval, obtuse or slightly undulate." But it is all one species, for Lesquereux found all the varieties together in one specimen, proving it to be Brogniart's species.

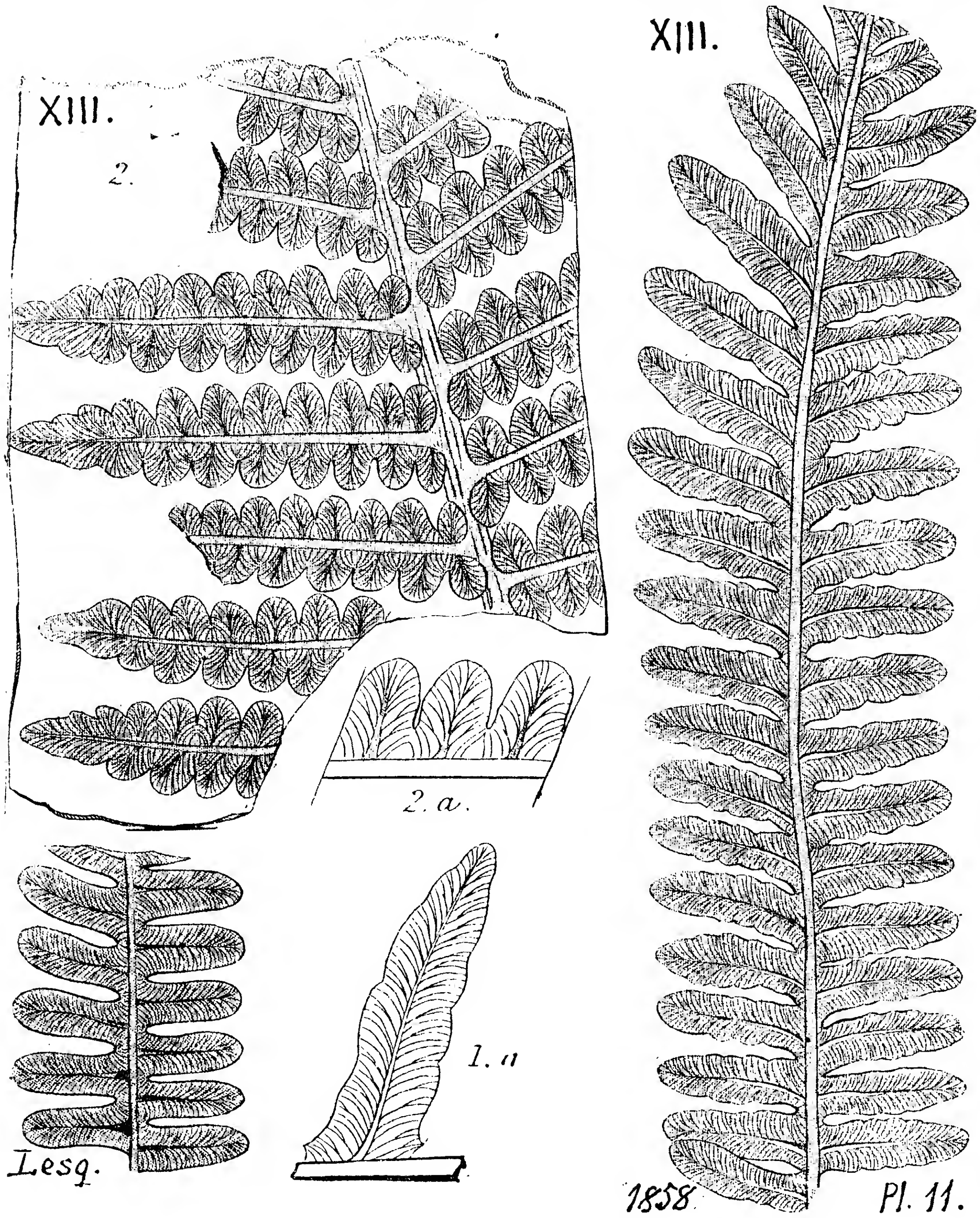


Alethopteris obscura. See **Callipteridium rugosum,** XIII.

Alethopteris obscura, Lesq. So called because of the difficulty of making out any secondary nerves. Geology of Pennsylvania, 1858, Vol. 2, p. 865, plate 1, figs. 3, 3a.—*XIII.* Anthracite Coal Measures, Gate Vein, Pottsville. NOTE. Unique specimen, and only the upper part of a frond.—See **Callipteridium rugosum.**



Alethopteris pennsylvanica. Lesquereux, Coal Flora, p.

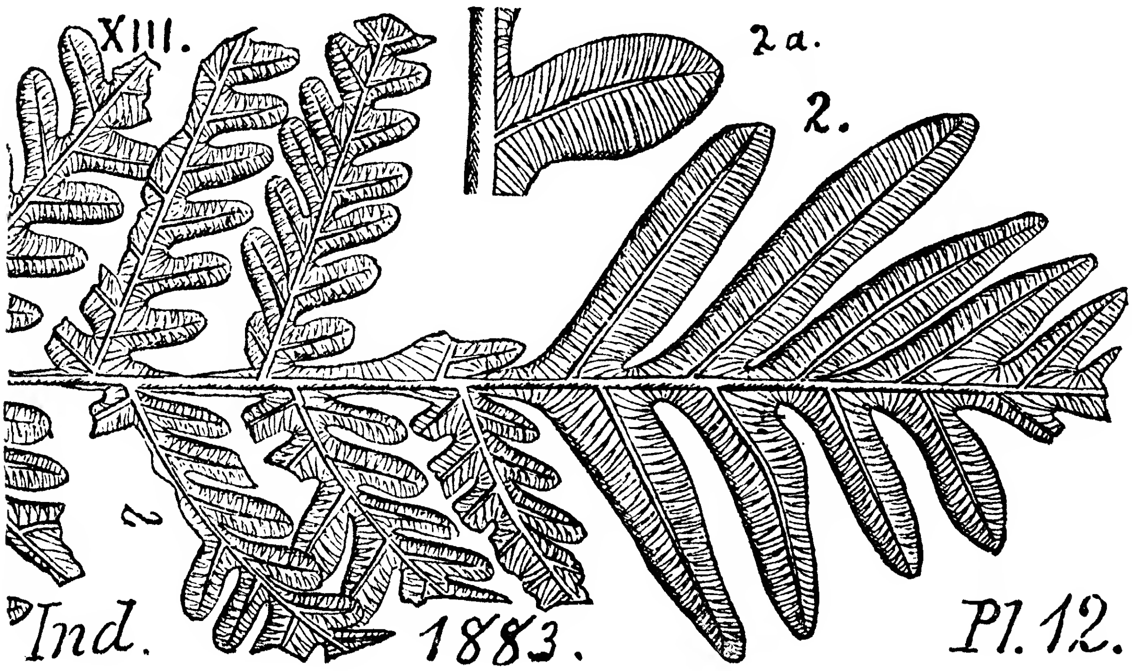


181; Bost. Jour. S. N. H. Vol. 6, p. 423; Geol. Pa. 1858, p. 864, pl. XI, figs. 1, 2; Geol. Rt. Ill. IV.; Schimper, I., 562. Has the general look of *A. helenæ;* and Schimper compares it with *A. grandini* of Brogniart. Lesquereux found it in the Salem anthracite bed at Pottsville, Pa.; in M. Lacoe's collection at Pittston, Pa., labeled Maltby, Pa.; and one poor fragment from the Morris coal, Ill. In the Broad Top coal field of Huntingdon county, this fern, or one very closely allied to it, makes up almost the whole flora of the roof shale of the Cook (= Fulton bed = bed B) at Powelton, also in the Ocean mine tunnel. I. C. White in Report T3, pp. 61, 62; the same abundance and exclusiveness (perhaps with a few *A. serlii*) in McHugh's well; and at Carbon colliery No. 1, T3, pp. 310, 319, 325. In the roof of the Barnet (bed A) a few fragments only were seen at the Reed mine. *XIII.*

Alethopteris robusta. Lesq. New species (not figured) in Lacoe's cabinet at Pittston; from Cannelton, Pa. Additions to Coal Flora, P, p. 835, 1884. *XIII.*

Alethopteris rugosa. See **Callipteridium rugosum.** *XIII.*

Alethopteris serlii. (*Pecopteris serlii*, Brogniart, 1882,)



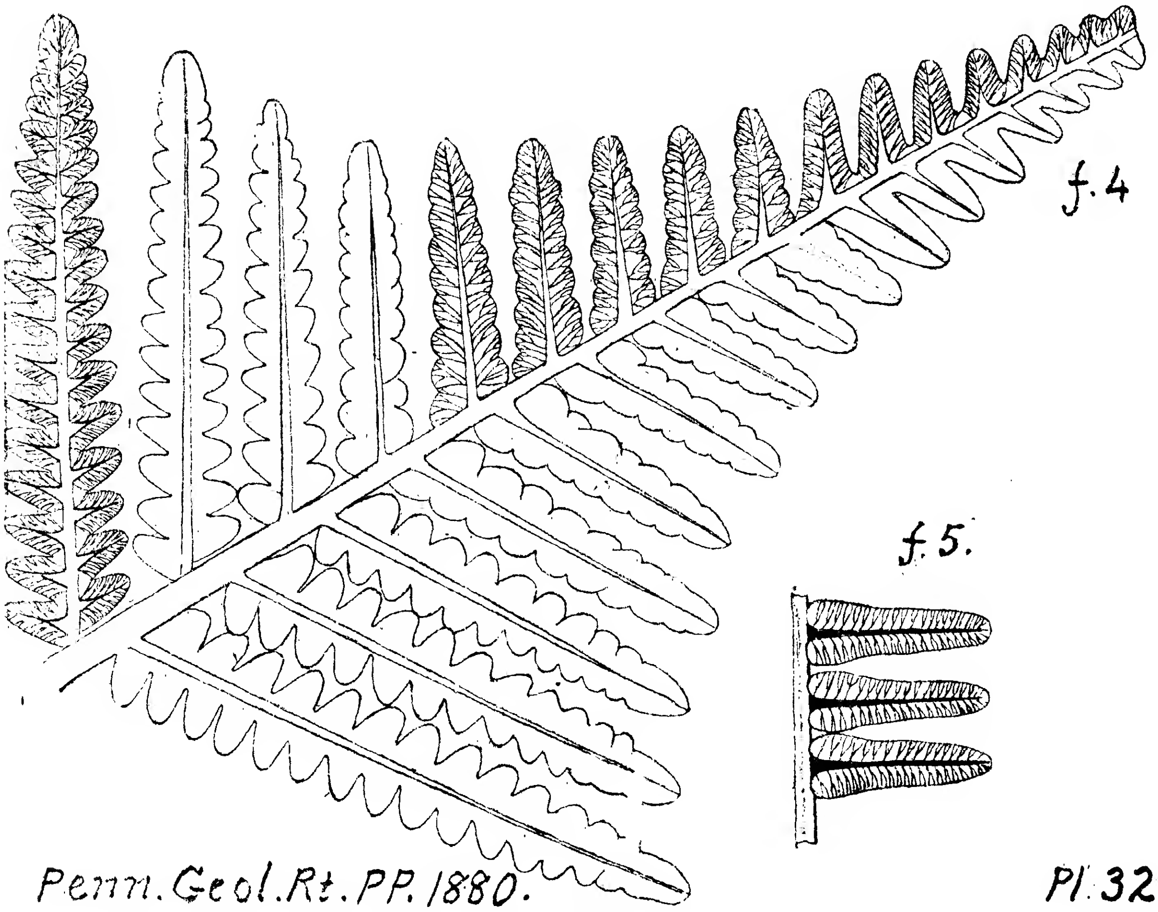
Collett's Indiana of 1883, page 58, plate 12, fig. 2. (See Lesquereux's Coal Flora, Report P, Penn. Geol. Survey, plate 29, figs. 1 to 5.) *XIII*; lower strata of the Middle Coal Measures; abounds in the Mammoth bed, anthracite region; not rare at Cannelton, Beaver Co., Pa.; abundant in Mazon creek nodules, Ill.—In the Broad Top coal basin, Middle Pennsylvania, I. C. White reports that *A. serlii* seems to be mixed occasionally with the *A. pennsylvanica* leaves which crowd the bottom of the Powelton shale, over the Cook-Fulton bed B, as at McHugh's. T3, pp. 62, 310.—Also that it is found in the black slate under Campbell's ledge conglomerate in the gap at Pittston, Luzerne county, Pa. G 7, page 39. *XI.*

Alethopteris serrula. See **Pecopteris serrula.** *XIII.*

Alethopteris solida. See **Pecopteris solida.** *XIII.*

Alethopteris sullivanti. See **Callipteridium sullivanti.** *XIII.*

Alethopteris virginiana. Fontaine & White, Geol. Sur.



Penn. Geol. Rt. PP. 1880. Pl 32

Pa., PP, 1880, page 88, plate 32, figs. 1 to 5; 33 figs. 1 to 4. Pinnæ very long, because fragments of one-foot length are found, but always single fallen ones, often the only plant preserved by thousands in the upper fine parting shale (under top bench) of the Waynesburg coal, at Cassville. In the roof shale of the top coal bench, full of all other plants, *this Alethopteris* is wholly absent at Cassville and elsewhere. Has a great variety of forms running into each other. Plate 33, fig. 1, shows swellings (? fruits). Compare Lesq. Ill. Rt. 4, pl. 10, f. 6, for similar fruitage to *A. inflata.* Upper coal measures.—*XVII.*

NOTE.—The genus *Alethopteris* includes many of the most common ferns of the coal age, especially *Aleth. lonchitica*, which abounds in all coal regions, and seems to have been as common in the coal swamps as the *Pteris aquilina* is now in Europe and America. The characteristic feature of its leaflets is that they adhere to the little stalk by their whole base and touch each other at their bases. Dawson.

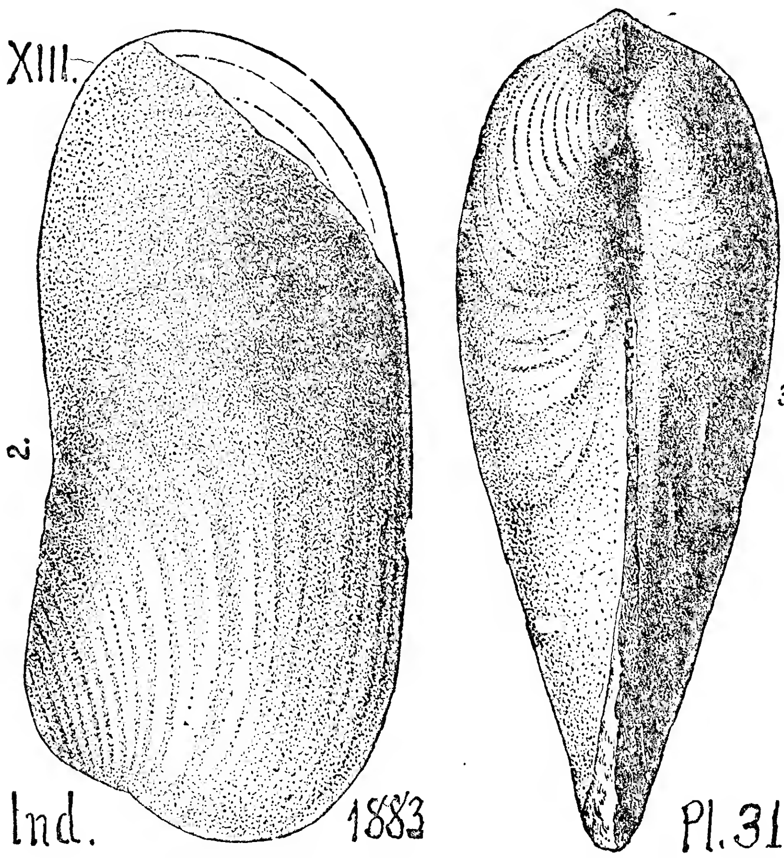
Algæ (*Thallasophytes*, *Sea-weeds*). Coal Flora, Report P, 1880, 1884. Being generally of soft cellular tissue, are seldom preserved in the rocks; those thrown up now on the sandy sea-shores in vast abundance rapidly disappear by decomposition and evaporation. Where the shore is muddy the clay absorbs and retains a portion of the oils into which they are partially decomposed; and this is one explanation of the great *black shale formations*, like *VIII b Marcellus*, & *VIII e Genesee* which contain large percentages of bituminous matter; although much of this contained hydro-carbon seems to be the product of the decomposition of macrospores and microspores (large and small plant-seeds). The vast abundance of the fossil forms or casts of seaweeds in the *Chemung* and *Catskill* (*VIII g*, *IX*) strata of north-western Pennsylvania, serves to apply the same explanation for the origin of petroleum. In the Arctic seas seaweeds now grow to a vast size, rivalling large tree trunks. In the middle of the Atlantic circular currents bring together such quantities of living seaweed that an area several hundred miles in extent, called the *Sargasso Sea*, struck the Phœnician seamen with affright, and impedes the progress of modern sailing vessels. A world of animal life, fish, etc., feed in it; and this helps to explain the abundance of fossil fishes in the Devonian rocks. Schimper (Pal. Veg. vol. 1, p. 149) asserts that *seven* or *eight thousand species* of living seaweeds have been described. They form floating prairies on the surface of the North Pacific ocean between Japan and the Kurile islands. The absence of fossil seaweeds in the coal measures is as remarkable as their abundance in the underlying Devonian strata. Probably the first true fossil seaweed of the coal measures ever noticed was the *Taonurus* (*caulerpites*) *marginatus*, found by Lesquereux in 1865 (described in Trans. Amer. Philos. Soc., 1866) as dim *cocktail* markings on a dark grey lime shale, in the *Pottsville conglomerate* formation No. *XII*, on Slippery Rock creek in Lawrence county, Pa., which become distinctly visible when the stone is covered with water. (Described in report J, p. 96.) No doubt these plants were the lineal descendants of the *Caudagalli* (cocktail) seaweeds of the early and late Devonian strata (For. *VII*, *VIII*.) Seaweeds however must have existed in some abundance in the coal age. *Paleophycus* (Hall=*Fucoides antiguus*, Schimper) *milleri; P. gracilis; divaricatus* are described by Lesq. in Coal Flora, 1880, pp. 10, 11, 12, as found in iron stone nodules in a bed of clay over coal L of the Indiana coal field; *Asterophycus* (starry seaweed) *coxii*, from sandstone beds in the Upper and Lower Coal measures on the Wabash; *Asterophycus simplex*, from irony clay over the conglomerate in Beaver Co., Pa. See Coal Flora, Plate B, figs. 7, 8; *Conostychus* however is too much like the sponges to be accepted without hesitation as a plant.

Dendrophycus desorii is another form of the early coal age. Coal Flora, p. 700. (This Dawson calls a rill-marking; Geol. Hist. Plants, 1888, p. 33.) *Dictyophyton* (net plant) of the *Chemung* age (*VIII g*) is placed by Lesquereux among the sea weeds. The much earlier Silurian sea weeds, so called, like *Bilobites*, *Palæochorda*, *Palæophytus*, *Licrophycus*, *Buthrotrephis*, *Asterophycus*, *Rusophycus*, *Arthrophycus*, *Crusiana*, *Eophyton*, are now pretty generally accepted as *worm burrows*, *worm tracks*, *worm dung*, and the various kinds of marks left by various kinds of most ancient (as well as modern living) animals on the shallow sea bottom; as proved by Nathorst of Sweden, and Dawson of Canada. See Geol. Hist. of Plants, Dawson, New York, 1888, p. 26. Such are now called *Protichnites*, (See **Protichnites lineatus**); *Rusichnites*, (See **Rusichnites acadicus**); *Nereites*, *Planulites*, *Rhabdichnites*, etc. Shrinkage cracks have also often been mistaken for fossil sea weeds. But this idea, carried too far under the inspiration of Nathorst's admirable researches, has produced a reaction. The best palæontologists express the opinion that some of the Cambrian and Silurian forms must be accepted as true fossil fucoids; and that sea-plant life must have long preceded land-plant life.

In the collections of the Survey are good specimens of *algæ* from Venango County: see Report O, No. 2912, in Sandy shale, Milltown hill, 3 m. e. of Pleasantville; 2945, in gray sandstone, Henderson farm; 2951, on green sand shale, Rooker farm, Pithole; 2943, in gray sandstone, McGee run; 3268, in Pocono X, sandstone, e. end, Oil City bridge. From McKean Co., 3635, and 3657 on *Chemung*, *VIII g*, green shale, hill e. of DeGolier.

Allorisma clavata. McChesney. New Pal. Foss *Chester group*, recognized by J. J. Stevenson in the Subcarboniferous rocks in the gaps of Chestnut Ridge and Laurel Hill, in Westmoreland and Fayette Cos. Pa. Report KKK, p. 311.—*X.*

Allorisma subcuneata. (Meek & Hayden. Proc. Acad. N. S. Phil. 1858. Pal. Upper Missouri 1864 p. 37, pl. 1, fig. 10) Collett's Indiana of 1883, page 148, plate 31, fig. 1, 2, 3, (*XIII*,) found throughout the Coal Measures of Indiana.—Also Found in *Mill Cr. limestone* bed. 1000′ above(*XII*) Conglomerate, in Upper Anthracite Measures near Wilkesbarre, Luzerne C . Pa. An. Rt. Geol. Sur. Pa. 1885, page 444, fig. 10; page 456. fig. 10A. Heilprin. Monongahela series. *XV.*



Allorisma terminalis. Hall, Stansbury's Expedition to the Great Salt Lake, 1852. Coal measures (Subcarboniferous.) Recognized by J. J. Stevenson in the *Subcarboniferous* rocks of the gays of Chestnut Ridge and Laurel Hill in Westmoreland and Fayette Cos., Pa. Report KKK, p. 311.—*X.*

Allorisma ——? *Subcarboniferous* rocks in gaps in Westmoreland and Fayette. J. J. Stevenson. Report KKK, p. 311.—*X.*

Allorisma ——? Decker's creek shale under Mahoning SS. top of *Allegheny series* (Lower Productive) coal measures, Morgantown, W. Va. J. J. Stevenson's section in Report L, p. 37.—*XIII.*

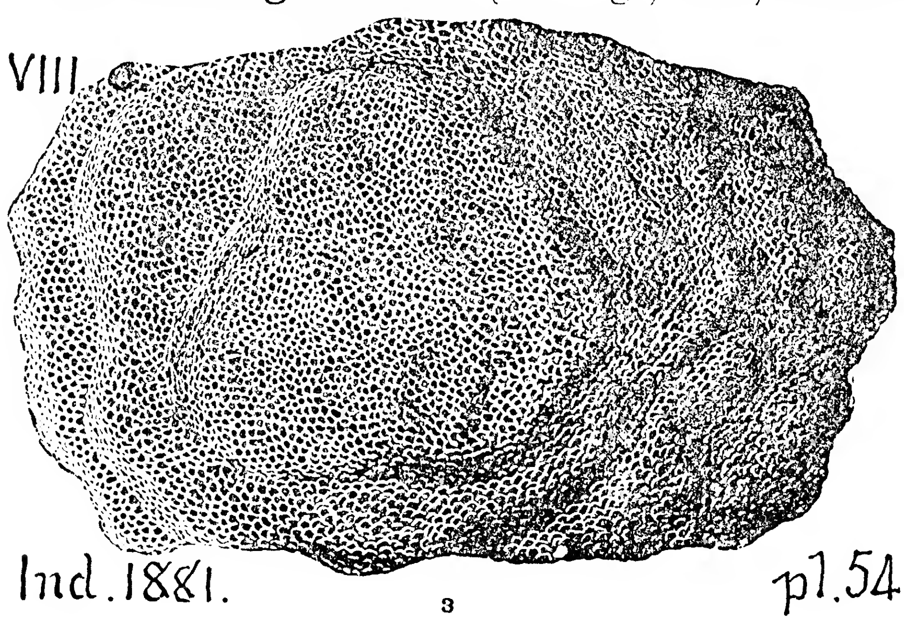
Allorisma ——? "Waverly form," in Cuyahoga shale (*Subconglomerate*) Mouth of Hickory Cr., Lawrence Co., Pa. I. C. White, Rt. QQ, pp. 70, 124. *XI? X?*

Allorisma ——? in Shenango shales, in Crawford shales, in Sharpsville sandstone, and in Berea grit? all *Subconglomerate* form atoms in Mercer Co., Pa. I. C. White, Rt. QQQ, pp. 60, 61, 62, 124, 158.—*X.*

Allorisma ——? badly preserved and rare in Shenango upper shales, XI, Crawford Co., Pa. I. C. White, Rt. QQQQ, p. 78, in Meadville lower shale, p. 85, and in Sharpsville upper sandstone (between the Meadville limestones) at all exposures, p. 86. Also, "Subcarboniferous form" in Kippel's sandstone quarry, under Olean Conglomerate (No. XII) Klippsville, p. 134. Also low in the Corry sandstone at Corry, p. 230.—*XI.*

Alveolites explanatus? recognized by Simpson, doubtfully, among Hale & Hall's collections near Orbisonia, Huntingdon Co., Pa. *Lower Held. VI.* See OO, Pal. Cat. p. 234, one spec. 601–27, encrusting *Chætetes*?; four 601′–23, in fragments: and two marked 601–31.

Alveolites goldfussi. (Billings, 1859, Can. Jour.) Collett's Indiana Report of 1881, page 397, plate 54, fig. 3, upper view of a corallum.—*Hamilton* formation in New York, Canada, &c. *VIIIc.*



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Alveolites minima. C. E. Hall's collections of 1875 near Orbisonia, Huntingdon Co., Pa. Proc. A. P. S. Jan. 5, 1876. Abundant in the lower 50′ of Lewistown limestone, over the Waterlime. Report T, p. 41, & T3, p. 126. *Lower Helderberg. VI.*

Alveolites? niagarensis? A doubtful genus and species; found by Hall & Hale near Orbisonia, in *VI*; closely resembling Röminger's figures and descriptions; but the tubes look like some *sponges.* G. B. Simpson, 1888. See OO, Pal.

Cat. p. 234, sixteen specimens, 601–24. Another specimen, equally doubtful is 601–34.

Alveolites ——? With the last at Orbisonia.—VI.

Ambocœlia biconvexa, n. s. Claypole, in the Salina rocks of Montour Co., etc., extends from the Bastard limestone up to the Oriskany, *V c* to *VII*. I. C. White. Report G7, p. 101.

Ambocœlia umbonata. (*Orthis nucleus.*) Hall, page,

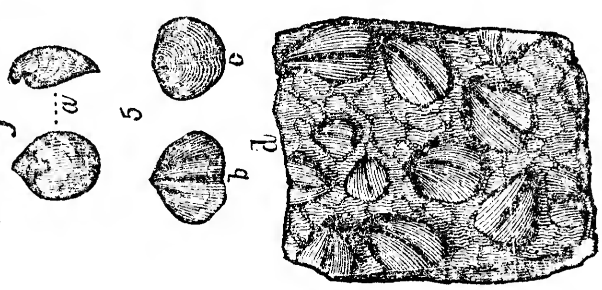
VIII.b.

71. | 8.

180, fig. 71, 8. *VIII b*. Marcellus and *VIII c*. Hamilton. See Conrad J. Ac. N. S. Phila. Vol. VIII. At Marshall's Falls, Monroe Co., eastern Pa., it was collected by C. E. Hall from both the Marcellus (*VIII b*) and Hamilton proper (*VIII c*); also by Claypole in Perry Co., middle Pa., from both. On the Susquehanna, I. C. White found it in the Selinsgrove Lower and Upper limestones. G7, pp. 79, 80, 360; near the top of the Marcellus p. 76, 230; in Huntingdon Co., McConnellstown section, near Heffner's mill, abundantly 10′ below top of Marcellus, T3, p. 198; abundant along Murray's run, E. Oneida township, p. 261; also at Cove station, p. 115; at the Car Works in Huntingdon, p. 115; vast numbers in top beds of Marcellus between McConnellstown and its railway station; also 203d mile post near Huntingdon, p. 113. *In the Hamilton Lower Shales*, at the Coffee Run RR. quarry, Huntingdon Co., T3, p. 112. On the Susquehanna, I. C. White found it in Hamilton Shales, G7, p. 75; at the base, 50′ from the top, and at the top of the *Hamilton sandstone* mass, p. 219, 230, 359 at Selinsgrove. In Huntingdon Co., in *Hamilton Upper shales*, at Mapleton, T3, p. 109, and in the Patterson section, p. 186. In the *Tully limestone*, I. C. White found it on Little Fishing creek; in Madison, Columbia Co.; at Catawissa; in Liberty township, Montour Co.; and at South Danville, G7, pp. 75, 207, 229, 289, 310, 352. It is in fact the most abundant fossil in the Tully limestone in middle Pa., T3, 108; the only perfectly defined shell in the mass of broken shells, p. 108; as at Cove station, Huntingdon Co., p. 107, and No. 4 of the Mapleton Section, p. 273. *In the Chemung strata*, two of its horizons are at 275′ and 300′ below the Lackawanna (Chemung Upper) conglomerate, at Haun's Bridge, Huntingdon Co., T3, p. 98. It is astonishing to find it in the Carboniferous lime shale below the Pittsburgh coal bed, near Harvey's five points, Westmoreland Co. C. E. Hall's collections, MS.

report Dec. 30, 1876, *VIIIb* up to *VIIIg*, and *XIV*. In Claypole's collections in Perry county there are 77 specimens from 20 collecting stations. See Rept. OOO, Cat. of Museum, 1888. Specimens in the cabinet OO, Pal. Coll. by Fellows & Genth, 1875, Marshall's creek, Monroe Co., Pa., *Hamilton shale*, *VIIIc*, 804–91; 804–93–2; 806–8. G. B. Simpson, 1888. Specimen 807–46 from Kintner's farm, Marshall's creek, Monroe Co., *Hamilton strata*, *VIIIc*, 858–4 (good); 860–74*a*; both from near Mansfield, Tioga Co. *Upper Chemung* (Sherwood) *VIIIg*.

Ambocœlia umbonata, Var. **gregaria,** Hall, page 267, fig. 121, 5, *VIIIg*, Chemung formation. (*Orthis unguiculus*, Hall. *Atrypa unguiculus*, Sowerby, Geol. Trans. [2] LIV, f. 8.) See Hall, 13th Rt. of Regents, 1860. In Columbia Co., Pa., in sandstone (Stony Brook beds) base of Chemung (*VIIIg*), G. 7, p. 210. In Huntingdon Co., Pa., in No. 6 of Haun's bridge, Chemung section, T3, p. 194; specially numerous in a very fossiliferous bed, 1100′ beneath Lackawaxen (U. Chemung) conglomerate, and 250′ beneath Allegrippus (L. Chemung) cong. S. bank Juniata river, T3, p. 193. In lime shales under Marcellus (*VIIIa*) Coffee Run section, T3, p. 171. In Bedford Co., Pa., 100′ beneath Allegrip. Cong. T2, p. 79; also 1000′ beneath Al. Cong. in dark *Portage* (*VIIIf*) sandstone, Yellow Creek section, p. 80; abundant in thin ferrug. bed traceable across Juniata township, p. 113; Sutter's, Napier t. p. 117; in Chemung flags, near Diehl house, p. 117; near Colvin's, p. 117; Chemung brownish red sandstone, St. Clair t. p. 122; in blocks of Allegrippus (L. Chemung) conglomerate, Scrubgrass cr., King t. p. 133 (possibly not this species); in Chemung flaggy sandstone near Union t. line, p. 133; in many shale layers *over* Alleg. cong. Southampton t. p. 205; in Chemung cong. Addison ridge crest, ¼ m. e. of Cherry Grove, p. 215. Spec. 807–40, Kintner's farm, Marshall's creek, Monroe Co.; 808–1, 22, Dingman's Creek falls, Pike Co.; both from *Hamilton strata*, *VIIIc* 860–74, from near Mansfield, Tioga Co. *Upper Chemung* (Sherwood) *VIIIg*.—*For cabinet specimens see Appendix.*



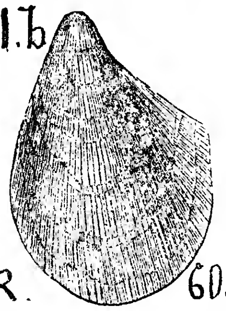
VIII. g. 121. 5

Ambrocœlia ———? Claypole's collections, Catalogue OOO, station 151, No. 5, one specimen.

Ambocœlia——? Underscribed species? Spec. 810–4, (O, p. 235), from south slope Hogback, Swanee road, Pike Co., from lower beds of *Upper Helderberg*, *VIII a.*

Ambonychia bellistriata, Hall.—Rogers, page 818, fig. 605. II, c. Trenton. See Hall. Pal. N. Y. Vol. I. 1847, p. 163, pl. 36, figs 4, *a*, *b*, *c*. A beautiful and easily reconized lamellibranch shell, from the central part of the Trenton formation at Middleville, Trenton Falls and elsewhere in N. Y., is mentioned by H. D. Rogers as found in Pa., but has not been reported during the second survey,—*II c.*—Note. See Owen's (1852) origin at figure, under *Posidonomya bellistriata.*

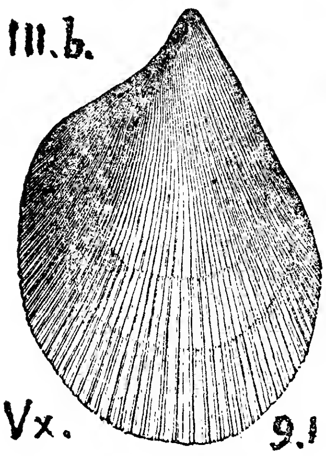
II.b



R. 605

Ambonychia carinata. (*Pterinea carinata.*) Emmons, page 402, fig. 111, 1. Vanuxem, page 65, fig. 91, 1. *IIc. Trenton*, and *IIIb. Loraine shale.* (See Goldfuss, 1826.) Always abundant in the Loraine shales of New York; found from top to bottom of the formation, to within four feet of the beds holding *Triarthus beckii;* but rare in the lower layers; but never seen in the *Utica slate.* Emmons. *III b*, the Sandstone shales of Pulaski. Vanuxem.

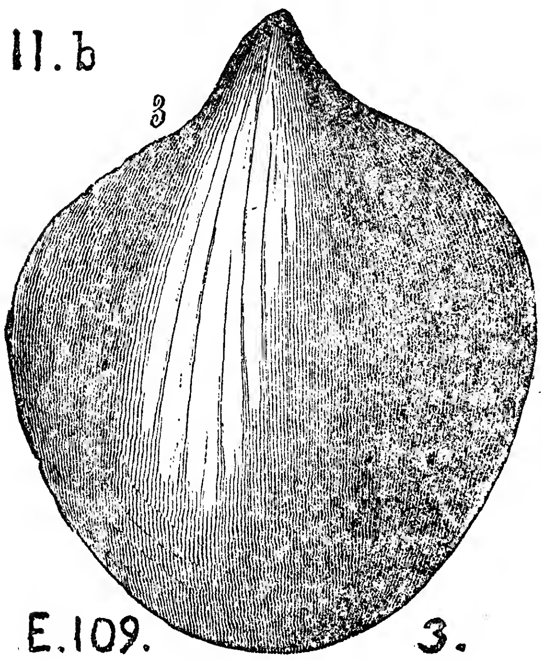
III.b.



Vx. 9.1

Ambonychia orbicularis. (*Pterinea orbicularis.*) Emmons, page 397, fig. 109, 3. *Trenton formation*, *IIc.* This fossil was found by Emmons at Watertown, N, Y., in the black limestone part of the *Trenton formation* (i. e. in the lower division of it, in some places, and in the upper division of it in other places) in company of *Nuculites inflata*, *Nuculites faba* and *Bellerophon profundus;* numerous, but seldom perfect, as the shell is thin and cannot be brought away whole from the rock.—*IIc.*

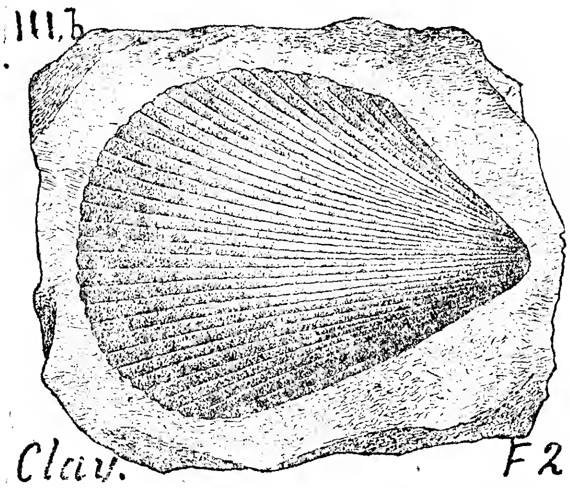
II.b

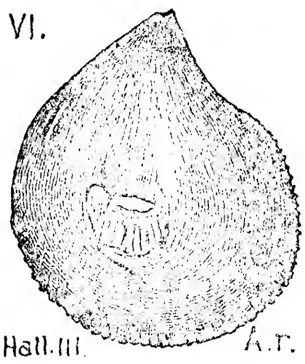


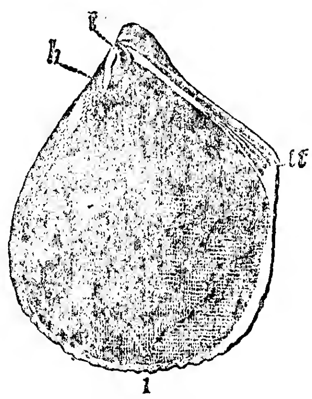
3

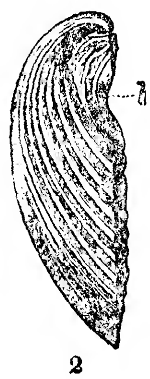
E.109. 3.

Ambonychia radiata. (*Pterinea carinata*, Conr. Van. and Emmons,) Hall, Pal. N. Y., Vol. I, 1847, p. 292, plate 80, fig. 4 b.—*II*, *c*. Trenton; *III*, *b*. Loraine shale. Geol. Pa., 1858, page 821; no figure. One of the commonest Hudson River fossils, from bottom to top, (but unknown in Utica slate or Trenton limestone) in New York, Ohio, Ind. and Ky. Hall. Also in Centre Co., Pa., Geol. Sur. Rt. T4, p. 427. In Bedford county, Pa. it ascends in the series, being found by J. J. Stevenson in one shaly parting of the *Medina* red rocks *IV b*, (the *Oneida IV a*, being there absent) along the Tussey mountain outcrop; in the Chambersburg, Bedford turnpike, through Evitts mountain, Rt. T 2, pp. 92 and 166.—Inside and hinge structure shown by Hall. Pal. N. Y. Vol. 3, p. 269 and 523, wood cuts.

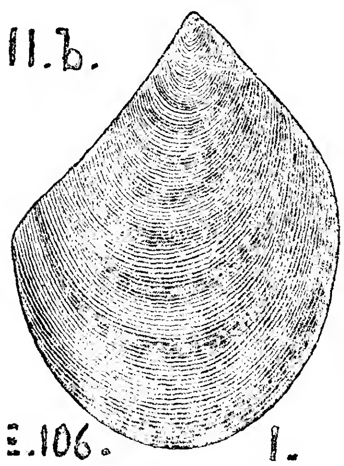








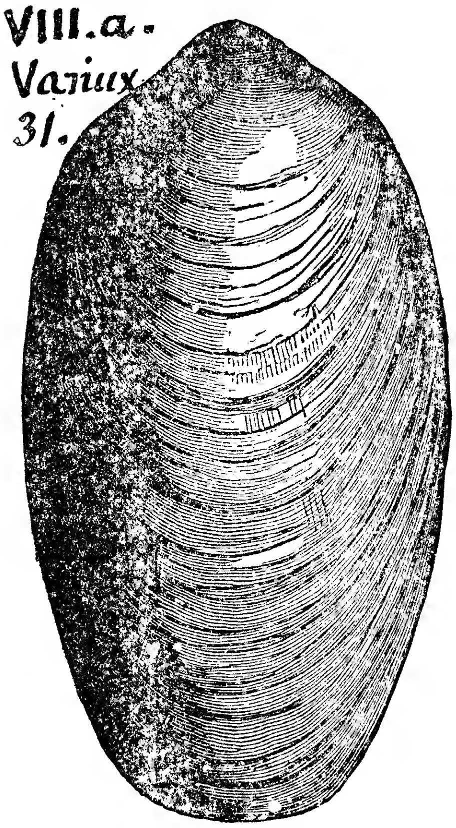
Ambonychia undata. (*Pterinea undata.*) Emmons, page 395, fig. 106, 1. *II b*. Black river limestone, and *II c*. Trenton.—Described by Emmons as a rare species, found in the grey beds of the Trenton limestone formation at Watertown, N. Y. It is not remarkable therefore that it has not been reported as yet found in any of the Trenton, Birdseye, or Black river limestone outcrops in Pennsylvania. *II c*.

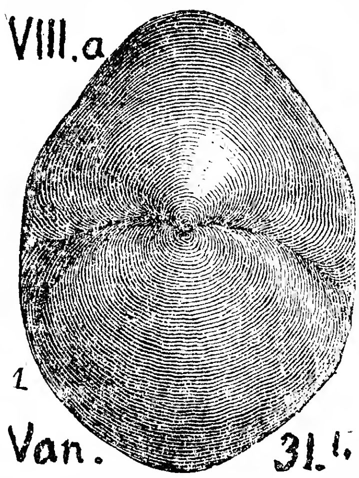


Ammonites——? *See Appendix*.—An *ammonite* occurs in the Crinoidal limestone (black) near water level at Pittsburgh, Pa.—J. J. Stevenson. See L, p. 21; also HHHH, p. 241; Geol. Pa. 1858, p. 600. A large species at the Livermore tunnel, Indiana Co. *XIV*.

Amnicola limosa. Say. Recent shell marl at Harmonburg, Crawford county, Pa. I. C. White's Report Q4, p. 41. *Post-tertiary.*

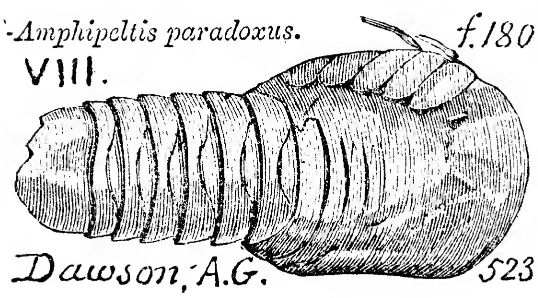
Amphigenia elongata (*Pentamerus elongatus*) Vanuxem,





page 132, fig. 31, I. Copied by Hall on plate, fig. [64, 1:] not common in western New York. *VIII a.* Upper Helderberg formation, and Schoharie grit. Variety, **undulata**; Hall, vol. IV, 1867, variety *subtrigonalis*. See **Meganteris subtrigonalis.** Hall, 10th Rt. of Regents, 1857. Vanuxem says it is diffused throughout the formation and confined to it. Some specimens are nearly five inches long.

Amphipeltis paradoxus, Salter. Dawson's Acadian



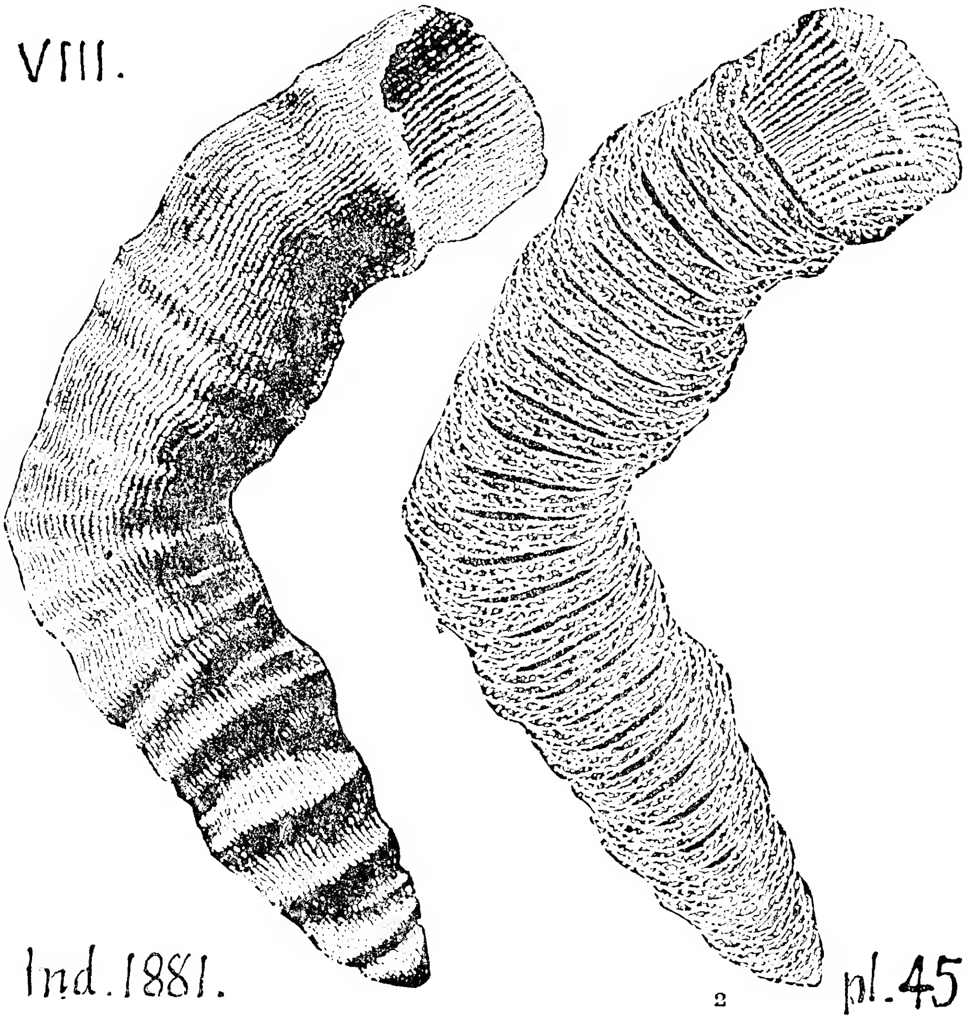
Geology, 1868, p. 523, fig. 180, a crustacean, allied perhaps to the modern *Stomapods*, found in the Devonian plant-beds of St. John, N. B., with the little *Eurypterus pulicaris*, *Spirorbis*, &c.—*VIII.*

Amphlexus? cruciformis. See **Zaphrentis cruc.** *VIII a.*

Amplexus shumardi (*Cyathophyllum shumardi.* M. Edwards, Mon. des Polyp. foss. Niagara.) A. Winchell's

Geol. Studies, 1886, page 204, fig. 114.—*VIII a* Niagara limestone formation. The Niagara and Clinton formations are mingled in Pennsylvania, but most of the corals grew only in the Western waters.

Amplexus yandelli. Edwards & Hairne. Collett's Indi-



ana Report of 1881, page 393, plate 45, fig. 1; side view of a corallum; fig. 2, section through it lengthwise, to show its internal tabellæ. Devonian strata at Jeffersonville, Ind.

Amynilespes wortheni. Scudder. A caterpiller of the coal formation in Illinois, found in a Mazon creek nodule. Zittel's handbuch der Pal., 1885, vol. 2, p. 729, fig. 899. *twice the natural size.* See **Acantherpestes** and **Euphoberia.**—*XIII.*

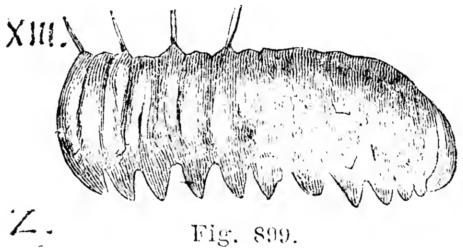


Fig. 899.

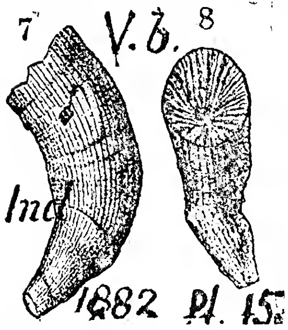
Amynilespes wortheni. *See Appendix.*

Aneyrocrinus bulbosus. *See Appendix.*

Angelina hitchcocki. See **Protypus hitchcocki.** Middle Cambrian.

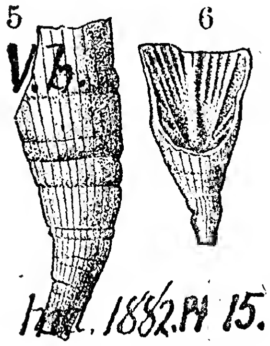
Anisophyllum trifurcatum. (Hall, 35th An. Rt. 1882 Foss. Corals, Niagara and Upper Helderberg.) Collett's Indiana of 1882, page 273, plate 15, figs. 7, 8. Niagara formation, at Louisville, Ky.—*V b.* This species may be distinguished from *A. unilargum* by its somewhat more slender form, its thinner plates and no side fossettes.

7 8



Anisophyllum unilargum (Hall, 35th An. Rt. N. Y. 1882.) Collett's Indiana of 1882, page 272, plate 15, fig. 5. Side view, ordinary size; fig. 6, imperfect, showing a single prominent ray back in the calyx. Niagara formation, Louisville, Ky. *Vb.* It has fifty plates (lamellæ) alternating in size, smaller ones rudimentary; two cross grooves (fossettes).

5 6

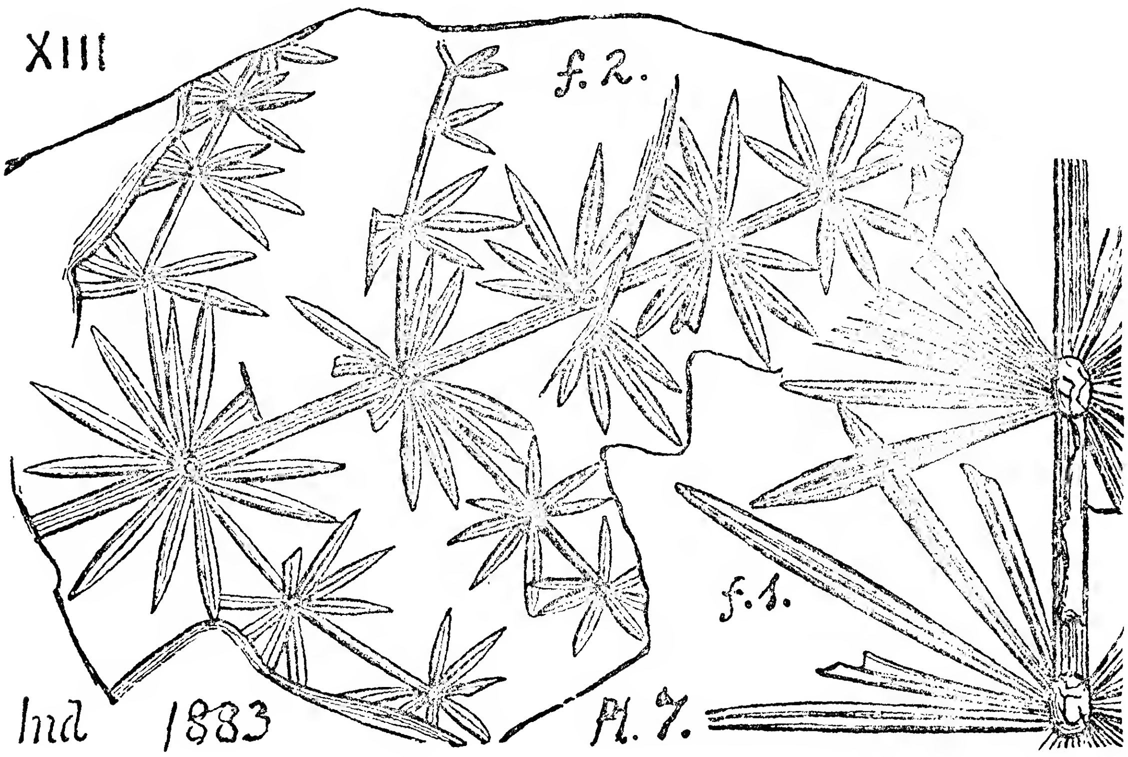


Annularia brevifolia. See **Annularia sphenophylloides.** *XIII.*

Annularia fertilis. See **A. longifolia.** *XIII.*

Annularia galioides. See **An. sphenophylloides.** *XIII.*

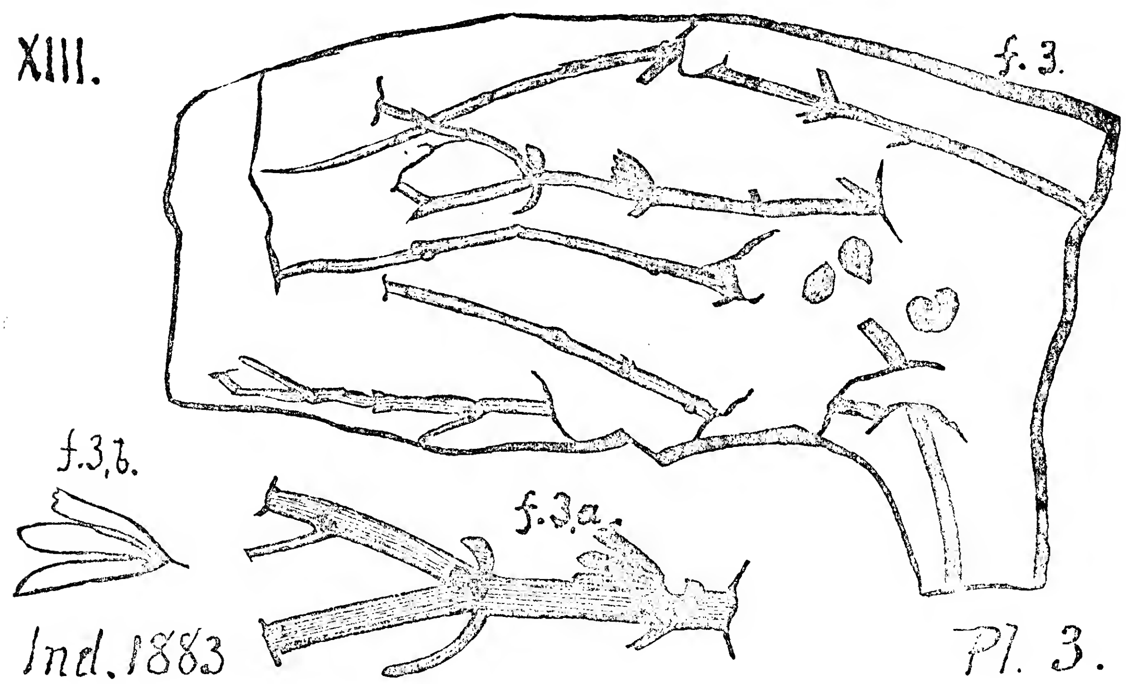
Annularia longifolia (*Pecopteris longifolia* Brogniart,



1828, Prodrome, &c.) Collett's Indiana of 1883, page 44, plate 7, figs. 1, 2.—XIII, Coal Measures. (See Lesquereux's Coal Flora, Report P, Penn. Geol. Survey, page 45, plate 2, figs. 1, 2, 2a, 2aa, Plate 3, figs. 10, 12 —Synonyms: *Annularia fertilis* of Sternberg. *Annularia spinulosa* of Sternberg; *Bruckmannia tuberculata* of Sternberg; *Asterophyllites tuberculatus?* of Lindley & Hutton (fruit;) *Equisetum stellifolium* of Harlan (Geol. Doc. Pa, 1835, Vol. I, page 261, plate 14, fig. 4.) Coal Measures, Clarion group, just above the Pottsville Conglomerate. Lesquereux. *XIII.*

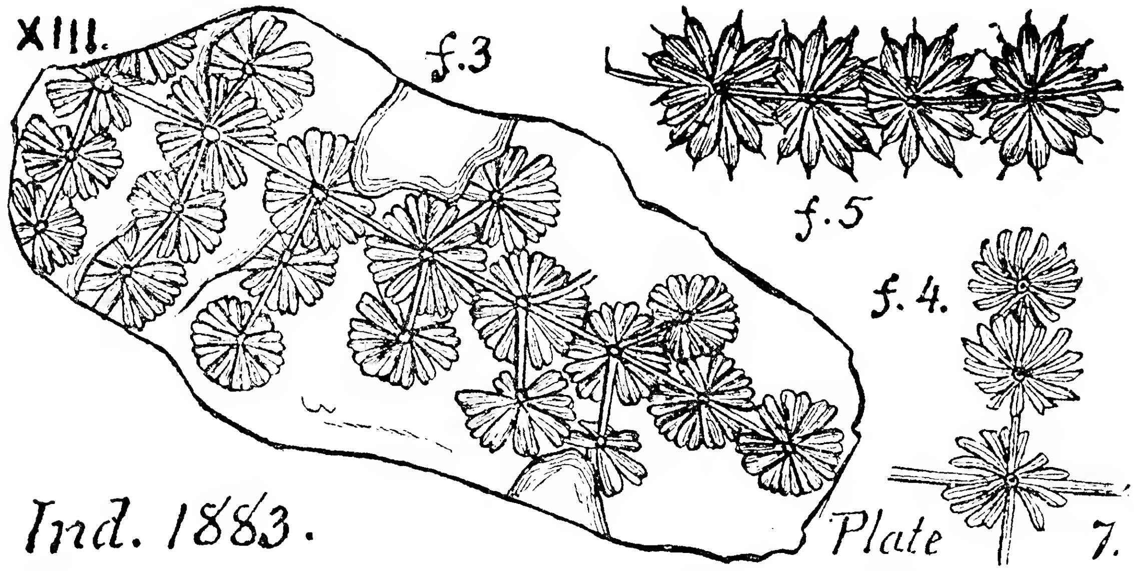
Note. For its *possible* fruit see *Asterophyllites equisetiformis.* Occurs with *fish* and *lingulæ*, in the Berea grit quarries at Berea, Ohio, in *Pocono* Sandstone formation No. *X.* Carll's Report I, p. 70. Either this or A. sphinophylloides occurs in the Darlington Coal, in Beaver Co., Pa., I. C. White's Report Q, p. 54.

Annularia roemingeri, (Lesquereux.) Collett's Indiana

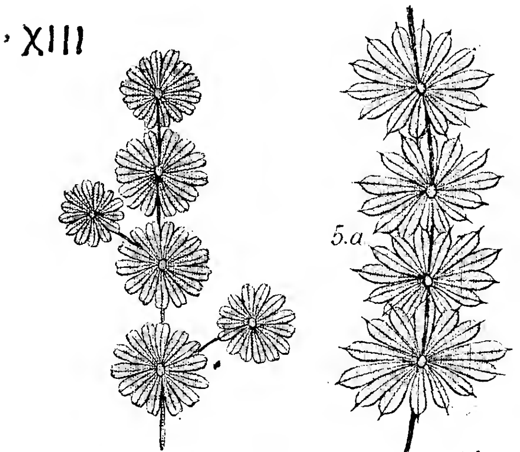


of 1883, page 45, plate 3, fig 3, 3a, 3b; showing the fragmentary condition of the specimens found by Dr. Röminger, State Geologist of Michigan at the top of the Silurian system; in Lower *Helderberg* sandstone, formation *No. VI*; proving the early appearance of reeds or bamboos, afterwards so abundant as *Calamites* in the Coal Age. (Compare fig. 3, with the pendant roots of the Calamite in Dawson's Geol. Hist. of Plants, 1888, page 123, fig. 47.)

Annularia sphenophylloides. Gutb. (*Galium spheno-*



phylloides, Zenker; *Annularia brevifolia*, Brogniart & Heer; *Annularia galioides*, Lind. & Hutton.) Collett's Indiana of 1883, page 45, plate 7, figs. 3, 4, 5; species common and variable, mostly in Middle Coal Measures. (See Lesquereux's Coal Flora, Report P, Penn. Geol. Sur., page 48, plate 2, figs. 8, 9,—*XIII*, Coal Measures, *Allegheny series*; abundant at Mazon creek, Ill.; also found at Cannelton and Pottsville, Pa.. Salem and Tunnel vein.) See Geol. of Pa., 1858, p. 852, plate 1, fig. 5. "Very abundant in the State in the upper coal beds of the Pottsville basin," Lesq. But this assertion, in regard to this and other coal plants, must be considered doubtful until the true places of the Salem and Gate veins are determined by the survey of the Pottsville coal basin now nearly finished. It is pretty certain that the Salem is a much higher coal than the Gate. F. A. Hill, in charge of the Anthracite Survey.



Annularia sphenophylloides Lesq. Pl. 4.

Annularia spinulosa. See **A. longifolia**, *XIII*.

Annularia ——? in Deckers creek shale under Mahoning sandstone, on the State line of W. Va. and Pa., too broken to specify. Report L, p. 37—*XIV*.

Annularia ——? over Waynesburg coal, Greene county, Pa. Stevenson's Report K, p. 59.—*XVI*.

Anomites resupinatus. See **Orthis resupinata.**

Anomœpus. *See Appendix.*

Anotopteris ? among the many plants to be got at the exceptionally good collecting place on Muddy creek, near Carmichaels, Greene Co., Pa. Stevenson's Report K, p. 59—over Waynesburg coal, top of Monongahela Series. *XV.*

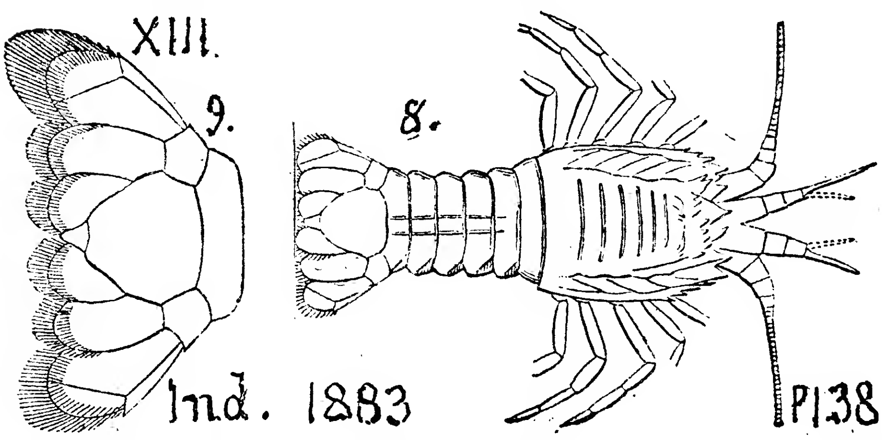
Antholites Brogt. See **Cordaites** Lesq.

Anthracomya (*Anthracosia*) **bradorica.** *See Appendix.*

Anthracosia (Anthracomya ?) **bradorica**, a minute lamellebranch shell of the Lower Carboniferous of Cape Breton. Dawson, Acad. Geol. 1868, p. 314, f. 33 *b*—*X.*

Anthraconectis See **Eurypterus mazonensis.** XIII.

Anthrapalæmon gracilis. (Meek & Worthen Illinois Reports Vol. 2, plate 32, fig. 4.) Collett's Indiana of 1883, page 180, plate 38, figs. 8 and 9. —Only found as yet in *XIII*, coal measures of Grundy county, Ill.—NOTE. See A. S. Packard's 3d part of 15th Memoir, Proc. National Acad. Sci. 1888, on the *Anthracaridæ* family of ancient ten-legged lobster-like animals preserved in the ore balls of Mazon creek, Ill.



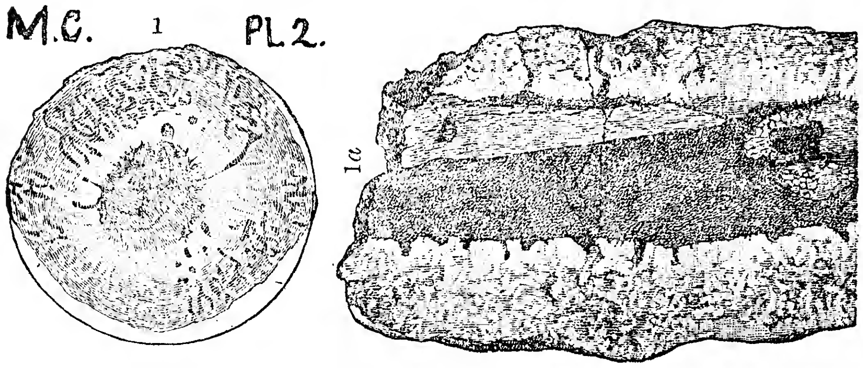
Aphlebia adnascens. European species. See **Rhacophyllum adnascens.** *XIII.*

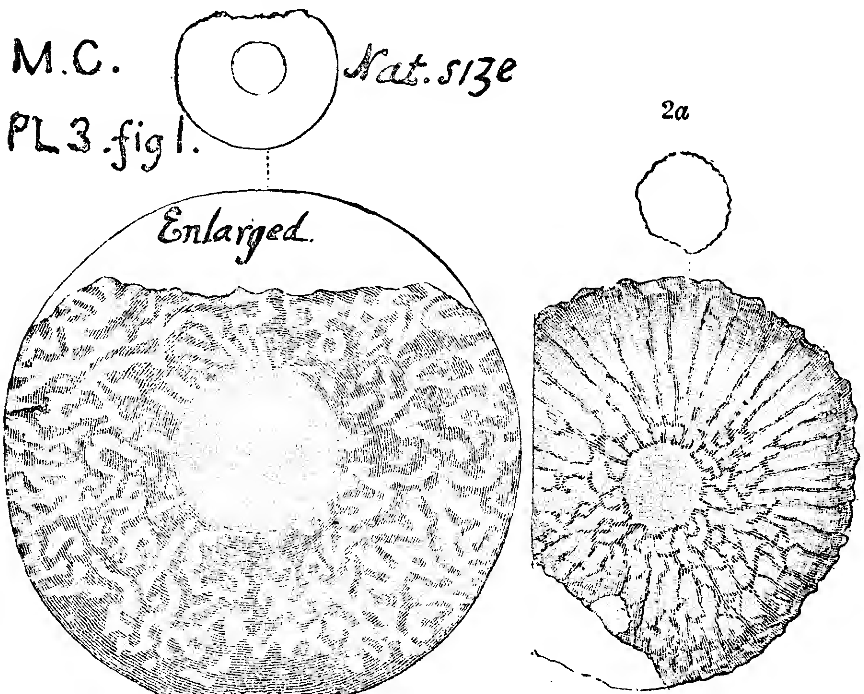
Archæocidaris——? Abound in Divisions F. G. H. of Randall's section at Warren, N. W. Pennsylvania. (Carll's Report IIII, p. 305, note; Report I, p. 53;) i. e. Shenango shales. Form. *XI*, between Olean and sub-Olean conglomerates, and the Pocono sandy shales of Form. *X*, under the sub-Olean; 200′ in all.—*X, XI.*

Archæocidaris wortheni. *See Appendix.*

Archæocyathellus. See **Ethmophyllum rensselæricum.** *Middle Cambrian, M. C.*

Archæocyathus atlanticus. Walcott. Bulletin, U. S. G. S. No. 30, page 73, plate 2, fig. 1, cross section, and fig. 1*a*, long section, of type specimen in Mus. Canadian Geol. Survey (*a*, the growth with the cup. *b* probably a foreign body not belonging to the animal.) (See Billings, 1861. Geol. Vt. II, 945; and Pal. Foss. I, 5.)—On plate 3, figure 1, shows the size of a cross section, and by an enlarged drawing, the internal anatomy of a specimen from L'Anse an Loup, Labrador. Fig. 2a. the same, of a specimen from Silver Peak, Nevada. (The other figs. given by Walcott are omitted here.)—Labrador and Nevada. *M. C.*





Archæocyathus billingsi. Walcott, Bulletin 30, page 74,

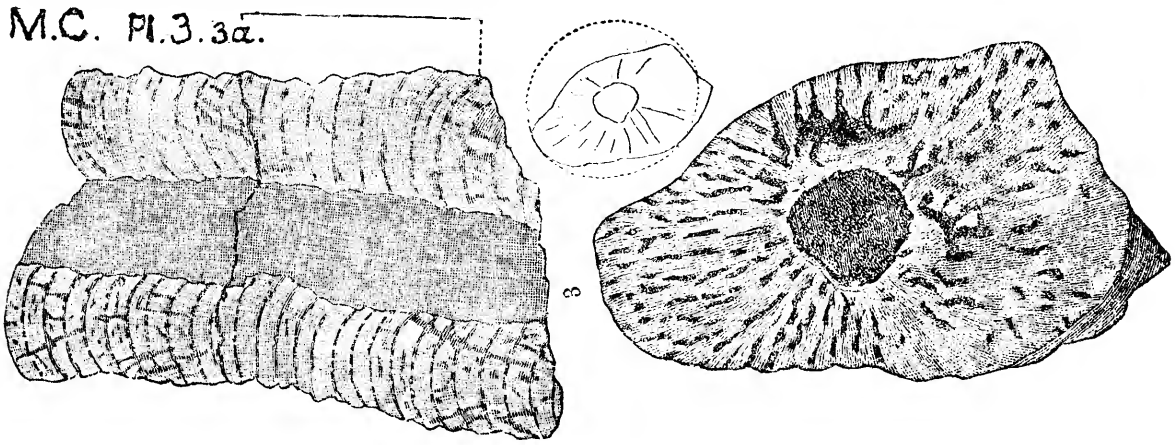


fig. 3, cross section, nat. size and enlargement, to show anatomy; fig. 3a, section lengthwise, to show central cavity and cross partitions (septa); outer walls mostly worn away. (Other figures omitted.) Braintree formation. *M. C.*

A. minganensis. See **Ethmophyllum minganense.** *M. C.*

A. profundus. See **Ethmophyllum profundum.** *M. C.*

Archæophyton newberryanum. Britton. Annals of the

Laur?

N.L.Britton. Ann. N.Y. Acad. Sc. IV. 4. 1888.

N. Y. Academy of Science, Vol. 4, No. 4; a figure, *natural size*, of probably the oldest known sea-weed (algoid), found in the

Azoic White Crystalline Limestone formation of Sussex Co., N. Y., supposed to be of Precambrian or Laurentian age, but possibly Cambrian.

Archæopteris bockshiana ? Geop. *Noeggerathia bocks-*

Lesq. in Geol. Pa. 1858. Pl. 3.

chiana. Lesq. Geo. Pa. 1858, p. 854'5, pl. 3, figs 1 to 1 *d*.—*Adiantites bockschii*, Goep.; *Cyclopteris bockschii*, Goep. Lesq. Coal Flora, p. 306, pl. 49, figs. 1 to 4.—*X*, *Pocono* (Vespertine) formation opposite Mauch Chunk; and below Pottsville, Pa.; always in small fragments.

Archæoptoris, halliana. (*Sphenopteris laxa.* Hall, Geol. 4th Dist. 1844, p. 275, formation, fig. 127, 1.— *Cyclopteris halliana*, Geop.; Daws.; *Cyclopteris jacksoni ?* Daws.; *Sphenopteris hitchcockiana*, Daws.) Lesq. Coal Flora, 1880, p. 304, says "that this figure represents the fructification of a species of *Archæopteris* is positive, and

VIII. g.
127.1.
Hall.

Prof. Dawson has recognised the accuracy of this reference: but in the absence of sterile leaflets" the species cannot be told. Compare a similar fig. (*Psilophytum condrusorum*) in Bull. Ac. R. Belgium, 1874.—*VIII g.* Chemung formation in New York; *Jacksoni*, from Upper Devonian in Maine; *Hitchcockiana*, from Lower Devonian in N. Y.

Archæopteris hybernica. *See Appendix.*

Archæopteris jacksoni. *See Appendix.*

Archæopteris minor. Lesquereux. (*Noeggerathia minor*, Lesq. Geol. Pa., 1858, page 854, plate 1, fig. 10). Collett's Indiana of 1883, page 71, plate 9, fig. 3, showing the fructification.—*XI.* Mauch Chunk red shale (sub-carboniferous) formation. (See Lesquereux's Coal Flora, Report P, Penn. Geol. Survey,

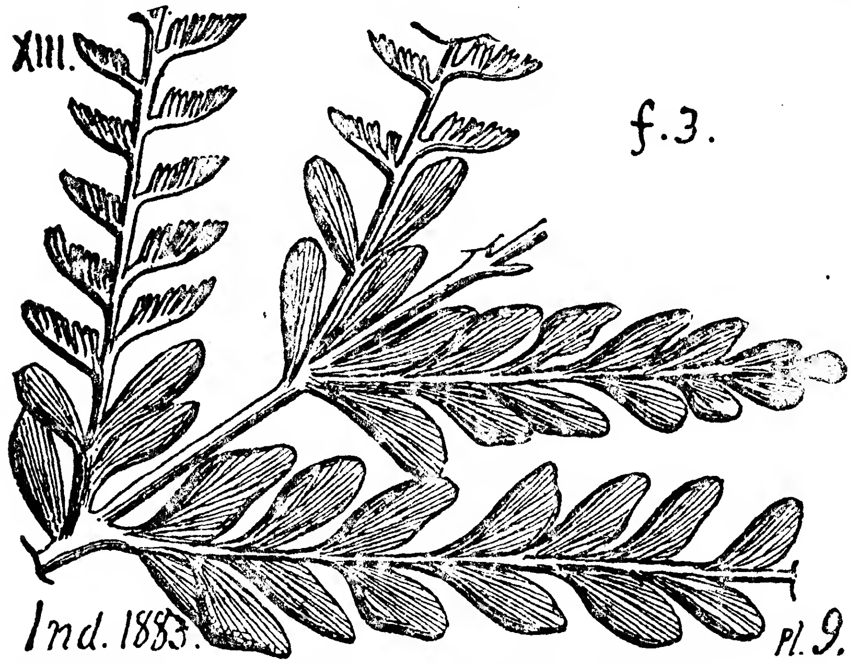
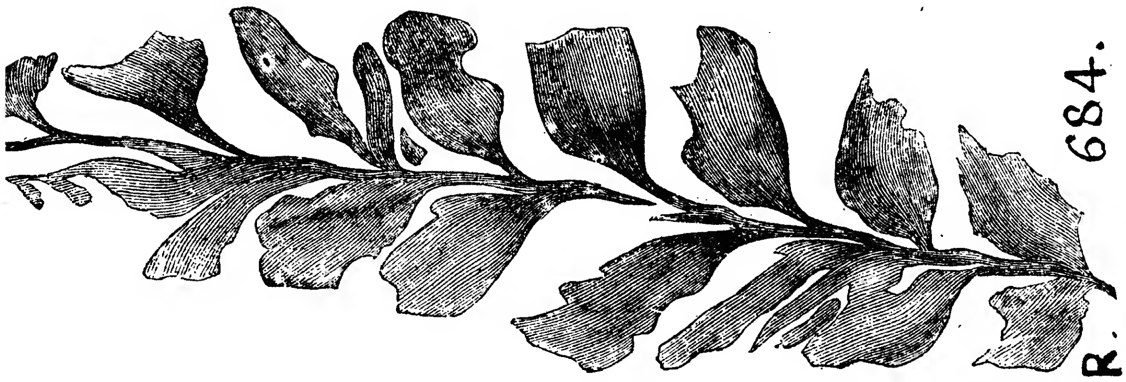


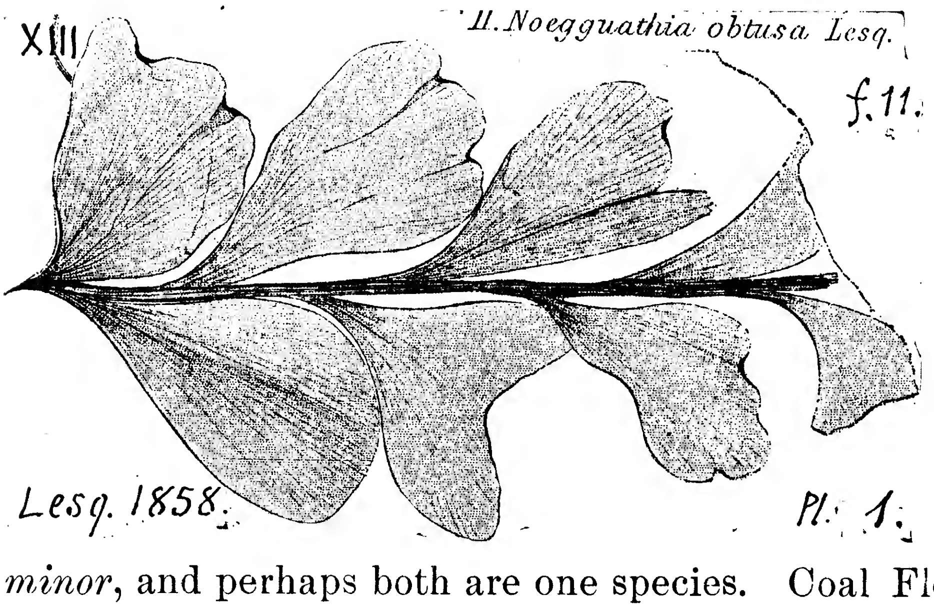
plate 49, fig. 5; plate 50, figs. 1, 2, 3, 4. Lesquereux identifies it with *Arch. stricta* of Andrews, Ohio Pal. Vol. 2, p. 418, plate 49, fig. 2, 2*a*.)—Abundant under Campbell's Ledge (*XII*) near Pittston, Pa. One fragment found at Mauch Chunk, Carbon Co., Pennsylvania.

NOTE.—I. C. White gives the Coxton, Susq. N. branch section of Catskill strata (IX), No 20 of which contains the plant; a thin layer of red shale in the middle of a 55′ greenish-gray sandstone, just overlying his Montrose red shale formation. Report G7, p. 61.—IX.

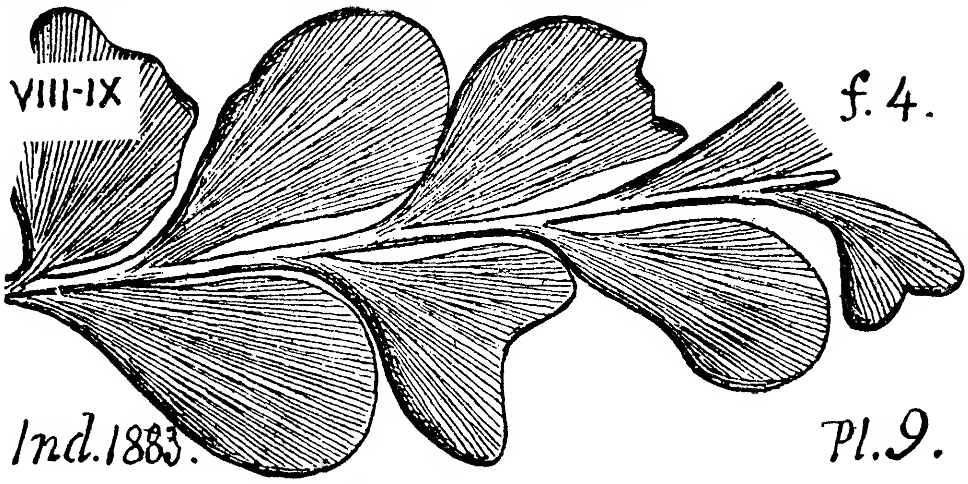
Archæopteris obtusa. (*Noeggerathia obtusa.*) Lesq. Geol.



Pa., 1858, p. 830, fig. 684, *IX*. Catskill formation; also p. 854, plate 1, fig. 11, found in the Catskill red sandstone (For. *XI*) in Mauch Chunk gap, Carbon Co., Pa., in small bits, with bits of *A. minor*, and perhaps both are one species. Coal Flora, 1880, p. 301, pl. 49, fig. 6, same as fig. 11 above; and fig. 7, sketched from large leaf of Mr. Riley, of Montrose, Wayne Co., Pa., part of which is given in Dana's Man. Geol., fig. 557 A. See also Dawson in Geol. Sur. Canada, 1871, p. 46, pl. 16, fig. 188, two leaves (pinnæ) of perhaps a different species.—Catskill formation. *IX*.



Archæopteris (Noeggerathia) obtusa (Lesquereux, in



Geology of Pennsylvania, 1858, page 854, plate 1, fig. 11, and Coal Flora, Report P, 1880, page 301, plate 49, figs. 6, 7.) Collett's Indiana of 1883, page 71, plate 9, fig. 4. *VIII-IX*, Chemung Catskill (Montrose sandstone) formation. The figure shows only the end of one feather of the magnificent leaf found at Montrose, (see a part of it represented in Dana's Manual, fig. 557 A.) The *Archiopteris obtusa* in Geol. Sur. Canada, Fossil plate XVI, fig. 188, is said by Lesquereux to look like *Cyclopteris.*

Archæopteris stricta. See **Archæopteris minor,** *XI.*

Archimedes. See Owens' figure, 1852, under **Retepora archimedes.** Keokuk Limestone. *XI.*

Archimedes lana (Hall, 1857, Proc. Am. Asso. Adv. Science, Vol. 10, Kaskaskia limestone). Collett's Indiana Report of 1881, page 361, plate 41,

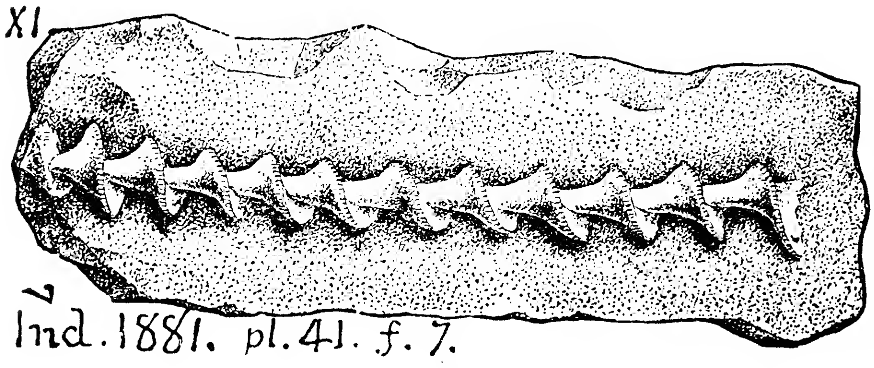
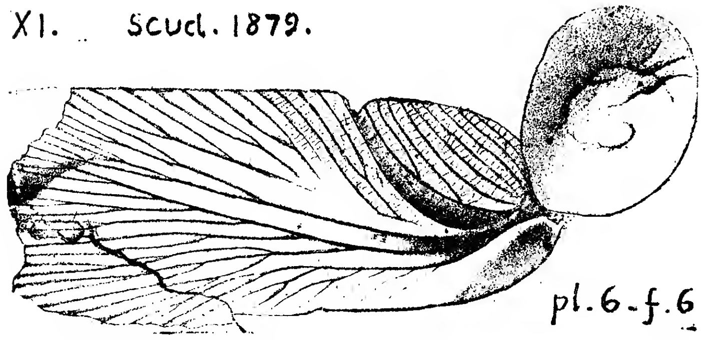


fig. 7; only the axis partly preserved; the frond destroyed; but the first row of little windows (fenestrules) appear on the edge of the spiral. (Natural size.) Mauch Chunk (Sub-Carboniferous, Kaskaskia limestone) formation. *XI.*

Archimedes? Specimens (OOO, 1888) 9664, 9665, 9666, 9667 (ten pieces) in Randall's collections, Division S. Chemung shales.— *VIII g.*

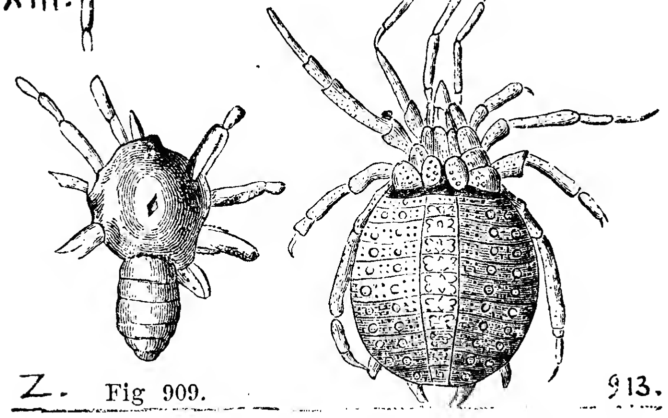
Archymilacris parallelum (i. e. the beginning of Cockroaches). Scudder. Boston Soc. Nat. Hist. Vol. 8, 1879, p. 85, plate 6, fig. 6, in the Mauch Chunk formation, under Campbell's ledge, in the gap, at Pittston, Luzerne Co., Pa. See White's report, G7, p. 41.—*XI.*



Arionellus quadrangularis. See **Agraulos quadrangularis.** *Lower Cambrian.*

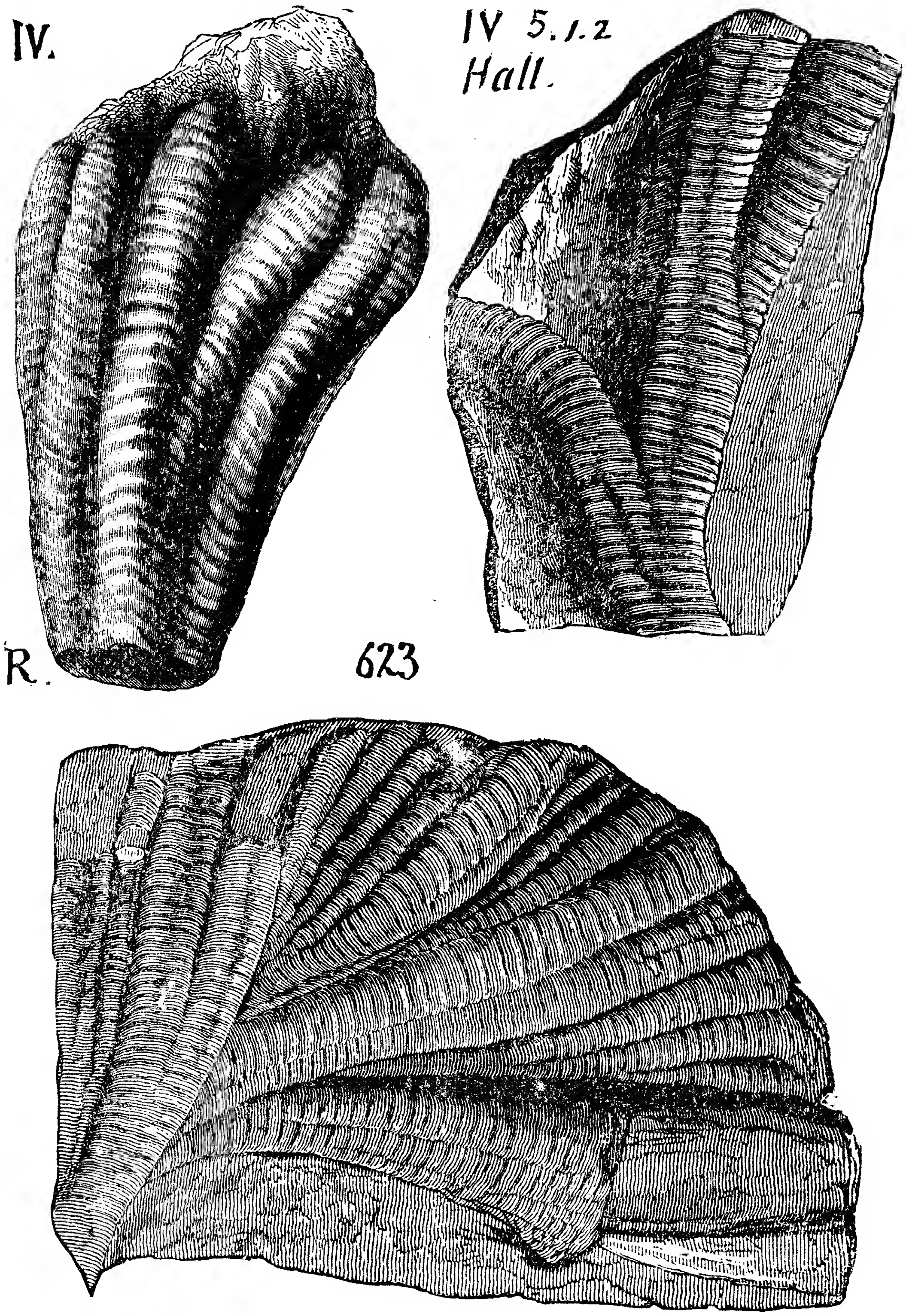
Aristozoa. Specimen in Carll & Randall's collections in Warren Co., Pa. C. E. Hall, Report of 1875, in Proc. Amer. Phil. Soc., Phila., January 5, 1876.—*VIII g*, *IX.*

Arthrolycosa antiqua. Harger. A fossil spider of the Coal Age, found in a Mazon creek nodule of the Illinois coal field. Zittel's Handbuch der Palæontologie, 1885, Vol. 2, page 735, fig. 909, *natural* size.—*XIII.* A more perfectly preserved spider, from the Colebrookdale coal measures of England, is added for comparison. Zittel (after Woodward), fig. 913.

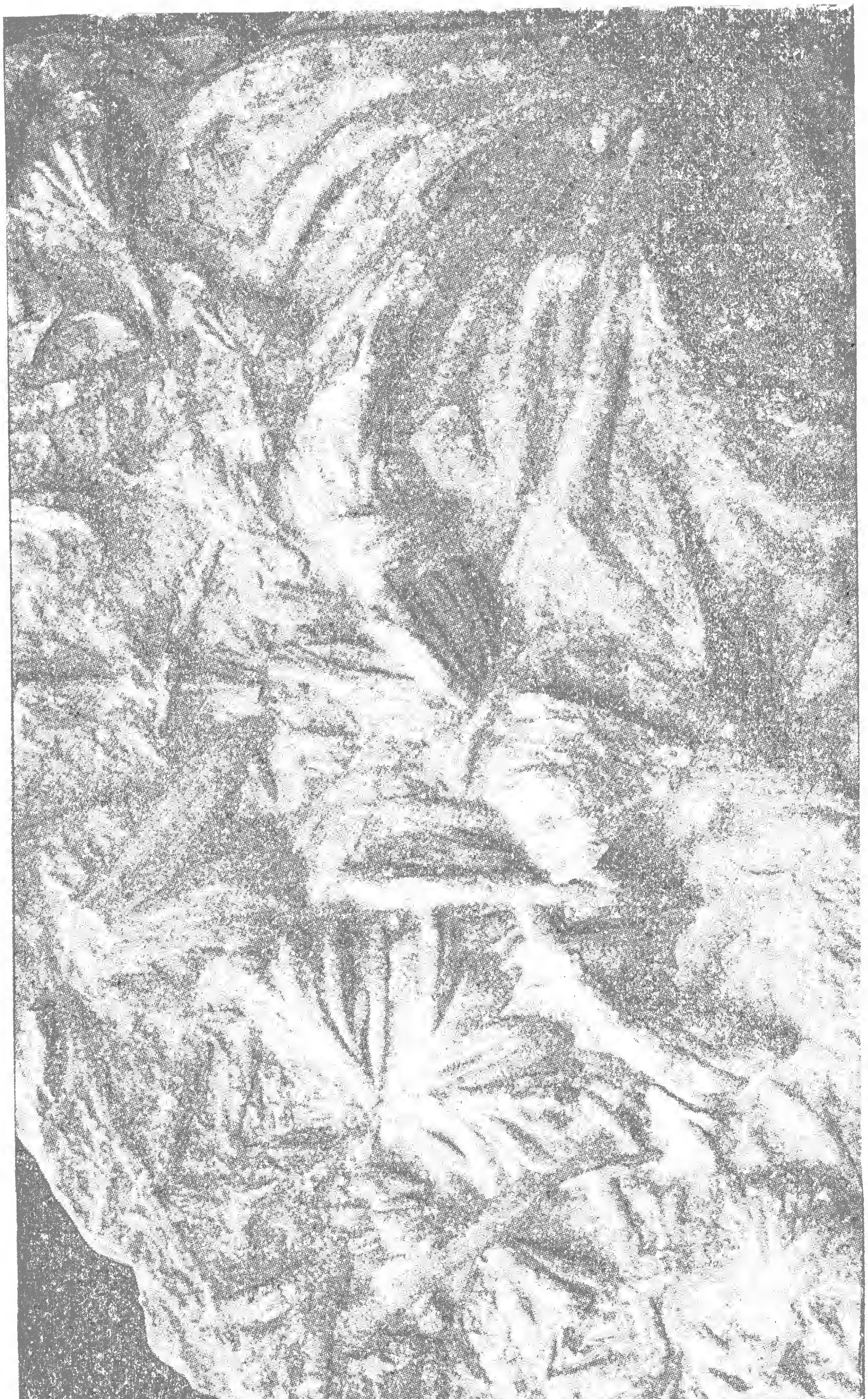


Arthrophycus harlani. (*Fucoides harlani.*) Hall, page 46, fig. 5, 1 and 2. Vanuxem, page 71, fig. 10. Rogers, page 821, fig. 623. See Conrad, An. Rt. N. Y., 1838. IV. Medina Sandstone formation. *IV b.*

Note. See **Harlania halli.** There is a disposition among geologists to regard these forms as not plants, but *worm-burrows.* C. E. Hall collected them for the Survey in Schuylkill and in Mifflin counties. In the mountain gaps of Blair Co. the uppermost thin beds of the White Medina (*IV c*) mottled red and gray are often covered with a net work of obscure impressions of these seaweeds, beneath greenish non-fossiliferous muddy slate partings. (T, p. 47).—In Huntingdon Co. large branching forms cover exposed surfaces in Waterstreet gap (T3, 143), and in Rockhill gap of Black Log at Orbisonia, the top

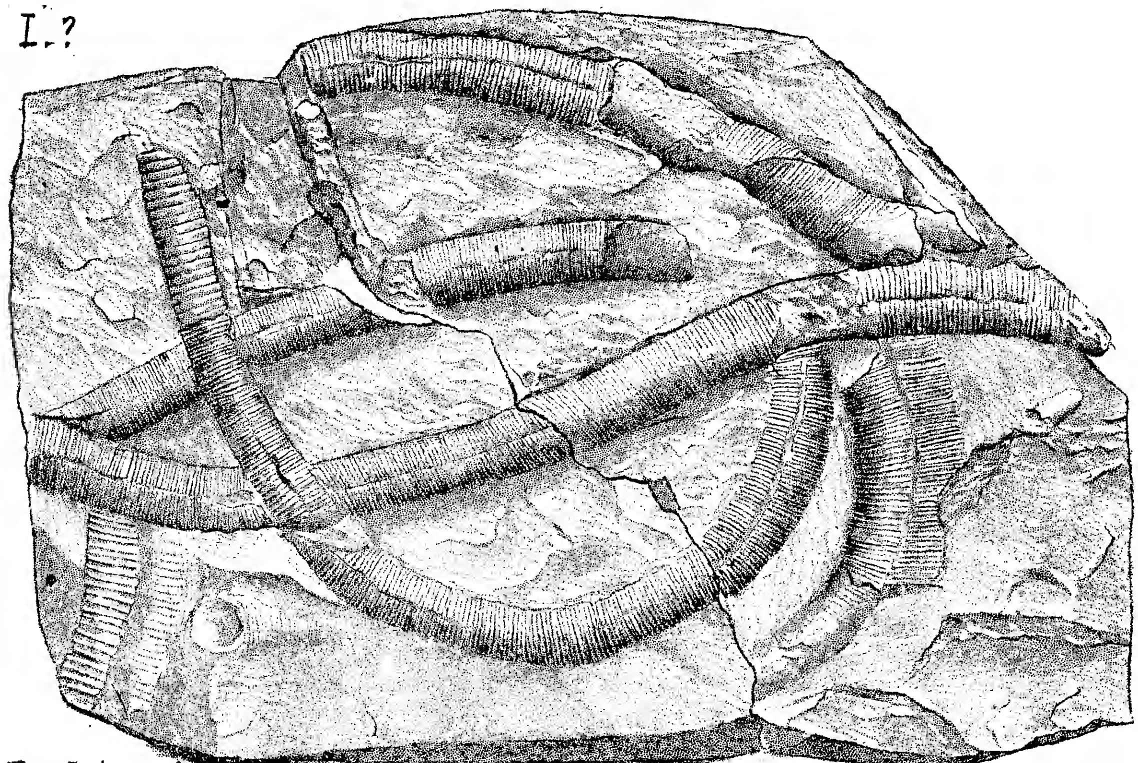


400′ of Medina alternations of hard white sand rock layers and red and green shales (T3, 145). Specimen 5246, came from the White Medina at Greenwood furnace, Broad Mountain (OO, p. 37.)—In Bedford Co. it was the only fossil ever seen by Stevenson in the White Medina (T2, 91); Piney ridge



(Wills mtn.) has these strata covered with the impressions (T2, 139); Evarts' mountain, abundant throughout the *lower* beds of white Medina, on Rainsburg Centreville road (T2, 146.)—In Centre Co. the only fossil in the White Medina of Bald Eagle Mtn. (T 4, 429,—*IV c.—For description of figure on page 39 see Appendix.* Specimens in the Cabinet. OO, Pal. Cat. five specimens, 400–1, collected by Chance, at Port Clinton, Schuylkill Co., 1874, from *Oneida Conglomerate, IV a;* and 401–2 (two) by Billin, at Greenwood, Huntingdon Co., 1876, from *Medina SS. IV b.*

Arthrophycus montalto, Simpson. 1888. Figure by G. B. I.?



Dr. Edgar's coll. at Chambersburg. Quarry at Mont Alto, Pa

Simpson, 1888, from reduced photograph of specimen by Rev. J. Edgar, Prest. Wilson Female College, Chambersburg, Pa., discovered by Col. Wiestling in the foundation wall of old saw-mill at Mt. Alto Iron Works, and traditionally taken from a quarry of hard rough sandstone, east of the company's office, up the mountain side, above another quarry of soft crumbling sandstone presumably No. 1, Potsdam formation. Search at the quarry failed to find another specimen. It seems impossible that Medina Sandstone (No. IV) should be there. The fossil resembles that of the Medina, but imitates a crinoid stem by regular cross lines on a flat surface. The "White Rocks" north of Mont Alto resemble Chiques Rock quartzite at Columbia, and is full of worm burrows (*Scolithus.*) The Scotch geologists, who have so well worked out the extraordinary structure of their Western Highlands, where our Appalachian formations and fossils are represented in their normal order, regard the so called *sea weeds* of *No. I* and *No. II* as worm burrows, tracks and excrements, and report them crowding and traversing in all directions most of the sand beds which were deposited before the deep sea limestone age. See Journal Geol. Soc. Lond. 1888. See also Dawson's **Rusichnites.**

Artisia. See **Cordaites serpens.** *XIII.*

Arvicola didelta, Cope. Proc. A. P S. 1871, p. 89, fig. 15 enlarged, *a*, *b*, *c*, *d*. Teeth of an extinct mouse found in the bone cave at Port Kennedy, Chester Co. Pa. *See Appendix for figures.*

Arvicola hiatides, Cope. The same, p. 91, fig. 18 enlarged, *a*, *b*, *c*.

Arvicola involuta, Cope. The same, p. 89, fig. 16.

Arvicola sigmodus, Cope. The same, p. 90, fig. 17, *a*, *b*, *c*, *d*.

Arvicola speothen, Cope. The same, p. 87, fig. 13.

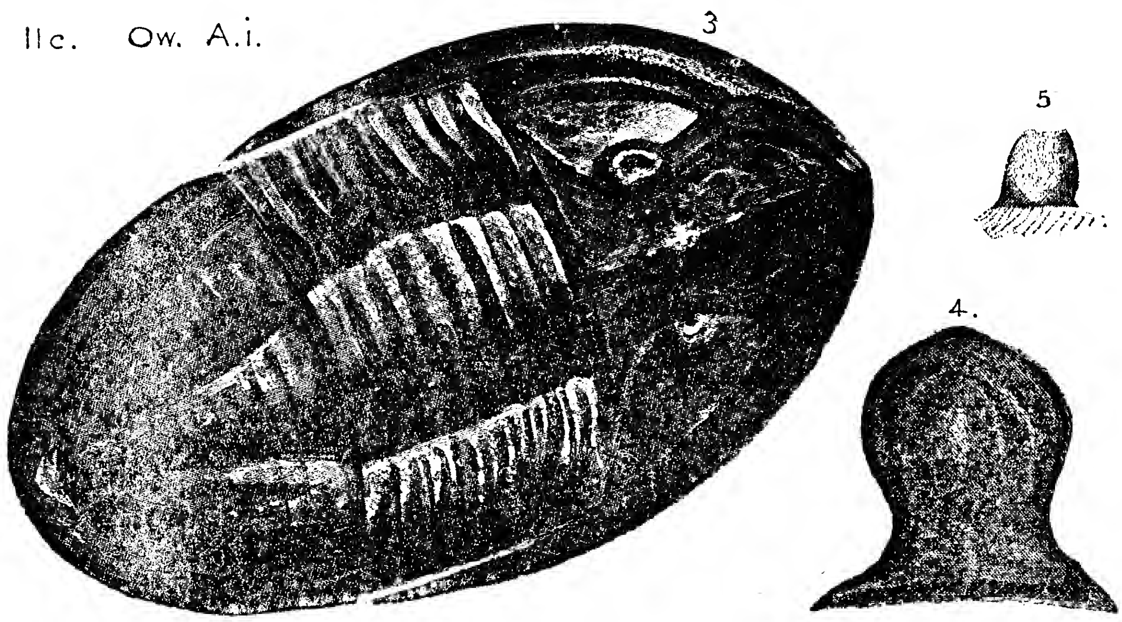
Arvicola tetradelta, Cope. The same, p. 88, fig 14.

Asaphus canalis. See **Isotelus canalis.** *II c*, *III b*.

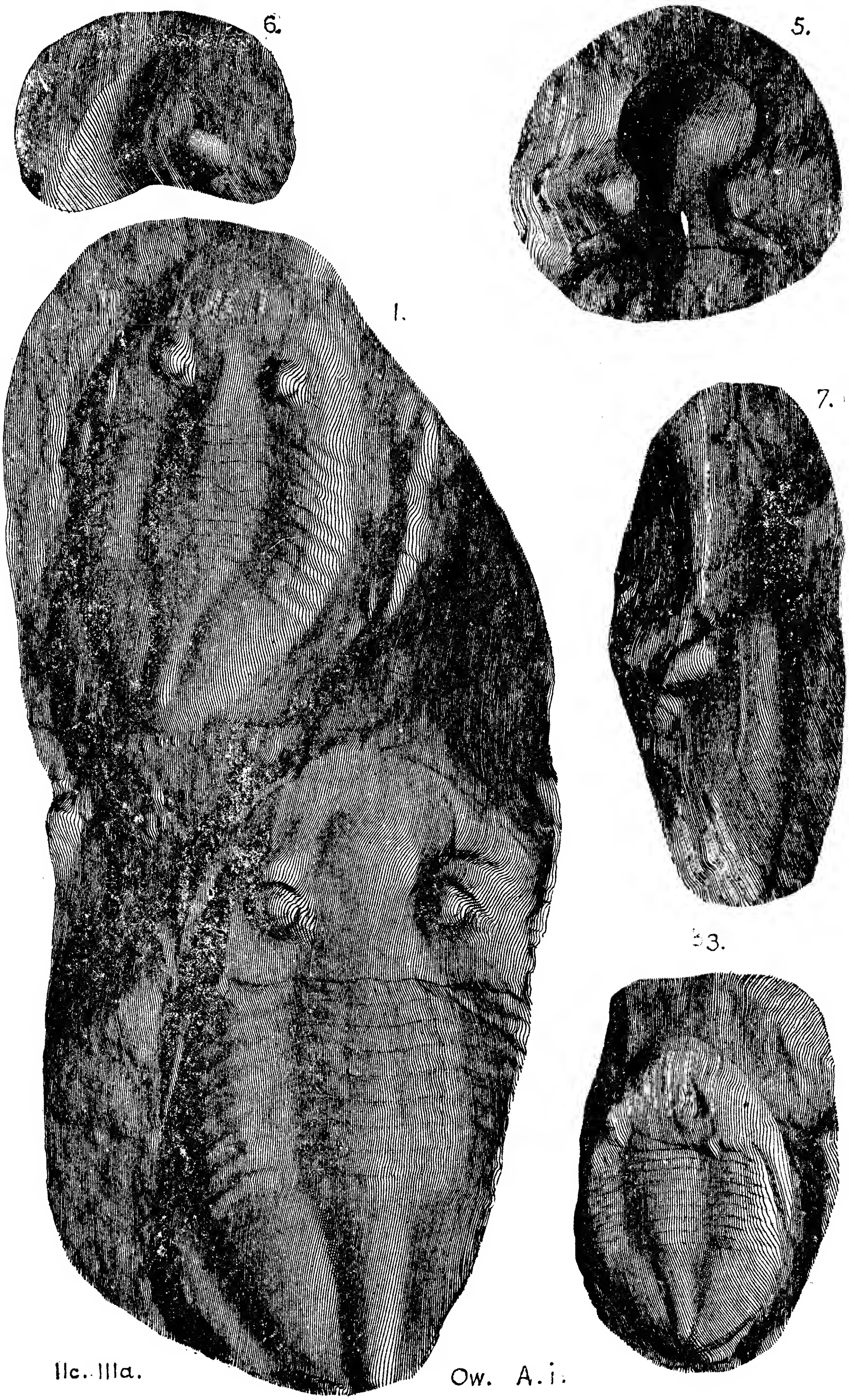
Asaphus coryphæus. See **Proetus coryphæus.** *V b.*

Asaphus (*Isotelus*) **iowensis.** Owen. Geo. Wis., Iowa

IIc. Ow. A.i.



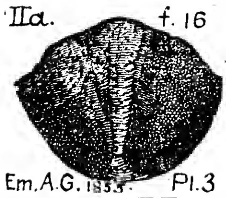
Asaphus iowensis continued.



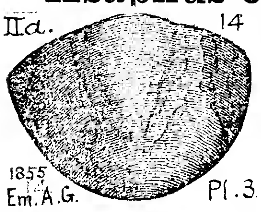
and Minnesota, 1852, pl. 2, fig. 3, 4, 5; pl. 2 A, fig. 1, (2) 3, (4) 5, 6, 7; head and tail pieces, and one of the elevated conical compound eyes of the trilobite. Trenton strata of Iowa.—*II c.* Note, the medal ruling gives fine relief and general effect, but not definite details of structure.

Asaphus limulurus. See **Dalmanites limulurus.** *V b.*

Asaphus longicordatus. See **Dalmanites limulurus.** *V b.*



Asaphus marginalis. (Hall, Pal. N. Y. Vol. 1, 1847. Chazy group.) Emmons, Amer. Geology, Vol. 1, part 2, page 235, plate 3, fig. 16. Axis with seven or eight distinct articulations; side lobes furrowed, or with false joints; margins entire. Chazy formation.—*II b.* Collected by C. E. Hall for the survey in 1875, in Kishicoquillis valley, Mifflin Co., Pa. Proc. A. P. S., Jan. 5, 1876. *Chazy.—II b.*



Asaphus obtusus. (Hall. Palæontology of N. Y., Vol. I, 1847, Chazy group.) Emmons, American Geology, Vol. I, part 2, page 236, plate 3, fig 14. A fragment too imperfect for identification, which may be *A. marginatus —II b*, Chazy formation. Specimens in the cabinet, OO, Pal. Coll. p. 233, specimens 210–97–*a;* 210–150; by Fellows, 1876, at Bellefonte, Centre county, in *Trenton limestone*, *II c.* Also 210–147, a hypostoma.

Asaphus——? OO, Pal. Coll. Spec. 211–7, by Fellows, 1876, at bluff above Tyrone forge, Huntingdon county, from *Trenton limestone*, *II c.*

Asaphus platycephalus See **Isotelus gigas**. *II c.*

Asaphus selenurus. See **Dalmanites selenurus.** *VIII a.*

Aspidaria undulata. See **Lepidodendron aculeatum** *XIII.*

Astarte subtextilis. See **Cardiomorpha subtextilis.** *VIII f.*

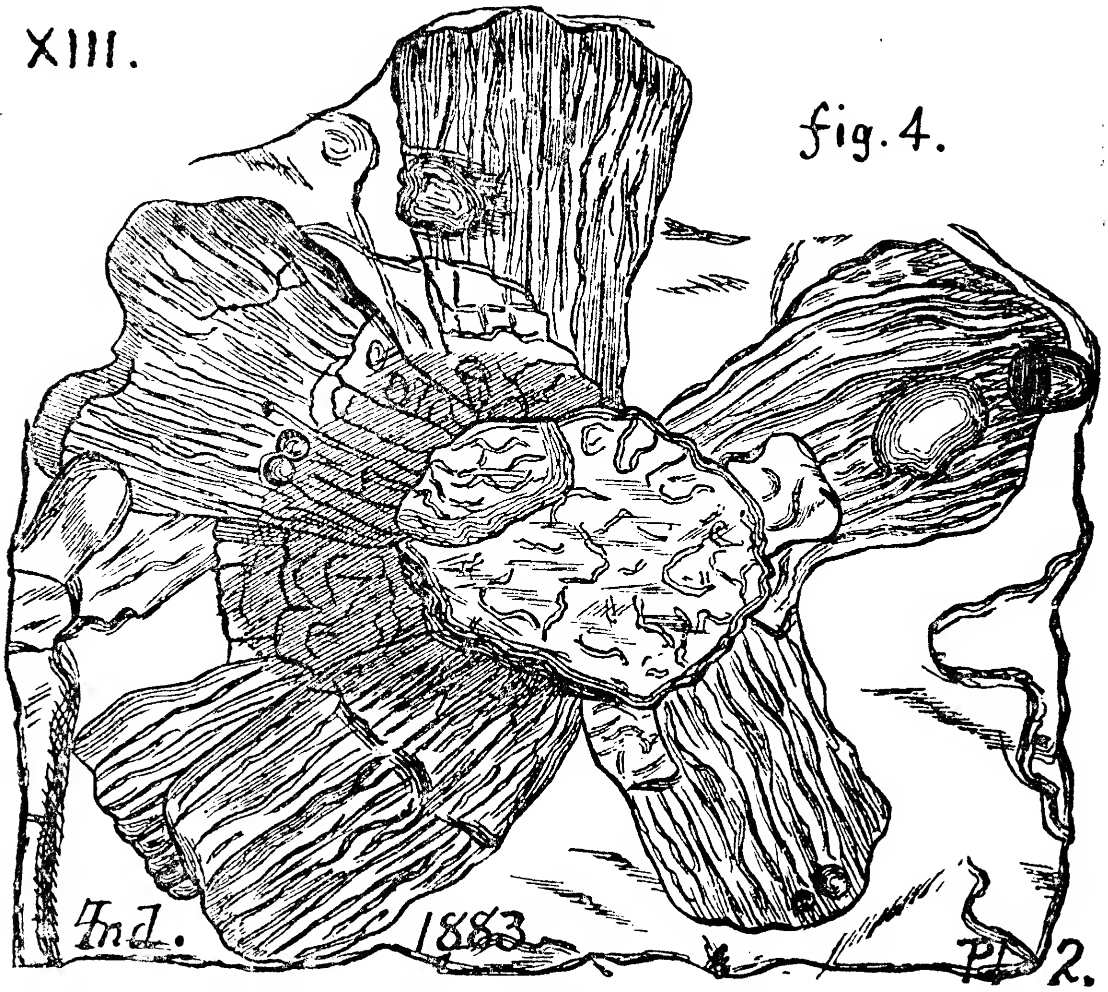
Astartella (*Edmondia*) **concentrica,** McChesney Desc. New Pal. Foss. Coal Measures —In Pennsylvania it is found in the Black fossiliferous limestone just above water level at Pittsburgh (L, 35); at Livermore, (H4, 78) and in Beaver Co. (Q, 30). In the Decher's creek shale, Stevenson in L, 37.

Abundantly in the Ferriferous limestone in Beaver (Q, 62); Lawrence (QQ, 47); Mercer (QQQ, 25); Butler (V, 146). White found it in the Mercer *lower* limestone, *XII* (QQ, 78). —Still lower, Stevenson found it in the Pocono sandstone strata, *X*, in the mountain gaps of Westmoreland and Fayette Cos. (KKK, p. 310).—*X to XIV. For figure see Appendix.*

Astartella vera. Hall, Geol. Report of Iowa, 1858, Coal Measures.—In Pennsylvania found by J. J. Stevenson, in Sub-conglomerate (Pocono, *X*) measures in the mountain gaps of Westmoreland and Fayette counties. Report KKK, p. 310.—*X.—For figure see Appendix.*

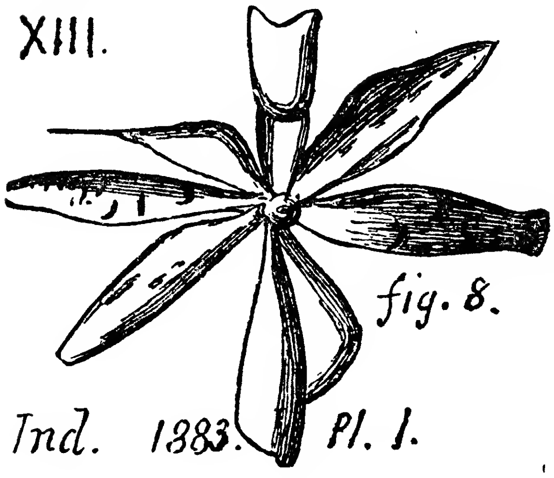
Astartella ——? found by J. J. Stevenson with *A. vera* in the gaps of Westmoreland and Fayette Cos., Pa. Report KKK, p. 310.—*X.*

Asterophycus coxii. (Lesquereux; in Geol. Report of Indi-

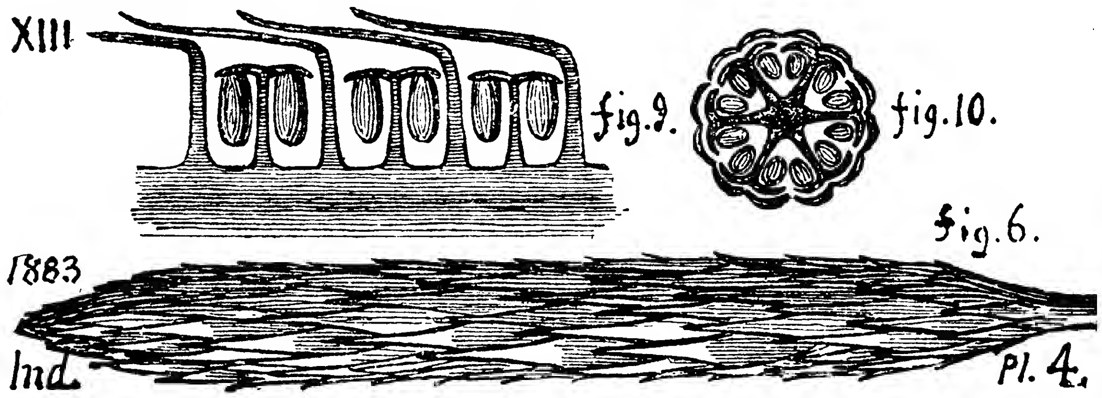


ana, 1875, page 139, plate 2.) Collett's Indiana of 1888, page 34, plate 2, fig. 4.—*XIII.* Coal measure sandstone New Harmony, Ind., and Rock Castle, Ky.—Coal Flora, B, figs. 5, 6.)

Asterophycus simplex. (Lesquereux. Coal Flora, Penn. Geol. Report P, page 13, plate B, figs. 7, 8.) Collett's Indiana, 1883, page 33, plate 1, fig. 8.—*XIII.* Allegheny Coal Measures, in clay above Pottsville Conglomerate (*XII*), near Beaver, Pa. [Note. The figure does not properly represent Lesquereux's; which see, and also his remarks on p. 13.]



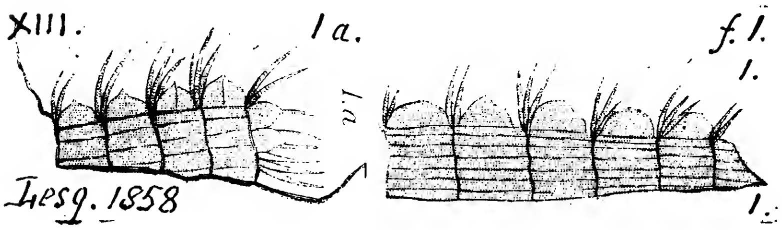
Asterophyllites. Brogniart. (Branches of Calamites,



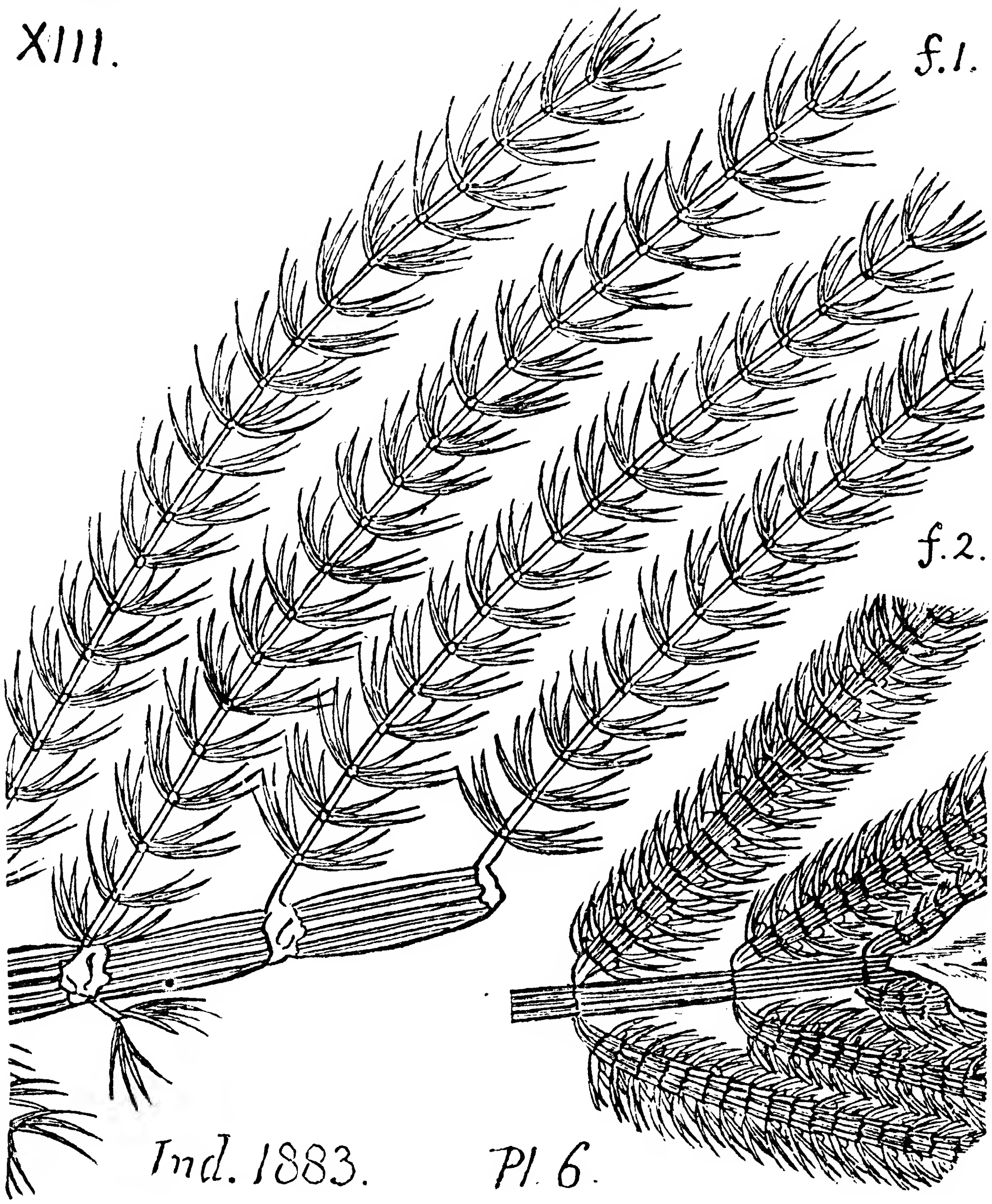
Calamocladus, or *Calamophyllites*, Schimper. Probably nearer to the *Lycopods.*) Collett's Indiana of 1883, page 41, plate 4, fig. 6, a conical ear or spike of fruit seeds; fig. 9, vertical section of a piece of the spike, to show how the seeds are concealed; fig. 10, cross section of the same. Coal Flora, page 34. Report I, p. 37; well preserved *Asterophyllites*, fish, &c., between First and Second mtn. sand, Oil Region, Pa.

Asterophyllites apertus See **Macrostachya aperta,** *XIII.*

Asterophyllites crassicaulis. Lesq. Geol. Penn. 1858, Vol. 2, page 851, plate 1, fig. 1, 1*a*. Perhaps the same as Gutbier's *Annularia longifolia;* species founded on only two small fragments from Schuylkill Co., Pa. Differs from all other species by its thick, deep furrows of stem; and by its fruit, nutlets compressed, apparently attached above the joints, filling the whole space between the whorls.



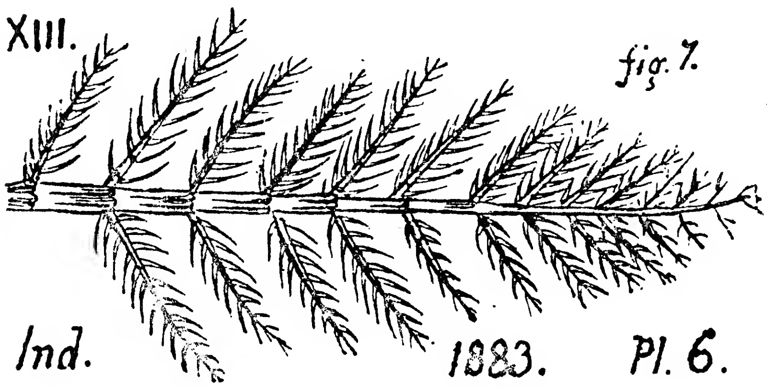
Asterophyllites equisetiformis. Brogniart. (*Casuari-*



nites equisetiformis, Schloth; *Asterophyllites ovalis?* Lesq.; *Asterophyllites erectifolius*, Andrews; *Hypurites longifolius*, Lind. & Hutton; *Calamocladus equisetiformis*, Schimper.) Collett's Indiana of 1883, page 42, plate 6, fig. 1, 2. (See Lesquereux's Coal Flora, Rept. P, Geol. Sur. Penn., page 35, plate 2, figs. 3, 3*a*; plate 3, figs. 5, 6, 7. *XIII*, *XIV*, *XV*, *XVI*, "the whole extent of Coal Measures; more prominent in the upper strata;" Cannelton, Gate Vein, &c., Lesq. Also in Darlington Coal, Beaver Co., Pa., with *A. foliosus*, and *A. sublœvis*, White's Rt. Q, p. 54.

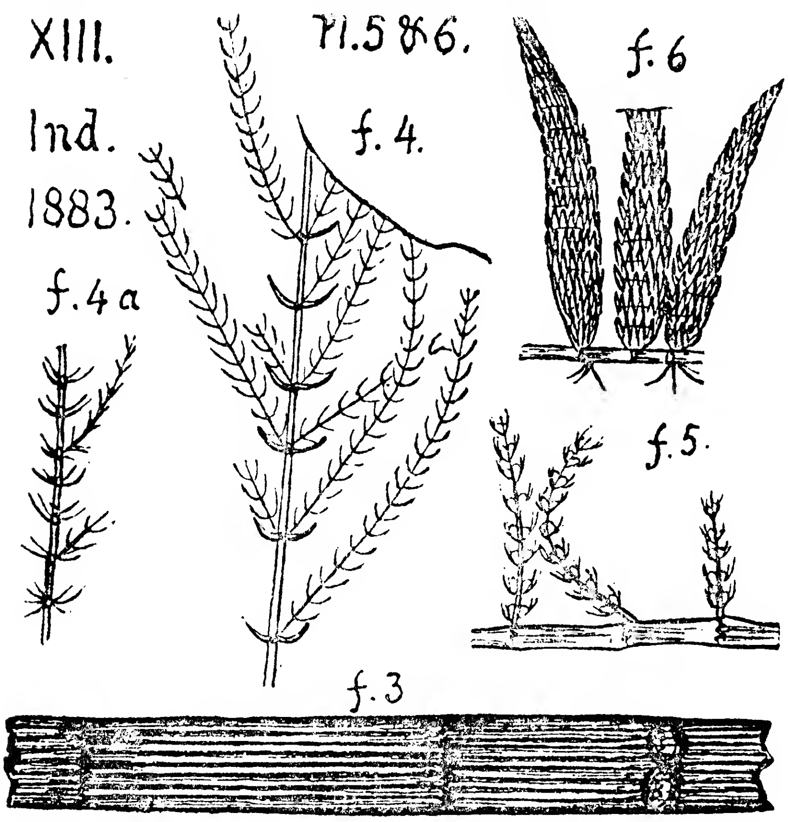
Asterophyllites erectifolius. See **Asterophyllites equisetiformis,** *XIII.*

Asterophyllites fasciculatus. (Lesquereux Coal Flora, Rept. P, Geo. Sur. Penn. 1880, page 41, plate 3, figs. 1 to 4.) A fine specimen from shale above coal bed in Missouri.



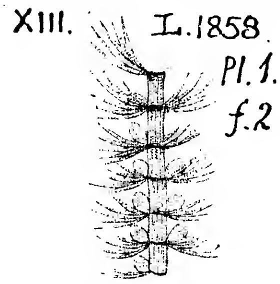
Asterophyllites foliosus. Ll. & Hutt. (Lesq. Coal Flora, p. 38, where see synonyms.) Found in Darlington coal, Beaver Co., Pa., by White; Report Q, p. 54—*XIII.*

Asterophyllites gracilis. (Lesquereux Coal Flora, Report P, Geol. Sur. Pa. 1880, page 42, plate 2, figs. 4–5*a*. Geol. Report Arkansas, Vol. 2, p. 310; plate 2, figs. 4, 4*a*, 1860.) Collett's Indiana of 1883, page 43, plate 5, fig. 3; plate 6, figs. 4 to 6.—Subconglomerate Coal Measures of Arkansas and Alabama. *Mauch Chunk*, *XI.*



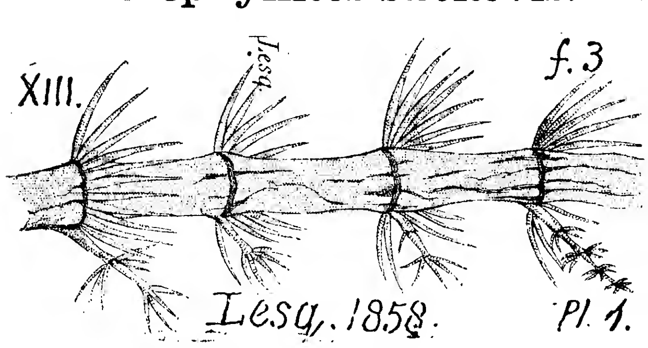
Asterophyllites longifolius. Brgt. (Lesq. Coal Flora, p. 36, with synonyms.) Found plentifully by Mr. Lacoe of Pittston, Pa., in the shales, under the Conglomerate of Campbell's Ledge. Q7, p. 39. *XI.*

Asterophyllites ovalis. Lesq. Geol. of Penn , 1858, Vol. 2, page 851, plate 1, fig. 2; differing from *A. crassicaulis* by its slender stem, slender furrows, more numerous leaves, and oval nutlets. Specimen from Gate vein, anthracite, "New Philadelphia," Schuylkill Co., Pa. See *A. equisetiformis*. *XIII.*



Asterophyllites sphenophylloides, Zenk. Found plentifully by Lacoe in sub-conglomerate shale, Campbell's Ledge, above Pittston, Pa., White's Rt. Q7, p. 39. *XI.*

Asterophyllites sublævis. Lesq. Geol. Pa , 1858, Vol. 2, page 851, plate 1, fig. 3; showing by its leaves of different length how easily one may be mislead into making new species where only *leaves* are found. The thick stem distinguishes it from *A. delicatula*. A remarkable root on the same slab of slate (I, f. 9) has a skin covered with wavy furrows crossing at right angles, looking like the woody substance of some conifers (I. f. 1*a.*) *XIII.* Found in Darlington coal, Beaver Co., Pa., with *A. equisetiformis* and *A. foliosus*, by I. C. White, Report Q, p. 54. *XIII.*

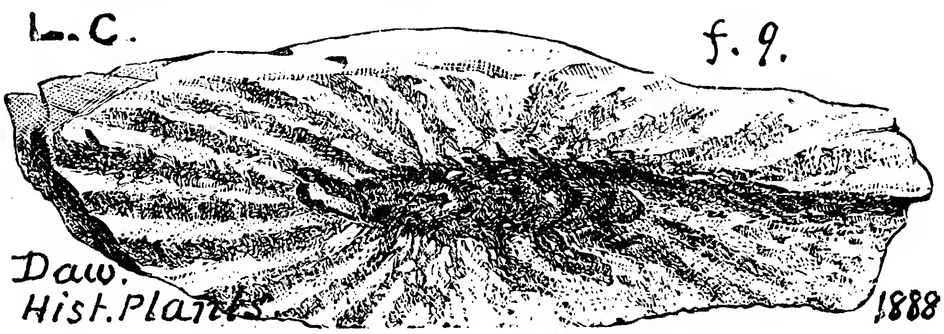


Asterophyllites tuberculatus. See **Annularia longifolia.**

Astræa rugosa. See **Acervularia rugosa.** VIII *a.*

Astrocerium or **Stromatopora.** Claypole's collections, Clark's Mills shale, Perry Co., Pa. Upper shaly beds of Lower Helderberg formation, *VI.* **Astrocerium** is **Favosites** of several species. Hall.

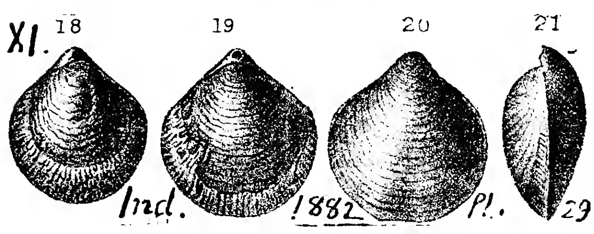
Astropolithon hindii, Dawson. Geol. Hist. Plants p. 31; possibly a vegetable of Lower Cambrian age, N. Scotia.



Astylospongia inornata. OO, Pal. Coll. ten specimens marked 601–20; four, marked 601–25; six, marked 601–29; twenty in all; collected by Hale & Hall, 1874, at Orbisonia; Huntingdon Co., Pa., at *Lower Held. VI. See Appendix.*

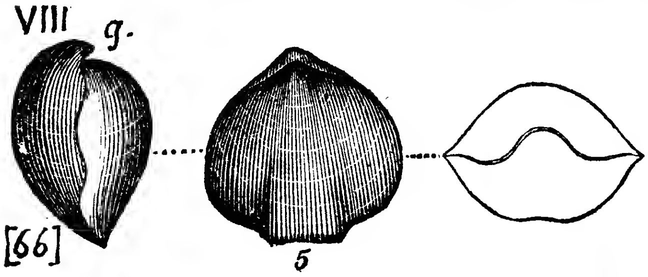
Athyris angelica. *See Appendix for figure.* Hall, 14th Regent's report, 1861, *Chemung.*—Specimens in the Cabinet (O, p. 235) 809–11, Coll. of Hall and Fellows, 1876, Canal n. of Port Jarvis, Pike Co., *Hamilton strata, VIII c.*—854–18 (cast showing changes by different degrees of weathering); 854–19 (shows muscular impressions and pustulate surface); 854–20 (four casts, preserving the form, and also traces of the external markings); 854–21 (two casts); 854–22 (three, variously preserved); 854–26 (cast, muscular scars, pustulose surface); 854–28 (small, fair spec.); 854–31 (both valves somewhat crushed); 854–35 (cast, slight scars); 854–87 (cast showing beaks); 854–45; all in Sherwood's collections, 1875, in Charleston t., Tioga Co., *Upper Chemung strata, VIII g.*—855–35 (cast); 855–49; 855–53; Sherwood's Coll, Sullivan t., Tioga Co., *Upper Chemung strata, VIII g.*—856–3 (casts); 856–4 (two casts); 856–10 (several casts); 856–14 (*b* cast); 856–15 (casts); 856–20 (cast showing muscular scar); 856–23 (good); 856–27 (casts); 856–41; 856–42 (shell preserved); 856–45; 856–47 (mostly *A. ang.*); all Sherwood's coll. at Mixtown, Tioga Co. *Upper Chemung, VIII g.* —860–2;–56 *a*;–64 *b*;–66;–88; all Sherwood's, near Mansfield, Tioga Co. *Upper Chemung, VIII g.*—861–6 *b*; 861–8;–12 (casts);–25 (impressions and casts); 28 (cast);–31 (cast);–32;–37 (cast): all Sherwood's coll. in Sullivan t., Tioga Co., Pa., from *Upper Chemung strata, VIII g.*

Athyris hirsuta, Whitfield. (*Spirigera hirsuta* of Hall, 1858, Trans. Alb. Acad. Vol. 4, Warsaw limestone; Whitfield, in Bull. 3 Am. Mus. N. H. p. 49, plate 6, figs. 18–21, 1882) Collett's Indiana of 1882, page 328, plate 29, fig. 18, a small Spergen Hill specimen, *enlarged twice*, showing setæ; figs 19, 20, 21, a larger specimen from same place.—*Sub-carboniferous. XI.*

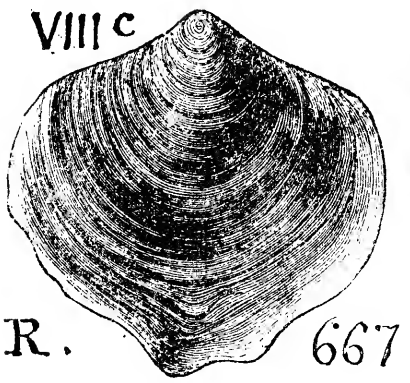


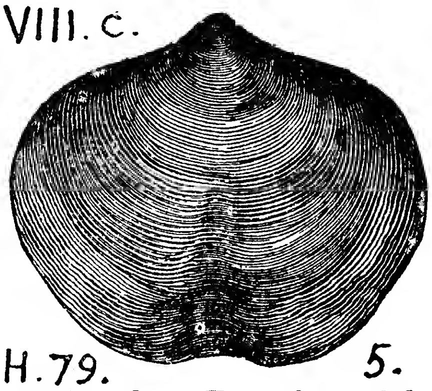
Athyris lamellosa. *See Appendix.*

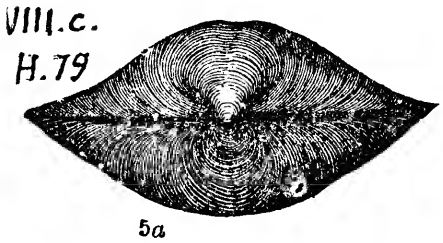
Athyris polita, (*Atrypa polita.*) Hall. 1843. Plate fig. [66, 5.] Chemung formation. Carll's collection's of 1875, in N. W. Penna. Also from Tioga Co., Pa. C. E. Hall's report in Proc. A. P. S., 1876.—*VIII g.*



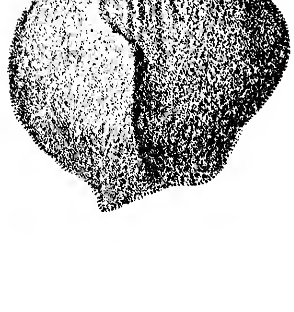
Athyris spiriferoides. (*Atrypa concentrica,*) Hall. page 198, fig. 79, 5. Rogers, page 828, fig. 667. (Rogers' *Spirifer spiriferoides.*) *VIII c.* Hamilton formation. In Pike Co., Pa., found by I. C. White, 4 m. above Port Jarvis, in dark sandy Chemung slate, with *S. mucronatus* etc. (G6, p. 194.) In Monroe Co. Marshall's falls, top rock, with *Spirifer*, *Grammysia*, crinoids, etc., near base of Hamilton, *VIII c.* (G6, p. 255.) Also in Columbia Co. Hemlock t., 250′ below top of Hamilton strata; also, South Danville, *top* of Hamilton proper, *VIII c*; Selinsgrove, Snyder Co. (I. C. White's Report G7, pp.75,79,229,352,359.)—In Huntingdon Co. Mapleton section, in upper Hamilton shales, (T3, p. 109); in hard Hamilton lower sandstone, 700′ above Oriskany, on Shy Beaver, Hopewell t. (p. 163.); in middle Hamilton, along Murray's run, Oneida t (p. 261). Specimens in OO, Pal. Coll. p. 235, spec. 805–7; 805–29; by C. E. Hall, 1875, at Bell's Mills, Blair Co. Pa. from *Hamilton shale*, *VIII c.*





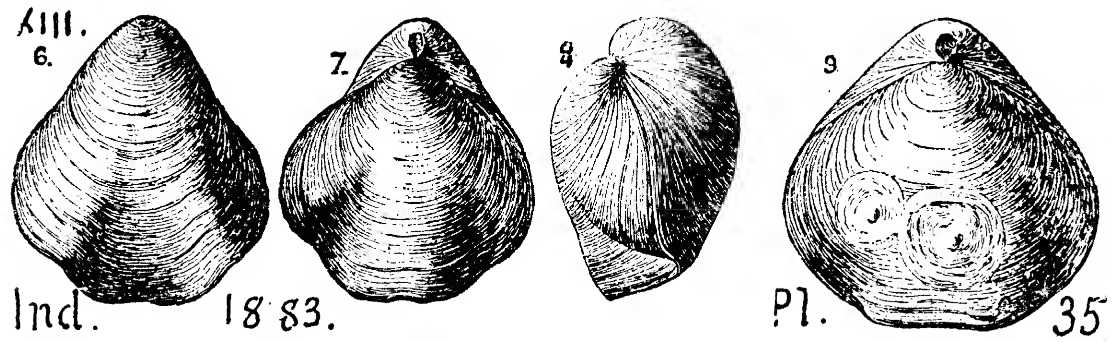


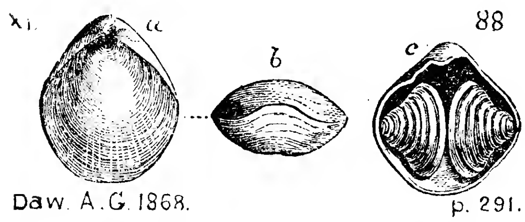
Athyris subquadrata. (Hall, Geo. Rt. Iowa, Vol. I, part 2, 1858, p. 703, pl. 27, fig. 2, Kaskaskia group.) Heilprin's report in An. Rt. Geol. Sur. Penna. 1885, page 453, 440, fig. 2. Several more or less perfect casts in the Mus. Wyoming Hist. Soc. Wilkes-Barre, from the Mill Creek limestone, 1000′ above the Conglomerate (XII) in the Northern Anthracite Coal field; about



the horizon of the Pittsburgh bed of the West.—*XV*, Monongahela series of coal measures.—Found by J. J. Stevenson, in the Loyalhanna gap, Westmoreland Co., Pa., numerous, with a few *Productus elegans*, in subcarb. limestone. (KK, p. 291.) (KKK, p. 311.)—*XI*. In Perry Co., collected by Claypole at Vanderslice's quarry, Bloomsburg, in Hamilton; numerous just over top of Marcellus, near Huntingdon (p. 258). Catalogue 87-4 (1).—*VIII c; VIII g*.

Athyris subtilita, (Hall, 1852, Stansbury's Expedition

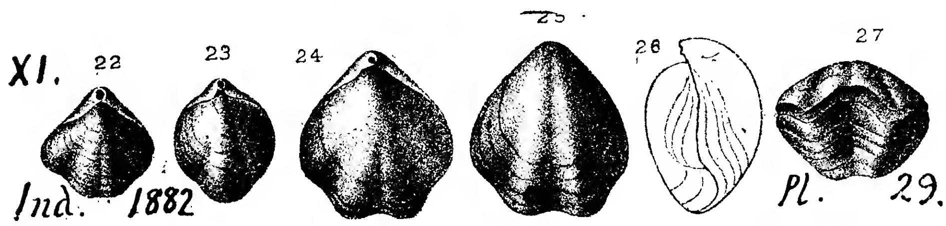




Coal Measures.) Collett's Indiana of 1883, page 136, plate 35, figs. 6, 7, 8, belly, back and side views of a typical example, *natural size;* fig. 9 back view of larger specimen to which are attached two under valves of *Crania modesta*.—*XIII—XVII*. Widely known, the most common and characteristic species of the Coal Measures, ranging from base to summit, and into the Permian (Meek); from Virginia to the Rocky Mountains; common in Upper and Middle, rarer in Lower Coal Measures. Dawson's Acad. Geology, 1868, page 291, figs. 88 *a*, *b* and *c*, showing the spiral gills, which give name to all the *Spiriferidæ*. Occurs by millions in the Lower Carboniferous limestone of Nova Scotia.—*XI*.

In Pennsylvania, abundant in Green Crinoidal limestone, middle of Barren Measures (Pittsburgh Series) and in the Black Crinoidal limestone, at Pittsburgh, and on the Conemaugh. (Reports K, p. 80; L, p. 35.) At Morgantown, W. Va. in Deckert's creek shale under Mahoning sandstone, bottom of Barren Measures (L, p. 36.)—In Lawrence, Beaver and Butler Cos. in Ferriferous limestone (Q2, pp. 47, 106; Q3, p. 25; V, p. 147); also, in Conglomerate *No. XII*, over Scrubgrass coal in Mercer Upper and Lower limestone (QQ, pp. 57, 61, 78, 129; QQQ, pp. 77, 78, 138)—In Fayette Co. replaced by calc spar, in Subcarboniferous limestone, No. XI, (KK, p. 291.)—It is probably the *Athyris* of Mansfield's Kittanning coal at Cannelton, Beaver Co., Pa., C. E. Hall, Ms. Rt. Dec. 30, 1876. I. C. White recognized it in Beaver and S. Butler Cos. in five horizons, *Crinoidal L.; Pine Creek L.; Brush Creek L.; Ferriferous L.;* and *Mercer L.* (Q 30, 33, 264, 62, 200, 62.)—*XI* to *XII.* (*See Appendix.*)

Athyris trinucleus. (*Terebratula trinucleus* Hall, Trans. Alb. Inst. 4, 7. 1856; Iowa report, 1858, p. 659;



Whitfield, Bull. 3, Am. Mus., p. 50, pl. 6, figs. 22–27, 1882.) Collett's Indiana of 1882, page 329, plate 29, figs. 22 and 23, two specimens from Bloomington, showing variations of form; figs. 24 to 27, a larger specimen from Spergen hill.—Subcarboniferous. *XI.*

Athyris———? OO. Pal. Coll., p. 235, spec. 806–9, by Fellows & Genth, 1875, at Dietrick's, ½ m. n. of Marshall's falls, Monroe Co., Pa., from *Ham. shale*, *VIII c.*

Athyris———? New species? Specimen 850–14 (three fair specimens unlike any known to G. B. S., 1888) in Sherwood's collections, 1875, at Lawrenceville, Tioga Co., Pa., from *Chemung strata*, *VIII g.*

Athyris———? Spec. 850–2, from Lawrenceville, Tioga Co., *Chemung*, *VIII g.*

Atops punctatus See **Ptychoparia trilineata.** *Middle Cambrian. M. C.*

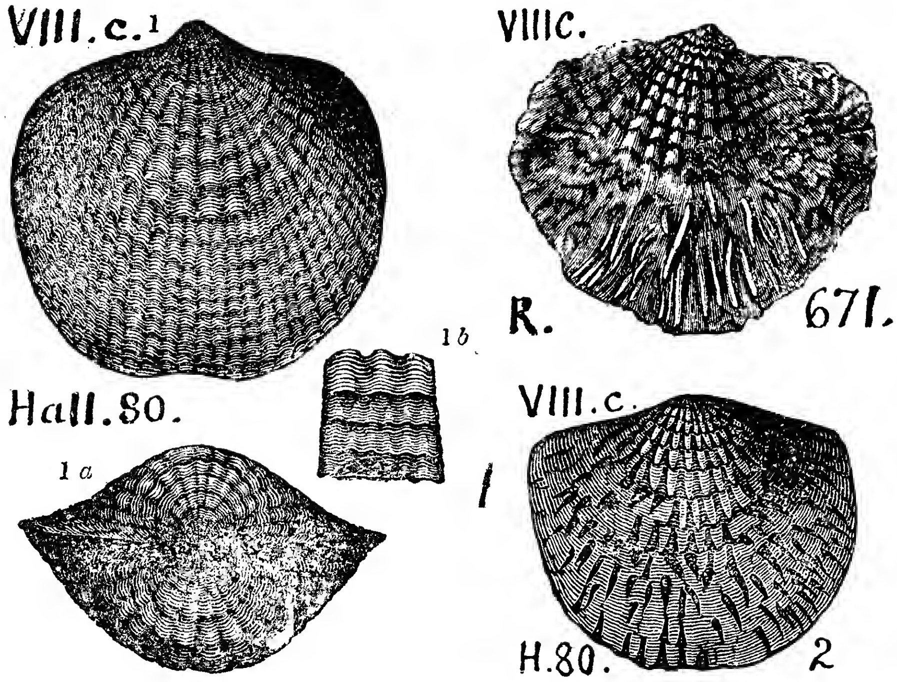
Atops trilineatus. See **Ptychoparia trilineata.** *Middle Cambrian. M. C.*

Atrypa affinis. See **Atrypa reticularis.**

Atrypa altilis. See **Rhynchonella altilis.** II*a*, *b*. Specimens in the Cabinet, OO, Pal. Coll. page 232, spec. 210–150, by Fellows, 1876, at Bellefonte, Centre Co., Pa., from *Trenton limestone.* *VI c.* G. B. Simpson.

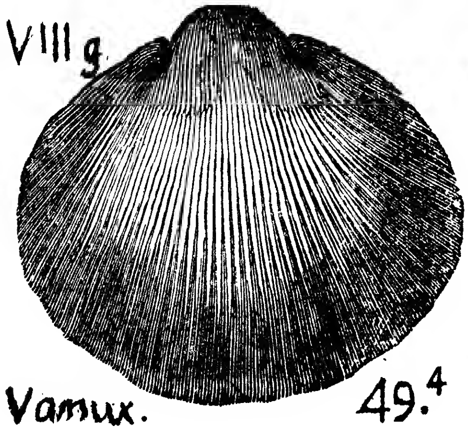
Atrypa ambigua. See **Camarella ambigua.** II c.

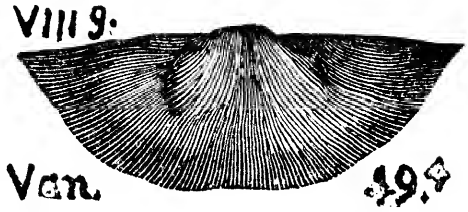
Atrypa aspera (*Terebratula aspera*). Hall, Report, W. D. 1843, page 200, fig. 80, 1, 1*a*, 1*b*, 2, Rogers, page 828, fig. 671, *VIII c*. Hamilton formation. (Compare Schlotheim's fig. of 1813, in Petrifacturkunde) — Claypole, Perry Co., Pa. Report F 2, preface, *VIII c*. Hamilton formation. In eastern Pennsylvania, Monroe Co., Marshall's falls, reported by H. D. Rogers. By I. C. White as *A. spinosa*, in various places, especially near Stroudsburg, S. of McMichael's or on Gap road, in Corniferous limestone, *VIII a*, (G6, p. 120.) From Tioga Co., Pa. C. E. Hall's list of collections, in Chemung strata, *VIII g*. (Proc. A. P. S. Jan. 5, 1876.) Perry Co., Pa., by Claypole, in Hamilton sandstone, *VIII c* (Preface to F2, p. xiii. Also OOO, catalogue of collections, 14 specimens from five localities.) Huntingdon Co., by White, Haun's bridge, Juniata township, 100′ and 300′ beneath Chemung Upper conglomerate. (T3, pp. 98, 194.) Bedford Co., by Stevenson, in Portage sandstone, *VIII f*, Yellow creek, 1000′ beneath Chemung lower conglomerate, (T2, p. 80); brown SS, Calvin's, Napier t., (p. 117) yellow SS. W. Borden's ridge, St. Clair t. (p. 122); reddish brown flags (p. 122); Chemung SS. Clear ridge, Zembower's, W. Providence t. (p. 216) — *VIII*. Specimen 855–29 (a very coarse specimen of *A. aspera?* in good condition); —30 (similar, but lower half broken off); in Sherwood's Coll. in Sullivan t., Tioga county, Pa , (O, p. 236), from *Upper Chemung VIII g*.



Atrypa aspera, var. **occidentalis,** Hall, Geological Report on Iowa, Vol. 1, part 2, 1858. *Hamilton formation*, *VIII c*. This is the variety seen in the Norih-western States.

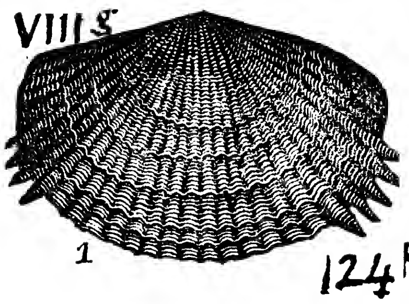
Atrypa chemungensis. Vanuxem, page 182, fig. 49, 4, *VIII g.* Chemung formation. (See Conrad, 1842, Jour. A. N. H. Phila., Vol. 8.—This is the largest *Atrypa* in middle New York; but the casts of it are more numerous than the shells themselves.

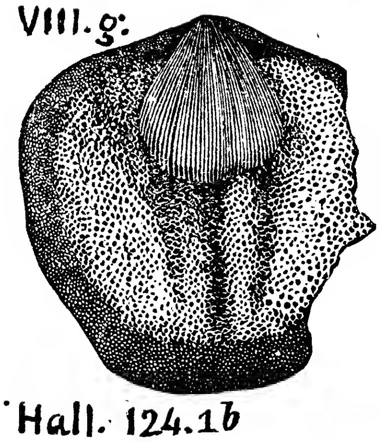




Atrypa concentrica. See **Athyris spiriferoides.** *VIII c.*
Atrypa concinna. See **Nucleospira concinna.** *VIII c.*
Atrypa congesta. See **Camarella congesta.** *V a.*
Atrypa consimilaris. See **Atrypa reticularis.** *VIII a.*
Atrypa contracta. See **Stenoschisma contractum.** *VIII g.*
Atrypa cuboides. See **Rhynchonella venustula.** *VIII d*
Atrypa cuneata. See **Rhynchonella cuneata.** *V b.*
Atrypa dubia. See **Rhynchonella dubia.** *II b.*

Antrypa dumosa. Hall. page 271, figs. 124, 1, 1a; 1b (a cast). Chemung formation. *VIII* g. *Dumosa* means *bushy*, in reference to its numerous spines; but the shells of this species found abundantly along the Chemung river, on Cayuta creek, at Elmira, &c., have usually lost their spines and look *scaley*, so that Prof. Hall at first named the species *Atrypa squamosa.* The cast of the interior of the flat valve is punctured all over, except on the scar, which is finely striated lengthwise, as shown in the figure, 1 b.





Atrypa duplicata. See **Stenoschisma duplicatum.** VIII g.
Atrypa elongata. See **Renssellæria ovoides.** VIII.

Atrypa exigua. (Hall, Pal. N. Y. Vol. I, 1847, Trenton group.) Emmons, Amer. Geol. I, ii, 1855, page 190, plate 10, fig. 6 *a*, *b*, *c*. Valve with a ridge in middle; depressed back; shell surface marked with fine concentric lines. Trenton formation. *II c.*

IIc. 6

a b c Em. A. G. 1855 Pl. 10

Atrypa eximia. See **Stenoschisma eximium.** *VIII g.*

Atrypa extans. See **Camarella extans.** *II c.*

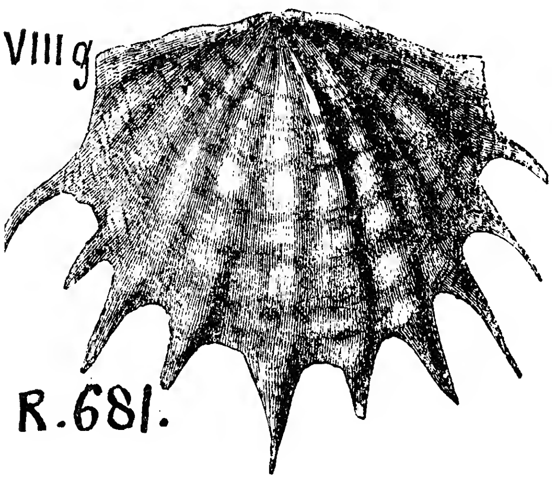
Atrypa galeata. See **Pentamerus galeatus.** *VI.*

Atrypa globuliformis. See **Leiorhynchus globulif.** *VIII g.*

Atrypa hemispherica. **Leptocoelia hemispherica.** *V a.*

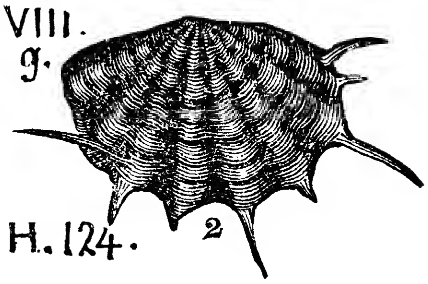
Atrypa hystrix. (Hall, page 271, fig. 124, 2. H. D. Rogers, page 829, figure 681. *VIII g.* Chemung formation. Claypole, Perry Co., Pa., Report F2, preface. *VIII c*; Hamilton formation. At Selinsgrove, section 95, bed 4, White's Report G7, p. 359, in lower Chemung, *VIII g.* or Portage, *VIII f.*—In Erie Co. with other genuine Chemung forms in middle and upper layers of I. C. White's 325′ of Chemung (Q4, p. 118).—Quite abundant in the *Spirifer bed* over the Third Oil SS. at the Carroll quarries, at LeBoeuf (Q4, p. 240).—With other Chemung forms at Crowley's run bridge, Greene township (Q4, p. 283).—*VIII g.*

VIII g



R. 681.

VIII. g.



H. 124. 2

Atrypa imbricata (*Terebratula imbricata*). Hall, Report on the Geology of the Fourth district of New York, 1843, page 103, plate fig. [14, 1.] Niagara formation. The figure is taken from H. D. Rogers, Geol. Pa., 1858. *V b.*

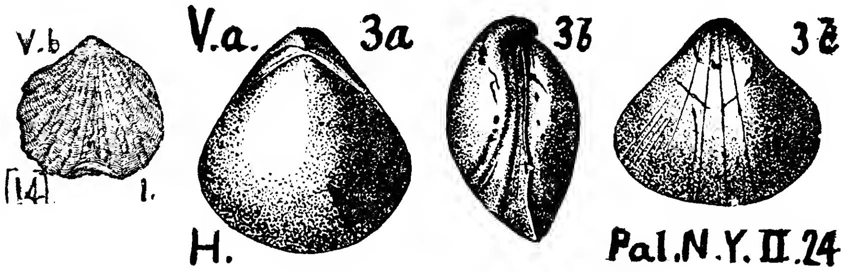
Va.

R. 634

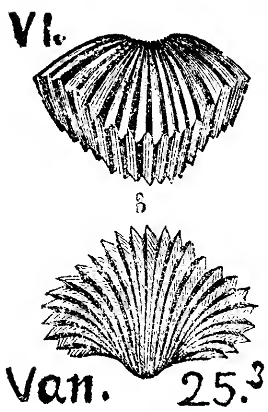
Atrypa impressa. Spec. 854–15 (doubtful species; poor cast, but showing muscular impression); in Sherwood's coll. in Charleston t., Tioga Co., *Chemung upper*, VIII g.

Atrypa increbescens. See **Rhynchonella capax.** *III b.*

Atrypa intermedia. Rogers, page 823, fig. 634. See Hall, Pal. N. Y. Vol. II, 1852. Clinton formation. Specimens collected by I. C. White, near Barre forge, Pa. RR., Huntingdon Co., Pa., from Clinton lower shale. See OOO, Claypole's list, 237–4, pill box full.—Specimens in the Cabinet, OO, Pal. Coll. p. 233, spec. 506–5; 506–28; by C. E. Hall, 1875, 2 m. S. W. of Bell's Mills, Blair Co., from *Clinton lime shale, V a.*

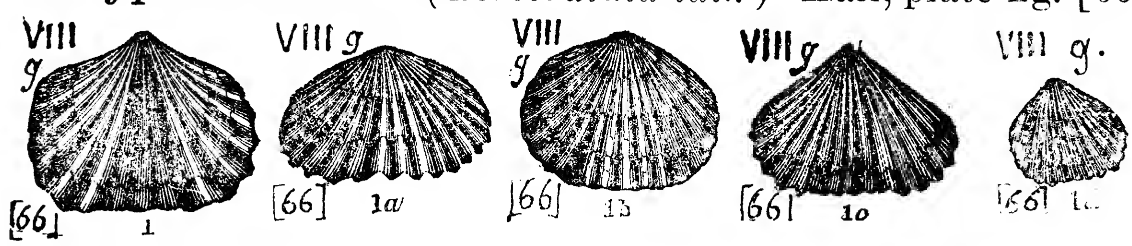


Atrypa lacunosa (*Terebratula lacunosa*). Hall, Plate fig. [27, 3]. Vanuxem, page 117, fig. 25–3, Lower Helderberg formation. It is a somewhat rare fossil shell of the Pentamerus limestone sub-division of the formation in New York, and was apparently confounded by European geologists with *Atrypa wilsoni*, also of this sub-formation. Vanuxem.—Lower Helderberg (Lewistown) limestone. *VI.*

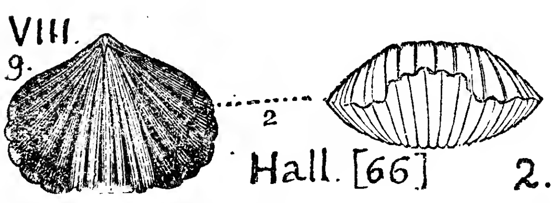


Atrypa lævis. See **Merista lævis.** *VI.*

Atrypa laticostata (*Terebratula lat.?*) Hall, plate fig. [66 1, 1a, 1b, 1c, 1d.] Chemung formation. *VIII g.*



Atrypa laticostata, (variant.) Hall, plate fig. [66, 2], a variety with six ribs instead of three; and possibly a distinct species. Chemung. *VIII, g.*



Atrypa lentiformis. See **Atrypa reticularis.** *VIII d.*

Atrypa limitaris. See **Leiorhyncus limitaris.** *VIII b.*

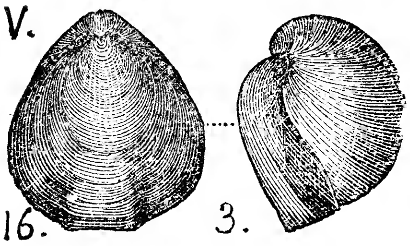
Atrypa linguifera. See **Atrypa naviformis.** *V a.*

Atrypa medialis. See **Eatonia medialis.** *VI.*

Atrypa mesacostalis. **Leiorhyncus mesacostalis.** *VIII g.*

Atrypa nana. See **Rhynchonella recinula.** *XI.*

Atrypa naviformis. (*Pentamerus linguiferus*; see English *Atrypa linguifera;* Sowerby, in Siluria, pl. XX, fig. 21, 1859; Silur. Research. pl. XIII, fig. 13.) Hall, page 71, fig. 16, 3. A nearly globular shell confined to the Clinton Upper limestone. *V a.*

V.

16. 3.

Atrypa neglecta. OO, 506–9; Bell's Mills, Blair Co., Pa., from *Clinton lime shale*, *V a.*

Atrypa nitida. See **Meristina nitida.** *V b.*

Atrypa peculiaris. See **Eatonia peculiaris.** *VII.*

Atrypa plena. See **Rhynconella plena.** *II a*, *II b.*

Atrypa plicatula. See **Rhynchonella plicatula.** *V a.*

Atrypa plicifera. See **Rhynchonella plicifera.** *II a.*

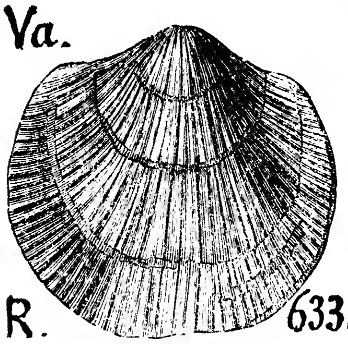
Atrypa polita. See **Athyris polita.** *VIII g.*

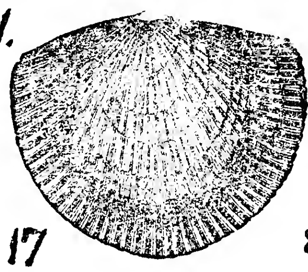
Atrypa prisca. See **Atrypa reticularis.** *V a* to *VIII g.*

Atrypa quadricostata. **Rhynchonella quadric.** *VIII e.*

Atrypa pseudomarginalis.— Specimen 856–16 (dorsal valve); Mixtown, Tioga Co., *Upper Chemung VIII g.*

Atrypa reticularis. (*Atrypa affinis.*) Hall, page 72, figs. 17, 8, 8*a*, old and young specimens. 8*a* (Vanuxem, page 88, fig. 12.) Rogers, page 823, fig. 633. V*a*, Clinton formation. Specimens in the Cabinet; OO, Pal. Coll. p. 233, spec. 503–3, much crushed; 503–6, poor; 503–8, poor: by Hale & Hall, at Matilda furnace, Mifflin Co., from *Clinton shale*, *V a.*—506–1; 506–2; 506–4; 506–19; 506–20; 506–23; 506–24; 506–25; 506–26; 506–27; 506–31; 506–33; 506–34; by C. E. Hall, 2 m. S. W. of Bell's Mills, Blair Co., from *Clinton lime shales*, *V a.*—507–2; 507–3; 507–6; 507–9, poor impression of a fragment; 507–11, dorsal valve; 507–15; by Fellows & Hall, at Matilda

Va.

R. 633.

V.

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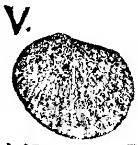
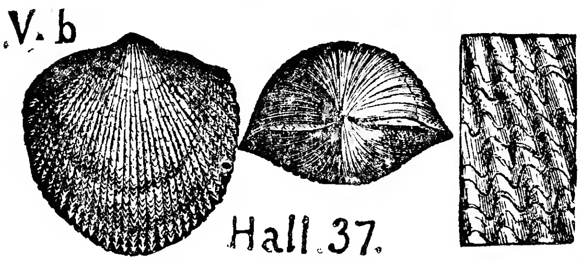
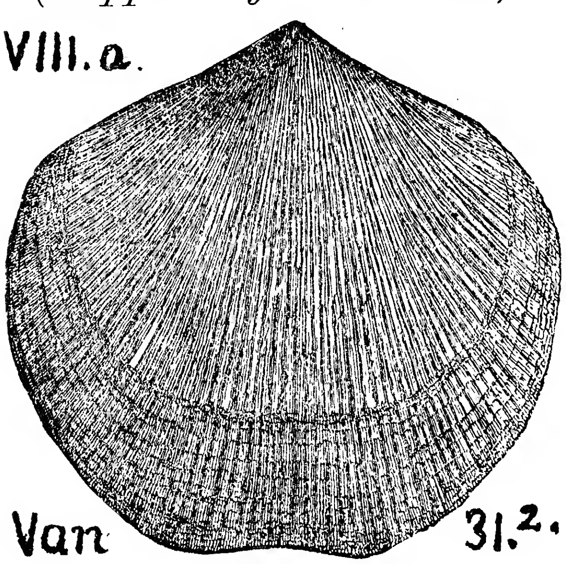
V.

17 8

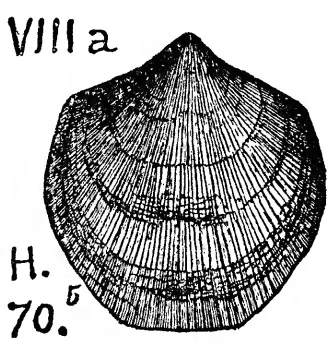
furnace, Mifflin Co , from *Clinton shale, Va.*—601–4 (four specs.); 601–5 (eight); 601–6 (twenty-one); 601–7 (four); 601–8 (four); 601–9 (fifteen); 601–10 (twenty); 601–16, fragments; 601–17 (one mended specimen); 601–21; by Hale & Hall, 1875, near Orbisonia, from Lower *Helderberg strata, VI.*—606–6; 606–7; 606–8; 606–9, with poor fragments of other species on the same surface; 606–14; 606–15, poor fragments; also 607–7, very poor; all by Fellows & Genth, ½ m. N. and 1 m. S. W. of Marshall's falls, Monroe Co., Pa., from *Hamilton shale, VIII c.*—610–1, by Billin, from Warrior ridge, Barree, Huntingdon Co., from *Lower Held. VI.*—701–1 (seven specimens) by C. E. Hall, at Sandy ridge quarry, in *Oriskany sandstone, VII.*—801–4, 801–8; by H. M. Chance, near Marshall's falls, Monroe Co. *Hamilton VIII c.*—805–5; by C. E. Hall, at Bell's mills, Blair Co., in *Hamilton shale VIII c.*—806–4; 806–7, crushed specimens; by Fellows & Genth, near Marshall's falls, Monroe Co., in *Ham. shale, VIII c.*—Spec. 807–54, Hall & Fellows' Coll. N. of Tyrone city, Blair Co., *Low. Held. VI.*—859–4 (cast of interior) Lawrence Nille, Tioga Co., *Upper Chemung, VIII g.*—855–44, (a very poor, very convex specimen) in Sherwood's Tioga Co., coll. from *Upper Chemung.*

(*Hipparionyx consimilis.*) Hall, page 108, fig. 37. *V b*, Niagara formation. (Compare M. C. page 324, fig. 2.) Vanuxem puts this with *H. proximus* and *Hip. similaris* of the *Oriskany sandstone.*



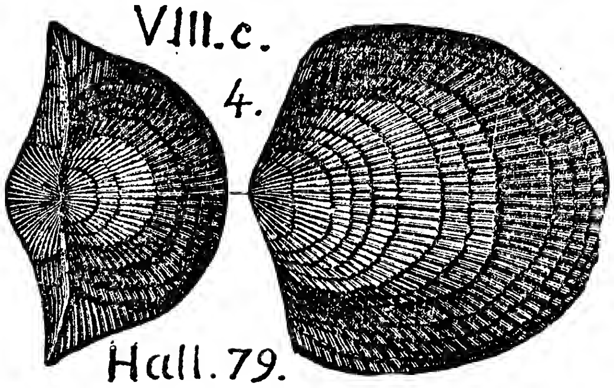
(*Hipparionyx similaris.*) Vanuxem, page 132, fig. 31, 2.





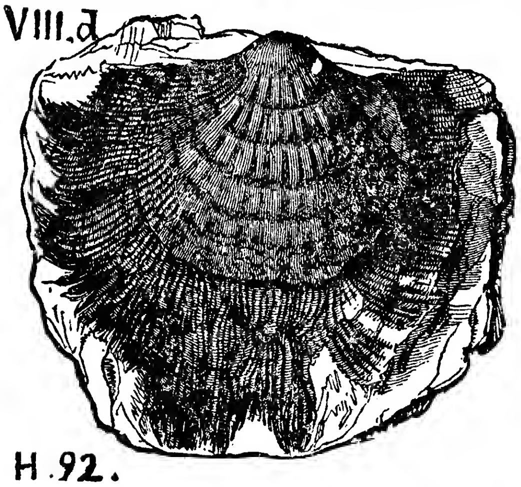
(*Atrypa consimilaris.*) Hall, fig. 34, 2. *VIII a*, Upper Helderberg formation. *Atrypa prisca*) Vanuxem, page 139, fig. 33, 5.—Hall, page 175, fig. 70, 5. *VIII a.*

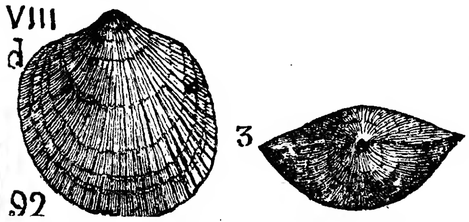
(*Terebratula affinis*, M. C.; *Terebratula prisca*, Von Buch.;



Terebratula reticularis, Brown, Leth. Geog.; *Atrypa affinis*, Sil. Res.; Hall, page 198, fig. 79, 4.—*VIII c.* Hamilton formation. Hall gives it as *Atrypa prisca;* size variable; often flattened; abundant; also in *VIII g.*

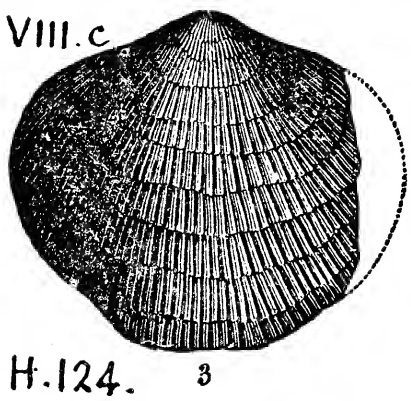
(*Atrypa affinis*, *Atrypa lentiformis.*) Hall, page 215, fig. 95, 4. Vanuxum, p. 163, fig. 41. 3.

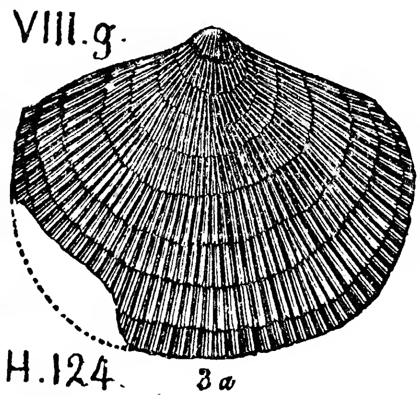




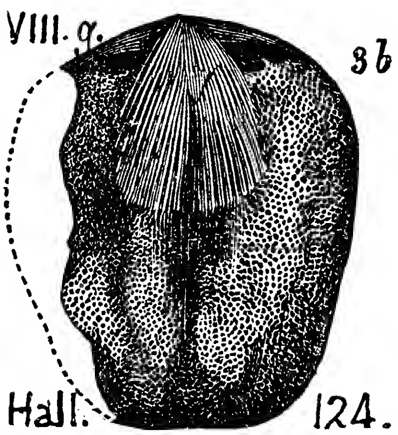
Hall, page 163, fig. 41, 3; page 215, 95, 3. *VIII d*, Tully limestone. The edges of the valves are much compressed, and look as if they were fringed.

(*Atrypa tribulis.*) Hall, page 271, fig. 124, 3, 3*a*, 3*b*. *VIII g.*





Chemung formation. Claypole (Report on Perry Co., Pa. F 2, preface, lists of fossils) records *Atrypa reticularis* from *VI*, Lower



Helderberg formation; *VIII b*, Marcellus formation; *VIII c*, Hamilton formation; and *VIII g*, Chemung formation. It is one of the commonest forms in the rocks in all the counties of Middle Pennsylvania. In Monroe county, at Stroudsburg and elsewhere along the Corniferous limestone outcrop; at Marshall falls, in the base of it (White, G6, pp. 120,122,134,247; C. E. Hall, collections, 1875.) In the Susquehanna counties, described in Report G7, it is found in the Clinton lower shales; upper shales; and iron ore; *V a.* (pp. 341; 231,252; 113,341; in the Lower Helderberg Stromatopora bed (p. 348), and from the Bastard limestone upward in Maurer's, Derr's, Russells, Mensch's, Lime ridge quarries, on both sides of Montour's ridge (pp. 89,97,101, 244,248,261,272,311,313); in the Hamilton shales and sandstone, Fishing creek, Catawissa, etc., (pp. 75,229,289); in Tully limestone (*VIII d*) on Little Fishing creek; Catawissa; S. Danville, etc., (pp. 75,207,289,339,352); in the Stony brook beds of Chemung (*VIII g*; p. 72.) In Perry and Juniata counties it is found in *VI*, *VIII b*, *VIII c*, *VIII g*. (See Claypole's Rt. F2, preface pp. xiii, xiv; also OOO, Catalogue of collections; 60 specimens from 23 collecting places.) In Huntingdon Co., Pa., it first appears in the 133′ of shale overlying the Clinton fossil ore at Orbisonia (T3, p. 136,141); and then a little higher, in the lime slate 320′, the cherty limestone 300′, and most numerous of all, in the coral bed, 260′ beneath the top of Lower Helderberg, formation *VI*; on the Weaver's run, Hopewell township, (T3, pp. 156, 157.) Then a little higher in the crinoid bed, 130′, the flint bed 90′, and the coral bed 30′ below the top of *VI*, in Powell's quarry, Cove Station, (T3, p. 123.) Also in the Bastard limestone part of *VI*, on Coffee run, (T3, p. 172.) Much higher it occurs in Hamilton upper sandstone, *VIII c*, on Shoup's run, Penn township, (T3, pp. 179, 184.) Still higher, in Tully limestone *VIII d*, No. 21 of Patterson section (T3, p. 184.) Still higher and only 275′ beneath the Chemung top conglomerate, *VIII g*, at Haun's bridge, (T3, p. 98.) In Bedford Co., Pa., it abounds in Mann's quarry, Monroe township, Lower Helderberg, VI, (T2, p. 187) and in Martin's ridge, near Maryland line, (p. 158.) Also in Portage sandstone *VIII f*, 1000′ beneath Chemung lower conglomerate, on Yellow creek, (T2, p. 80.) Also in brownish Chemung sandstone, *VIII g*, in Napier and St. Clair tt., (T2, pp. 117, 120, 122.) In Centre Co., it is found in Lower Helderberg, *VI*, Marcellus *VIII b*, and Chemung *VIII g* (T4, 430, 433, 434.) In Lycoming, in Clinton upper lime shales, V *a*, (T, 43.) From Bradford Co., N. of Leroy, specimens of it (with *Strophodonta cayuta*) are in the Claypole collection, (OOO.) One specimen (*Atrypa prisca*) of it, well preserved, got at 1200′ beneath the surface, in boring the Coburn well at Fredonia, was given to Mr. Carll, (Rt. III, p. 153).

Atrypa rostrata. See **Meristella rostrata.** *VIII c.*

Atrypa rugosa. See **Rhynchonella rugosa.** *V b.*

Atrypa scitula. See **Meristella scitula.** *VIII a.*

Atrypa singularis. See **Eatonia singularis.** *VI.*

Atrypa sordida. See **Rhynchonella sordida.** *II c.*

Atrypa spinosa. See **Atrypa aspera,** and *Terebratula aspera* of Schlotheim. *VIII c.* (Claypole, F2, preface)

Atrypa subtrigonalis. See **Rhynchonella subtrig.** *II c.*

Atrypa sulcata. See **Merista sulcata.** *VI.*

Atrypa tenuilineata. Hall, 1843, page 271, fig. 124, 4. *VIII g.* Chemung formation. Nearly circular, beak small, surface marked by numerous very fine radii; possibly an *Orthis*, Hall.

VIII-f.

H. 124. 4

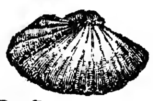
Atrypa tribulis. See **Atrypa reticularis.** *VIII g.*

Atrypa unguiformis. See **Orthis hipparionyx.** *VII.*

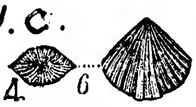
Atrypa unguiculus. See **Ambocoelia umbonata.** *VIII g.*

Atrypa —— ? at the Clinton ore crop, Howard furnace, Centre Co., A. L. Ewing's report, in T4, p. 429. *V a.*

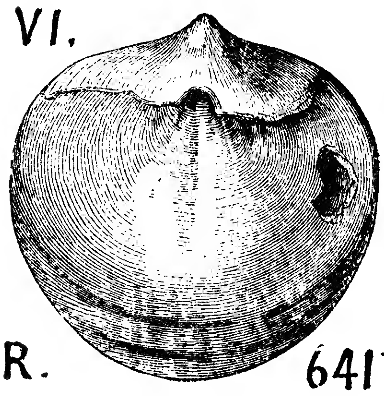
Atrypa —— ? Hall. Plate fig. 14, page 2. *V b.*—It belongs to the group of coarsely ribbed *Atrypas* (*rugosa*, *nodostriata*, *camura*, *neglecta*, *&c.*,) figured in Pal. N. Y., Vol. 2, 1851, pl. 56, 57.

V. b.

[14] 2

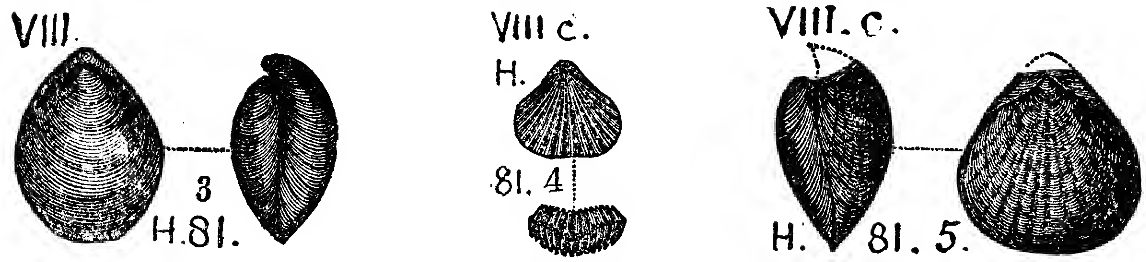
Atrypa —— ? Hall, page 137, fig. 54–6. . *V c.* Salina formation, a fine salt mud, the free acid in which has destroyed its fossils, leaving only obscure casts.

V. c.

54 6

Atrypa —— ? Rogers, page 825, fig. 641. *VI* Lower Helderberg. This is a common fossil shell in H. D. Rogers' Premeridian (Lewistown) limestone, and in the sandy shales between its top and the bottom of the Meridian (Oriskany) sandstone. It is of the size and general shape of *Orthis musculosa* as figured in Hall's Pal. N. Y., 1861, vol. 3, pl. 95, gg. 4. *VII.*

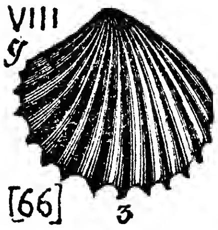
VI.

R. 641

Atrypæ? Hall, page 202, figs. 81–3, 4, 5. Hamilton. *VIII c.*



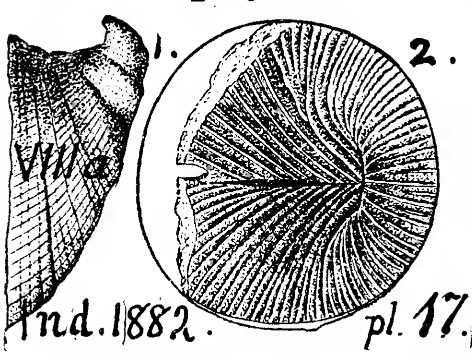
Atrypa —— ? Rogers, p. 829. Found with *Goniatites interruptus*, in *VIII e*, Genesee formation. See note to p. 829.

Atrypa —— ? Hall. Plate fig. [66,3.] *VIII g.* Chemung formation.

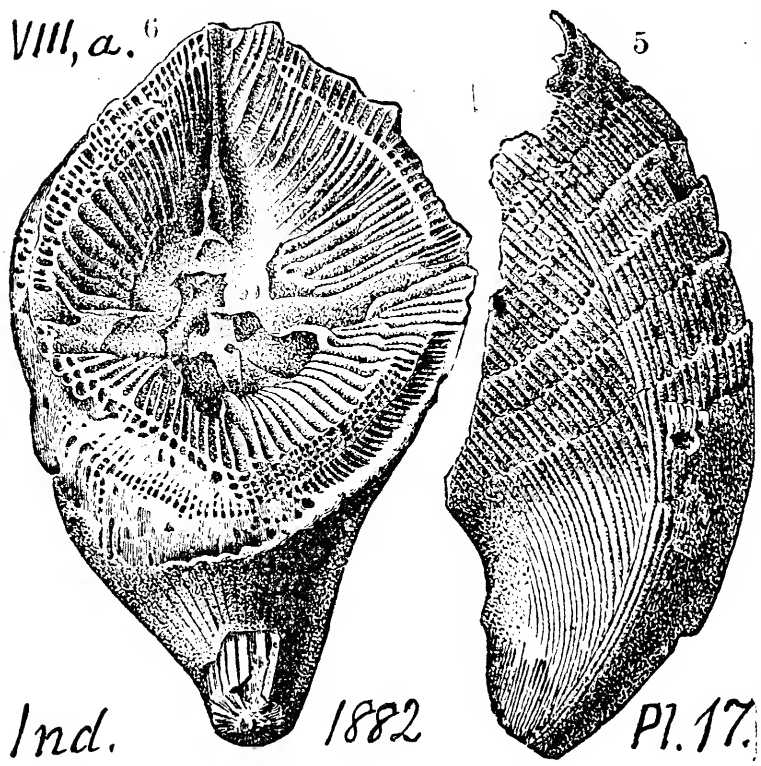


Atrypa —— ? Erie Co, Pa., Franklin t., Fall's run, section No. 15, 200′ beneath Third oil sand. (Q4, p. 250.) *VIII g.*

Aulacophyllum convergens. (Hall, 35th An. Rt., 1882. Fossil Corals, Niag. and V. Held.) Collett's Indiana of 1882, page 281, plate 17, figs. 1, 2.— *VIII a.*, Corniferous limestone; Falls of the Ohio. The lamellæ of this species vary from 80 to 120, alternating in size, thin toothed; fossette narrow, deep.

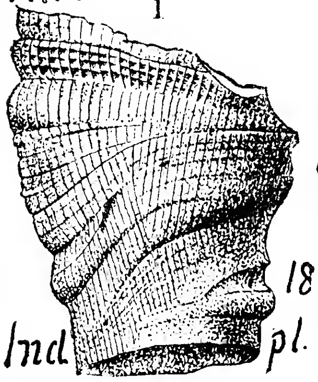


Aulacophyllum cruciforme. (Hall, 35th An. Rt., 1882. Foss. Corals Niag. and V. Held.) Collett's Indiana of 1882, page 283, plate 17, figs. 5, 6.— *VIII a.* Corniferous limestone; Falls of the Ohio. The lamellæ of this species are 140, nearly uniform at the margin, alternating below; bottom of calyx convex and nearly smooth. Two rudimentary cross fossettes.



Aulacophyllum pinnatum. (Hall. 35th An. Rt., 1882. Fossil Corals, Niag. and V. Held.) Collett's Indiana of 1882, page 284, plate 18, fig. 1, side vein of imperfect specimen; and plate 22, fig. 10. — *VIII a*, Corniferous limestone.

VIII a. 1



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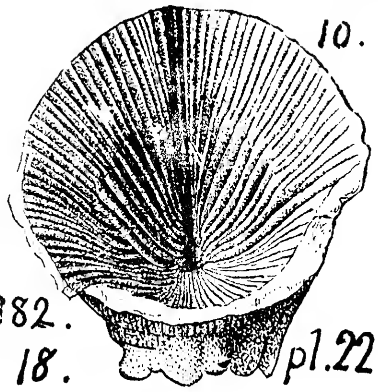
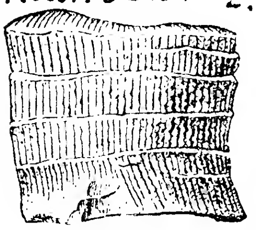


Ind. 1882. pl. 18. pl. 22

Aulacophyllum poculum. (Hall's 35th An. Rt., 1882. Fossil Corals of Niag. and V. Held.) Collett's Indiana of 1882, page 283, plate 18, fig. 2, side view of upper part of specimen; fig. 3, the cup; fig. 4, outline curve of the inside surface of the cup.— *VIII a*,

VIII. a
Ind. 1882. 2.



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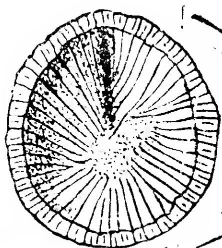

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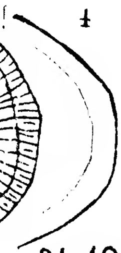
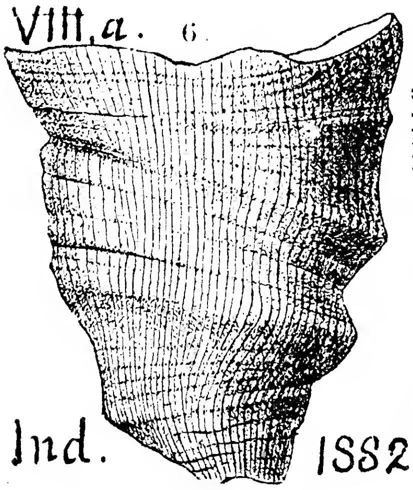


Pl. 18 Pl. 18.

Aulacophyllum præciptum. (Hall's 35th An. Rt. 1882) Collett's Indiana of 1882, page 280, plate 16, fig. 6, side view; fig 7, cup — *VIII a*, Corniferous lime-stone; Falls of the Ohio. This species has 120 nearly uniform lamellæ, and 2 cross grooves.

VIII. a. 6



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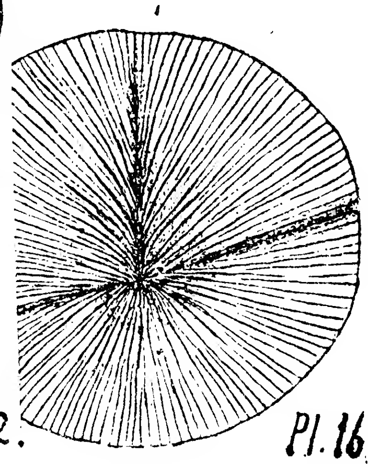
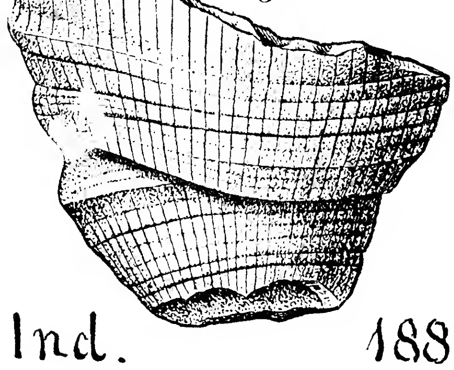


Ind. 1882. Pl. 16

Aulacophyllum præteriforme. (Hall's 35th Rt. 1882)

VIII. a. 3



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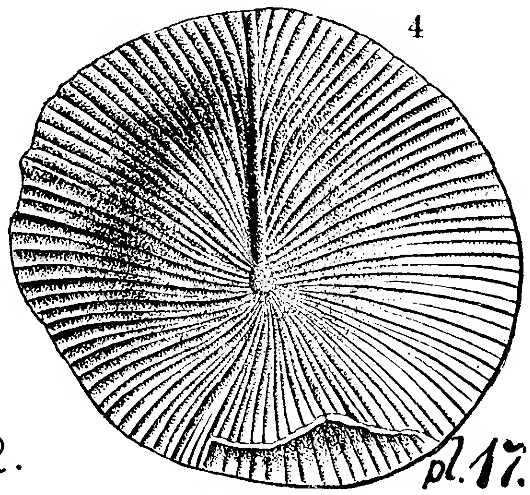
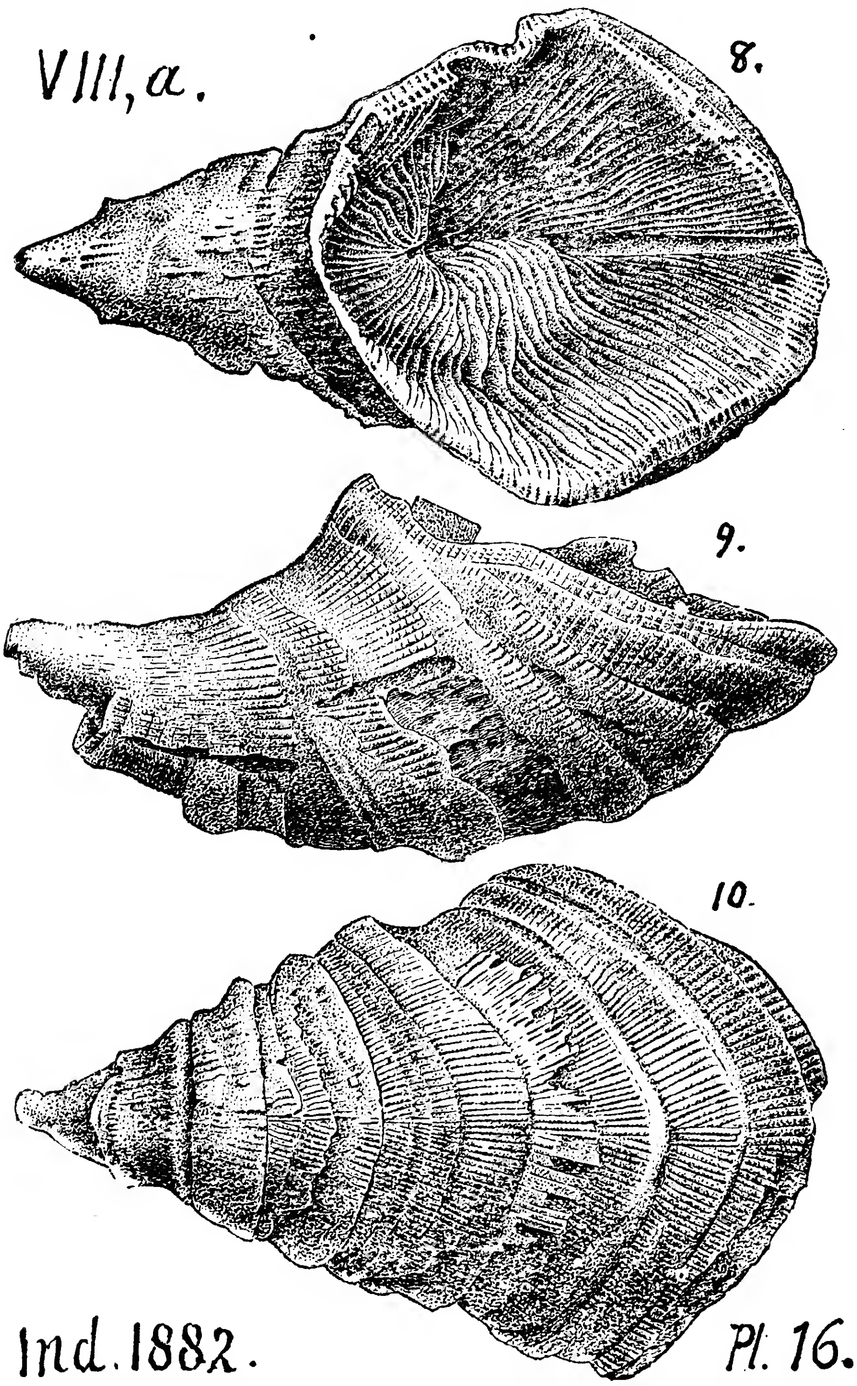


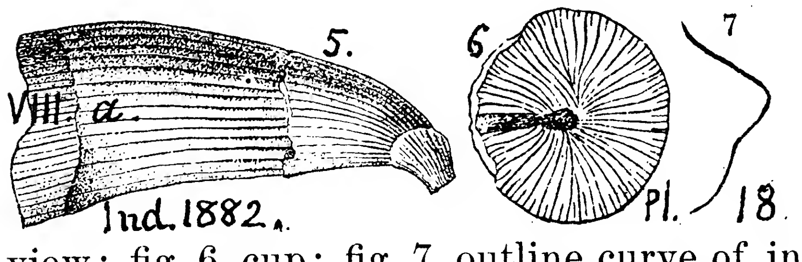
Ind. 1882. pl. 17.

Collett's Indiana of 1882, page 282, plate 17, fig. 3, side view of imperfect specimen; fig. 4, its cup.—*VIII a*, Corniferous limestone; Falls of the Ohio.

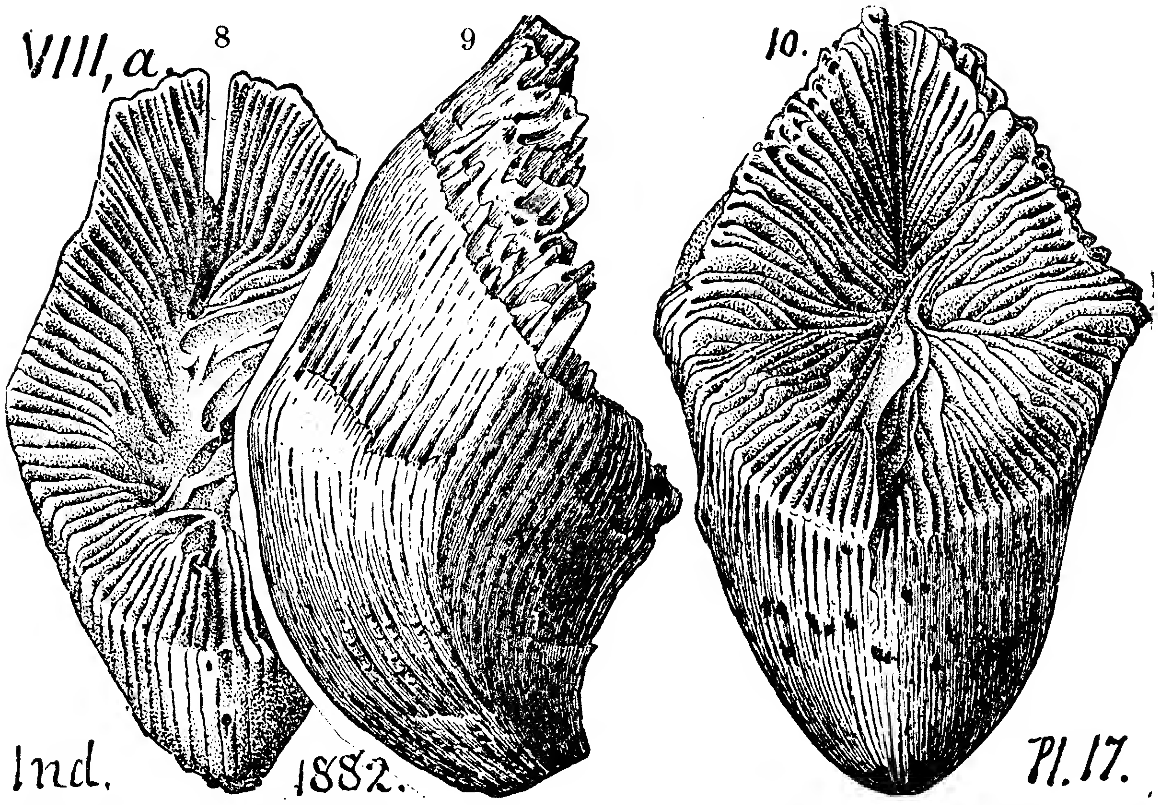
Aulacophyllum princeps. (Hall's 35th An. Rt. 1882. Foss. corals of Niag. and V. Held.) Collett's Indiana of 1882, page 281, plate 16, fig. 8, views of cup; fig. 9, of side; fig. 10, of back. — *VIII a*, Corniferous limestone; Falls of the Ohio. This species has many waves, wrinkles and lines of growth; fine striæ from cup to point very distinct; well defined groove (fossette); and 160 to 180 lamettæ, alternating strongly as they descend. —*VIII a.*



Aulacophyllum reflexum. (Hall's 35th An. Rt. 1882. Foss. corals, Niag. and V. Held.) Collett's Indiana of 1882, page 284, plate 18, fig. 5, side view; fig. 6, cup; fig. 7, outline curve of inner surface of cup. Corniferous limestone; Falls of the Ohio.—*VIII a.*

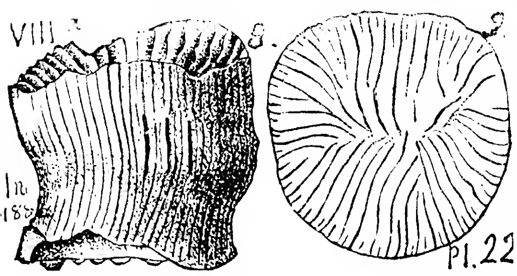


Aulacophyllum sulcatum, Edwards and Haines. (*Oani-*



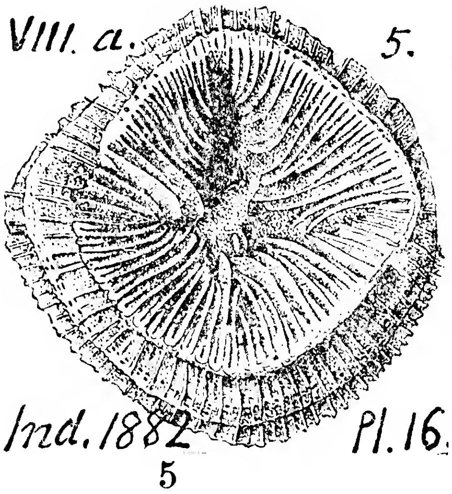
nia sulcata, D'Orbigny.) Collett's Indiana Rt. of 1882, page 279, plate 17; (fig. 7 of the cup of a worn specimen *omitted*); fig. 8, similar, but showing variations in the bundling of the layers; fig. 9, in side of a specimen the skin of which has been worn off; fig. 10, front view, looking into the cup.—*VIII a.*

Aulacophyllum tripinnatum. (Hall's 35 An. Rt. 1882.



Foss. Corals Niag. & V. Held.) Collett's Indiana Rt. of 1882, page 285, plate 22, fig. 8, specimen imperfect at the base, fig. 9, side view of cup.—Corniferous limestone formation. *VIII a.*

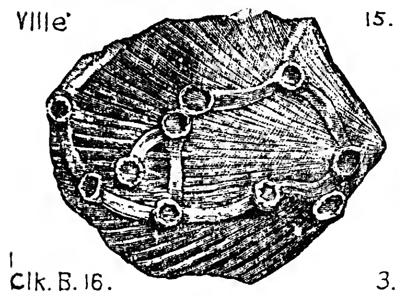
Aulacophyllum trisulcatum. (Hall's 35th An. Rt. 1882.



5

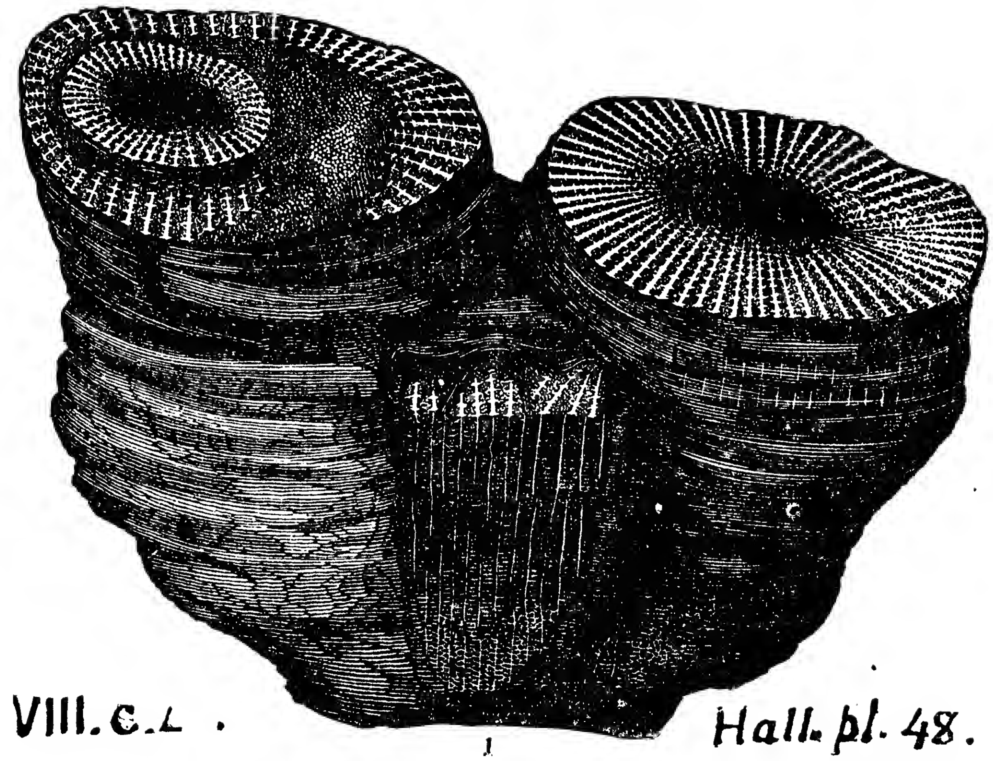
Foss. Corals, etc.) Collett's Indiana Rt. of 1882, page 279, plate 16, fig. 5, the cup.—*VIII a.* Corniferous (Upper Helderberg) limestone formation, at the Falls of the Ohio, and in Clark county, Ind, Its lamellæ are 160 in number, alternating in size, only near the margin of the calyx. No real side fossettes. *VIII a.*

Aulopora annectens. Clarke, Bull. 16, U. S. G. S., 1885, p. 63, pl. fig. 15, *natural size ;* one specimen found on a valve of *Lunulicardium ornatum*, in the sandy lower bed of the Naples (Upper Genesee) shales, Whale's Back, Lake Canandagua, N. Y.—*VIII e'*.



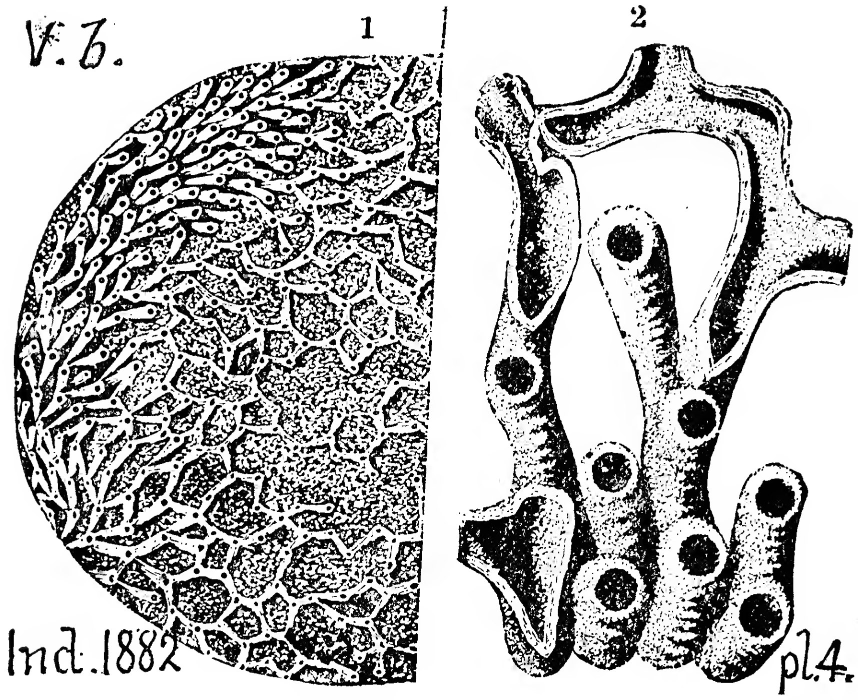
Aulopora schohariæ. Hall, 26th Regents' Report, N. Y., 1874. Found by G. B. Simpson among Hale & Hall's collections near Orbisonia, Huntingdon Co., Pa. OO, Pal. Coll. 1875, p. 234, specimen 601–15, from *Lower Helderberg*, *VI.*

Aulopora tubæformis, attached to or growing upon *Cysti-*

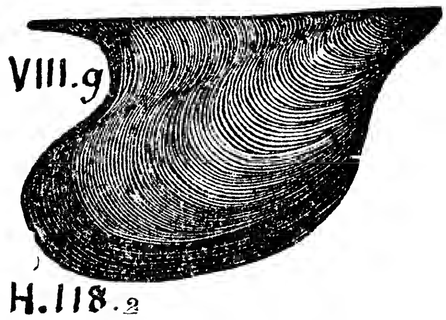


phyllum americanum (*cylindricum*) Hall, page 209, fig. 87, I. *VIII c.* Hamilton.—Claypole, list of fossils of Perry Co., Pa.; Report F2, preface, xiv,—*VIII c* Hamilton formation.—In the Upper Selinsgrove limestone, Sect. 95, bed 3, White's Report, G7, p. 79, 359, 360.—In Chemung section at Rupert, bed 41, G7, p. 67; at Bloomsburg, bed 12, 180′ above the Genesee, p. 12; ; at Catawissa, bed 71, p. 267; lower Chemung, bed 47, p. 367.—In Perry Co., Pa., in Hamilton, *VIII c*, Claypole, F2, preface p. xiv; OOO, Catalogue of Collections, 22 specimens from 8 localities.—In Huntingdon Co., near Orbisonia, in Lower Helderberg bottom beds, over Waterline beds, T3, p. 126; C. E. Hall's list, Proc. A. P. S. 1876.—*VI*, *VIII c*, *VIII g*.

Aulopora vanclevii. Collett. Indiana Report of 1882, page 255, plate 4, fig. 1, (Van Cleve) a large colony; shows compact and scattered forms of growth. Fig. 2, several tubes, *much magnified.* Niagara formation in Indiana and Kentucky. *A. serpens* is a much larger species, but quite similar to this in the mode of its growth, and moreover lived in later Devonian times.—*V b.*



Avicula acanthoptera. Hall, page 263, fig. 118, 2. (Compare Phillips' Pal. Foss. XXIII, fig. 90, 91, 92.—*Avicula damnoniensis*, Sowerby, Geol. Trans. [2] LIII, fig. 22.) *VIII g.* Chemung formation. This beautiful shell, from Phillipsburgh, N. Y., has a sharp hind wing.



Avicula bellistriata, reported by I. C. White from the Hamilton shales under Tully limestone, on Little Fishing creek; G7, p. 75.—*VIII c.*

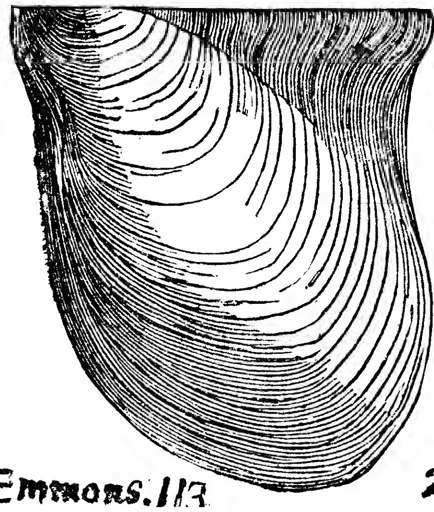
Avicula carinata. See *Pterinea carinata*, Conrad, and *Ambonychia radiata*, Hall. Emmons, Amer. Geol. I, ii, p. 175, plate 17, fig. 23. Found in Canada, New York, Ohio and southwest Virginia, in Loraine (Hudson river) shales; "the most characteristic fossil of the upper part of the Lower Silurian system." *III b.* *See Appendex.*

Avicula chemungensis. See **Pteronites chemungensis.** *VIII* g.

Avicula damnoniensis. See **Pteronites chemungensis.** *VIII* g.

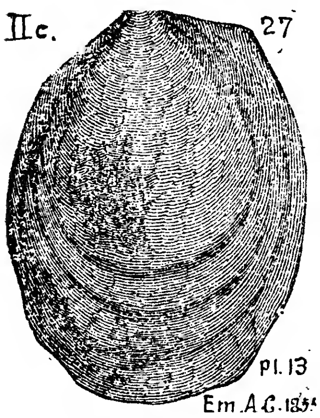
Avicula decussata. See **Pteronites decussatus.** *VIII* c.

Avicula demissa. (Conrad, Journal Acad. Nat. Sci. Phil. Vol. 8, 1842, Hudson river formation.) Emmons' Rept. p. 404, fig. 113, 2. American Geol. I, ii, p. 175, plate 13, fig. 10; Characterises Loraine (Hudson river) shales, and is found in S. W. Virginia.—*III* b. Note.—Emmons gives on page 233, the same plate 13, fig. 10, 11, as D'Orbigny's *Lyonsia mytiloidea.* But *Lyonsia* is now *Sedgwickia;* and *S. compressa,* Meek; *S. divaricata,* Hall and Whit.; *S. fragilis,* Meek; *S. neglecta,* Meek, are all from the Cincinnati (Loraine) formation. S. A. Miller's Am. Pal. Foss. 1877.—*III b.*

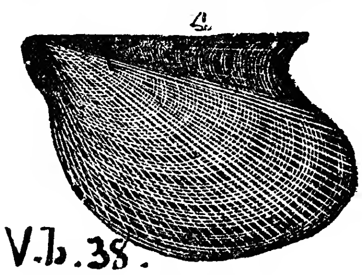


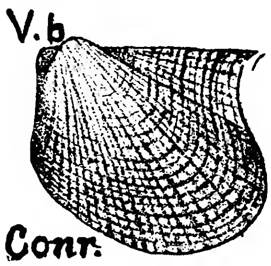
Avicula desquamata. See **Obolella crassa.** *M. Cambrian.*

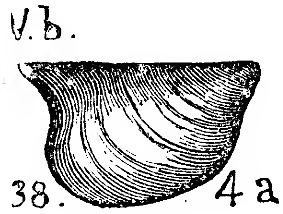
Avicula elliptica. (Hall, Palæontology of N. Y., Vol. I, 1847, Trenton group.) Emmons' American Geol. Vol. I, part 2, page 175, plate 13, fig. 27, a cast of a somewhat elliptical shape, hence called by Emmons *subelliptica.*—Trenton formation.—Hall gives its figure in pl. 36, fig. 3, and compares it to Sowerby's *A. obliqua.* Sil. syst. p. 635; adding that it may be an *Ambonychia.*—*II c.*



Avicula emacerata. Hall, page 108, fig. 38, 4. (Conrad,







Jour. Acad. Nat. Sci. Phil. VIII, 241, plate 12, fig. 15.) *Niagara formation, V b.*—In Pennsylvania it seems to occur earlier. See OO, Pal. Coll. p. 233,—specimens 501–1, 8, 18, 19 (an impression), 24 (two in good condition on a slab), 25; by Hale & Hall, 1875, in Ferguson Valley, Mifflin Co., Pa.—Spec. 504–13, from near Orbisonia.—Spec. 505–4, at McKee's ore bank, Mifflin —Spec. 507–5, 12, Fellows & Hall, Matilda furnace, Mifflin. All from *Clinton shale, V a.*—It is reported by Claypole from

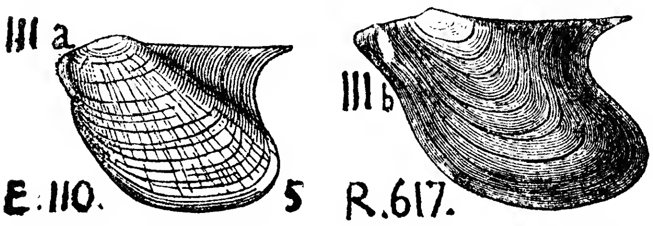
Perry Co., Pa., 2 m. s. w. of New Bloomfield, collecting station No. 116 (116–16, of OOO catalogue), from top of Hamilton SS. base of Ham. Upper shales.— *VIII c.*

Avicula equilatera. **Aviculopecten equilaterus.** *VIII b.*

Avicula flabella. See **Pterinea flabella.** *VIII c.*

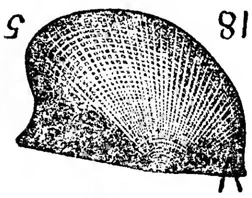
Avicula fragilis. See **Aviculopecten fragilis.** *VIII e.*

Avicula insueta. Rogers, page 821, fig. 617. *III b.* Lower part of the Loraine (Hudson river) formation. Emmons, page —, fig. 110, 5. (Also Amer. Geol. Vol. I, plate 17, fig. 15.) A rare shell in the eastern district of New York.



Avicula lævis. See **Pteronites lævis.** *VIII c.*

Avicula leptonota. Hall, page 76, fig. 18, 5. *V a.* Clinton formation. Found by I. C. White on the tip of the Bloomsburg Iron Co.'s mine near Nethart's, Columbia Co., Pa., Hemlock township, Clinton fossil ore bed, G7, p. 232.— *V a.*



Avicula longispina. See **Pterinea longispina.** *VIII g.*

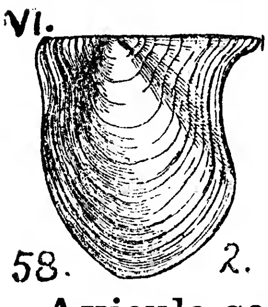
Avicula muricata. See **Pteronites muricatus.** *VIII b.*

Avicula orbiculata. **Lyriopecten orbiculatus.** *VIII c.*

Avicula pecteniformis. See **Aviculopecten pecteniformis.** *VIII g.*

Avicula rhomboidea. *See Appendix.*

Avicula rugosa. Hall, page 142, fig. 58, 2. Vanuxem, page 112, fig. 23, 2. (Conrad, 1841, Annual Report, N. Y.)—Name preoccupied by Munster in 1826 (Miller).—Water-lime division of Lower Helderberg formation. *VI.* By the combination of *Orthis plicata, Cytheria alta, and Avicula rogosa* the Waterlime is known.



Avicula securiformis ? *See Appendix.*

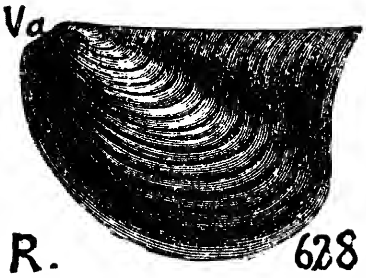
Avicula signata. See **Aviculopecten signatus.** *VIII* g.

Avicula speciosa. Hall, page 243, fig. 106, 1, 1*a.* *Portage formation, VIII f,* i. e. the shales of Cashaqua creek in western New York, immediately overlying the Genesee black shale. In Huntingdon Co., Pa., these pretty little shells fill the Genesee black shale at the big bend of the RR. 125 rods

south of Cove station in Hopewell township, T3, p. 158. They abound also in company with *Goniatites complanatus* in the Genesee, No. 18 of Patterson section, T3, 184. *VIII e*, *VIII f*.

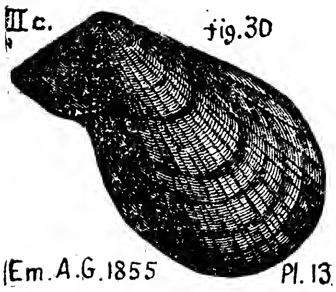
Avicula spinigera. See **Pteronites spinigerus.** *VIII g*.

Avicula subplana. Rogers, page 823, fig. 628. (Hall, Pal. N. Y., Vol. II, 1852,) *Va*, Clinton formation in Pennsylvania. *V b*, Niagara formation in New York. This is one of the prettiest and commonest shells of the fossil ore shales; and it is sometimes seen in the ore itself.— *V b*.

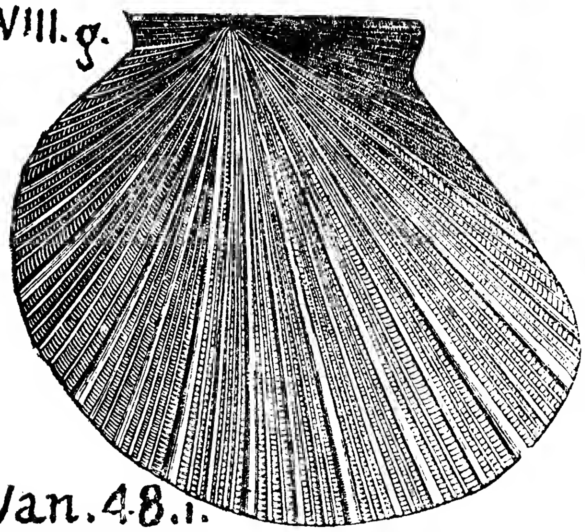
Va

R. 628

Avicula textilis, var. **arenaria.** Hall, III, pl. 110, f. 2.—OO, Pal. coll., p. 233, spec. 702–12, an impression; spec. 702–14, doubtful. (G. B. Simpson), from southern end of Royers' ridge, near Orbisonia. Huntingdon Co. Ashburner and Hall, from *Oriskany sandstone*, *VII*.

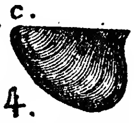
Avicula trentonesnsis, (Conrad, Jour. Acad. Nat. Sci., Philadelphia, Vol. 8, 1842, Trenton group.) Emmons, Amer. Geol. Vol. 1, part 2, 1855, page 176, plate 13, figs. 28, 29, 30. Intersecting rays and circles make a sunken panneled surface to the shell.—Trentonlime stone at Middleville and Water town, N. Y.—*II c*.

IIc. fig. 30

(Em. A. G. 1855 Pl. 13

Avicula tricostata. (See *Lyriopecten tricostata*), Vanuxem, page 179, fig. 48, 1, *Chemung formation*, *VIII g*. In Pennsylvania, Columbia Co., Orangetown, it abounds in Chemung strata 50′ to 100′ above the Stony Brook beds. G7, p. 73; also at top of the Chemung formation on Fiedler's creek, L. Mahanoy t., Northumberland Co., and in Upper Chemung bed 25 of section 96, G7, pp. 366, 367.— *VIII g*.

VIII. g.

Van. 48. 1.

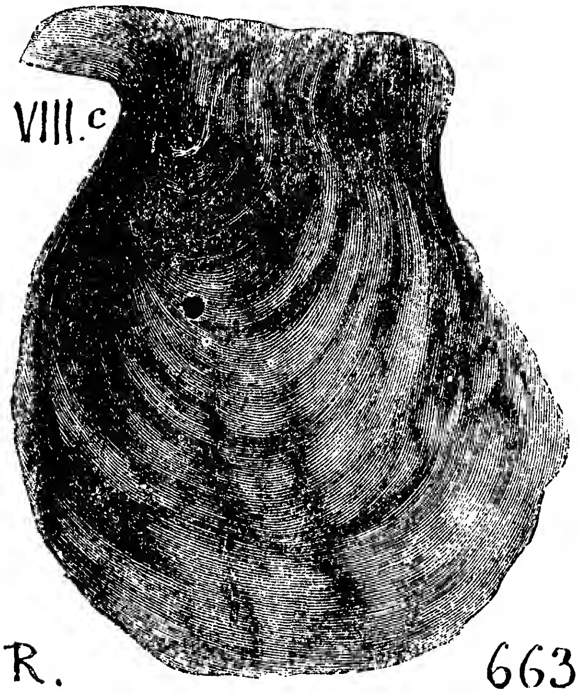
Avicula triquetra. Hall, page 137, fig. 54, 7. V, c. Salina (or Onondaga) formation. At W. Comp's mill, 2½ miles south-east of New Bloomfield, Perry Co., Pa. Report OOO, catalogue of Claypole's collections, specimens labeled 2–9, 10–21. *Hamilton upper shale*. *VIII c*.

V. c.

54. 7

Avicula——? Emmons, page 433, 399, *III a*.

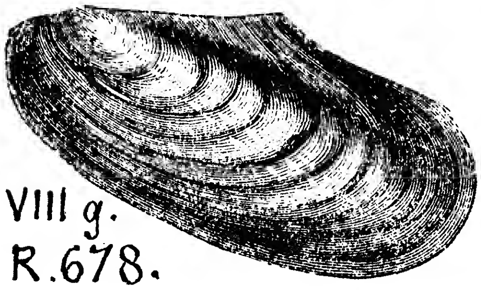
Avicula——? Rogers, page 827, fig. 663, *VIII c*. Hamilton formation.

VIII.c



R. 663

Avicula——? Rogers, page 829, fig. 678. *VIII g*. Chemung formation. This shell is identified by H. D. Rogers, in Geol., Pa., 1858, as the European Devonian *Avicula damnoniensis*, now known as *Pteronites damnoniensis*, but in America, as *Pteronites chemungensis*.



VIII g. R.678.

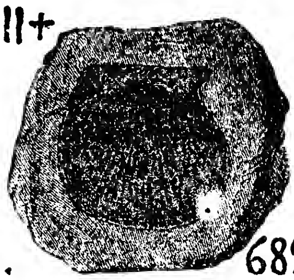
Avicula——? Rogers, page 829, fig. 679. *VIII g*. Chemung formation. This shell is said by H. D. Rogers to be somewhat common in the Pannsylvania outcrops of the uppermost beds of the Chemung formation. He considered it to be a new species, but gave it no name. Geology of Pa., 1858, page 830.

VIII g.

R.679.

Avicula——? Rogers, page 833, fig. 689. A small avicula found in 1857, by Mr. Wm. B. Rogers, Jr., in coal slate near the mouth of the Ravensdale tunnel, a few miles east of Pottsville, in Schuylkill county. This, and a nameless *Tellinomya* cast, were the first shells ever found in the Anthracite measures.

XIII+



R. 689

Avicula——? in a limestone in the Clinton upper lime-shales, T, p. 43.—*V a.*

Avicula——? numerous fragments near the bottom of the 75′ shale overlying the Ore Sandstone at Barree station, Huntingdon Co., Pa., T 3, p. 222.—*V a.*

Avicula——? multitudes in the limestone partings at the Genesee black shale, at Mapleton, Huntingdon Co., Pa., T3, p. 273.—*VIII e.*

Avicula——? very numerous, with *Spirifer*, *Tropidoleptus* and Crinoidal fragments in the coral bed near Stroudsburg, Monroe Co., ¼ m. below Spragueville, on Broadhead's Creek, G6, p. 271.—Upper Helderberg, *VIII a.*

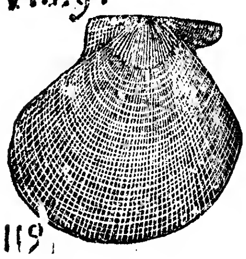
Avicula——? with large *Orthoceras*, large *Spirifer*, and a *Cypricardia ?* in fallen fragments in the town of Warren, Pa.; outcrop never found by Carll's report IIII, p. 318, 319.—*Waverly*, *Pocono*, *X ?*

Avicula——? abundant under Third Mountain Sand of Venango Co., Pa., at 3 miles N. W. of Pleasantville, 300′ beneath the Olean Conglomerate (XII); and at 2½ m. N. W. of Pleasantville, 250′ beneath XII; with many other genera of shells; very rich collecting grounds; Carll's report I, p. 79, note.—*Pocono*, *X.*

NOTE.—These "little birds" (*Aviculæ*) are so abundant in the formations of Pennsylvania, that we may expect to identify all the known species of them, especially those which carry New York names, whenever a systematic collection and study of the fossils of the State shall be made. New species or varieties will undoubtedly be found. Of the 93 species named in S. A. Miller's invaluable Catalogue of American Palæozoic Fossils, 2d ed., 1883, Cincinnati, O., 31 have been transferred to other genera. Of the 62 which are still known as *Aviculas*, only 10 have been reported by name from Pennsylvania localities. Ten others are figured without names, or reported without names, and remain to be figured if new.

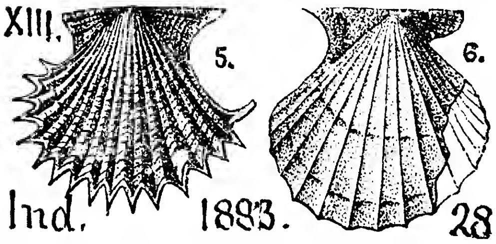
Aviculopecten cancellatus. (*Pecten cancellatus.*) Hall, page 264, fig. 119, 4. *VIII g.* Chemung formation.—A fine specimen of *Aviculopecten*, *resembling cancellatus*, is 855–32 of Sherwood's Coll. in Sullivan t., Tioga Co. (OO, p. 236), from *Upper Chemung*, *VIII g.* (G. B. Simpson, 1888.)

VIII.g.

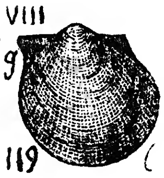


119.

Aviculopecten carboniferus. (*Carbonarius?*) (*Pecten carboniferus*, Stevens, Am. Jour. Sci. Vol. 25, 1858, page 261.) Collet's Indiana Rt. of 1883, page 144, plate 28, fig. 5, left valve, *natural size;* fig. 6, right valve of another individual.—*XIII*, coal measures, at several places in Indiana. (Note.—Probably the same as Swallow's *Pecten broadheadi*, upper coal measures of Missouri. No doubt the same as Geinitz's *Pecten hawni* from Nebraska. Found also in New Mexico, 100th Med. Geol. Survey, Collett.)—In Pennsylvania, in the Black fossilliferous limestone, 250′ beneath the Pittsburgh coal, in Fayette Co., F. Platt in report L, p. 35; J. J. Stevenson, KKK, p. 309. Also in Decker's Creek shale, under Mahoning sandstone, Morgantown, W. Va., Stevenson, in L, p. 36. Also in Ferrif. L. Allegheny series, coal measures, Beaver Co. (Q. 62), Lawrence Co. (QQ, 47); Mercer Co. (QQQ, 25); and Butler Co. (V, 147).—*XIII*, *XIV*.

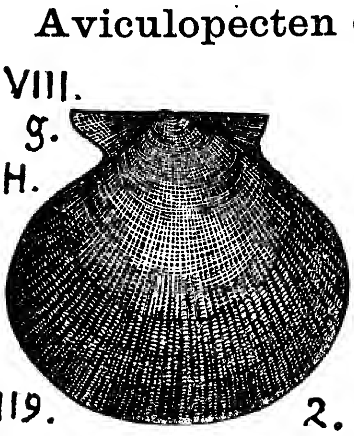


Aviculopecten convexus. (*Pecten convexus.*) Hall, page 264, figs. 119, 6. VIII g. Chemung formation. A species which cannot be mistaken by reason of its unusual fatness or convexity, and the height of its beak above the hinge line.—*VIII g.*



Aviculopecten dolabriformis. (*Pecten dolabriformis*) Hall, page 264, figs. 119, 4.—*VIII* g. Chemung formation. It resembles *Aviculopecten convexus;* but its beak is closer to its hinge, its ears differently proportioned, hind ear very sharp, and the whole shell more lopsided (oblique) and much flatter.

Aviculopecten duplicatus. (*Pecten duplicatus.*) Hall, page 264, figs. 119, 2. *VIII g.* Chemung formation. This species differs from all the other Chemung *Aviculopectens* in its extraordinary breadth, and the doubling of its radiating ribs towards the margin. These ribs are plain towards the beak, and cut up into squares by a system of concentric lines. They grow rough downwards towards the margin of the shell.—*VIII g.*



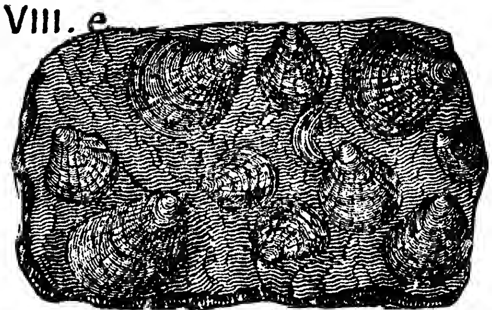
Aviculopecten equilaterus. (*Avicula equilatera.*) Hall, 1843, page 180, fig. 71; Marcellus formation. In Pennsylvania found by White in the richly fossiliferous bed near the top of the Marcellus, and in bed 100′ beneath the top of the Hamilton, on Big and Little Fishing Creek, Hemlock t., Columbia Co., Pa., G7, pp. 229, 230.— *VIII b*, *VIII c*.

VIII. b.

H. 71. 7.

Aviculopecten fragilis. (*Avicula fragilis.*) Hall, 1843, page 222, figs. 41, 1, 2.— *VIII e*. Genesee formation. In Pennsylvania, Erie Co., Springfield t., below Cherry Hill P. O., Griffith section, near base of Blue Shale. Q4, p. 255; multitudes in 6″ shale lying 50′ above top of Girard Shale, Girard t., Babbit's Sect. Q 4, p. 258. This, or some closely allied form, characterizes the opening of Chemung life, at top of non-fossiliferous Girard Shale. Q4, p. 262.— *VIII g*.

VIII. e



H. 94. 1

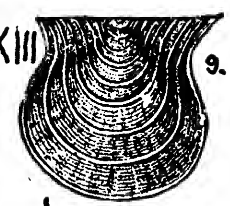
VIII e.

94. 2

Aviculopecten (*Streblopteria?*) **herzeri.** *See Appendix.* Found by Stevenson in Decker's cr. shale, Morgantown. *XII.*

Aviculopecten interlineatus. (Meek & Worthen, 1860, Proc. Acad., N. S., Chicago. Lower Coal Measures; Illinois Report, Vol. 2, p. 329, plate 36, fig. 7.) Collett's Indiana Rt. of 1883, page 145, plate 30, fig. 9, outside view of left valve, *natural* size; marked by ten or twelve concentric sharp slender ridges.—*XIII.* Rather rare, but found at distant points of Illinois and Arizona, and to be sought for in the Upper Coal Measures.—*XV.*

XIII

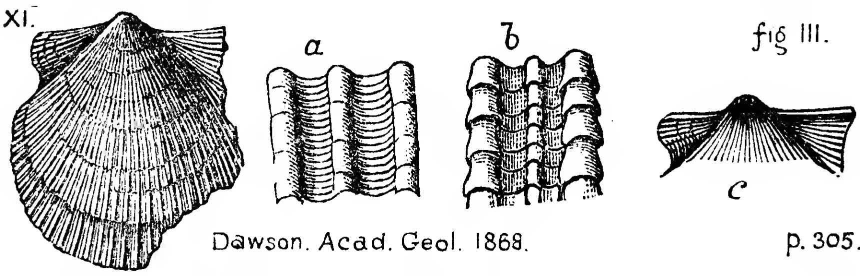


9.

Ind. 1883. Pl. 30

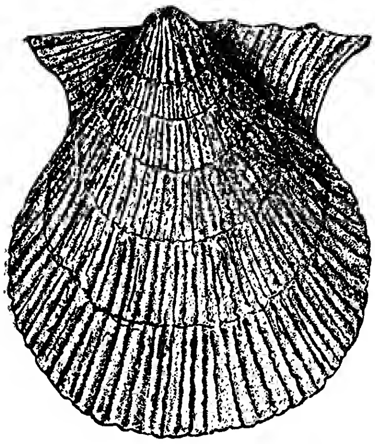
Aviculopecten lyelli, Dawson. Acadian Geology, 1868, page 305, fig. 111, a beautiful scallop shell of the Nova Scotia carboniferous limestone formation, with 60 distinct ribs..—*XI.*

XI.

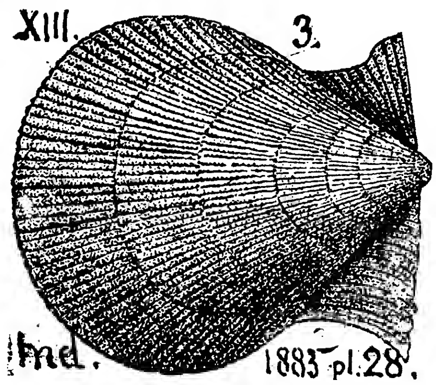


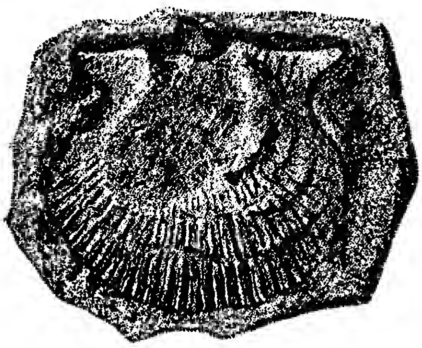
Dawson. Acad. Geol. 1868. p. 305.

Aviculopecten occidentalis. (Shumard, in Swallow's Missouri Rt. of 1855, page 207, plate C, fig. 18.) Collett's Indiana Rt. of 1883, page 143, plate 28, fig. 3, outside view of left valve, natural size. *XIII–XV.* One of the commonest shells of the Upper and Lower Coal Measures, from Indiana westward; has been found in Utah and Arizona; ranges up into the Permian (Meek.) Note.—It is not the *Chemung* shell to which Winchell applied the same name in 1863, Proc. Acad. N. S. Philadelphia. (S. A. Miller.) Found by Heilprin in Coll. Wyoming Hist. Soc. Wilkes-Barre, Pa. *For western Pa. see Appendix.*



5A AVICULOPECTEN OCCIDENTALIS.

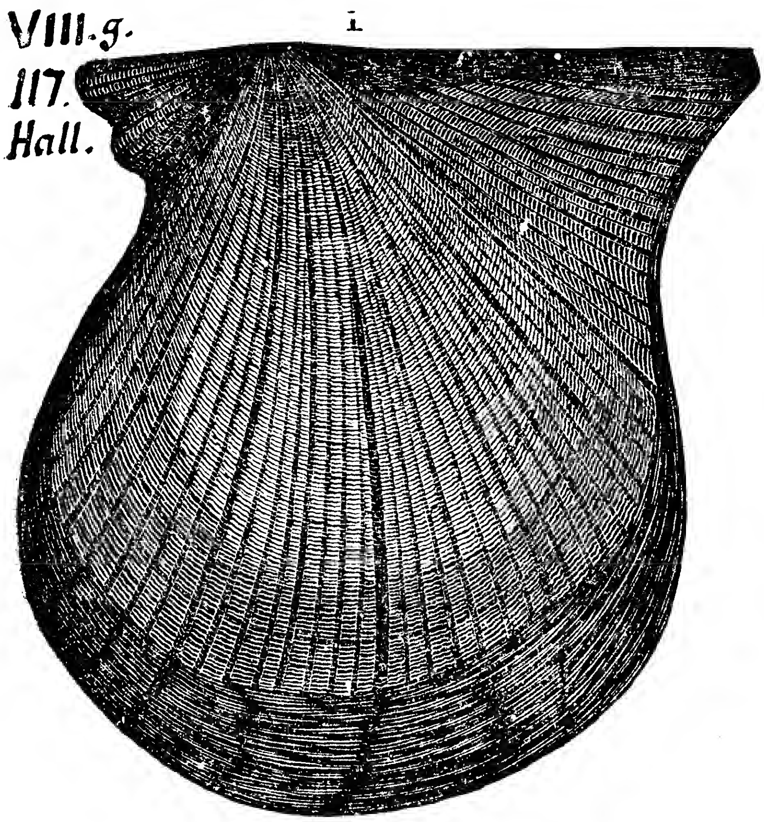


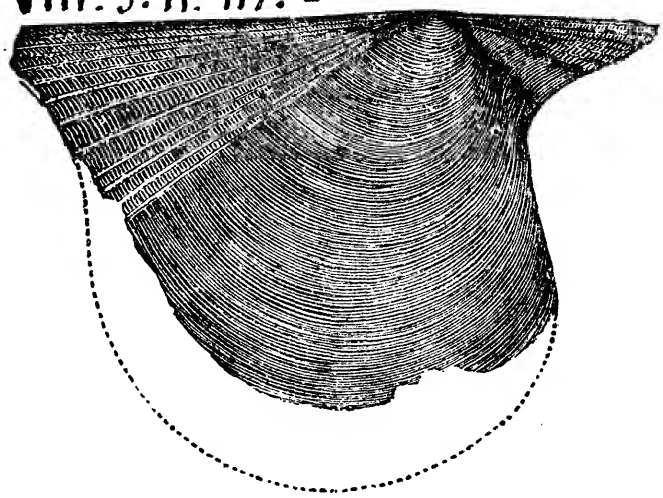


5 AVICULOPECTEN OCCIDENTALIS.

Aviculopecten orbiculatus. See **Lyrispecten orb.** *VIII c.*

Aviculopecten pecteniformis. (*Avicula pecteniformis.*) Hall, page 262, fig. 117, 1, 2. (Conrad, 1842, Journal Academy Nat. Sciences, Philadelphia, Vol. *VIII*, Pl. ——, fig. ——.) *VIII g* Chemung formation. (*VIII a* Upper Helderberg, *VIII b.* and Marcellus formations. Miller.) Lower valve abundant in Western New York. (Hall.) See sect. at Corning quoted in Rt. I, p. 93. Col-



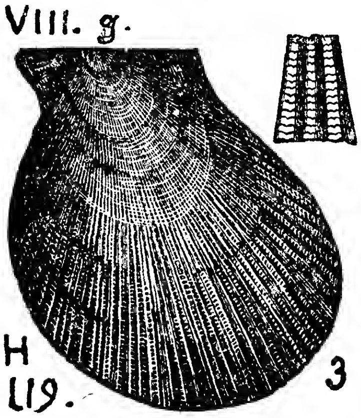


lected by C. E. Hall, 1876. Rt. OOO, Claypole's list, 72–1, spec. from near Towanda, Bradford Co., Pa. Reported by I. C. White, from Rupert (Catawissa and Bloomsburg Section) bed 30 (59), G7, p. 69 (286), one foot thick crowded with genera and species, 900′ over the top of the Genesee, i. e. in Chemung, *VIII g.*

Aviculopecten princeps. *See Appendix.*

Aviculopecten rectilaterarius. *Avicula rectilaterarea. See Appendix.*

Aviculopecten rugæstriatus. (*Lima rugœstriata.*) Hall, 1843, page 264, fig. 119, 3. *VIII* g. Chemung formation. Moderately convex; ears not very distinct from the shell; strong radiating striæ, which grow larger towards the base, and are crossed by raised wavy plates (lamellæ), giving to the surface a rough appearance, which is visible in the enlarged portion (little figures). Found at Rockville; Hubbieville, All. Co., N. Y.

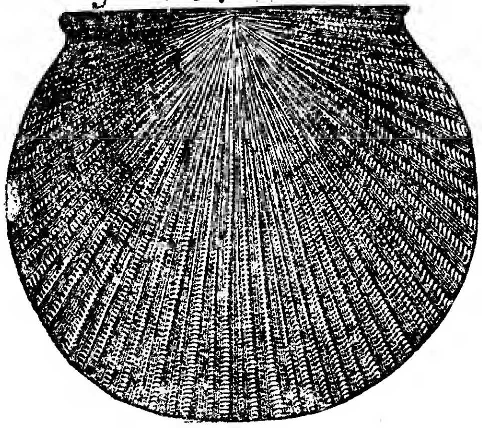


Aviculopecten signatus. (*Avicula signata.*) Hall, 1843, page 264, fig. 119, 5. *VIII g.* Chemung formation. The surface is marked by sharp concentric lines or lamellæ, which give the shell a peculiar aspect. Found at Rockville, All. Co., N. Y.

Aviculopecten striatus. (*Pecten striatus.*) Hall, 1843, page 264, fig. 119, 7. *VIII g.* Chemung formation. This species differs from all the others in its fine even radiating striæ. Its ears are small and nearly equal; shell erect (not lopsided), moderately convex. Steuben Co., N. Y.

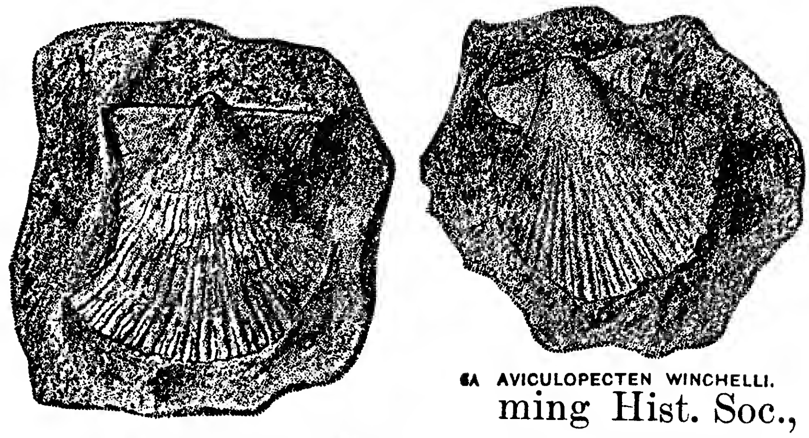
Aviculopecten suborbicularis. (*Pterinea suborbicularis.*) Hall, 1843, page 264, fig. 119, 1. *VIII* g. Chemung formation.—In Pennsylvania, Crawford Co., found by I. C. White in the First Oil Sand, in company with *Productella boydii*, *Spirifera disjuncta*, etc., good Chemung types, Q4, p. 102; also, with many other Chemung forms, in the Cussegago SS. at the Meadville iron bridge, Q4, p. 165; also, Carll got fine specimens from an abundance of them in flags in the bed of Mill run, at the Meadville oil well, Q4, p. 171.— *VIII-IX*. Hubbieville, All. Co., N. Y.

VIII.g. 119.1 Hall.

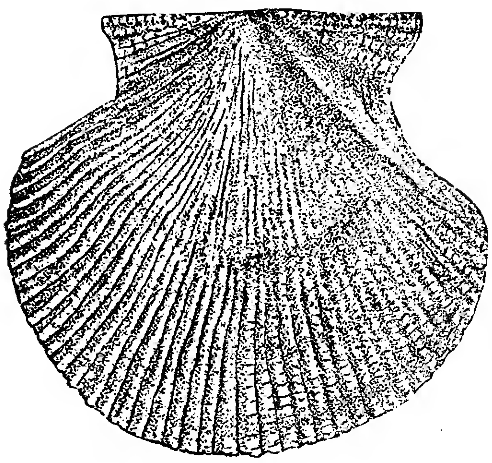


Aviculopecten whiteii. *See Appendix.*

Aviculopecten winchelli. (Meek, Ohio Geol. Rt. Vol. 2, page 96, plate 15, fig. 5.) Heilprin, Geol. Sur. Pa. An. Report of 1885, Special Report on Wilkes-Barre fossils in Cabinet of Wyoming Hist. Soc., p. plate 442, fig. 6, page 453, fig. 6a. Two or more less perfect impressions from Mill Creek limestone, 1000′ above Conglomerate (XII).—*XV*, upper Anthracite Coal Measures near Wilkes-Barre. The two upper figures are Heilprin's. The lower one is a copy of Meek's Ohio shell, cast of the outside of large specimen. Newark, O. *Waverly*, *X*.



6A AVICULOPECTEN WINCHELLI.



Aviculopecten——? Bedford Co., Wolfsburg, Pa. Stevenson, Rt. T2, p. 144; in shale partings of Clinton fossil ore bed.— *Va.*

Aviculopecten——? large, with greatly extended wings, Bedford Co. King. t., Mrs. Colbach's, on the pike. Stevenson, Rt. T2, p. 131; in Marcellus limestone.— *VIII b.*

Aviculopecten——? in Bedford Co. Yellow Creek, Pa., Stevenson, T2, p. 80. Crowd a bed near top of Portage formation, says 450′ beneath Chemung lower conglomerate.—*VIII g*.

Aviculopecten——? Same locality; T2, p. 225; fill a layer above middle of No. 19 of Yellow cr. section, say 1260′ beneath Catskill formation.—*VIII g*.

Aviculopecten——? and *Rhynchonella* in Venango Co., Pa., Nelson Farm, 3 m. N. W. of Pleasantville, in green SS. Rt. O, Cat. Carll's collections, No. 3318; also with *Strictorhynchus*, same, No. 3319; also 1 m. e. of Little Cooley, in gray SS. loose, No. 3257.—*X*? See report I, p. 79, note.

Aviculopecten——? with Productus, Cypricardia, Spirifera and fucoids, characterize the outcrops of shale No. *XI*, under the Olean (Garland) Conglomerate No. *XII* throughout Warren and Crawford Cos., Pa. See Carll's Rt. III, pp. 29, 51.

Aviculopecten——? in the Wrightsville Conglomerate, *X*?, Warren Co., Pa. Carll's Rt. *III*, p. 230.

Aviculopecten——? OO, Pal. Coll., p. 235, Spec. 801–19, Chance's Coll. at Marshall's Falls, Monroe Co., and 805–35 (only a small fragment). C. E. Hall's Coll. at Bell's Mills, Blair Co.; both from *Hamilton shale*, *VIII c*.—Also 855–33 (in very good condition);—34 (good);—35 (a fine guttapercha cast can be made from this);—36 (fair);—855–40 (more elongate than the other forms); all in Sherwood's Coll. in Sullivan t., Tioga Co., Pa., from *Upper Chemung* strata, *VIII g*.

Aviculopecten——? A large species in the Faighney's quarry sandstone, in Warren Co., Pa., supposed by Carll to be the Panama conglomerate of W. New York. Rt. *III*, p. 240. *VIII g*.

Aviculopecten——? Abundant in the Erie Co. quarry of Le Boeuf conglomerate, White's Third Oil Sand, and characteristic of it. Report Q4, pp. 110, 249. *VIII g*.

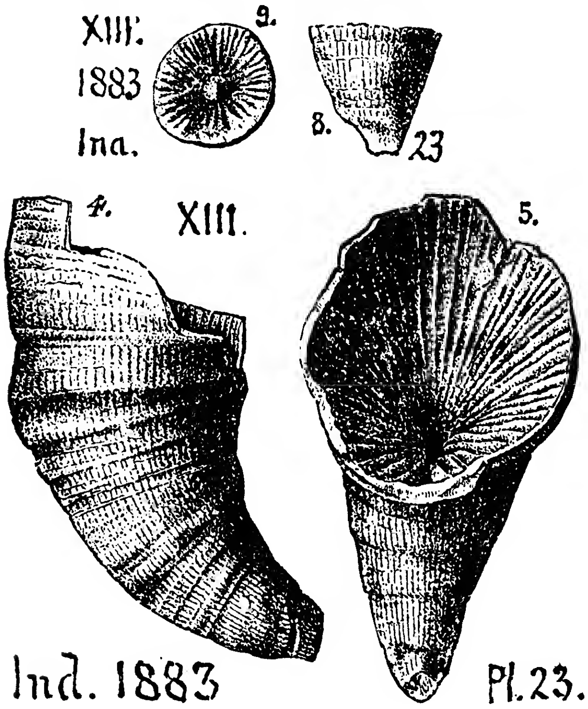
Aviculopecten——? in the Warren Co. Third mountain sandstone; Carll's report *III*, p. 273. X.

Aviculopecten——? in Sherwood's collections in Bradford and Tioga Cos., Pa. C. E. Hall's MS. report of Dec. 30, 1876.—*VIII g*.

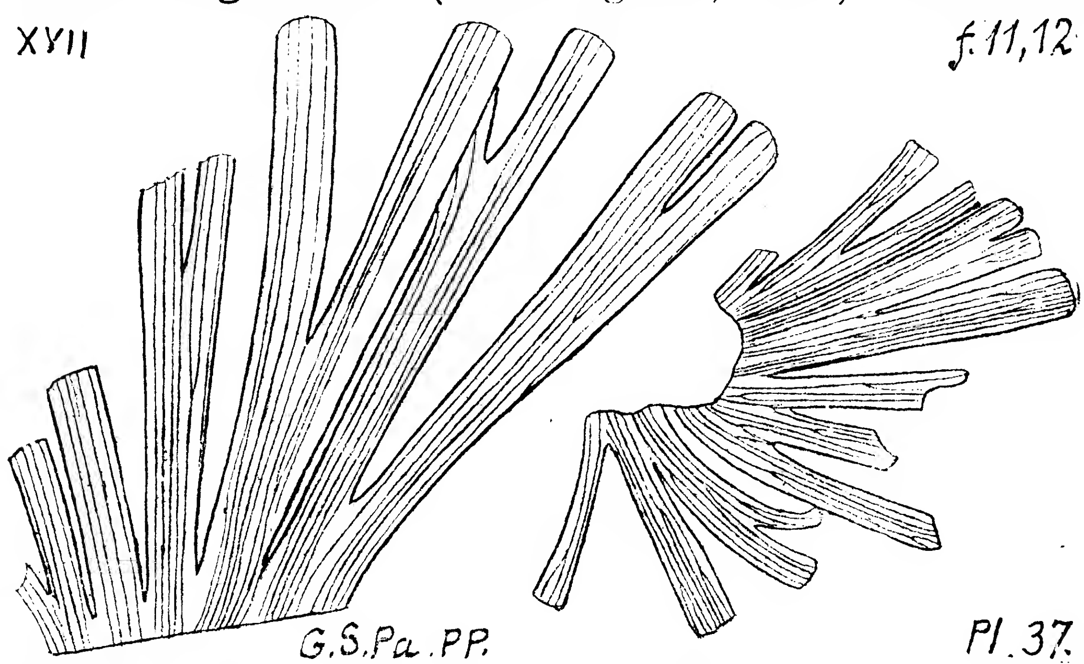
Aviculopecten——? in Coll. Wyoming Hist. Soc., Wilkes-Barre; not figured by Heilprin in An. Rt. Geol. Sur. Pa., 1885, page 451.—*XIII ?*

Aviculopinna americana. *See Appendix.*

Axophyllum rude. (White and St. John. Trans. Chicago Acad. Sci., Vol. 1, 1867, page 115). Collett's Indiana Rt. of 1883, page 118, plate 23, fig. 8, side view of a small one, *natural size ;* fig. 9, cup of the same, *XV.* Not uncommon in the Upper Coal Measures of Indiana, Illinois and Iowa; sometimes singly, often in clusters, budding sidewise; average size somewhat larger than in the figure; the new or young coralla are often attached together by their roollets. From Newport, Ind.



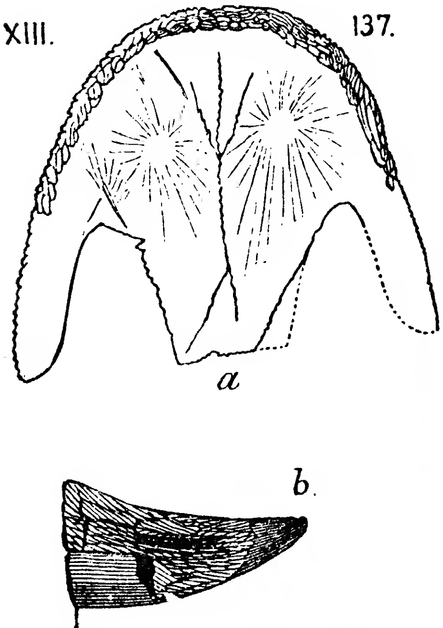
Baiera virginiana. (Braun's genus, 1840.) Fontaine and



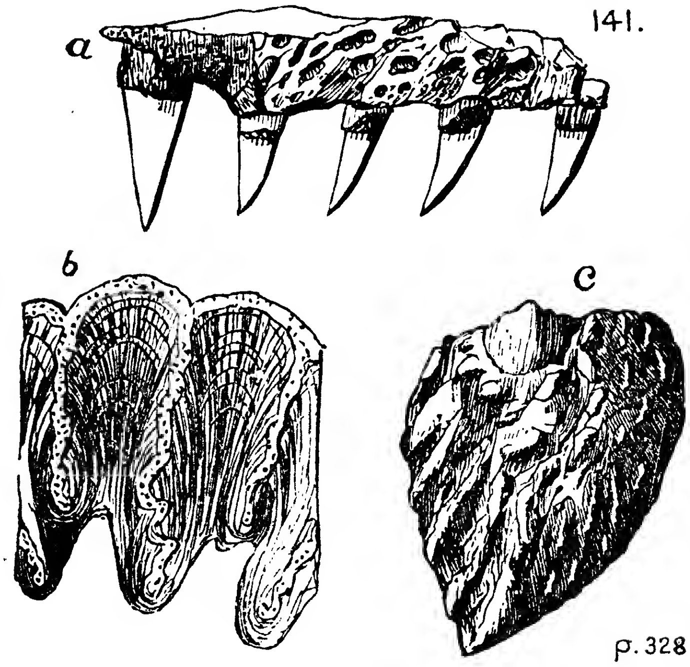
White's Rt. PP, to Geol. Sur., Pa., 1880, page 103, plate 37, figs. 11, 12; never seen entire; robust, thick leaf; like *B. longifolia* (*Scunapaulia*) Heer, of the Jurassic rocks of Europe (Foss, Flor. Arctica, ix, 1 to 11). Close to *B. digitata* Heer, (*Zonarites digitatus*, Brgt. Geinitz, Permian). Upper Barren Coal Measures of S. W. Penna. and W. Va.—*XVIII.*

Baphites planiceps. Owen, Proc. Geol. Soc., Lond., 1853.

XIII. 137.



141.



Dawson. Ac. Geol. 1868 p. 328

Dawson, Acadian Geol., 1868, p. 328, f. 137, front of scull seen from beneath, *reduced from seven in. wide by five long*, set with strong conical teeth (fig. 137 *b*, tooth *natural size ;* f. 141 *a*, five teeth, *natural size*, four outer, one inner; *b*, section of inner tooth *magnified ; c*, skin scale, *natural size ;*) found by Dawson, 1850, in ironstone parting of Albion mine coal bed, Pictou, N. S., with abundance of *spirorbis*, large fish scales and teeth, and bony spines, some ½ in. wide. *See Appendix.*

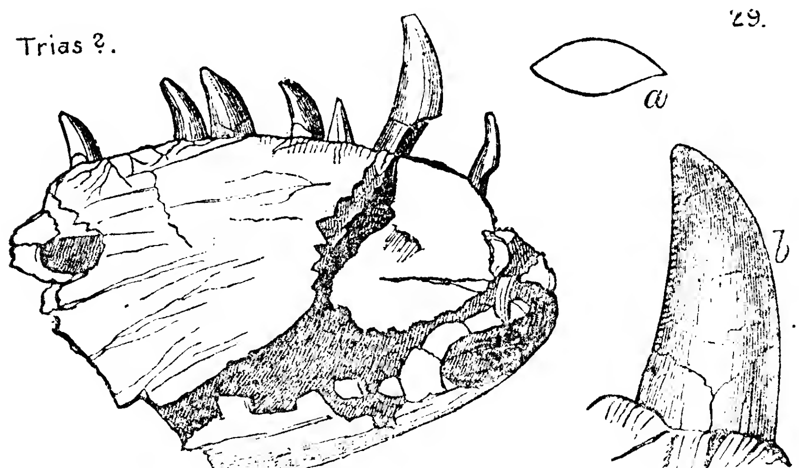
Barrandia thompsoni. See **Olonellus thompsoni.** *M. C.*

Barrandia vermontana. See **Mesonacis vermontana.** *Middle Cambrian.*

Batacanthus baculiformis ? *See Appendix.*

Bathygnathus borealis. Leidy, Proc. Acad. Nat. Sci. Phila.

Trias ?. 29.

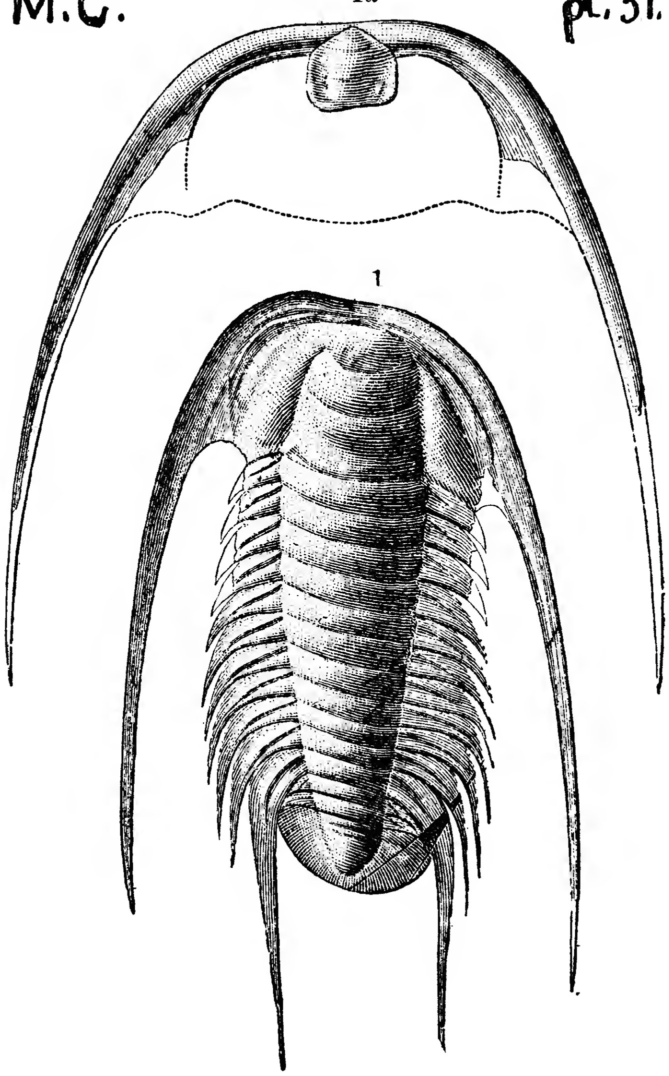


Dawson. Acad. Geol. 1868. p. 119

Dawson, Acad. Geol. 1868, p. 119. fig. 29, a *reduced* copy of Leidy's *a*, cross section of second tooth, *nat. size ; b*, fifth tooth, *nat. size ;* part of the jaw of a carnivorous reptile, as large as an alligator, (allied to *Thecodontosaurus* of the English New Red sandstone); found in the *Trias* of Prince Edwards island; now in musuem of Acad. N. S. Philadelphia. *See Appendix.*

Bathynotus holopyga. *Peltura holopyga*, *Olenus holopyga*, Hall, 1859, 12th An. Rt.; Pal. N. Y. Vol. 3; *Paradoxides? quadraspinosus*, Emmons, 1860, Manual Geol., page 80, fig. 57; also *Pagura quad.* Emmons, p. 280.) Hall, 1860, 13th An. Rt. and 1861, Geol. Vermont, plate 13, fig. 3. Walcott, Bulletin, U. S. G. S. No. 30, page 191, plate 31, fig. 1, nearly perfect specimens, but long eye lobes crushed down. Natural size; fig. 1 a, free cheeks and hypostoma (lower jaw plate) in position.——*Lower* Cambrian (Georgian) formation, Parker's farm, Georgia, Vt. *L. C. See foot note to p. 134.*

M.C.



pl. 31.

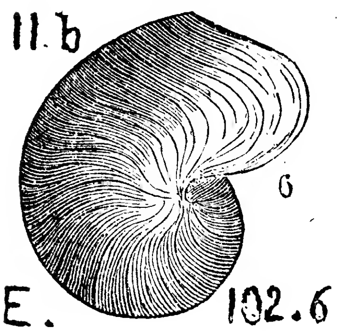
Bathyurus extans (*Asaphus extans*, Hall, 1847) abundant in Pennsylvania *Trenton limestone, II c. See Appendix.*

Bathyurus parvulus. See **Protypus senectus**. *L. C.*

Bathyurus senectus. See **Protypus senectus.** *L. C.*

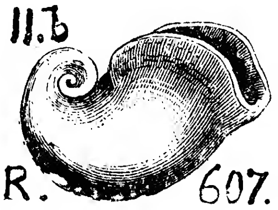
Bellerophon bilobatus. (*Cyrtolites biloba.* Emmons) Rogers, page 819, fig. 607. Emmons, page 392, fig. 101, *b.* II b. Black river formation. III b. Loraine (Hudson river) shale.—Rogers, page 822. V a. Clinton formation. (compare Sowerby, 1839; Murchison's Sil. Sys.

II.b



E. 102.6

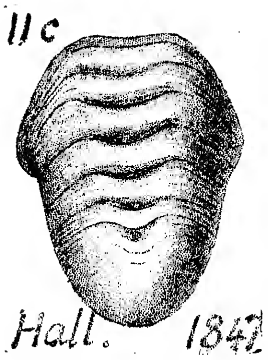
II.b



R. 607.

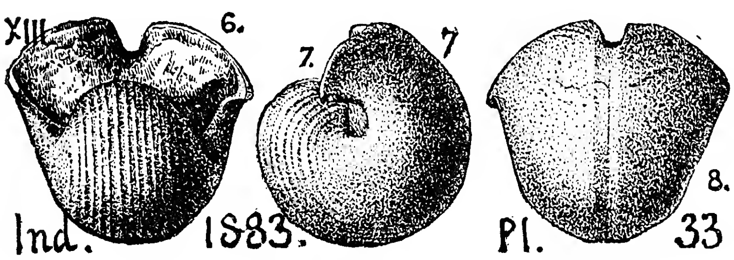
Belleropkon bilobatus, var. **acutus.** Hall, Pal. N. Y., Vol. 1, 1847, page 185, plate 40, fig. 4, a. Trenton formation. The remarkable characteristic sharpness of the ridge is not due to pressure, in all cases, and must be considered a native distinction, but not amounting to species. *II c.*

Bellerophon bilobatus, var. **corrugatus.** Hall, Pal. N. Y., Vol. 1, 1847, page 185, plate 40, fig. 6 *a.*—II *c.* Trenton formation.—Reported by A. L. Ewing, from Hudson river (Loraine) shales, III b, in Centre Co., Pa., who says (report T4, p. 425) that at Matternville on Buffalo run, the lower 600′ (grading downward into Trenton limestone) contain fossils common to Utica and the Trenton formations. This shell is reported as spec. 702–15, in the Orbisonia collections, from the *Oriskany sandstone, VII; OO*, p. 235, (G. B. S 1888.)

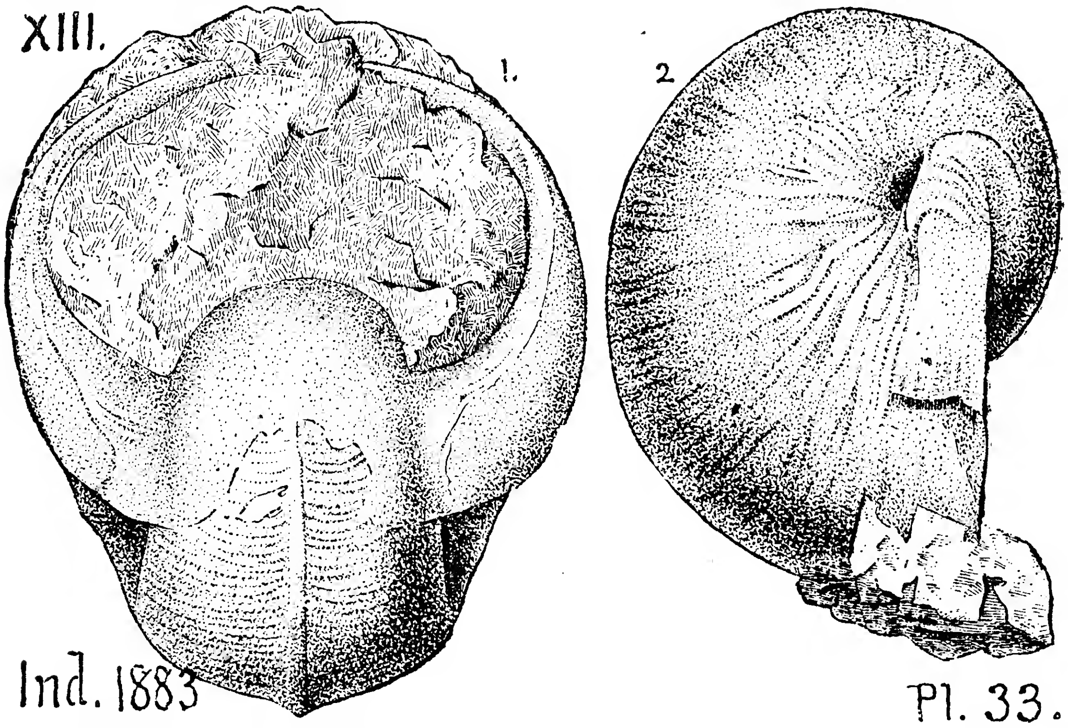


Bellerophon cancellatus. See **Bellerophon textilis.** *XI.*

Bellerophon carbonarius. (Cox, Kentucky Rt. of 1857, Vol. 3, page 562.) Collett's Indiana Rt. of 1883, page 158, plate 33, fig. 6, 7, 8, views of Cox's type specimen, *natural size*, but a little distorted by pressure. In the coal measures, from W. Virginia to Nebraska; where Collett makes a variety *B. carb. papillosus.* (Note.—It was usually identified with Fleming's *Bellerophon urii*, and may be the same. Collett.)—In Pennsylvania, it is found by I. C. White in Ferriferous Lime. In Beaver Co. on Trough run (Q,62, 200); in Lawrence Co. at Wampum quarries, QQ, pp. 47, 106; and in Mercer Co. with *B. montfortianus, percarinatus* and *stevensanus*, QQQ, pp. 25. 77, 78.—In Fayette Co. Stevenson finds it in the Barren measure black fossil (*crinoidal*) lime, 250′ beneath Pitts. C. (L, p. 36; KKK, p. 310; Q. p. 30).—In Indiana Co. W. G. Platt, abundantly in the same, with *B. montfortianus* and *percarinatus.* HHHH, p. 78, 241.—*XIII, XIV.*

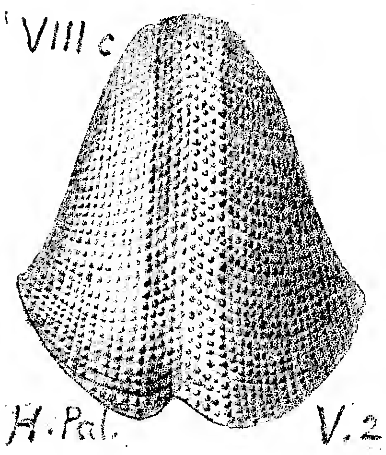


Bellerophon crassus. (Meek & Worthen, Proc. Acad. Sc.



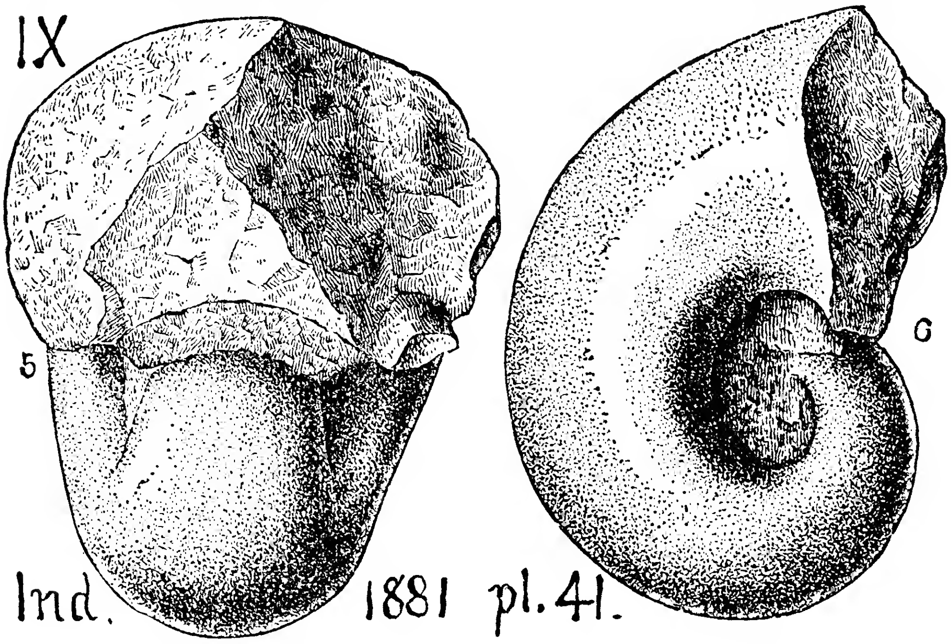
1860; Illinois Rt. of 1866, Vol. 2, page 385, plate 31, fig. 16.) Collett's Indiana Rt. of 1883, page 157, plate 33, fig. 1, 2, *natural size.* XIII–XV; Lower and Upper Coal measures, from Indiana to Nevada; in Indiana, Upper Coal measures.—In Eastern Pennsylvania, doubtfully identified by Heilprin as a spec. in collect. of Wyoming Hist. Soc. at Wilkes Barre, from Mill Creek limestone, 1000 feet up in anthracite measures above Conglomerate No. XII; therefore Monongahela series. An. Rt. Geol. Sur. Pa. 1885, page 457. In West Pennsylvania, Stevenson found it in the gaps of Westmoreland and Fayette Cos., in Subcarboniferous strata. Rt. KKK, p. 311. *XI* to *XV.*

Bellerophon crenistriatus. (Hall, 1876, Ill. Dev. Foss. Pal. N. Y. Vol. 5, part 2, page 116, plate 25, fig. 17.) Claypole, preface to Report F2; list of fossils in Perry Co., Pa., in Hamilton Upper shale. See OOO, catalogue, Claypole's specimen 5–102, from Barnett's mill. *VIII c.*—Note by J. Hall, 1879. Thus far rarely found, but at distant places in New York: Schoharie Co., one specimen; Chenango Co., one; Otisco lake, one; Cayuga lake, one; Livingston Co., one. It is different from any other Hamilton form.



Bellerophon expansus. See **Bucania expansa,** *VIII f.*

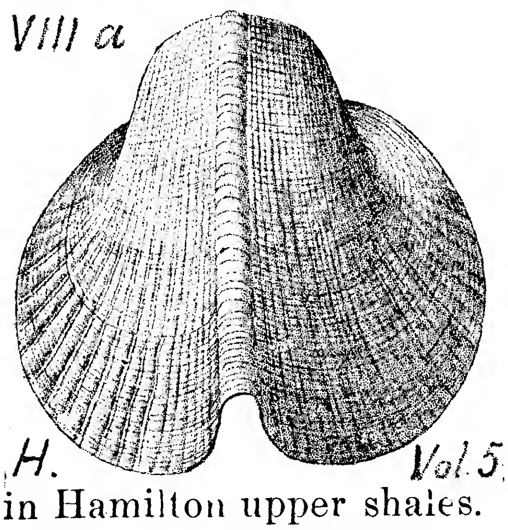
Bellerophon gibsoni. Collett's Indiana Report of 1881, page 360, plate 41, fig. 4, 5, 6, (4 omitted) back, front and side views of *cast* of inside surface of shell (one of the largest



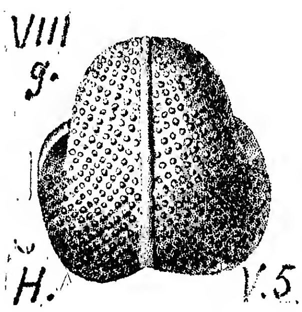
species of *Bellerophon* as yet known in American rocks), fig. 5, showing the great thickness of shell between inner and outer whorls; *natural size.* St. Louis limestone, *XI.*

Bellerophon inspeciosus. See **B. nodocarinatus** ? *XIII.*

Bellerophon leda. (Hall, 1862, 15th An. Rt.; Pal. Vol. 5, part 2, page 110, plate 23, f. 9) —Claypole, Report on Perry Co., Pa., lists of fossils in preface. *Hamilton* formation —In Pennsylvania, Perry Co, at Barnett's Mill, F2, xiv; and OOO, Cat. Spec. 5—104. Hamilton upper shales.—In Huntingdon Co. at Rough & Ready, in bottom beds of Hamilton middle shales, T3, p. 111; at Huntingdon, in Hamilton upper shales. p. 109.—Spec. 801-7, (OO, p. 235) Marshall's Falls, Monroe Co.— *VIII c.*



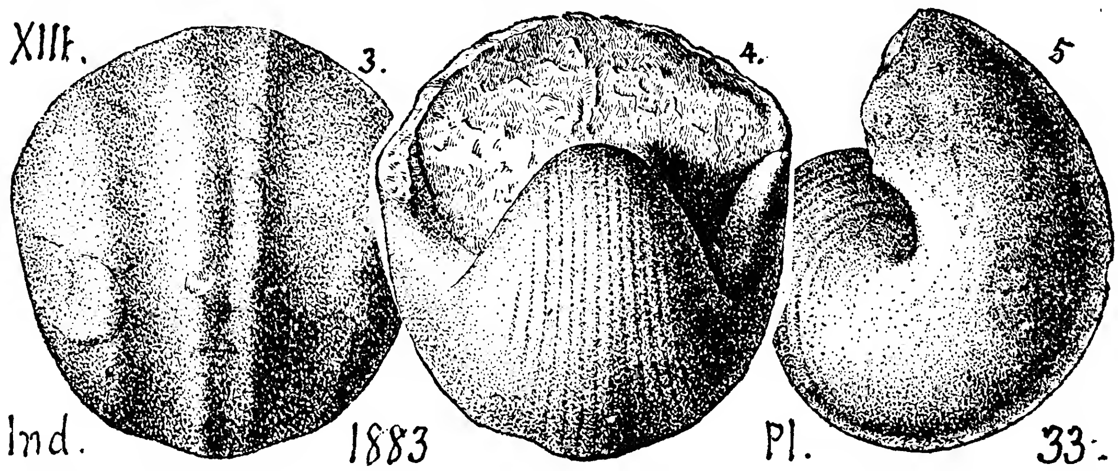
Bellerophon mæra. (Hall 1876, Illust. Devon. Foss. Pal. N. Y. Vol. 5, part 2, page 119, plate 25, fig. 11. Chemung.)—In Pennsylvania, Perry Co., Wheatfield t. Hartzler's, S. of mouth of Lock's run, in Chemung beds. F2. xv. OOO, Cat. Spec. 131-1 (boxfull).—In Columbia Co. 2 m. above Danville, G7, p. 72, 208. Spec. 80-2, 31, in Chemung-Catskill, *VIIIg–IX.*



Belleropnon meekanus. *See Appendix.* This western carboniferous shell was found in Pennsylvania by J. J. Stevenson (Report L, p. 36) in Barren measures. *XIV.*

Bellerophon montfortanus. *See Appendix.* This western carboniferous shell was found by White (QQ, 47; Q3, 25) in Ferr. L. *XIII;* and by Stevenson (L, 36) in Barren Measures, *XIV.*

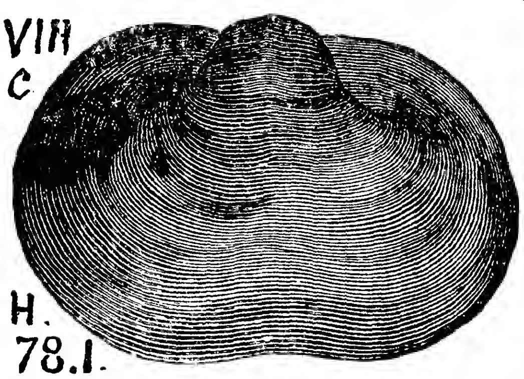
Bellerophon nodocarinatus? (Hall. Iowa Rt. of 1858,



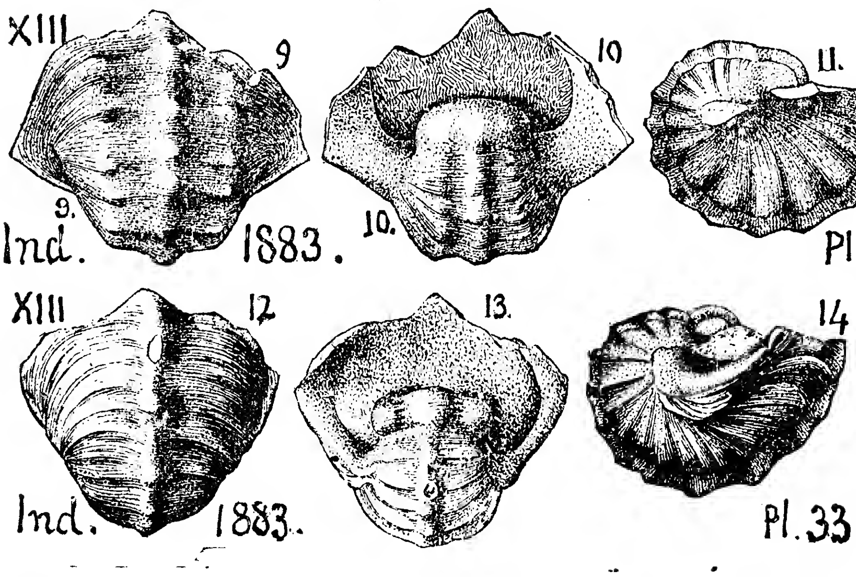
p. 723, plate 29, figs. 15, a, b, c.) Collett's Indiana Rt. of 1883, page 159, plate 33, fig. 3, 4, 5, large individual, *natural size. Coal measures* of New Harmony, Ind. (Note. Possibly not Hall's *B. nodocarinatus.* Possibly also merely a variety of Collett's *B. inspeciosus* from New Mexico.)—Doubtfully identified by Heilprin, as a specimen in Museum of Wyoming Hist. Soc. found in Mill Creek limestone near Wilkes Barre, 1000′ feet above the conglomerate, An. Rt. Penn. Geol. Sur. 1885, p. 456.—*XIV.*

Bellerophon papillosus, a variety of **Bellerophon carbonarius.** *XIII.*

Bellerophon patulus. (Hall, page 196, fig. 78, 1. *Hamilton*)—Found at Marshall's creek, Monroe Co. See Cat. OO, p. 235, specimens 801-7. (G. B. S. 1888.) OOO, Catalogue of Collections, specimens 5-97,-186, from Barnett's Mills, Perry Co. in Hamilton upper shale.—Huntingdon Co. Saxton section, bed No. 84, Hamilton middle shales; White, T2, 231.—*VIIIc.*



Bellerophon percarinatus. (Conrad. Jour. Acad. N. S. Phil. 1842, Vol. 8, plate 16, fig. 5; Norwood & Pratten, Jour. Acad. N. S. Phil. 1854, Vol 3, page 74, plate 9. fig. 4) Collett's Indiana Rept. of



1883, page 158, plate 33, figs. 9, 10, 11, views of a specimen showing both side ridges and middle nodular ridges, or rows of little knobs; figs. 12, 13, 14, another specimen without side ridges; all of *natural size.* One of the commonest shells from coal M. of Indiana upward through the Upper Coal Measures.

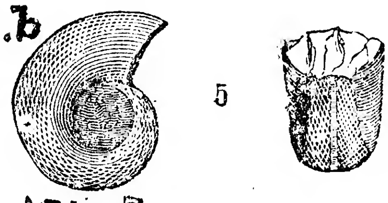
In Wilkes-Barre anthracite measures doubtfully identified by Heilprin, in An. Rt. G. Sur. Pa. 1885, p. 451, in Wyoming Hist. Soc.'s collections.—In Western Pennsylvania, Beaver, Lawrence, Mercer and Butler Cos. in Ferriferous limestone (Q 62, 200; QQ 47, 106; QQQ, 25; V, 147). In Fayette Co. Coal measures, KKK, 310. In W. Va. Barren measure shale 250′ beneath Pitts. C. Stevenson, Trans. A. P. S. quoted in L, 36.—*XIII, XIV.*

Bellerophon profundus. Emmons, page 393, figs. 103, 1, 2, 3.—*Trenton* formation. *II c.*—Abundant in the black beds of the formation. At Watertown, N. Y., in the lumpy beds it may be found in certain

irregular masses which no one would suspect to contain fossils, for they are black, smooth, polished and without external marks. The shells here are of the size of the figures above; but elsewhere the species grew sometimes four times that size. Mouth rarely seen; but in one large specimen shows remarkably expanded, and wide out of all proportion to the body.

Bellerophon punctifrons. Emmons, page 392, fig. 101, 5. *Black River* and *Trenton* formations. This beautiful little shell was found (1842) by Emmons in the same grey crystalline limestone at Watertown, as his *Subulites elongata*, and his *Pleurotomaria lenticularis. II c.*

II.b



5

E.101. 5.

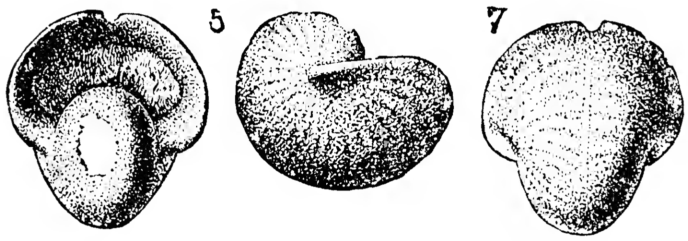
Bellerophon stevensanus. See *Appendix.*

Bellerophon striatus. Hall, page 245, fig. 107. 7. *Portage* formation. (Compare Phillips, Pal. Foss. XL, fig. 198.—Name preoccupied by D'Orbigny.—See Sowerby. 1839. Murchison's Sil. System.)—*VIII f.* See Hall's Geol. Fourth district, N. Y.

VIII f

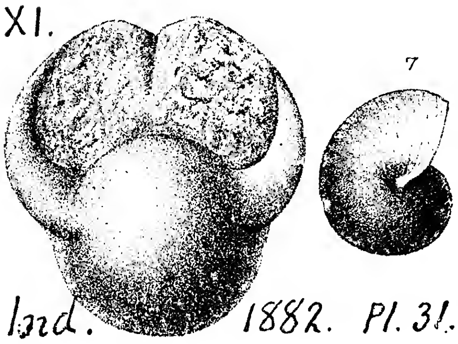
H 107. 7.

Bellerophon sublævis. (Hall, 1856, Trans. Albany Inst. Vol. 4, p. 32, Warsaw limestone.) Collett's Report on Indiana, 1881, page 359, plate 40, fig. 5, 6, 7, mouth, side and back views; nat. size.—Also Indiana Rt. of 1882, (quoting Hall's Iowa Rt. of 1858, page 688, plate 23, fig. 15; and Whitfield's Bull. 3, Am. Mus. N. H. of 1882, page 89, plate 8, figs. 6, 7) page 371, plate 31, figs. 6, 7. *Subcarboniferous* at Alton, Ill., Spergen Hill, &c. *XI.*—Very doubtfully identified by Heilprin among the Wyoming Hist. Society's anthracite fossils at Wilkesbarre. Pa. Geol. Sur. An. Rt. 1885, p. 4·1.—*XIII?*



5 7

XI.



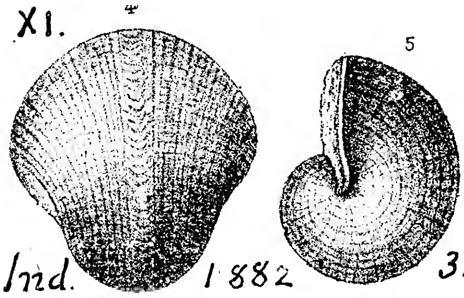
7

Ind. 1882. Pl. 31.

Bellerophon sulcatinus. See **Bucania sulcatina.** *II a.*

Bellerophon textilis. (*Bellerophon cancellatus*, Hall, Trans. Albany Inst. Vol. 4, page 31; *textilis*, Hall, Miller's Cat. 1877; Whitfield, Bull. 3, Am. Mus. 1882, plate 8, figs. 4, 5), Collett's Indiana Rt. of 1882, page 371, plate 31, figs. 4, 5, *enlarged twice.* At Bloomington, Ind. *Subcarboniferous. XI.*

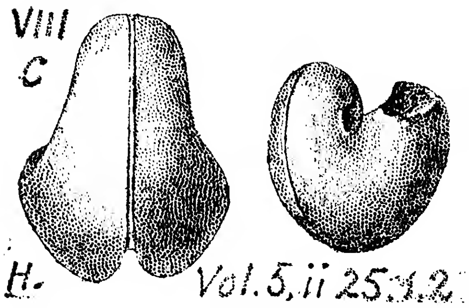
XI.



5

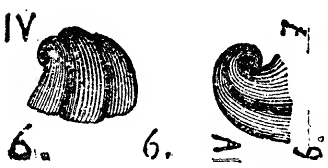
Ind. 1882 31.

Bellerophon thalia. (Hall 1862, 15th An. Rt. Hamilton group). Claypole's list of fossils in preface to Report on Perry Co., Pa, F2, *Hamilton* formation. See Report OOO, 1888, Catalogue Collections; Claypole's specimen marked 5–90, from Barnett's Mill locality, *Hamilton upper shales.— VIII c.*



Bellerophon triliratus, OO, p. 235, spec. 804–106, Marshall's Falls' vicinity, Monroe, *Hamilton shale, VIII c.*

Bellerophon trilobatus (*Planorbis trilobatus*, Con.) Hall, page 48. figs. 6, 6, & 6, 7. *Medina* formation, *IV b.* (Rogers, p. 822, *Clinton. Va.* Compare Murchison, Sil. System. Sowerby 1839.) —In Pennsylvania Specimens in the cabinet, 810–24 (doubtful; perhaps = 850–25 n. sp.) Fellows' coll. Hogback, Shawnee, *Upper Held. VI.*—850–20, Sherwood's coll. Lawrenceville, Tioga Co., *Chemung, VIII g.*



Bellerophon urii. See **Bellerophon carbonarius.** *XIII.*

Bellerophon——? in Clinton fossil ore shale partings, Wolfsburg, Bedford Co., Pa. T2, 144.— *V a.*

Bellerophon——? in Marcellus & Genesee, Marshall's Falls, Monroe Co., C. E. Hall's collections, Proc. A. P. S., Jan. 15, 1876.— *VIII b, e.*

Bellerophon——? Spec. 117–4, Claypole, collection at Falling Spring, Perry Co. Marcellus limestone.— *VIII b.*

Bellerophon——? abounds in highest Hamilton beds, Bedford Co.; and with *B. patulus* in Hamilton middle shales, bed 84 of Saxton section. T2, pp. 83, 231.— *VIIIc.*

Bellerophon ? OO, p. 231, Spec. 203–9 (poor), ¼ m. w. of Bellefonte, Centre Co. *Trenton limestone, II c.*

Bellerophon——? (cast) in top beds of Chemung, ½ m. n. of King's Mill, Perry Co., Pa., Spec. 103—?, Claypole's collections.— *Upper Chemung, VIIIg.*

Bellerophon——? low in Chemung, olive shale, bed 45 of Pa. R. R. section below Huntingdon. T3, 264.— *VIIIg.*

Bellerophon——? Spec. in Carll & Randall's collection from subcarboniferous rocks at Warren, Pa. C. E. Hall. Proc. A. P. S. Jan. 5, 1876. Carll's Rt. I, p. 54 — *VIII-IX.*

Bellerophon——? characteristic of Third Oil Sand=LeBoeuf conglomerate; abundant at Stone quarry, Erie Co., Pa. Q4, p. 110, 249.—*VIII-IX.*

Bellerophon——? *Three* undetermined species found by J. J. Stevenson in the subcarboniferous strata of Fayette Co., Pa., section beds No. 19 to 21. KKK, p. 311—*XI.*

Bellerophon——? found by Heilprin in anthracite measures at Wilkes Barre, in coll. Wyoming H. Soc —*XIII.*

Bellerophon——? in No. 42 of Stevenson's list of coal measure fossils of Fayette & Westmoreland Cos., Pa.—*XIII.*

Bellerophon——? a minute species frequent (with *bryozoa*) in the Middle Washington limestone of Greene & Fayette Cos., Pa. Stevenson, KKK, p. 306.—Also in Limestone No. IV of the Upper Barrens, near Washington in Washington Co. Very minute, silicified and in vast numbers, K, p. 49, 242.—*XVI.*

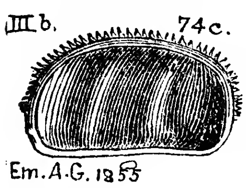
Bellinurus danæ. See **Euproops danæ.** *XIII.*

Belodon caroliniensis, Emmons Bones of a reptile; recognized in York Co., Pa, and at Phœnixville, Pa., by E. D. Cope. Proc. Amer. Phil. Soc. 1877.—*Trias.*

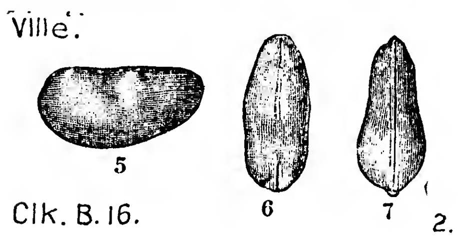
Belodon lepturus. Cope. Reptile, Phœnixville; Wheatley's collections from the R. R. R. tunnel; Proceedings A. P. S. 1877.—*Trias.*

Belodon priscus, Leidy. Reptile, recognized by E. D. Cope at Phœnixville, and in York Co., Pa. Proc. A. P. S. 1867.—*Trias.*

Beyrichia ciliata. Emmons, American Geology, Vol. 1, part 2, 1885, page 219, fig. 74 *c*, greatly enlarged, as shown by small oval underneath. One margin set with hairs, apparently, but when seen under the microscope the hairs look more like edge-folds. Blue Limestone of Ohio.—*III b.*



Beyrichia dagon. Clarke, Bull. 16, U. S. G. S. 1885, page 29, plate 2, figs. 5, 6, 7, side, back and belly views of this minute crustacean (*figs. magnified 20 times*) of the *Genesee black shale* at Bristol Centre, Ontario Co., N. Y.—*VIII e.*



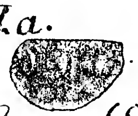
Beyrichia granulata. *See Appendix.*

Beyrichia lata. (*Agnostus latus*) Hall, page 72, fig. 17, 10. Rogers, page 822. *Clinton* formation.—Claypole, Perry
V.17 Co., Pa., F. 2, *Va*, abundant in Clinton Iron SS. and Ore
10. SS. and Sand Vein ore bed; also in the green upper shale,

Clinton. See Rt. OOO, 1888, Catalogue; specimens 46–6; 161–6, 7 (5 in all).—In Montour Co. Clinton fossil ore bed; White, 67, p. 113, 232.—In Huntingdon Co. Orbisonia, fossil ore bed roof lime shales, through 133′, C. E. Hall's collections; Proc. A. P. S. Jan. 5, 1876.—Specimens in the cabinet as follows: (See OO, Pal. Coll. p. 233,) Specs. 501–16, McKee's ore bank, Mifflin; 502–1, 23, 1 m. N. W. of McKee's house; 504–10, Orbisonia, Huntingdon Co. all from *Clinton shales over fossil ore bed.*—508–3 (numerous specimens), 508–14, 19, 26, 27, 28 (small piece), 29, 31 (numerous good specimens) all from Orbisonia, *Clinton shale.*—510–1 (numerous impressions), 510–2 (decomposed impressions), 510–3 (impressions), 510–6, all from *Clinton shale*, 140 feet above base of Clinton formation near Orbisonia.—511–1, 80 feet above base of Clinton, at Orbisonia. —512–2, 3 (numerous specimens) 60 feet above base of *Clinton*, at Orbisonia.—All the above in *Va.* Only known from obscure casts in iron ore, or in irony slate and sandstone. In the best specimens its surface seems granulate or pustulate. Hall. Pal. N. Y. Vol. I, page 301.

Beyrichia lobata. See **Agnostus lobatus.** *III b.*

Beyrichia maccoyana. Rogers, page 834, fig. 695, *Vc.*
Va. Salina formation. (Jones, 1855. Ann. and Mag. Nat. Hist. [2] Vol. XVI.

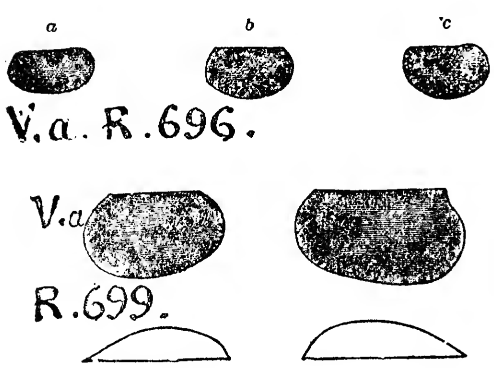


R. 695

Beyrichia persulcata. *See Appendix.*

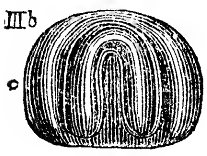
Beyrichia notata. *See Appendix.* This Lower Helderberg shell has been found by Claypole in Perry county, Pa., and by Dr. Barrett at Port Jervis, on the Delaware.

Beyrichia pennsylvanica. Rogers, page 823, fig. 696. *Clinton* formation. Rogers, page 834, fig. 699. Salina formation. (Jones. Ann. and Mag. Nat. Hist. 1858, [3] Vol. I.) Locality given by H. D. Rogers, in his Geology of Pennsylvania, 1858, is simply Aughwick Valley, Huntingdon Co, Pa.—*Vc.*



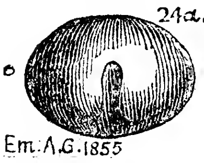
Beyrichia punctulifera. *See Appendix.* This Hamilton New York shell has been found by Claypole in Perry county, Pa.; by White in Columbia county, and at Huntingdon; all in Hamilton upper shales. Also by White at Huntingdon in the Marcellus.

Beyrichia regularis. Emmons. American Geology, 18 5, Vol. I, part 2, page 219, fig. 74, *b*; greatly enlarged; the natural size is shown by the little oval on the side of the figure. A slight obliquity is observable in the direction of the ribs.—Blue limestone of Ohio. *III b.*


IIIb c Em.A.G. f.74b.

Beyrichia seminalis. (H. D. Rogers, reports this minute crustacean and *Leperditia alta* as almost the only fossils of his Scalent gray marls (*Salina.*) T, p. 41; and the same (?) in Lycoming Co., Pa., in the Surgent upper lime shale (*Clinton*,) T, p. 43. It is not recognized as a species in S. A. Miller's Cat. Pal. Foss. 1877, 1883.—*V a, c.*

Beyrichia simplex. (English species, Jones, Journal Geol. Soc. Lond. IX, p. 161.) Emmons, Am. Geol. I, ii, p. 218, fig. 74 *a*, (greatly enlarged, see small oval alongside,) which Emmons says, however, does not agree with the English description; both borders rounded; gully (sulcus) variable in depth and position. Compare *B. logani* of Canada which is probably the species so abundant in the Blue Limestone of Ohio.—*III b.*


24a. c Em.A.G.1855

Beyrichia sulcopunctata n. s. Claypole; founded upon many specimens from Clinton and Salina strata at Waggoner's mill, Perry county, Pa., also specimens from King's mill. *See Appendix.*

Beyrichia symmetrica, recognized by G. B. Simpson, among Hale & Hall's collections, 1875, OO, Pal. Col. page 231, spec. 502–5, 32, 41 (doubtful) 1 m. N. W. of McKee's house, Mifflin Co., in shale over *Clinton fossil ore bed.* *V a.*

Beyrichia ungula. n. s. Claypole. (Report F2 on Perry Co., Penn, preface, page xiii. *No figure of this has been drawn.*) Marcellus formation. *VIII b.* *See Appendix.*

Beyrichia ——? OO, Pal. Col. page 231, specimens 203–26 (numerous), 203–29 (several good interiors and many fragments), 203–34 (many interiors), 203–38, recognized by G. B. Simpson among C. E. Hall's collections, 1875, on north side of creek, $\frac{1}{4}$ m. W. of Bellefonte, Centre Co., in *Trenton limestone.*

—Also *Beyrichias* (?) spec. 210–14, and 210–21 (casts of Beyrichia ? too poor for representation); 210–141 (twelve specimens), from Fellows' coll. 1876, at Bellefonte, in *Trenton limestone*, *II c*.

Beyrichia ——? in *Medina* red or lower division, Bedford borough, Pa. T2, p. 89. (Stevenson says it is of the character of the Beyrichia of the *Tentaculite limestone.)—IV b.*

Beyrichia ——? OO, specimens 508–5 (five specimens) and 508–24 (very poor), from Orbisonia, *Clinton shale*, *V a.*

Beyrichia ——? in Millerstown *Clinton fossil ore* bed, Perry Co., Pa. Claypole's spec. 161–1 (1).—*V a.*

Beyrichia ——? indistinct, in the *Bossardville limestone* of Monroe and Pike Cos., Pa. G6, p. 219.—*VI.*

Beyrichia ——? A minute species in the *Bastard limestone* of Mensch's quarry, Montour township, Columbia Co., Pa. G7, p. 98, 248; also in bottom beds of the Low Bros. quarry, p. 260. *Beyrichias* appear throughout the *Lower Helderberg* formation, in that region; in Mauser's quarry, bed 22, Hemlock town. Columbia Co. G7, p. 226, 244.—The same minute species in the *Bossardville limestone*, Russell quarry, p. 314.—*VI.*

Beyrichia ——? in blue flaggy *Lower Helderberg* limestone, at Bedford Springs. T2, p. 148.—*VI.*

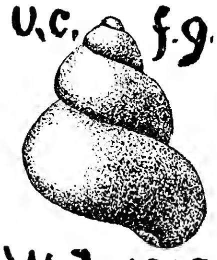
Beyrichia ——? in *Hamilton upper* shales, at Barnett's Mill, Perry Co., Pa. OOO, 1888, Claypole's Cat., specimens 5–48 (2).—*VIII c.*

Beyrichia ——? in Chemung Catskill passage beds, Shermansdale Mill, Perry Co., Pa. Claypole's spec. S–64 (1).—*VIII g–IX.*

Beyrichia ——? See figures *natural size* and in group, under **Leperditia okeni.** *XI.*

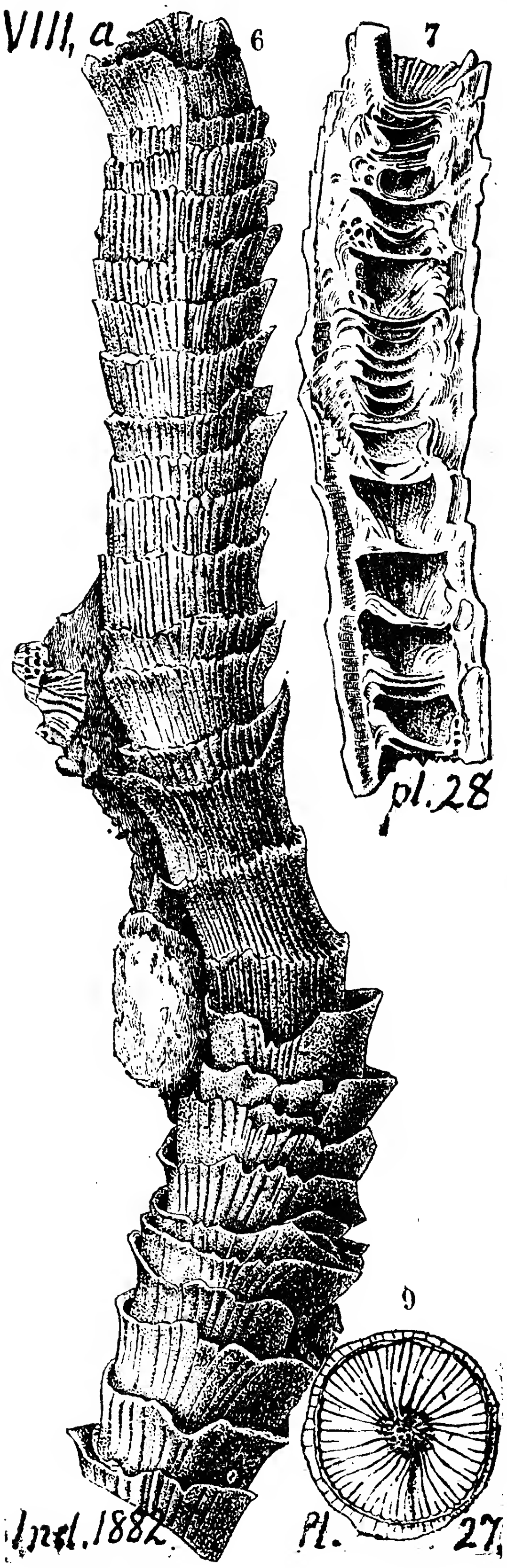
Billingsia saratogensis. Walcott. Potsdam fauna of Saratoga county, N. Y., 1888, pl. —, fig. 9.—(See Bull. 30, U. S. G. S. pp. 61, 62. It is a gasteropod found, as yet, only in the *Upper Cambrian* formation in Saratoga county, N. Y. To be looked for in Penna. along the north slope of the South Mountains and along the North and South Chester Valley hill ranges.—*U. C.*

U.C. f.9.



Walc. 1888.

Blo.hrophyllum promissum. (Hall's 35th An. Rt. 1882. Foss. Corals, *Niagara* and *U. Helderberg.*) Collett's Indiana Rt. of 1882, page 304, plate 28, fig 6, the axis of a specimen from which the skin or bark of the coral has been removed, showing the unsheathed (invaginated) character of the walls; fig. 7, a section, lengthwise, of another one; plate 27, fig. 9, a cup. Falls of the Ohio. Corniferous limestone, *VIII a.*—This is one of the four new species by Hall, of Billings' genus Blothrophyllum, and is here given as an illustration of the genus, no species of which has thus far been recognized in Pennsylvania. The four species described and figured in Hall's 35th report, on pages 448, 449, are—*B. multicalicatum*, from Canada west;—*B. papulosum*, from Leroy, N. Y.;—*B. sinuosum*, from the Falls of the Ohio; and—*B. promissum*, which has 70 lamellæ; and a flat area at the bottom of the cup, which distinguishes it from *B. sinuosum*, which also has from 60 to 70 lamellæ. *B. papulosum* has from 90 to 100 lamellæ, and a flat space at the bottom of the calyx. *B. multiplicatum* has as many as 120 lamellæ.



Bornia ——? in coarse white sandstone; Ware farm, Warren Co., Pa. Carll's collections, O, p. 130, specimen 2930.—*IX, X.*

Bornia ——? in loose piece of reddish sandstone, Pleasantville, Venango Co., Pa., Carll's collections.

Bornia radiata. (*Calamites radiatus.*) *See Appendix.*—This is the Sub-carboniferous species in Brogniart's Hist. Veg. Foss. See Lesquereux's Coal Flora, P, 1880, page 30, plate 1, fig. 7; page 706, plate 91, fig. 5, and plate 93, fig. 2.—*XI.*

Bos. Among many bones found in the clay which filled the cave at Port Kennedy, on the Schuylkill river above Philadelphia, in Chester county, Pa., were those of some extinct species of American bison or ox. See E. D. Cope, in Proceedings of the American Philosophical Society, at Philadelphia, 1871, page 96.—*Quaternary.*

Bothriolepis. See **Holoptychius.**

Bothriolepis taylori. (English species.) *See Appendix.*—This Devonian fish is reported by Claypole in F2, in Perry county, Pa., preface, page 15, as found by him in *Catskill-Chemung* beds; Specimens 50 *a*–1 (sixteen); 36–1; 114–5, from Linton's hill, west of King's mill.—*VIII g–IX.*

Bruckmannia tuluculata. See **Annularia longifolia.** *XIII.*

Bryozoa are numerous in the *Trenton formation II c.* See OO, Pal. Coll. p. 231. Specimens in the collections may be found marked 202–1 (many fragments requiring long study to distinguish their species, and with poor fragments of *Orthis testudinaria* on the back); 202–3, (numerous specimens) resembling Orthopora, and unless determined by Ulrich in Wisconsin, they are *new species;* 202–4, fragments of branching forms, very obscure; all from Kishicoquillis valley, Reedsville, Mifflin Co.—203–6 *b*, numerous specimens (too poor to draw;) 203–10 many fragments difficult because indistinct; 203–26, fragments requiring close study; 203–37 numerous fragments of ramose forms, mostly very poor; 203–44, numerous undetermined and poor; 203–46, branching forms needing much study; all from C. E. Hall's collection at Bellefonte, Centre Co.—210–26, branching; 210–28, branching, needing study; 210–29 many fragments, branching, in a fair condition for drawing; 210–42 fragments, branching, poor; 210–57 numerous fragments, very poor; 210–74, *a large slab, with numerous beautiful fragments on it;* 210–99 (indistinct fragments); 210–106 (mostly useless fragments); 210–117, poor; 210–121, *very good example;* all from W. A. Fellows' collections at Bellefonte 1876.—211–2b (fragment), 6 (fragment). 211–9. several *very interesting forms*, all from Tyrone Forge bluff, on Little Juniata river, *Trenton limestone*, *II c*. (G. B. Simpson, 1888.)

Bryozoon from *Loraine* (*Hud. riv.*) *shale* collected by R. H. Sanders, 1875, 1½ m. S. W. Henrietta mines, Blair Co. OO, Pal. Coll. p. 232, spec. 304–4, impression of a branching (ramose) bryozoon, too poorly preserved for identification. G. B. Simpson, 1888.—*III b*. (G. B. S.)

Bryozoa from *Lower Helderberg formation*, collected by Hall & Fellows, 1876, from quarry north of Tyrone City, Blair Co. OO, p. 234, spec. 607–8 (very many fragments too poor for identification); 610–5, closely resembling *Callotrypa heteropora* of New York; 610–6. too poor to identify; 610–8, *sections* of bryozoan branches, but no *surfaces* to be seen on the specimen; 610–11, resembling *Callotryra heteropora*.—*VI*. (G. B. S.)

Bryozoa (*Fenestella* &c.), abundant in Mann's quarry, Bedford Co., Pa. Monroe township, T2, p. 187; also E. of Luth. Church, Imlertown, p. 156; *Lower Helderberg*.—*VI*.

Bryozoa from the *Hamilton*, on Marshall creek, Monroe Co., Fellows & Genth, 1875, OO, p. 235, spec. 804–102, impression, extremely poor. (G. B. S.) *VIII c*.

Bryozoon, small, in delicate round patches, frequent in Hamilton middle shales, on Coffee run; and in the bottom *Hamilton* bed (just over Marcellus) at Goodman's near Huntingdon, Pa. T3, 112, 258.—*VIII c*.

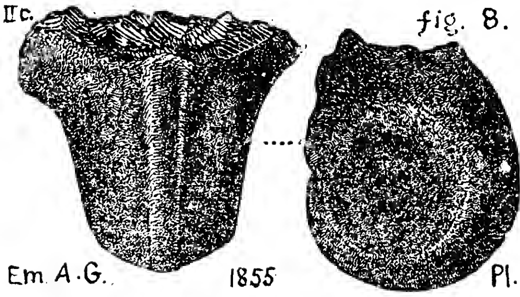
Bryozoa abundant in *Mercer lower limestone*, Lawrence Co., Pa. Wayne township, UU, p. 100.—*XII*.

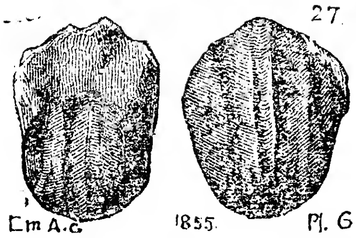
Bryozoa, a few appear near the top of the *Barren measure* shale, 250′ beneath Pitts. C. Fayette Co., Pa. L, p. 36.—*XIV*.

Bryozoa, obscure (only seen on weathered surface), in a layer ten feet beneath the top of the *Great limestone* of the Monongahela Series of Coal Measures. K, p. 231.—*XV*.

Bryozoa, branching, in immense numbers, locally, on the weathered surfaces of the *Washington Middle limestone*, but so defaced as to be indeterminable; Washington and Greene Cos., Pa. KKK, p. 306. Converted into calcspar they glisten on the weathered surfaces near Washington, Pa. K, p. 49, 242.—*XVI*.

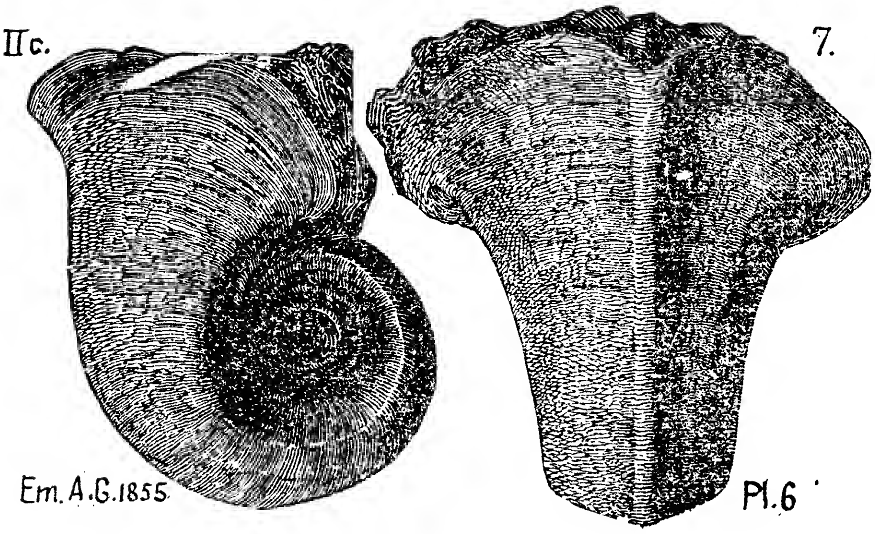
Bucania bidorsata. Hall. (*Bellerophon bidorsatus*, D'Orbigny.) Emmons, Amer. Geol. I. ii, 1855, page 165, plate 5, figs. 8, 27 (copied from Hall's Pal. N Y., Vol. 1, 1847).—*Trenton* formation at Middleville and Watertown, N. Y.—Note. The name comes from a narrow sharp ridge between two grooves down the keel of the back. In young ones the keel band and central line are very conspicuous. At Watertown in beds over the Black river limestone.—*II c.*



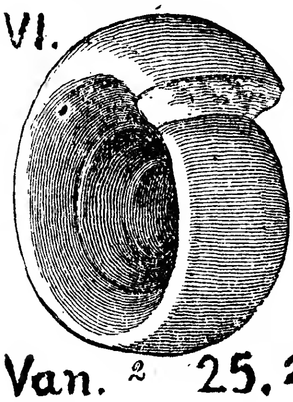


Bucania bilobatus. See **Bellerophon bilobatus.**

Bucania expansa. (*Bellerophon expansus*, Hall, Pal. N. Y. Vol. 1, 1847, *Trenton.*) Emmons, Amer. Geol. Vol. 1, part 2, page 164, plate 6, figs. 7 *a*, *b*, showing the "wide everted semi-circular mouth." *Trenton* limestone at Watertown, N. Y.—In Pennsylvania, I. C. White finds it in the *Chemung* in bed 30 of section 13 (bed 59 of section 78) at Rupert and Catawissa, in Columbia Co., 950 feet above the top of the Genesee, and therefore *Portage*, G6, p. 69, 286.—*II c* and *VIII f.*

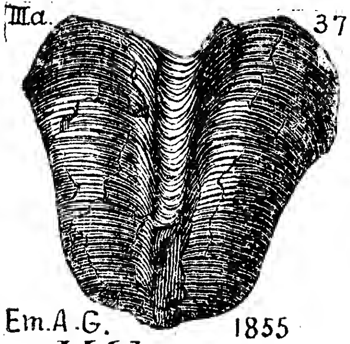


Bucania profunda. (*Euomphalus profundus.*) Hall Geology of the Fourth district of New York, 1843. Plate fig. [27, 2]. Vanuxem, Geology of the Third district N. Y., 1842, page 117, fig. 25, 2. (Conrad, 1841, Ann. Rt. N. Y.) *Lower Helderberg* formation. (Hall, Pal. N. Y., Vol. III, 1859, *Lower Helderberg* formation.)—Claypole list of Perry Co., Pa., fossils. F2, preface p. xiii.—*VI.*



Bucania rugosa. Emmons American Geology, Vol. 1, part 2, 1856, page 166, fig. 37 in the text. About three whorls, covered with lines (striæ) sharply arched upon the wide dorsal grooved band at the curve; band & lines replaced by distant wavy lines.—A rare fossil of the *Loraine* (Hudson river) shales & sandstone at Loraine, Jefferson Co. N. Y.

IIIa. 37

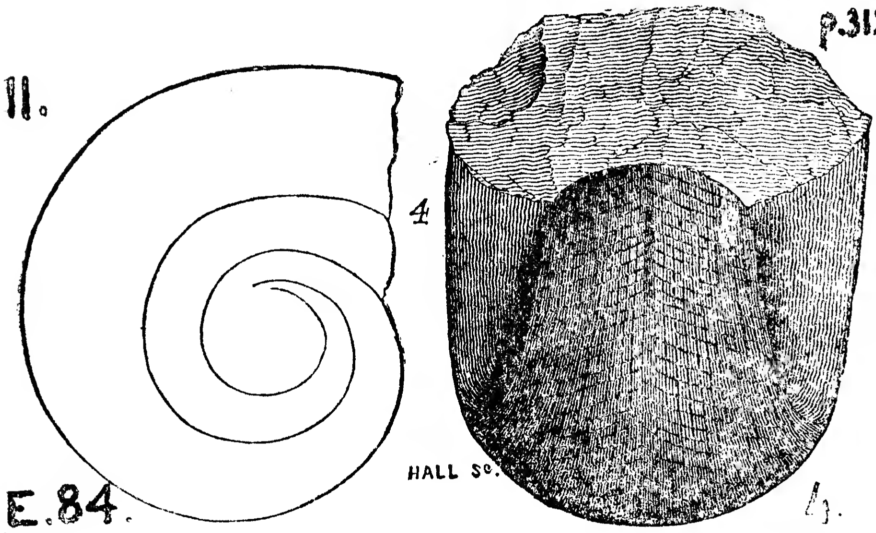


Em.A.G. 1855

—*III b.*

Bucania sulcatina. (*Bellerophon sulcatinus.*) Emmons (Geology of the Second District of N. Y., 1842, page 312, fig. 84, 4) says that this univalve and *Scalites angulatus*, *Euomphalus* &c., fill the fifth subdivision (20 feet thick) *from the bottom*, of the *Calciferous sandrock* formation in Northern New York, near Chazy village, a mass of dark-colored finely granular limestone.—*II a.*

II. P.312



E.84. 4

Bucania trilobata. (*Planorbis trilobatus.*) Rogers, page 822, fig. 624. (Conrad, 1838, Ann. Rt. N. Y.) *Medina & Clinton* formations. *IV b*, *V a*.

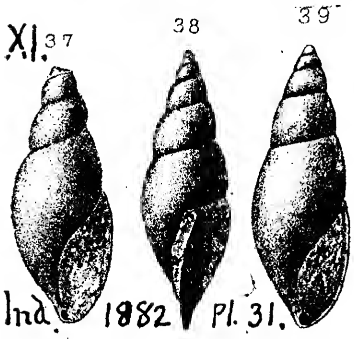
IV.

R. 624

Bulimella canaliculata. **Bulimorpha canaliculata.**—*XI.*

Bulimorpha bulimiformis (Hall, Trans. Albany Inst. 1856, Vol. 4, page 29; *Polyphemopsis bulimorphis*, Meek & Worthen, in Illinois Rt. Vol 2, 1866, page 372; *B. b.* Whitfield, Bull. 3, Amer. Mus. N. H., 1882, plate 8, figs. 37–39.) Collett's Indiana Rt. 1882, page 366, plate 31, fig. 37, specimen *enlarged twice*, from Bloomington, Indiana, showing columella; fig. 38, smaller specimen, *enlarged three*

XI. 37 38 39



Ind. 1882 Pl. 31.

times, side view, showing notch (sinus) in the upper part of the lip; fig 39, front view of a third, *enlarged three times.*—Spergen Hill, &c., Ind. *Subcarboniferous. XI.*

XI. 41

Ind 1882 31.

Bulimorpha canaliculata. (*Bulimella canaliculata.* Hall, Trans. Albany Inst. Vol. 4, 1856.—*Polyphemopsis canaliculatus*, Meek & Worthen, Illinois Rt. Vol. 2, 1866. *Bulimorpha canaliculata*, Whitfield, Bull. 3, 1882, plate 8, fig. 41.) Collett's Indiana Rt. 1882, page 367, plate 31, fig. 41, type specimen, *magnified threefold*, showing channeled sutures.—Spergen Hill.—*XI. Subcarboniferous.*

XI. 40 1882

Ind. pl. 31.

Bulimorpha elongata (Hall, Trans. Albany Inst. Vol. 4, 1856. *Polyphemopsis elongata.* M. & W., Ill. Rt. Vol. 2, 1866. *Polyphemopsis teretiformis*, Miller's Cat. 1877. See Whitfield's Bull. 3, Amer. Mus. 1882, plate 8, fig. 40.) Collett's Indiana Rt. of 1882, page 368, plate 31, fig. 40, type specimen, *enlarged twice.*—Spergen Hill, &c., Ind. Subcarboniferous. *XI.*

Bumastis barriensis. See **Illænus ioxus.** *V b.*

Bumastis trentonensis. **Illænus trentonensis.**—*II b, c.*

Buthotrephis antiquata. (Hall, Palæontology of New York, Vol. 1, 1847.) Vogt's Lehrbuch der Geologie, Brunschweig, 1866, Vol. 1, part 2, page 253, fig. 88, wrongly quoting Hall's genus as *Butholepis.*—*Calciferous sandstone* (Lower Silurian, or Ordovician formation in New York. *II a.*

It looks much like a modern sea plant (*fucus*); was not tubular; and is in the Upper Calciferous, or more properly bottom *Chazy* limestone belts, i. e. somewhat higher in the series of formations than *Palæophycus tubularis*, and *Palæophycus irregularis*, Hall, 1847, page 8, plate 2, fig. 6.

Buthotrephis gracilis. Rogers, 1853, page 808; no figure. II b, Rogers, 1858, page 822, fig. 625. Hall, Geology of the Fourth District, 1843, page 69, fig. 14. V a. (Hall, Pal. N. Y., Vol. I, 1847; *Trenton up to Clinton* formations.)—In Pennsylvania, Huntingdon Co. Aughwick and Ferguson valleys, in *Clinton lime shales* (133′ thick) overlying the fossil ore bed at Orbisonia. C. E. Hall's collections, Proc. Am. Phil. Soc. Philada., Jan. 5, 1876. White's Report T3, page 141.—*V a.*

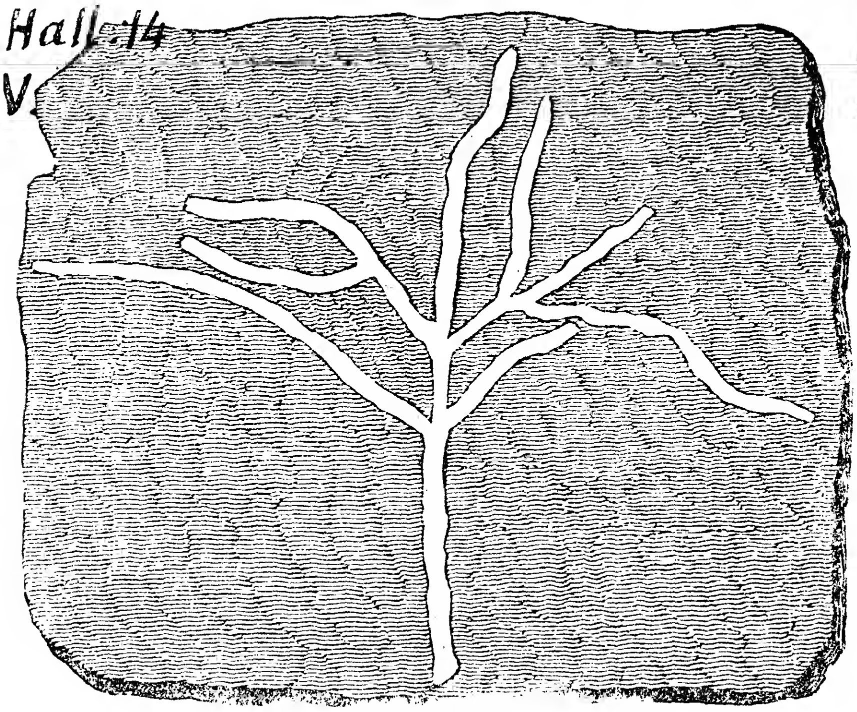
V.

R.

625.

Hall. 14

V.

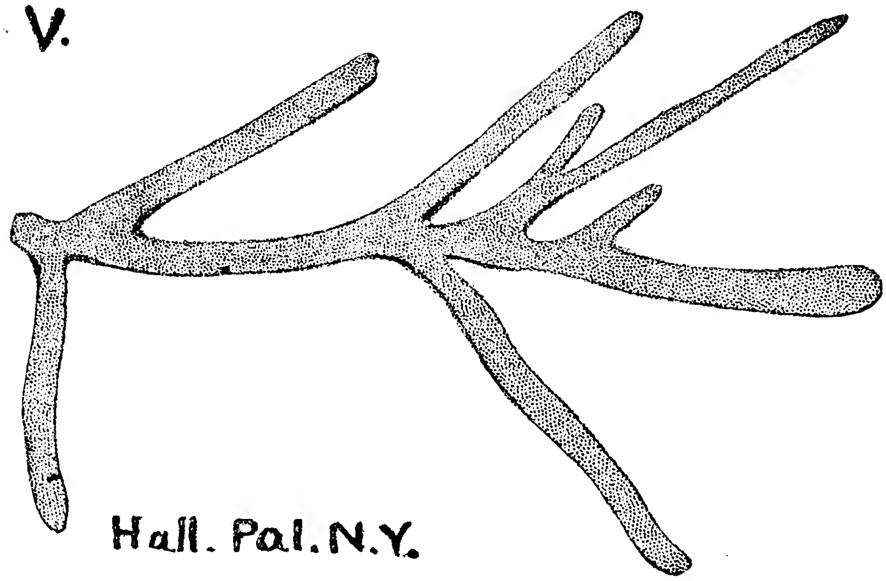


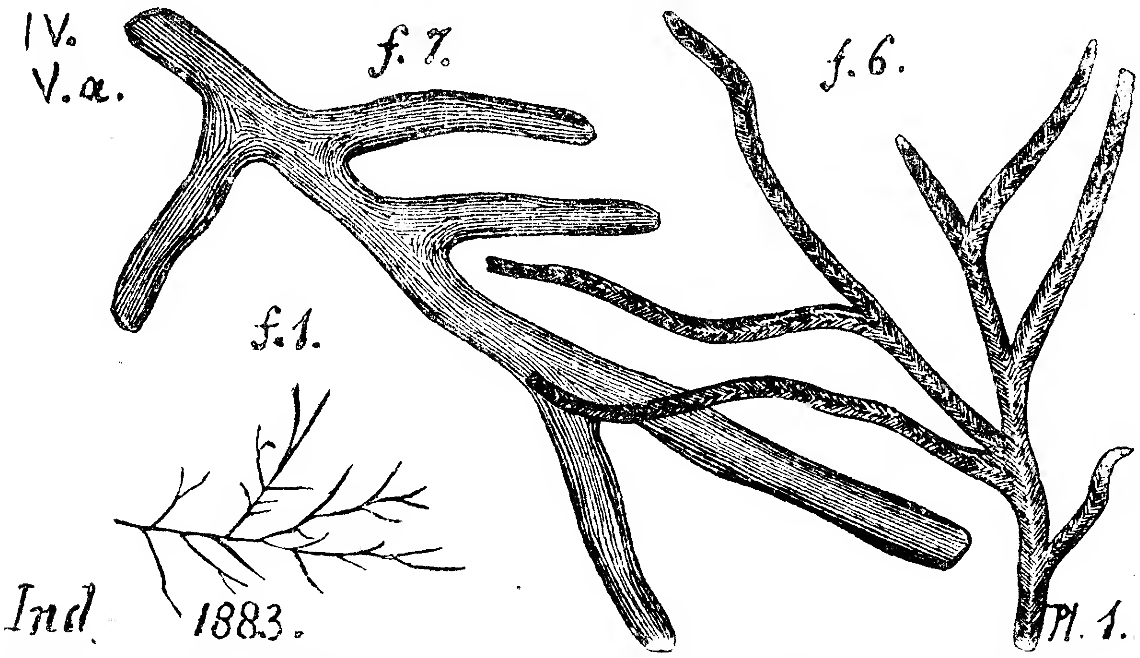
Note. Hall says that a coaly film is all that remains of the plant, on the shaly partings between the crystalline limestone beds, in the central and lower part of the *Trenton* formation, at Jacksonville and Middleburgh in Herkimer county, New York. *II c.*—Great numbers of obscure vegetable markings are seen on the shaly beds of the *Trenton* throughout the United States and Canada.—Hall.

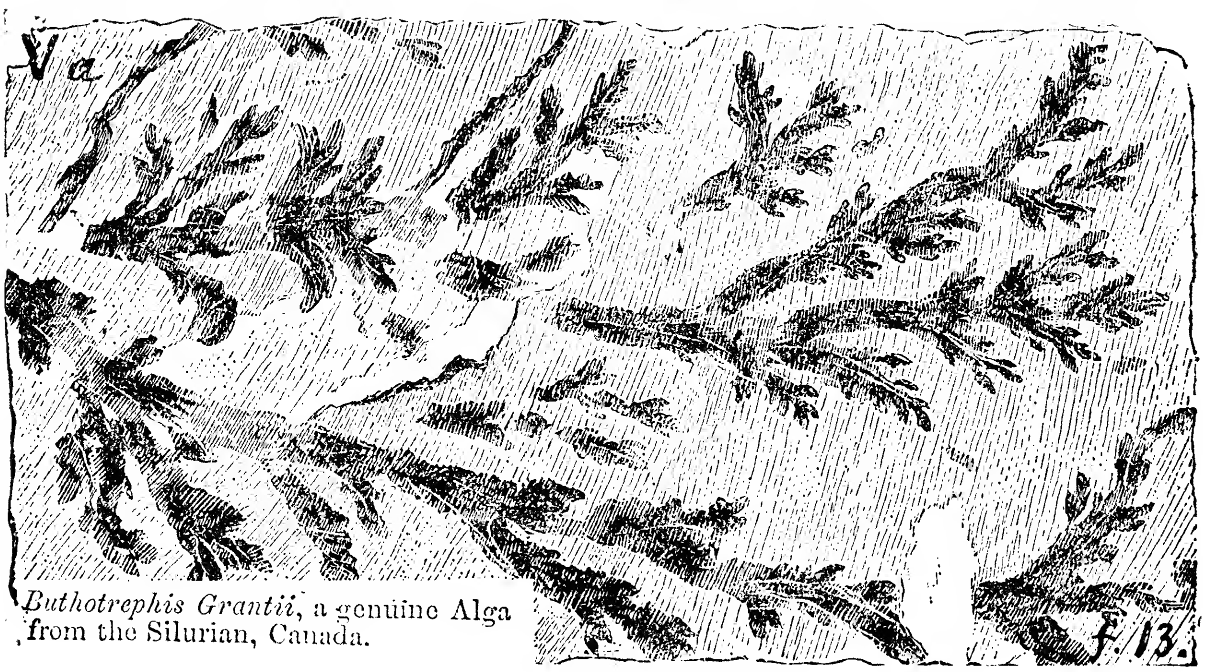
Buthotrephis gracilis, *continued.*

Hall, Pal. N. Y. 1847, p. 62, pl. 21, f. 1.—*II c.*

Buthotrephis gracilis, var. **crassa**. Hall, Pal. N. Y. Vol. 2, 1881, pl. 5, f. 3 a, b, c. There seems to be no line of specific distinction between the slender forms in shale and the coarser forms on sandstone. *Clinton*, *Va.*







Buthotrephis Grantii, a genuine Alga from the Silurian, Canada.

Buthotrephis grantii. Dawson. Geological History of Plants, New York, 1888, page 37, fig. 13.—*Clinton* (or *Niagara?*) of Canada; found by Col. Grant, of Hamilton.—*V a ; b ?*

Buthotrephis succulens. *See Appendix.*

Buthotrephis ——? in black *Stormville shale*, Montour Co. Pa., Grove tunnel. G7, p. 298; also Northumberland Co. Selinsgrove sect. bed 16, under Oriskany. G7, p. 345.—*VI.*

Buthotrephis numerous at Coxton, N. B. Susq. river, Luz. Co., *Catskill*, sect. 10, beds 21 to 44. G7, p. 62—*IX.*

Buthotrephis in sandy shale, Venango Co., S.W. of Pleasantville, Holbrook farm. Rt. O, Cat. of Carll's collections, spec. No. 2880.—*Pocono*, *X.*

Buthotrephis roots. See **Conostychus ornatus.** *XIII.*

Byssopteria radiata. Spec. 850–29, in Sherwood's collections near Lawrenceville, Tioga Co., Pa. (OO, p. 236), from *Chemung strata*, *VIII g.*

Cadodus. In the *Cleveland black shale* of Ohio, full of fish scales at Newburg Falls, O., and containing sharks teeth (*Cadodus*, *Orodus*, *Polyrhizodus*) at Bedford, O., with shells (*Discina newberryi* and *conularia* at Vernon in Trumbull Co., O.

Calamites and *Lepidodendra* may be collected from the shale at the base of Catskill formation in Clear ridge and Smith's Valley, Huntingdon Co., T3, p. 102.—*VIII–IX.*

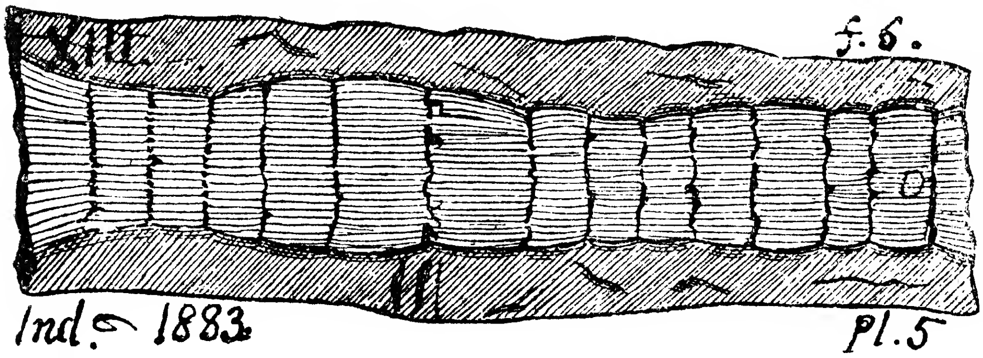
Calamites collected from Cove Mountain, Perry Co., at Foose's tunnel in Pocono sandstone. OOO, spec. 113–3.—*X.*

Calamites collected by Randall in ABCDE sub-divisions of Warren section, i. e., Middle and Lower Conglomerate, Carll's Rt. IIII p. 305. Very abundant in D, the sandstone above the second conglomerate.—*XII.*

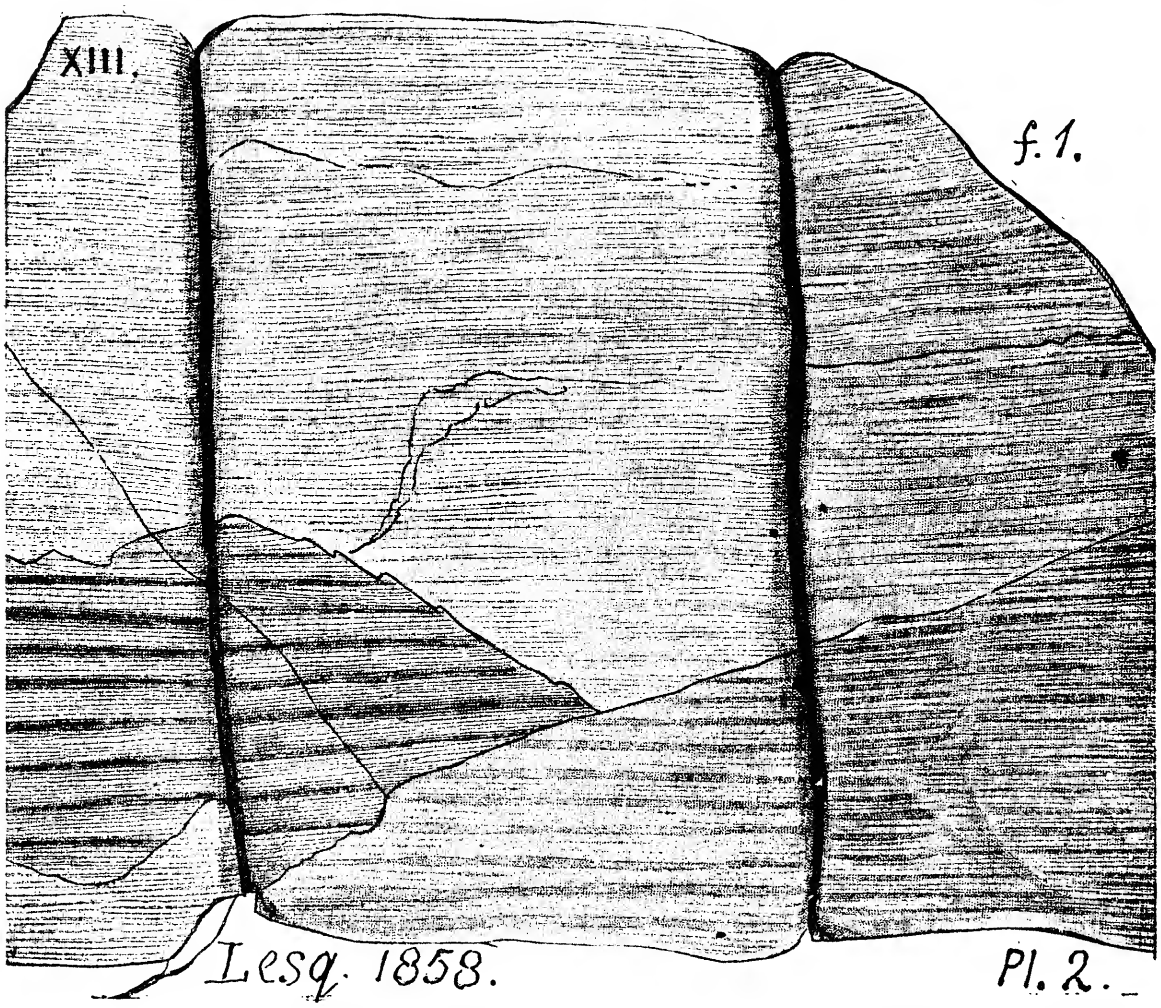
Calamites collected by Carll, Cat. O, 2793 in light red SS., Ennis hill, Pleasantville, Venango Co., Pa.; 2883, in yellow flag, Holbrook farm; 2925, in gray SS., Ware farm; 2933, in yellow brown SS., Widow Beach farm; 2935 in grey SS., Parker farm; 3091, in Devil's rock, just W. of Franklin, above 2d Mtn. SS.—*X* and *XII.*

Calamites alternans. See **Cal. approximatus.** *XIII.*

Calamites approximatus. (Schlotheim, 1820.—Lesquereux's specific synonyms are *cruciatus*, *elongatus*, *alternans*, *difformis*, *petzholdi*, *leiodermus*, *varians*, *communis*, &c. See his Coal Flora. Geol. Pa. Rt. P, 1880, page 26, plate 1, fig. 5.) Collett's Indiana Rt. 1883, page 40, plate 5, fig. 6.—Note. It is found in its numerous varieties in all the strata of the Middle Coal Measures; i. e. *Allegheny series.* (Lesq.) *XIII.*

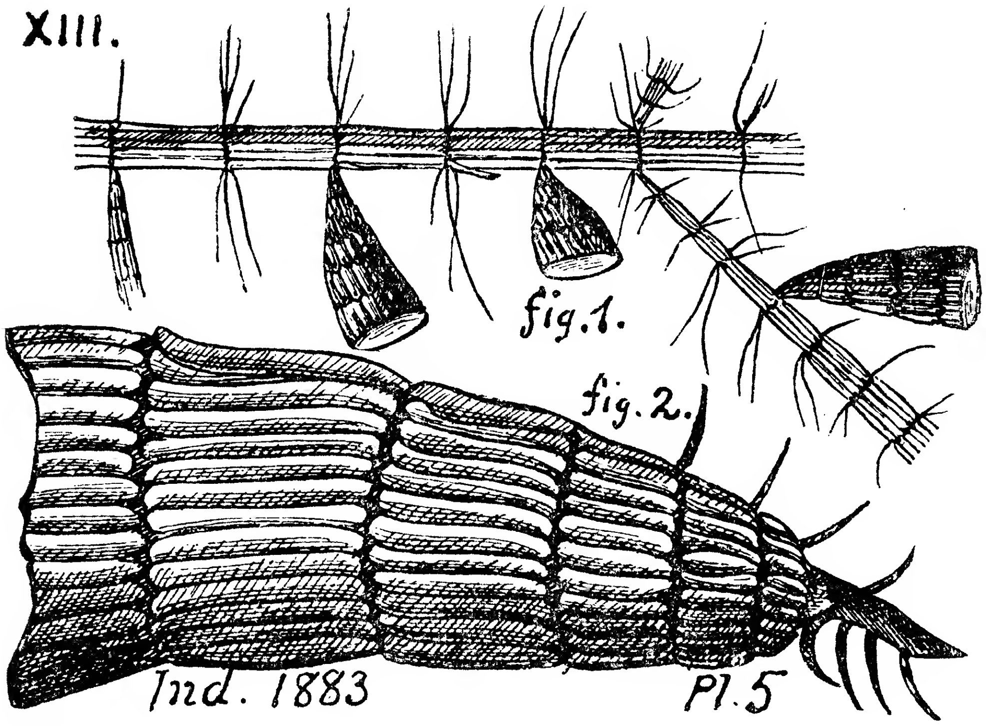


Calamites bistriatus. Lesq. Geol. Pa. 1858, Vol. 2, p. 850 plate 2, fig. 1. (Name preoccupied by Sternberg. May be referable to *C. dubius.* Coal Flora, P, 1880, page 28.) One specimen from Gate Vein, Anthracite, New Philadelphia, Schuylkill Co., Pa.—*XIII.*



Calamites, said by Lesquereux to be like *bistriatus*, or *disjunctus*, at King's Mill, Perry Co., Pa., in Catskill rocks. OOO, 1888, Cat. of Claypole's collections, spec. 36 A.—*IX.*

Calamites cannæformis. (Schlotheim.— Lesquereux's synonyms are: *C. decoratus* of Brogniart; and *C. suckovii of* Heer. See his Coal Flora, page 24. plate 1, fig. 1.)



Collett's Indiana, 1883, plate 5, fig. 1, mode of growth underground; fig. 2, mode of growth above.—Same distribution in the Coal Measures as *C. suckovii*, but more rare. (Lesq.)—Possibly *IX;* see *C. like bistriatus* &c., above.—*XIII.*

Calamites cistii. Brongniart. (*C. varians* of Weiss. Lesquereux in Coal Flora, page 27, plate 1, fig. 6.)

Collett's Indiana report, 1883, plate 5, fig. 4.—Not rare in Middle Coal Measures; especially common in Anthracite region, Wilkes Barre, Pittston, Carbondale. Lesquereux; who detected one specimen in the Mazon creek nodules, Illinois.—*XIII.*

Calamites communis. See **Calamites approximatus,** and **suckovii.**—*XIII.*

Calamites cruciatus. See **Calamites approximatus.**

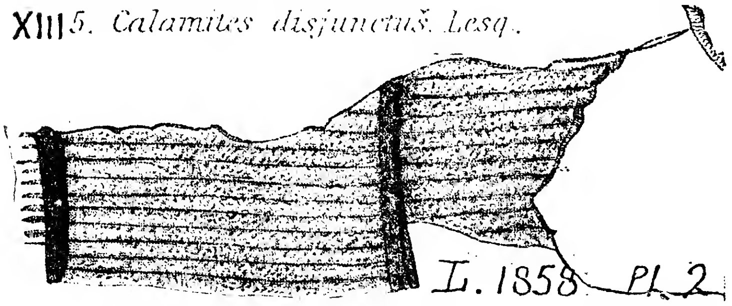
Calamites decoratus. See **Calamites cannæformis.** *XIII.*

Calamites difformis. See **Calamites approximatus.**

Calamites elongatus. See **Calamites approximatus.**

Calamites leiodermus. See **Calamites approximatus.**

Calamites disjunctus. Lesq. Geol. Pa. 1858, Vol. 2, page 850, plate 2, fig. 5; a very distinct species found in the roof of the Gate Vein at Pottsville, Pa. *XIII.*



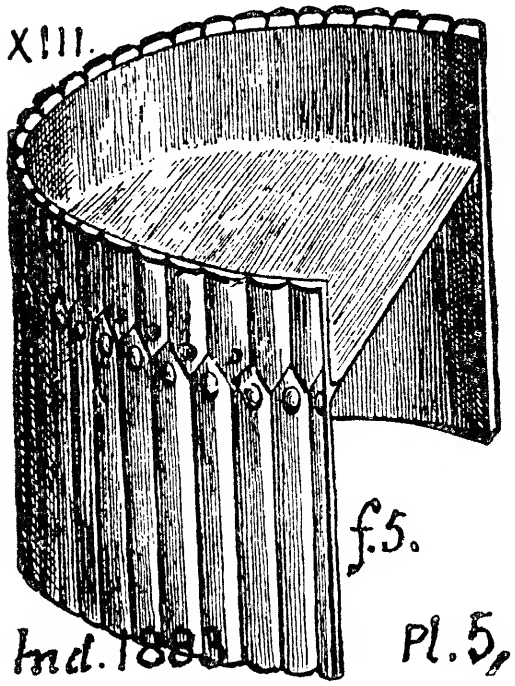
Calamites nodosus. See **Calamites suckovii.** *XIII.*

Calamites petzholdi. See **Calamites approximatus.**

Calamites ramifer. Lesq. Coal Flora, 1880, p. 23, plate 91, fig. 4, recognized by Lesq. among the plants in shale under Pottsville Cong. XII, at Campbell's Ledge, above Pittston, Luzerne Co. White's Rt. G7, p. 39.—*XI.*

Calamites suckovii. See **Calamites cannæformis.** *XIII.*

Calamites suckovii. (Brongniart. *Calamites nodosus* of Brongniart, and *Calamites communis*, are accounted synonyms by Lesquereux. Coal Flora, page 20, plate 1, figs. 3, 4.) Collett's Indiana Rt. 1883, plate 5, fig. 5, showing diaphragm across the cylinder at each joint, as in the modern canes.—" In all the strata of the middle coal measures, from the Conglomerate (XII) up to the Pittsburgh coal; in the Anthracite region, from the Mammoth, up to the Salem vein. (Lesquereux.) *XIII, XIV.*



Calamites varians. See **Calamites cistii,** and **approximatus.** *XIII.*

Calamites, many excellent *stems*, well preserved, several feet long but very slender, in SS. No. 2. of Rock run section, under Cong. KKK, p. 75, Fayette Co., Pa.—*XI–XII.*

Calamite roots, in SS. at base of coal measures, over Pottsville Conglomerate, Cranberry sect. Venango Co., Pa., Carll's report III, p. 438.—*XII–XIII.*

Calamite impressions numerous in the Middle Conglomerate beds, Broad Top, Huntingdon Co., Pa., T3, 71.—*XII.*

Calamite stems numerous in black shale under coal bed, mouth of Laurel run, Ohiopile falls, Fayette Co., Pa., Stevenson's report KKK, 83.—*XIII.*

Calamites, a fine *stem* replaced by "blue lump iron ore" (exhibited in the office of the pit boss, Dunbar mines, Fayette Co., Pa.,) from clay bed 4 feet under Pittsburgh coal. Stevenson's KK, 182.—*XIV–XV.*

Calamite impressions on the partings of the Redstone coal bed in Fayette Co., Pa. KK, 374.—*XV.*

Calamites plentiful in Washington Upper (white) limestone (No. VI) in the Upper Barren Coal measures of Greene Co., Pa. Stevenson's report K, 47.—*XVI.*

Calamites in the Conglomerate, north of Akron in Ohio, are the commonest plant; and so numerous are the broken, macerated, drifted stem impressions, that they must have been piled up by the waves on an ancient sand shore. The smaller ones have perished; the bark of the larger ones has become, sometimes, a film of coal; rarely, a thin stratum of coal, a few rods in extent, *always without underclay.* Ohio reports, quoted in Rt. I, p. 64.

Calamocladus equisetiformis. See **Asterophyllites equisetiformis.**—*XII.*

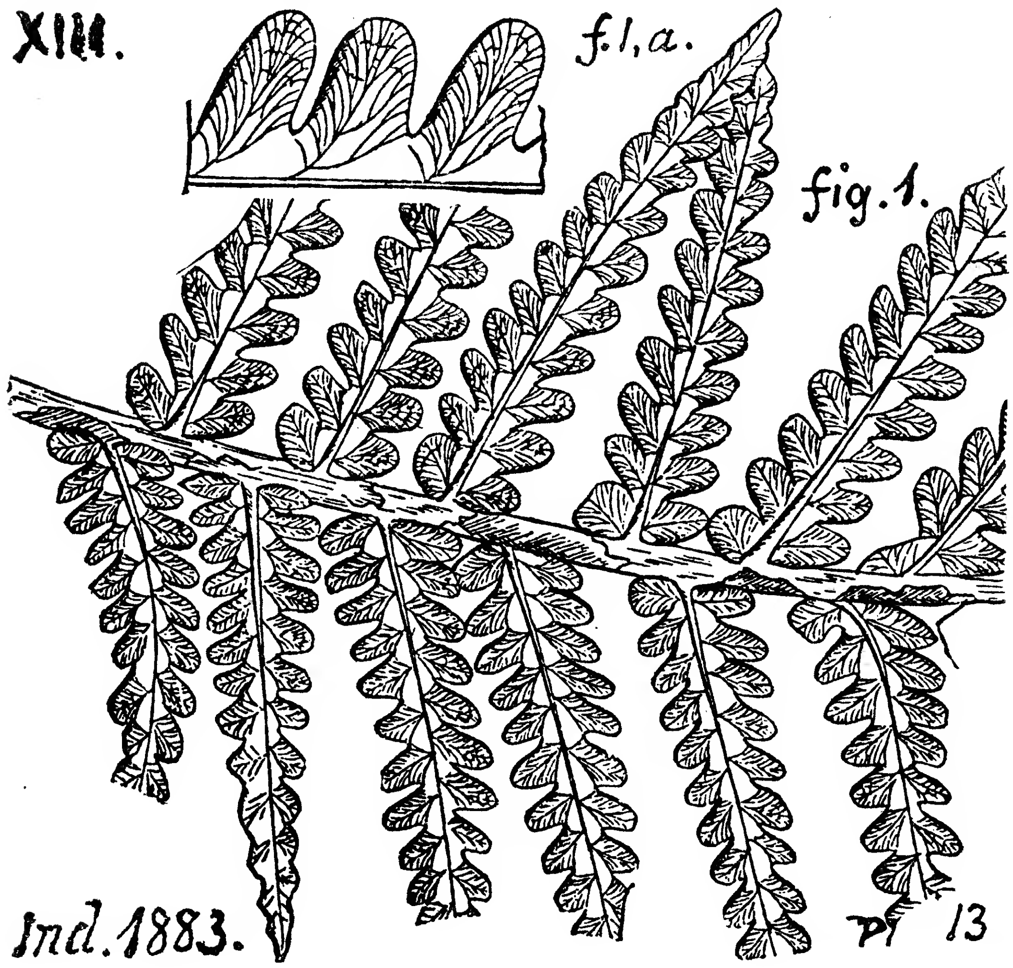
Calamodendron, *stem*, 6 feet long, with many *fine fern impressions*, in the roof of the Waynesburg coal bed, Greene Co., Pa. K, 131.—*XV.*

Calamopora. See **Favosites favosus.** *V b.*

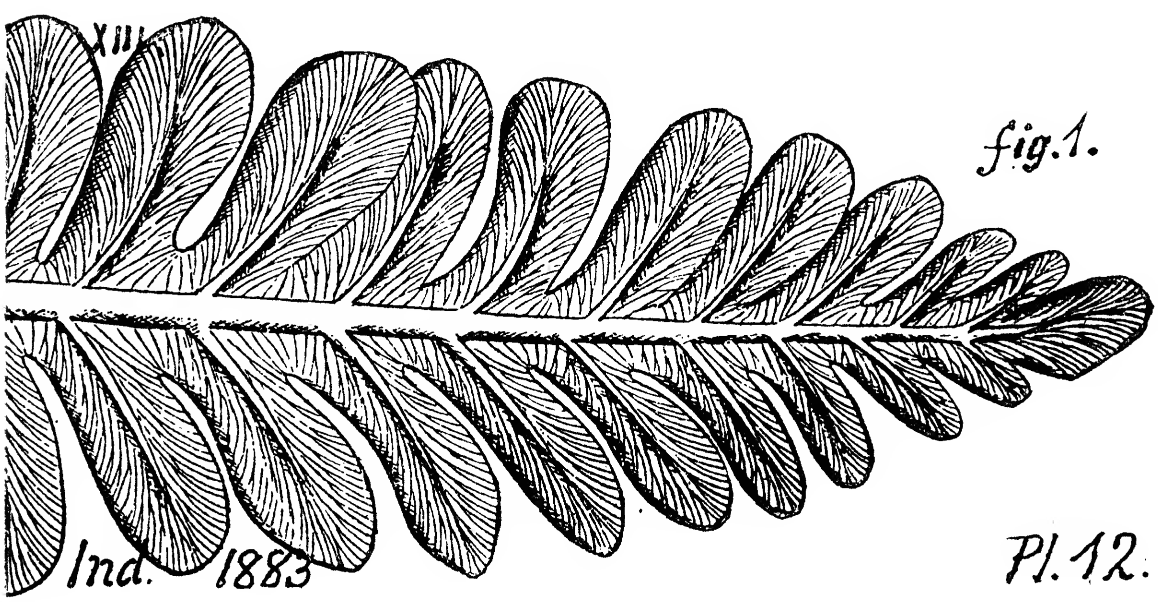
Calamostachys tuberculata, in the Darlington coal bed, Beaver Co., Pa. Rt. Q, p. 54.—*XIII.*

Callipteridium mansfieldi. Lesq. Coal Flora, p. 166, pl. 27, f. 1, 2, in the Darlington coal bed, Beaver Co., Pa. I. C. White's Rt. Q, 54.—*XIII.*

Callipteridium rugosum. (Lesquereux, Coal Flora, Pa. Geol'g. Surv'y, Rt. P, page 169, plate, 36, figs. 1, 2.—*Alethopteris rugosa*, Lesq.; *Alethopteris obscura*, Lesq., 1858.) Collett's Indiana Rt., 1883, page 57, plate 13, fig. 1; showing its relationship to *Pecopteris*.—Three localities in the Anthracite region; Gate & Salem veins; No. 1 vein at Olyphant; F? vein, Oakwood, Wilkes Barre (Lesquereux).—*XIII.*

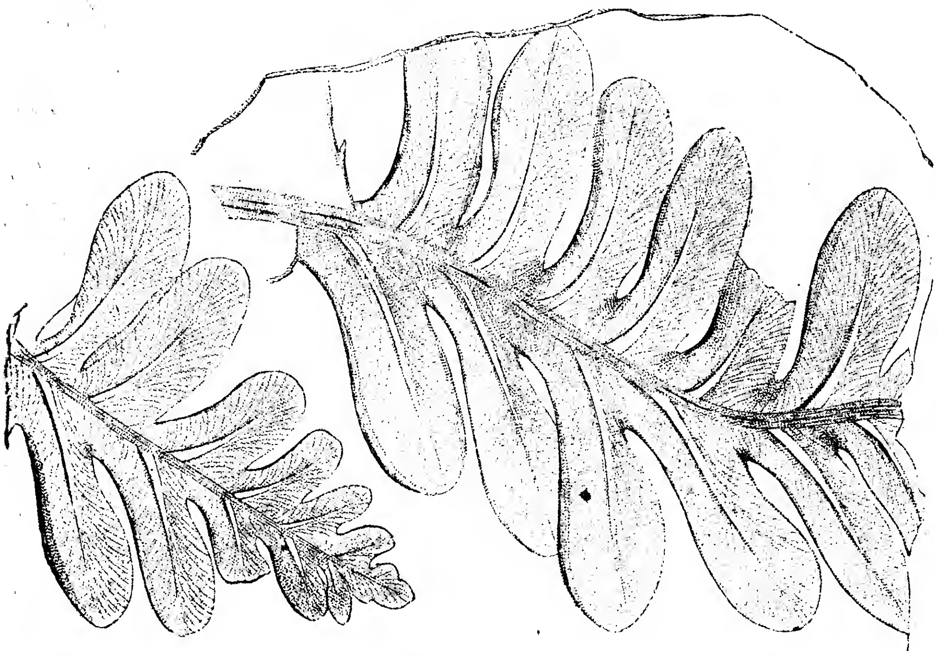


Callipteridium sullivanti. (Lesquereux, Coal Flora, page



164. *Callipteris sullivanti*, Lesq. Geol. Pa., 1858, plate 5, fig. 13; Illinois Geol. Rt., Vol. 2, plate 38. fig. 1—*Alethopteris sullivanti*, Schimper, Pal. Veg. Vol. 1.) Collett's Indiana Rt., 1883, plate 12, fig. 1 (two-thirds of it only).—In the Lower Anthracite coal bed at Shamokin, Pa.; just over the Conglomerate roof shale of Colchester & Morris beds; also nodules on Mazon creek, Ill.; also in clay iron balls at Clinton, Mo.; also at Cannelton, Pa., with *Callipt. mansfieldi*. (Lesq.) *XIII.*

Callipteris sullivanti. Lesq. Geology of Penn., 1858, Volume 2, page 866, plate 5, fig. 13; a beautiful species with secondary nerves arched, slender, close and forking repeatedly. It stands nearest to *Neuropteris conferta*, Sternberg, figured by Göppert, in Gatt. Foss. V, VI. From of West Vein, Shamokin, Pa.—*XIII.*

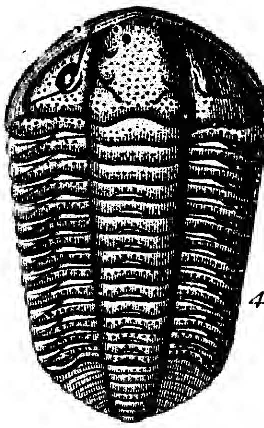


Callonema? proutana. See **Holopea proutana.** *XI.*

Callotrypa heteropora. See **Bryozoa** from *Lower Helderberg. VI.*

Calymene (*Triarthrus*) **beckii.** See for figures, &c. **Ptycoparia trilineata,** one of Walcott's *Lower Cambrian species.*—See however, OO, p. 231, spec. 203–32, (an imperfect head, not good for drawing, G. B. S.)in C. E. Hall's collections at Bellefonte, Centre Co., Pa., from the *Trenton limestone.*—Spec. 306–13, in Sander's Coll. 1875, in Leathercracker Cove, Blair Co., Henrietta furnace No. 1; and 307–1, in Fellows' Coll. 1876, at Bellefonte, (47 hand specimens or slabs, containing numerous fragments of the trilobite, mostly heads, or casts of heads; comparatively few bodies, and these always more or less crushed; tails comparatively rare, all from *Loraine* (*Hudson river*) *shale*, exposed in conformable, uninterrupted sequence *above the Trenton* formation (marked by its own characteristic fossils), underlaid by Chazy and Calciferous Limestone strata several thousand feet thick. It is therefore impossible to consider these trilobites as belonging to the Cambrian system.—*II c*, *III b*.

Calymene blumenbachii. Rogers, page 822; sometimes in the *Clinton* formation, with *C. clintoni;* oftener in the *Niagara* formation. Figure 47 taken from Davidson's chart of British trilobites.—*V a*, *V b*.—See Hall, Pal. N. Y., vol. 2, p. 307, for a long list of European synonyms, and references: *C. senaria; C. niagarensis; Trilobites paradoxus; Trilobus tuberculatus; Entomolithus paradoxus* (of Linnæus, 1759); *Entomostracites tuberculatus;* and *Oniscus No. 3* (of Bechman, 1773.)


47

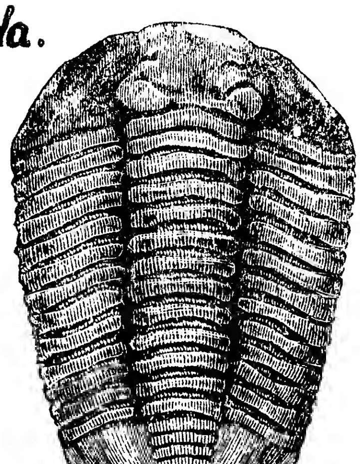
Cal. *Blumenbachii*

Calymene bufo. See **Phacops bufo.** *VIII c.*

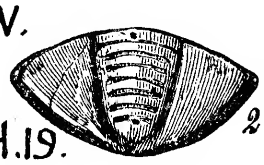
Calymene callicephala. See **Calymene senaria.** *II c.*

Calymene clintoni. (*Hemicrypterus clintoni.*) Rogers, page 823, fig. 673. Hall, Fourth District, page 77, fig. 19, 2 (a tail piece). Vanuxem page 79, fig. 11, 2. *Clinton.*—Claypole's lists of Perry county fossils, Pa. Report F2, preface; abundant in Iron SS., Ore SS., Ore Sand vein and upper green shales of the Clinton formation.—In Huntingdon Co. and elsewhere it occurs in the fossil ore. G7, p. 113, 232. In Lycoming Co., in Clinton lower calc. shales, 5 m. below Jersey Shore. Geol. Pa. 1858, Vol. 1, p. 536.—*V a.*

Va.


R. 637.

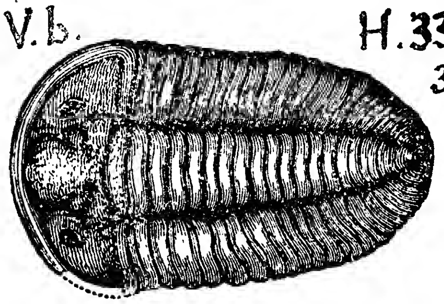
V.


H.19. 2

Calymene crassimarginata. See **Proetus crass.** *VIII a.*

Calymene niagarensis. Hall, page 101, fig. 33, 3. *Niagara* formation. (Very like *Calymene senaria* of the *Trenton* formation.) The American variety of *C. blumenbachii.* (Miller.)—Claypole's list. F2.—*Clinton V a; Niagara V b.*

V.b.


H.33. 3.

Calymene nupera. See **Phacops nupera.** *VIII g.*

Calymene odontocephalus. See **Dalmanites selenurus,** and *Odontocephalus selenurus.* *VIII a.*

Calymene rana. See **Phacops rana.** *VIII d.*

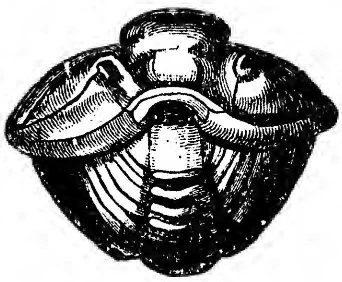
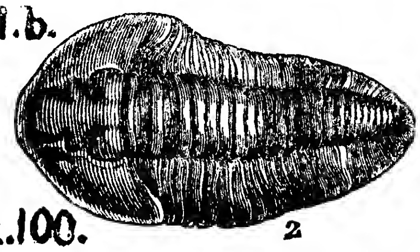


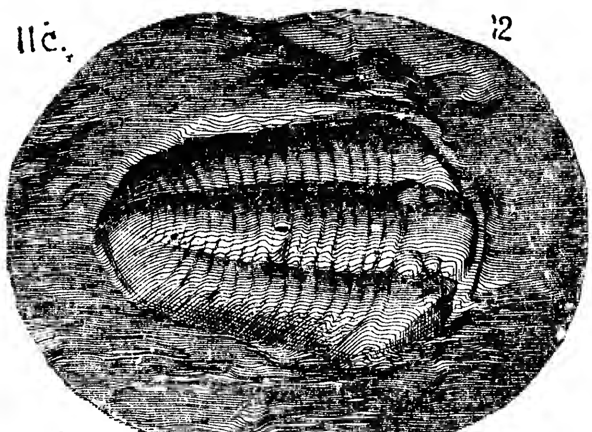
Fig. 798.
Calymene senaria Conr. Unt Silur. Cincinnati, Ohio.

II.b.



E.100. 2

IIc. 12



W. C.c.

Calymene senaria (*callicephala*). Zittel's Handbuch, Vol. 2, page 604, fig. 798. Emmons, page 390, fig. 100, 2. *Trenton* formation. (Conrad, 1841, Ann. Report N. Y. Trenton and Hudson River formations.)—In Pennsylvania it is occasionally found in some of the *Trenton* beds in Huntingdon Co. C. E. Hall, T3, p. 367; Nittany Valley, Proc. A. P. S. Jan. 5, 1856; and in Upper beds of Trenton, in Morrison Cove, Friends Cove, and on Cove creek, Bedford Co. Stevenson's Rt. T2, p. 94, 163, 164; in Centre Co., Ewing, T4, p. 424.—Also in *Loraine shale*, at Raver's gap in Tussey Mt. Bedford Co. C. Miller's. Stevenson, T2, 178. —Also in *Loraine* shale, in Perry Co., Pa., Thunder hill, Honey creek. OOO, 1888, Claypole's spec. 24. — See in Owen, 1852, pl. 2A, f. 12, a figure of an Ohio specimen, expressly made to test the medal-ruling process for purposes of Palæontology.—See also, OO, p. 232, spec. 210–67 (two specimens); 210–135 (nine, two of which are poor); 210–141 (nine, poor); 210–147; all in collections at Bellefonte, Centre Co., 1876, from *Trenton limestone.*—*II c*, *III b.*

Calymene trisulcata. Hall, Geology of the Fourth District of New York 1843, page 72, fig. 17, 9. *Clinton* formation (Rochester green shale associated with another little trilobite, *Agnostus latus*). It is much smaller and has a different arrangement of the eyes from *C. downingiæ* of the British Wenlock.—*V a.*

V

17. 9.

Calymene ——? Emmons' Geology of the Second District of New York, 1842, page 390, fig. 100, 5, *Trenton* formation. He gives a figure of the central portion of the head of this little trilobite, because this alone is usually found preserved in the rock, and is quite sufficient to characterize the formation, without the body or tail.—*II c.*

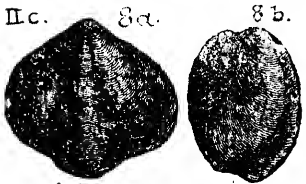
II.b

E.100.5

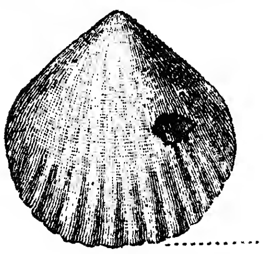
Calymene ——? in Claypole's collections in Perry Co. OOO, Cat. Spec. X-24, 4, Thunder hill, Honey Creek, Hose Valley, in *Loraine shale* (Hudson river) formation—*III b.*

Calymene ——? in Claypole's Coll. Perry Co. OOO Cat. X-14, eight specimens, from Limestone ridge, ½ m. N. N. E. of New Bloomfield; and 6 (three specimens), from Clark's Mill, 2½ m. N. W. of N. B.; both from *Lower Helderberg upper shaly* beds.— *VI.*

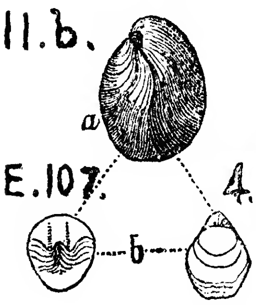
Camarella ambigua. (*Atrypa ambigua*, Emmons' American Geol. I, ii, p. 190, plate 10, figs. 8 *a*, 8 *b*. (for 9, *see Appendix.*) Hall, Pal. N. Y. Vol. 1, 1847.—See Cat. OO, p. 232, Spec. 210–77 *a*, in Fellows' Coll. at Bellefonte, Centre Co. from *Trenton limestone*. *II c.*

IIc. 8a. 8b.

Em. A.G. 1855 Pl.10

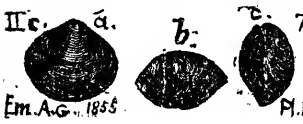
Camarella antiquata. Billings, 1861; Geol. Vt. II, 353, 1863; Geol. Can. fig. 290; 1865, Pal. Foss. I, 10, fig. 13. Walcott, Bulletin U. S. G. S. No. 30, page 122, plate 7, fig. 7, ventral valve, enlarged to twice its size.—*Middle Cambrian* (*Georgian*) formation; 2 miles east of Swanton, Vt.—*M. C.* *See footnote to p. 134.*

M.C. 8 PL.7


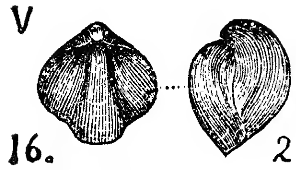
Camarella bisulcata. (*Orthis bisulcata*) Emmons' Geology of the Second District of N. Y., 1842, page 396, fig. 107, 4. *Trenton* formation. One of the smallest of the *Orthidæ* which lived in this Lower Silurian Age. Fig. b. gives the natural size of it, and *a* an enlargement to show its sculpture. It is quite common at Adams in Northern New York.—*II c.*

II.b. a E.107. 4.

b

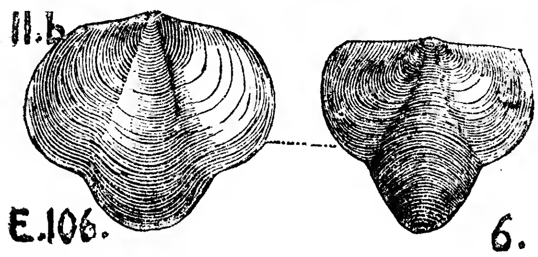
Camarella circulus (*Atrypa circulus*, Hall, Palæontology of New York, 1843, Vol. I, 1847, Trenton.) Emmons' American Geology, I, ii, p. 190. *Trenton* formation.—*II c.*

IIc. a. b. c. 7

Em.A.G. 1855 Pl.10

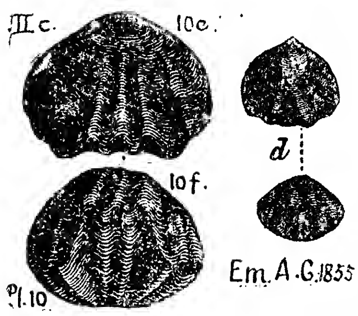
Camarella congesta. (*Atrypa congesta.*) Hall, Geology of the Fourth District of New York, 1843, page 71, fig. 16, 2. Rogers, Geol. Pa. 1858, page 823, fig. 632. (Conrad in Journal Acad. Nat. Sci. Phila., 1842, Vol. VIII, page 265, plate 16, fig. 18.) *Clinton* formation.—In Perry county, W. Center township, Wagner's mill. OOO, 1888, Claypole's collections, 60–1 (two specimens) from *Clinton* & *Salina*.— *V a, c.*



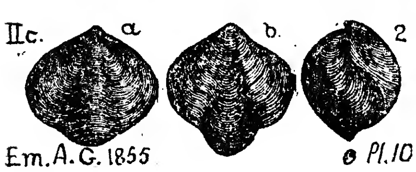
Camarella extans. (*Atrypa extans.*) Emmons' Geology of Northern District of New York, 1842, fig. 106, 6. *Trenton* formation. See fig. &c., under the old name **Triplesia extans.** *IIc.*



Camarella hemiplicata. (*Atrypa hemiplicata.* Hall, Pal. N. Y. Vol. 1, 1847, *Trenton.*) Emmons' Amer. Geology, Vol. 1, part 2, page 190, plate 10, fig. 7, *a*, *b*, *c*. Ventral (larger) valve has broad fold, in folds which do not reach the beak, etc.; somewhat variable; ventral valve usually very full. Confined to the *Trenton* limestone formation. Emmons.—See Cat. OO, p. 232, Spec. 210–52 (poor condition); 210–97*c*, Coll. at Bellefonte, Centre Co., from *Trenton limestone*. *IIc.*

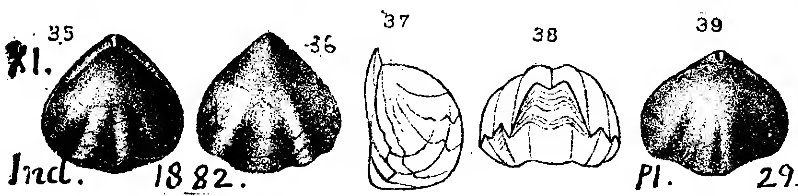


Camarella nucleus. (*Atrypa nucleus*, Hall, Pal. N. Y. Vol. 1, 1847, *Trenton.*) Emmons' Am. Geol. I, ii, 189, plate 10, figs. 2, *a*, *b*, *c*. Like, but smaller than *Atrypa extans*, and perhaps identical.—*Trenton*, *IIc.*



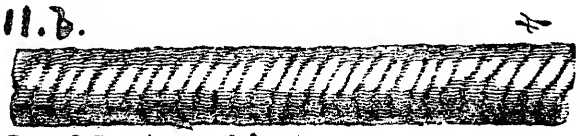
Camarium typum. See Catalogue OO, p. 234, Spec. 601-12 (three specimens); 601-13 (four fragments); 605-2 (twelve fragments); in coll. at Orbisonia, from *Lower Helderberg. VI.*

Camarophoria? wortheni. (King's genus, 1844, Ann. & Mag. N. H., Vol. 14.— *Rhynchonella wortheni*, Hall. Trans. Alb. Inst.

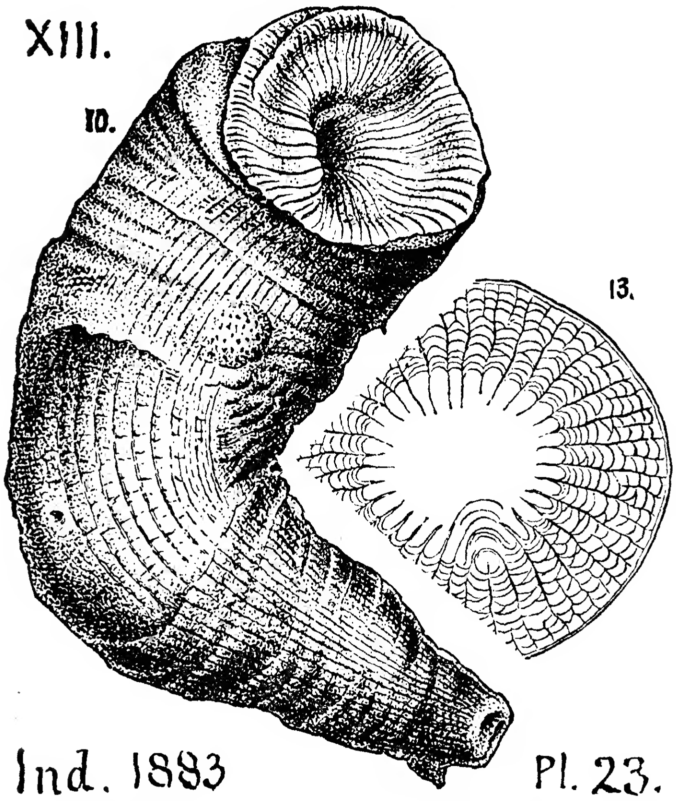


Vol. 4, 1856.—*Rhynchonella mœra*, Whitfield Bull. 3, Am. Mus. 1882, pl. 6, figs. 40–42). Collett's Ind. Rt. of 1882, page 335, plate 29, figs. 35 to 39.—Spergen Hill, &c., Ind. *Subcarboniferous.—XI.*

Cameroceras trentonense. Emmons Geol. Second District, N. Y., 1842, page 397, fig. 109, 4. (Conrad, 1842, Journal Acad. N. S. Phila., Vol. VIII). *Trenton.* (The cast of a siphuncle, or central canal, is shown in Emmons' figure).—*II. c.*



Campophyllum torquium (*Cyathophyllum torquium*, Owen, Geo. Rt. Wisconsin, &c., 1852, plate 4, fig. 2. *Camp. torq.* Meek, U. S. Geo. Sur. Nebraska, 1872, plate 1, fig. 1). Collett's Ind. Rt. 1883, page 119, plate 23, figs. 10 and 13. Some specimens six inches long. *Upper coal measures*, (or Permo-Carboniferous) *only;* common in the northwestern States.—*XV, XVI.*



Ind. 1883 Pl. 23.

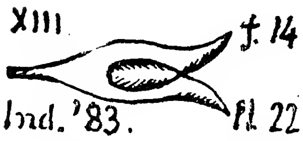
Caninia punctata, Europe. See **Heliophyllum corniculum.** *VIII a.*

Capulus acutirostris. See **Platyceras acutirostris.** *XI.*

Cardiocarpus annulatus, Newberry; found by Lesquereux at Campbell's Ledge, Luzerne Co., G7, 40, 43.—*XI.*

Cardiocarpus apiculatus. Lesq. also.—*XI.*

Cardiocarpus bicornutus. (*Ptilocarpus bicornutus*, Lesquereux, Geol. Sur. Illinois, Vol. 4, Coal Measures) Collett's Indiana report of 1883, page 103, plate 22, fig. 14, a very remarkable seed, hard, compact.—*Upper Coal* of Ohio.



Cardiocarpus bicuspidatus. See **Carpolithes.** *XIII.*

Cardiocarpus congruens. Lesq. under Campbell's Ledge, Luzerne Co., Pa., G7, 40, 43.—*XI.*

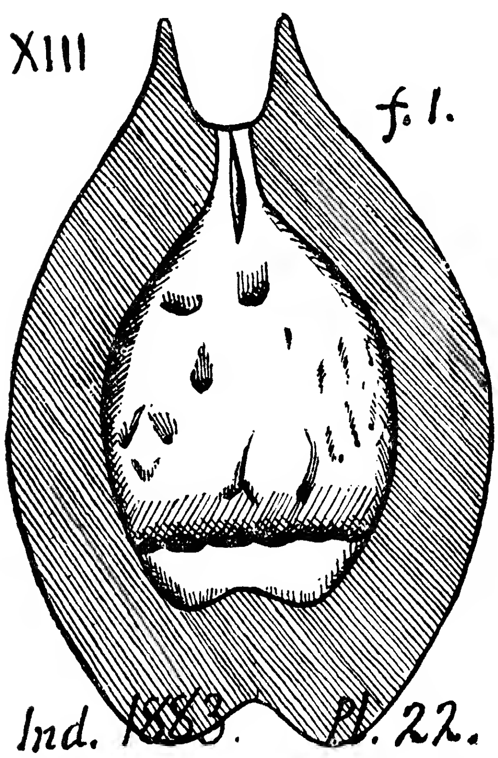
Cardiocarpus diminutivus. Lesq. G7, 40.—*XI.*

Cardiocarpus ellipticus. See **Carpolithes bicuspidatus.** *XIII.*

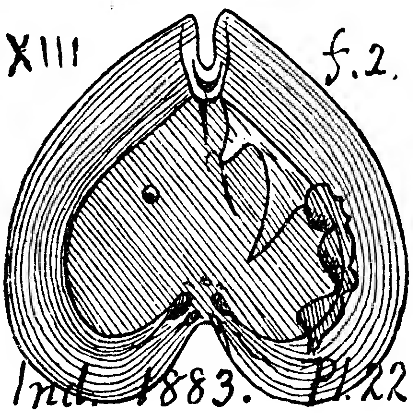
Cardiocarpus elongatus. Newberry. Campbell's Ledge; G7, 40.—*XI.*

Cardiocarpus fasciculatus. Lesq. G7, 40.—*XI.*

Cardiocarpus harveyi. (Lesquereux. Coal Flora, page 808, plate 109, figs. 22, 23.) Collett, Indiana report of 1883, page 102, plate 22, fig. 1.—*Sub-conglomerate coal*] of Arkansas. *XI?*



Cardiocarpus ingens. (Lesq. Coal Flora, page 563, plate 85, figs. 34, 35) Collett's 1883, plate 22, fig. 2.—*Sub-conglomerate coal* Arkansas report Vol. 2, p. 311, plate 4, fig. 4, 4*a*.—*XI?*



Cardiocarpus latealatus. Lesq. G7, 40.—*XI.*

Cardiocarpus latus. Newb. Also G7, 40.—*XI.*

Cardiocarpus mammillatus. (Lesquereux. Coal Flora, page 571, plate 85, figs. 32, 33, 33a; also page 810, plate 109, fig. 7, where it is said that figs. 32, 32*a*, represent different species; 32 a *Cardiocarpus*, and 32*a* a *Rhabdocarpus*. Specimens of the latter in the Lafayette College museum at Easton came from the Hazleton mines (Mammoth bed ?). Others in Lacoe's collection at Pittston came from the Ontario Colliery, *Northern Anthracite* coal field. Some have been got from the Mazon creek nodules. Fig. 7 (pl. 109), came from *sub-conglomerate* coal in Arkansas.) Collett's Indiana Rt. of 1883, page 103,

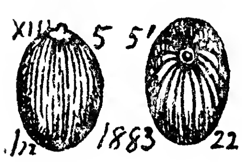


plate 22, figs. 5, 5a; found by White in roof of Darlington coal, Beaver Co., Pa., Q, p. 55; also in roof of "Mt. Savage" coal bed, Q, p. 68.—*XI; XII; XIII.*

Cardiocarpus ovalis. (Lesquereux. Coal Flora, page 810,

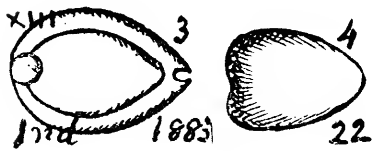
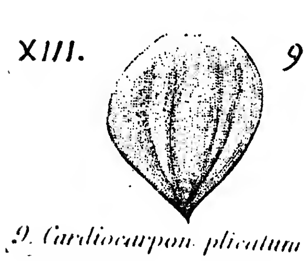


plate 109, figs. 8, 9.) Collett's Indiana Rt. of 1883, page 103, plate 22, figs. 3, 4. —Common in the *Sub-conglomerate coal* of Arkansas, *XI?*

Cardiocarpus pachytesta. Lesq. in shales under Campbell's Ledge Conglomerate in gap above Pittston, Pa.—*XI.*

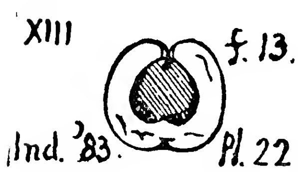
Cardiocarpon plicatum. Lesq. Geol. Pa. 1858, Vol. 2,



page 876, plate 17, fig. 9; differs from *C. trevortoni*, Lesq. by its wavy plaited surface, without a middle line; found mixed with that species, and with *Dictyopteris obliqua*, in the *Upper Anthracite* coal bed at Trevorton, Northumberland Co., Pa.—*XV?*

Cardiocarpus regularis. See **Carpolithes bicuspidatus.**

Cardiocarpus (*Samaropsis*) **simplex.** (Lesquereux, Coal



Flora, page 569, plate 85, figs. 49, 50, and page 812.) Collett's Indiana Rt. of 1883, page 103, plate 22, fig. 13. *Sub-conglomerate* shales under Campbell's Ledge in the gap at Pittston, Luzerne Co. Pa.—*XI.*

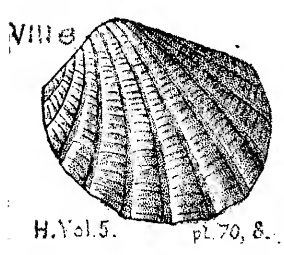
Cardiocarpus zonulatus, Lesq. Same.—Note. All the above are found in the Forkston coal bed.—*XI.*

Cardiocarpus, abundant in roof of the Cook bed, B, Broad Top, Huntington Co. Pa., T3, 62, 278.—*XIII.*

Cardiocarpus, in roof of Sharon coal bed, Mercer Co., Pa., QQQ, p. 53, 126, 160; also under the Connoquenessing division of Conglomerate, in Lawrence Co. Pa., QQ, p. 96.—*XII.*

Cardiola doris. *See Appendix.*

Cardiola speciosa. (Hall, 1877, Pal. N. Y., Vol. 5, plate



70, fig. 8. *Genesee*) Claypole's list of fossils in preface to Report F2, p. xiv on Perry Co., Penn. *Portage?* black slate.—In Huntingdon Co., Pa., McConnellstown section, abounds in bed 2, near top of *Genesee* formation, T 3, 108, 199; also at a few exposures, in the *Portage* formation, 100′ to 200′ above Genesee, T3, 102, 108; OOO

Claypole's Cat. 193–2.—In Perry Co., Newport-Baileysburg upper road, in *Portage?* black slate, with other forms, F 2, xiv. OOO, specimen 146–5.— *VIII e, f.*

Cardiola vetusta. (*Cardium vetustum.*) Hall, Geology of Fourth District, N. Y., 1843, page 245, fig. 107, 4. *Portage* formation. A somewhat triangular shell, slightly keeled on the back slope; with plain ribs; usually obliquely triangular; found in the soft green shale on Cashaqua creek, Genesee river, and Lake Erie shore.— *VIII f.*

Cardiomorpha bellatula. **Grammysia bellatula.** *VIII c.*

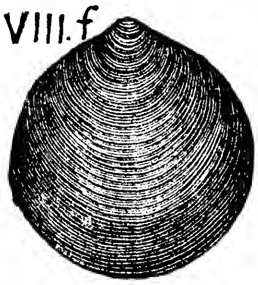
Cardiomorpha concentrica. Reported by I. C. White in Hamilton upper shales at Huntingdon, Pa., T3, 109.— *VIII c.*

Cardiomorpha cordata. Reported by I. C. White in Hamilton upper shales at Huntingdon, Pa., T3, 109.— *VIII c.*

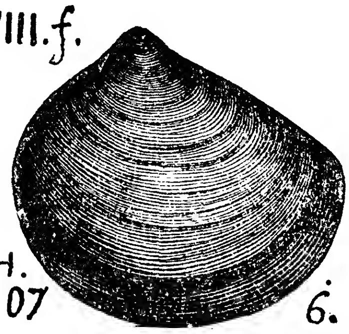
Cardiomorpha rotunda. *See Appendix.*

Cardiomorpha subglobosa. *See Appendix.*

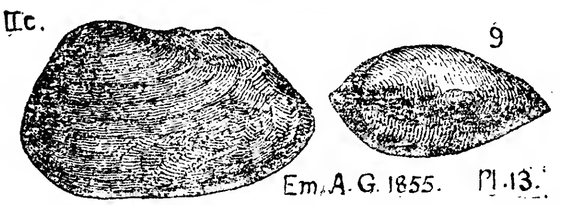
Cardiomorpha suborbicularis. (*Ungulina suborbicularis.*) Hall, Geology of the Fourth District, N. Y., 1843, page 243, fig. 106, 2. *Portage* formation.—In Pa., at Rupert, Catawissa and Bloomsburg, found by White in bed 68 of Sect. 78. See G7, p. 69, 287, 290.— *VIII f.*—Bed 68 (95 feet of dark olive sandy shales, very fossiliferous) lies 580 feet above the *Genesee.*



Cardiomorpha subtextilis. (*Astarte subtextilis.*) Hall, Geology of Fourth District of New York, 1843, page 245, fig. 107, 6. *Portage* formation. Beek prominent; surface marked with strong concentric folds and finer lines, which are crossed by a few faint elevated radiating striæ. Shore of Lake Erie, Chautauqua county.— *VIII f.*



Cardiomorpha vetusta. (Now **Cypricardites vetustus,** which see). Hall, Pal. N. Y. Vol. 1, 1847, page 154, plate 34, fig. 8, a single imperfect specimen, well represented in Hall's figure, slightly compressed. (*Trenton limestone,* thin, shaley middle layers.) Emmons' Amer.



Geol. I, ii, 234, plate 13, fig. 8. Emmons named it *Lyonsia vetusta.—Trenton* formation, *II c.*—(Note, fig. 9 has got upon this cut by mistake).

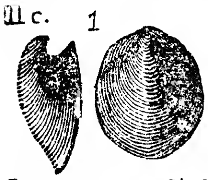
Cardiomorpha zonata. Reported by I. C. White, at Huntingdon, Pa., in *Hamilton upper shales.— VIII c.*

Cardiopsis, in C. E. Hall's Ms. Rt., December 30, 1876, as among Carll's collections in the oil regions, Upper Chemung.

Cardium vetustum. See **Cardiola vetusta,** *VIII f.*

Carinaropsis patelliformis, Hall, (*Helcion patelliformis,* D'Orbigny), Pal. N. Y. Vol. 1, 1847, page 183, pl. 40, fig. *2 a,b;* page 239, plate 83, fig. *7 a,b;* copied by Emmons in Amer. Geol. Vol. 1, part 2, page 164, plate 6, fig. 1. *Trenton* and *Loraine* (Hudson river) formations; more abundant in the latter than former, and attains a greater size.—*II c, III b.*

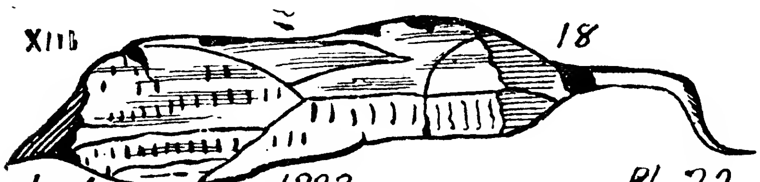
IIc. 1



Em.A.G.1855 Pl. 6.

Carpolithes arcuatus. (*Rhabdocarpus arcuatus.* Lesquereux, Coal Flora, page 583, plate 85, fig 52, where it is misnamed *Carpolithes rostellatus,* from Geol. Rt. Kentucky (Owen) Vol. 4, p. 484, where specimens were got by L. from Lower Carboniferous coal in Morgan county. A specimen was found at Cannelton, Pa.) Collett, 1883, page 106, plate 22, fig. 18. *XIII.*

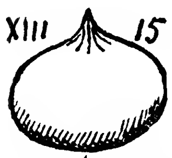
XIII 18



Ind. 1883 Pl. 22.

Carpolithes bicuspidatus. Sternberg. (*Cardiocarpus bicuspidatus,* Newberry, Geol. Rt. Ohio, Pal. Vol. 2, page 373, plate 43, figs. 9, 9*a*. Lesquereux, Geol. Pa., 1858, page 877. Coal Flora, page 573, plate 85, figs. 42, 43.) Colletts' Indiana Rt. 1883, p. 105 plate 22, fig. 105. Not rare in the Lower (Allegheny) Coal Measures. Roof shales Coal No. 1, Cuyahoga Falls, Ohio. Salem vein, Pottsville.—*XIII.*

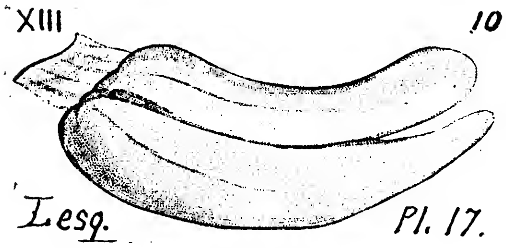
XIII 15



Ind/83. 22

Carpolithes bifidus. Lesq. Geol. Penn., 1858, Vol. 2, page 877, plate 17, fig. 10; also Coal Flora, P, 1880, page 593, 808, plate 85, fig. 16. Species uncertain. "I have attributed to it divers forms which are probably referable to different species." Spec-

XIII 10



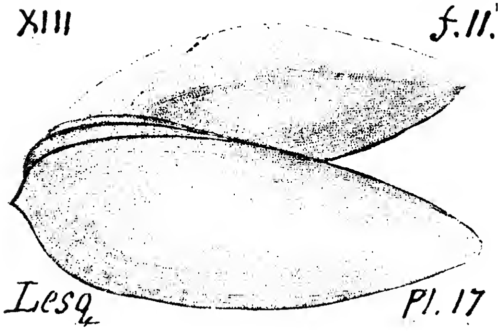
Lesq. Pl. 17.

imen figured here is from the "Gate vein" anthracite, at New Philadelphia, .Schuylkill Co. Pa. Specimens in Muesum of Lafayette College, Easton are all from Hazleton, Pa.—*XIII.*

Carpolithes canneltoni, reported by I. C. White, from the Darlington Coal bed, Beaver Co. Pa. Q, p. 55.—*XIII.*

Carpolithes clypeiformis. The same.

Carpolithes disjunctus. Lesq., Geol. Pa., 1858, Vol. 2, page 877, plate 17, fig. 11; an oval fruit, divided into two parts (the upper one convex, the lower one concave) as if by a twisting pressure; quite smooth; from an anthracite bed at Trevorton, Northumberland Co., Pa.—*XIII.*

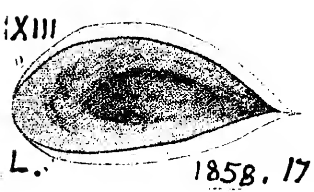


Carpolithes fraxiniformis? Goepp. & Berg. See **Lepidocystis fraxiniformis,** Lesq. Coal Flora, p. 457. Reported by I. C. White in Darlington bed, Beaver Co. Q, 55.—*XIII.*

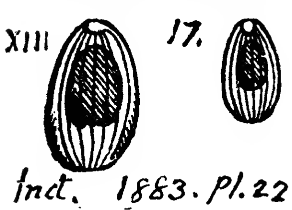
Carpolithes multistriatus St. See **Rhabdocarpus multistriatus.** Lesq. C. Flora, p. 578. Reported by White in Darlington coal, Beaver Co., Pa. Q, 55.—*XIII.*

Carpolithes orbicularis. Newberry. Collett's Indiana Rt. of 1883, page 105, plate 22, fig. 16. Rare. It has been found in Pennsylvania in the Kittanning (Allegheny series) coal bed, at Cannelton, Beaver Co., Pa.—*XIII.*

Carpolithes platimarginatus. Lesq. Geology of Pennsylvania, Vol. 2, page 877, plate 17, fig. 12; a smooth fruit, found in an anthracite coal bed at Trevorton, Northumberland Co., Pa., low in the series.—XIII.—Reported by White in Darlington coal, Beaver Co. Q, 55.—*XIII.*



Carpolithes regularis? Sternberg (*Cardiocarpus regularis?* of Lesquereux, Coal Flora, page 572, plate 85, figs 31, 31*a*; perhaps the same as *Cardiocarpus ellipticus* of Sternberg; both shapes being found together in large numbers by Lesquereux in the same plate of roof shale, Kittanning bed, at Cannelton, Beaver Co., Pa.) Collett's Indi-

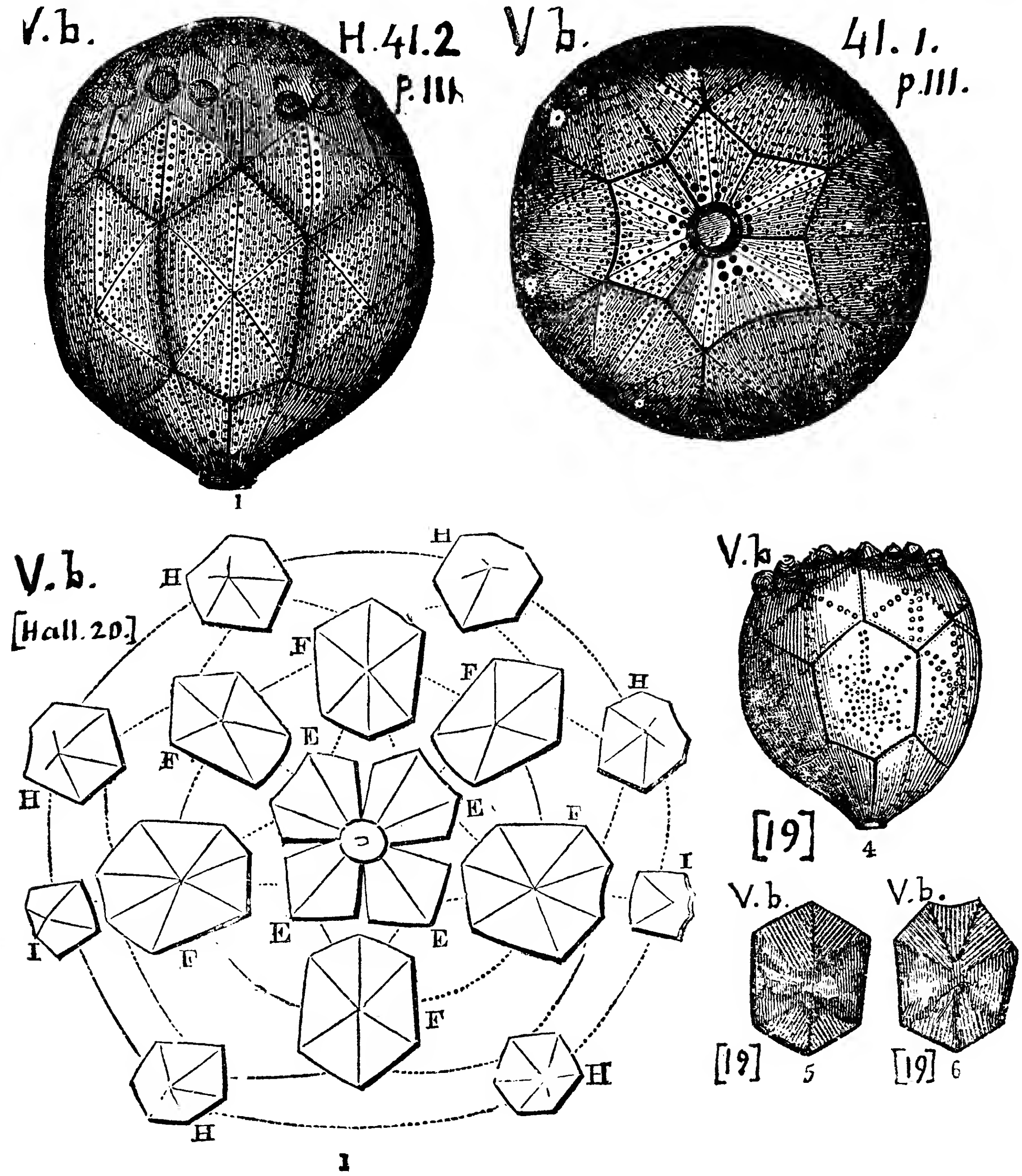


ana Rt. of 1883, page 106, plate 22, figs. 17, 17*a*.—Coal measures, Allegheny series.—Recognized also in the shales under Campbell's Ledge in the Pittston gap, Luzerne Co., Pa. G7, 40, 43.—*XI; XIII.*

Carpolithes rostellatus. See **Carpolithes arcuatus.** *XIII.*

Carpolithes vesicularis. In Darlington coal, Beaver Co., Pa. Q, 55.—See **Lepidocystis vesicularis.** Lesq. Coal Flora, 457, pl. 69, fig. 18–20.—*XIII.*

Caryocrinus ornatus. Hall, Geology of Western District,



N. Y., 1843, page 111, fig. 41, 1, 2. *Niagara.* (Say. 1825, Jour. Acad. Nat. Sci. Philada., Vol. 4; *Clinton & Niagara* formations.)

Caryophyllia——. **Heliophyllum corniculum.** *VIIIa.*

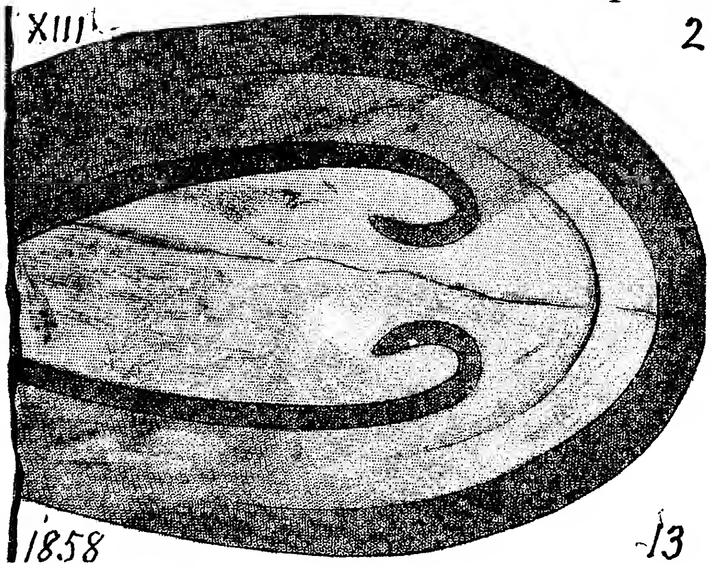
Casteroides ohioensis, Foster. Amer. Jour. Sc., 1837, p. 80; Report of Geol. Sur. Ohio, 1838, p. 81; Boston Soc. N. H., 1847, p. 385, plates of scull 37–39; An. Rt. Geol. Sur. Pa., 1887. A gigantic extinct beaver; tooth found in the Hartman (Crystal Hill) cave near Stroudsburg, Monroe Co., Pa. *For figure see Appendix.—Quarternary ?*

Catenipora agglomerata. **Halysites agglomeratus.** *V b.*

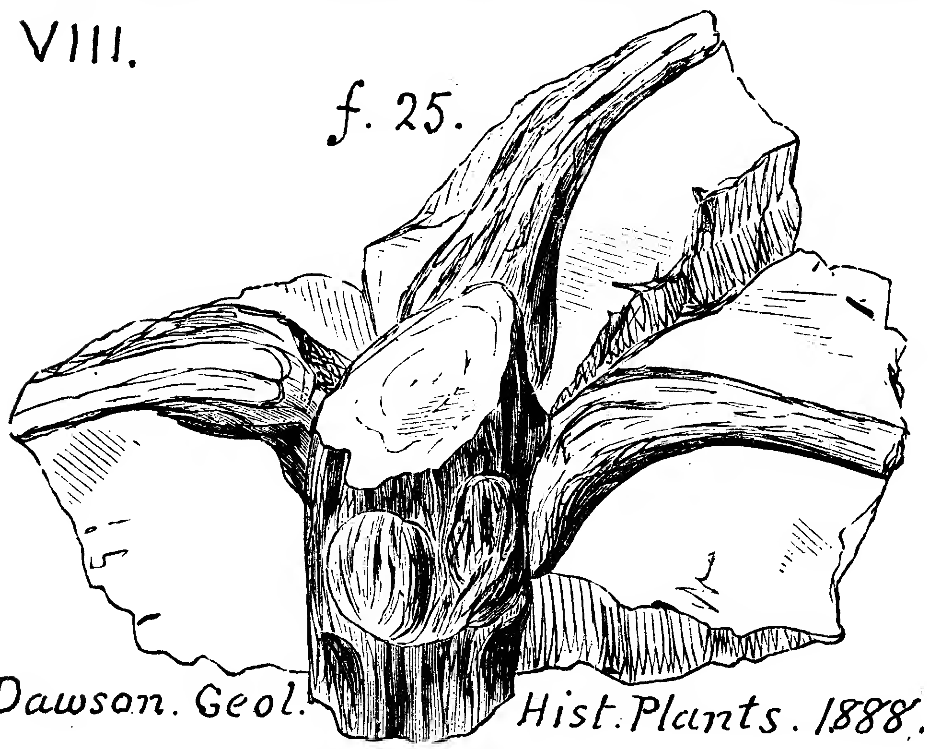
Catenipora escharoides. See **Halysites escharoides.** V *b.*

Caulerpites marginatus. **Taonurus marginatus.** *XII.*

Caulopteris gigantea. Lesquereux, Geology of Pennsylvania, Vol. 2, p. 869, plate 13, fig. 2; differs from *C. punctata* in larger scars and an entirely smooth surface, and in the space between the scar horns. Figure from a beautiful specimen owned by Mr. Clarkson at Carbondale, Pa., in the northern Anthracite, *XIII.*

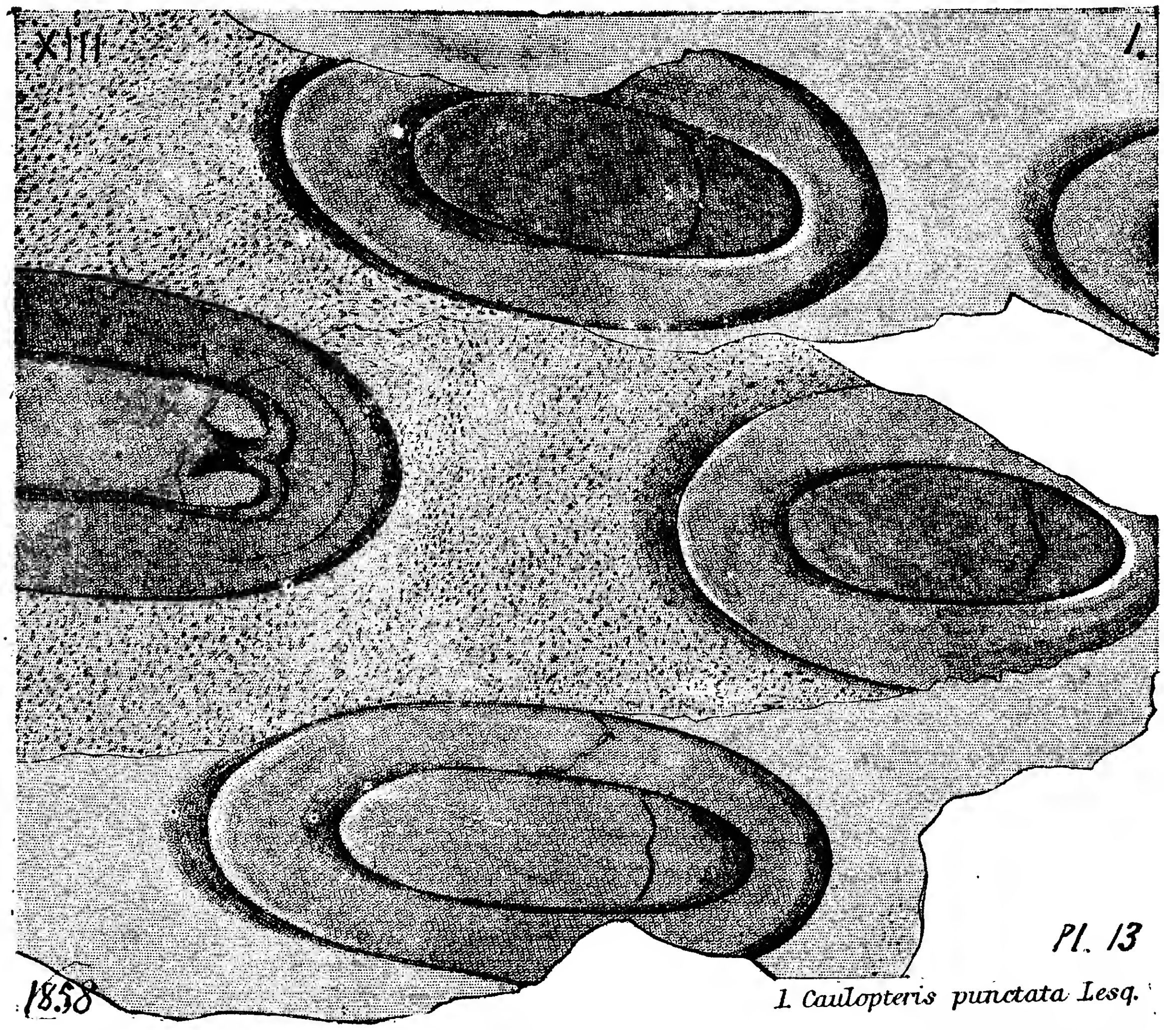


Caulopteris lockwoodi. Dawson. Geological History of plants, 1888 page 75, fig. 25, of a fine specimen from Gilboa, N.Y.—Devonian *VIII.*



Caulopteris obtecta. Lesq. Illinois Geol. Vol. 4, pl. 28, fig. 1–4. Coal Flora Penna., 1880, p. 344, pl. 59, fig. 8.—In Darlington Coal, Beaver Co., Pa., Q. 55.—*XIII.*

Caulopteris punctata. Lesquereux. Geol. Pa., Vol. 2, p.



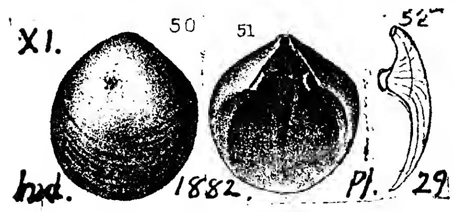
869, pl. 13, f. 1; scars two inches long; margin of scars curved into horns upward; space between scars thickly dotted with round points, like glands, but probably the bases of rootlets which have been broken off; a beautiful species; found in the Gate Vein, Pottsville, Pa.—Anthracite, *XIII.*

Caulopteris, one of the characteristic fossil plants of the first and second mountain sands of Venango Co., Pa. Carll in I, p. 37, 38.—*X.*

Cave fossils. See **Arvicola, Bos, Castoroides, Dicotyles, Erithizon, Equus, Felis, Hesperomys, Jaculus, Mastodon, Megalonyx, Mylodon, Platygonus, Scalops, Sciurus, Tapirus, Ursus, Vespertilio.** The exact age in which the remains of these creatures were swept into the caves cannot be fixed; but the deposits were made slowly or rapidly in the times just preceding the appearance of man, or perhaps in the early stages of the present human era. But no relics of man have been found in the two or three caves in Pennsylvania thus far explored. They were certainly not caves of habitation; but rather of the nature of sink holes.

Centemodon sulcatus See **Clepsisaurus] pennsylvanicus.** *Trias.*

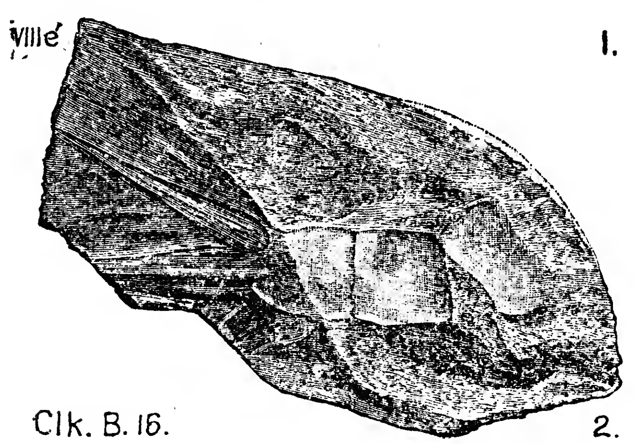
Centronella crassicardinalis. (Whitfield. Bulletin Am. Mus. Nat. Hist. No. 3, Warsaw L.) Collett's Indiana Rt. of 1882, plate 29, figs. 50, 51, 52. Outside, inside and profile of one valve. *Subcarboniferous* (*Warsaw* limestone) formation, at Spergen hill, Alton, &c.——This may be the *centronella* found by I. C. White in the middle layers of the Trough creek limestone, Huntingdon Co., Pa., at the bottom of the Mauch Chunk red shale formation, T3, p. 77.—*XI.*



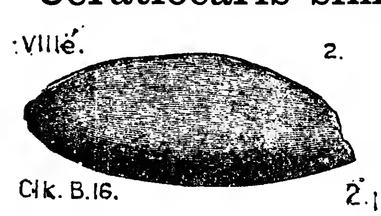
Ceramopora ——? OO, p. 231, Spec. 203–12, from Bellefonte, in *Trenton limestone*, *II c.*

Ceratiocaridæ. See Beecher's new species from the Chemung-Catskill beds at Warren, Pa.—**Echinocaris socialis; Elymocaris siliqua; Tropidocaris alternata, bicarinata, and interrupta.**— *VIII–IX.*

Ceratiocaris beecheri. Clarke, Bull. 16, U. S. G. S. 1885, page 44, pl. 2, fig. 1, tail and spines, *natural size*, of a crustacean of the *Naples* (*Upper Genesee*) *black shales* of Cashaqua creek, Livingston Co., N. Y. Unique specimen.— *VIII e'.*

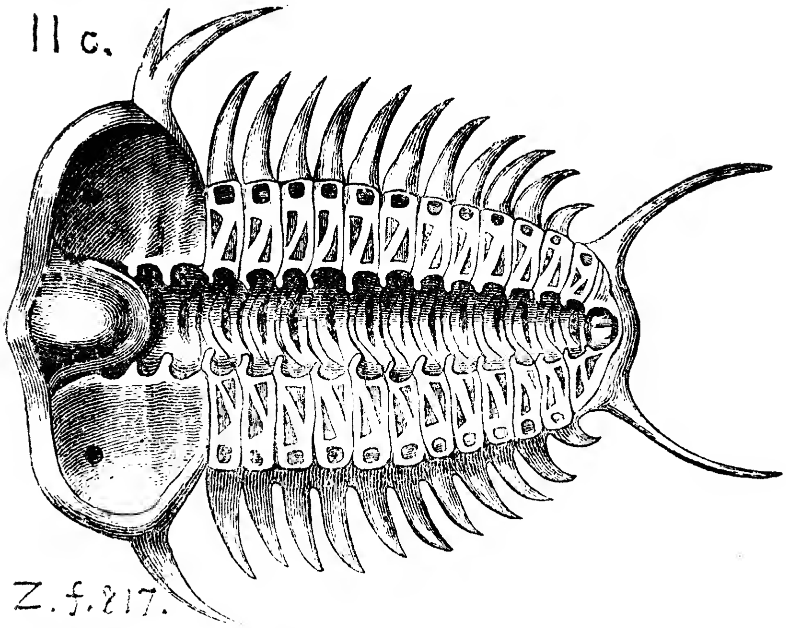


Ceratiocaris simplex. Clarke, Bull. 16, U. S. G. S. 1885, page 43, 44, pl. 2, fig. 2, shield (carapace) *natural size*, of a crustacean of the *Naples* (*Upper Genesee*) *black shale*, immediately under the concretionary limestone of Parrish gully, Ontario Co., N. Y. *VIII e'.*



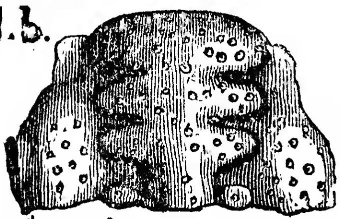
Ceraurus pleurexanthemus. (*Cheirurus pleurexanthemus*, Green, Monograph of Trilobites, 1832, Trenton and Hudson river formations.) Zittel's Handbuch der Palæontologie, vol. 2, p. 615, fig. 817, from a specimen of the under or inside of the trilobite, found at Trenton Falls, N. Y.—Emmons, page 390, fig. 100, 6. *Trenton* formation. (Green, 1832, Monog. Trilobites, *Trenton* and *Hudson River* formations.)—See Cat. OO, p. 232, spec. 210–148 *a*, Bellefonte, *Trenton*, *II c.*

II c.



Z.f.817.

II.b.



E 100. 6.

Ceraurus vigilans. See **Encrinurus vigilans.** *II c.*

Ceraurus —— ? OO, p. 232, spec. 211–7 (26 specimens), bluff of L. Jun. river above Tyrone forge, in *Trenton*, *II c.*

Cestracion philippi. Coy. Zittel's handbuch, vol. 3, pp.

Fig. 69.

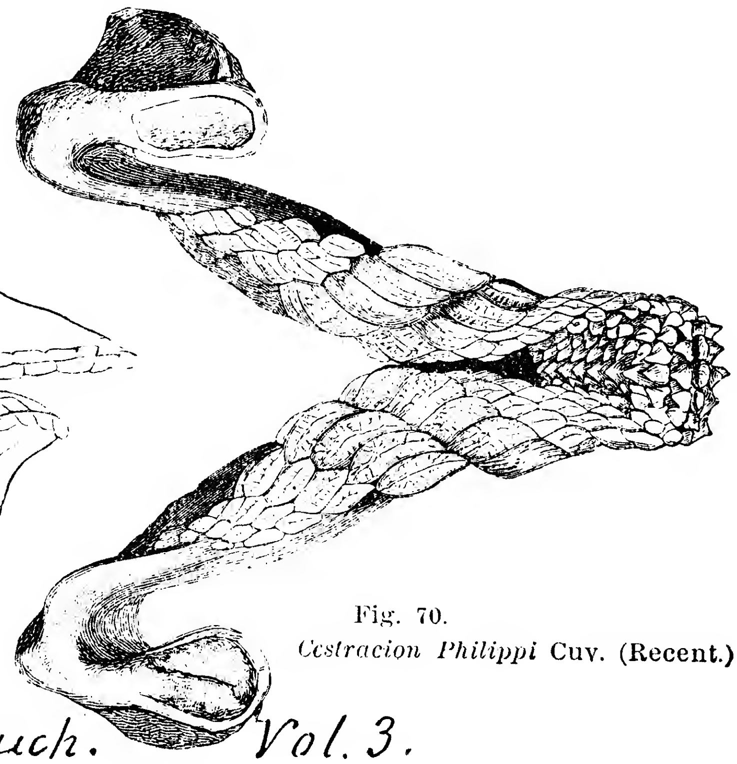
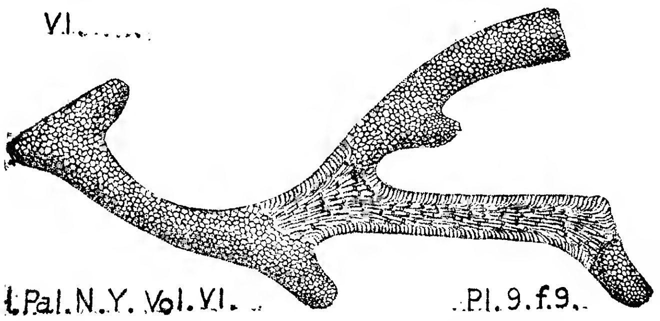


Fig. 70.
Cestracion Philippi Cuv. (Recent.)

Zittel's handbuch. Vol. 3.

74, 75, figs. 69, 70, for comparison with American fossil fish teeth, and to illustrate their crushing apparatus.—*Now living.*

Chætetes (*Monticulipora*) **abruptus.** (Hall, 32d An. Rt. N. Y. Mus. Nat. Hist., 1879, p. 148; Pal. N. Y., Vol. VI, page 13, plate 9, fig. 9, Lower Helderberg.) Claypole's list of fossils in preface to report F2, p. xiii, on Perry Co., Penn. Rt. OOO, 1888, Cat. Claypole's collections 6–14, 15, Clark's Mill, near New Bloomfield, in upper shales of *Lower Helderburg* formation. (Spec. 210–43, in Fellows' Coll., 1876, at Bellefonte, resembles *C. abruptus.* G. B. S., 1888.)—*VI.*



Chætetes arbusculus? See Spec. 210-115 of Fellows' collections at Bellefonte, 1876, in *Trenton limestone.* It very much resembles it, but is a poor specimen.—*II c.*

Chætetes lycoperdon. See **Monticulipora lycoperdon,** for fig. and specimens of it found in Pennsylvania.

Chætetes ——? Slender, branching, with frequent spots of larger cells. Spec. 210-144 of Fellows' coll., 1876, at Bellefonte, from *Trenton limestone*, *II c.*

Chætetes ——? Specimens 211-1 (indistinct fragments); 7 (See Hall, Pal. N. Y., Vol. 1); 213–3, 4 (branching, slender); are in Fellows' Collections of 1876, at Tyrone forges, Huntingdon Co. from *Trenton limestone*, *II c.*

Chætetes ——? in Trenton L. Morrison's Cove, Bedford Co. school house No. 7. Stevenson, T2, p. 172. The principal form to be seen (with a *Rhynchonella*) in Marhoff's quarry above Tyrone forge, Blair Co., T, 59.—*II c.*

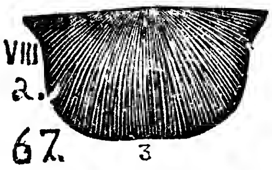
Chætetes ——? in *Clinton* rocks. near Bloomsburg, Columbia Co. White's Spec. in Claypole's Coll., 86–9.—*Va.*

Chætetes especially numerous in Low. Held. cliffs at McConnellstown, Huntingdon Co, Pa. White, T3, p. 201; fill the slaty limestone 320′ under Oriskany in Weaver's run sect. T3, 157; in Bastard Lime., No. 44 of Coffee run sect. T3, 172; in Crinoid beds, 100′ to 130′ below Oriskany, Powell's quarry, Cove Station, T3, 123. In Bedford Co. abundant in Martin's ridge, near Md. State line. Stevenson, T2, p. 159.—*VI.* See Spec. 604–2 (too poor to identify) of Fellows' and Genth's collections, 1875, at Mansing's quarry, near Hazardville, Carbon Co., from *Lower Held. VI.*

Cheirotherium. See **Otozoum parvum.**—*Trias.* **Chimxrichnus ingens.** E. H. Hitchcock, *new species* of reptilian footprint found in New Red quarry at Milford, N. J. Boston N. H. S. Dec. 19, 1888. *See Appendix.*

Chondrites colletti. See **Taonurus colletti.** *XV.*

Chonetes acutiradiata. (*Strophomena acutiradiata*).



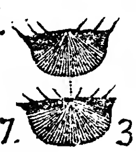
VIII a. 67. 3

Hall, Geology of Fourth District of N. Y., 1843, page 171, fig. 67, 3; surface covered with sharp striæ, which fork approaching the margin. It is found in the very high beds of the *Corniferous limestone formation. VIII a.*

Chonetes carinata. (*Strophomena carinata.*) *See Appendix for figure.*—Conrad, Journal of Academy of Nat. Sci. Phil. 1842, Vol. 8; *Hamilton formation.*—In Pennsylvania it has been collected by C. E. Hall at Marshall's Falls in Monroe county.—Also abundant in the *Hamilton middle sandstone* at the south end of Jack's mountain in Huntingdon Co. T, p. 32. Also in Hamilton upper sandstone, T3, p. 111.—In Perry Co. it occurs with *Spirorbis*, in *Ham. Up. shales*, at Barnetts mill, spec. 5-137, 138; at Pisgah hill, spec. 59-17.—In Northumberland Co. at Selinsgrove, spec. 78-4.—Other places in Perry Co. are Crawley hill, spec. 94-2,-7-25 (thirteen specimens; Rambo's, spec. 107-1 (three).—In Huntingdon Co. at Grafton, spec. 243-5. All the above specimens were got from *Hamilton strata.* But at Buck hills, Perry Co. spec. 62 is reported as found in *Clinton strata*, which is probably a mistake.— *VIII c.*

Chonetes complanata. *See Appendix.*—Hall's 10th An. Rt. also Pal. N. Y. *Oriskany.*—In Pennsylvania it has been collected by Dr. Barrett near Port Jervis on the Delaware river from the upper beds of the *Stormville shale* sub-division of the *Lower Helderberg* formation, I. C. White's Report on Pike and Monroe counties.— *VI.*

Chonetes cornuta. (*Strophomena cornuta.*) Hall, Geology



V. 17. 3

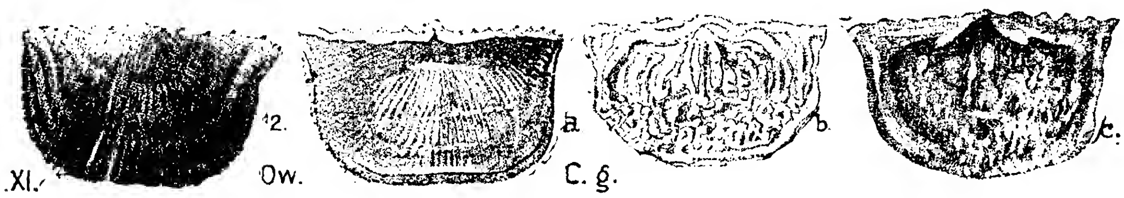
of Fourth District, N. Y., 1843, page 72, fig. 17, 3; *Clinton* formation; finely and equally striated; six stiff diverging spines on the hinge line of each valve. Closely resembles *Leptæna lata*, Von Buch, in Silurian

System, pl. 5, fig. 13, but is much smaller and more finely striated. *L. lata* is a *Ludlow* (= *Hamilton*) English fossil. (Hall.) *V a.*

Chonetes coronatus. Spec. 705–31, 802–2 in C. E. Hall's collections from Orbisonia, and 805–33 from Bell's mills, (both identified by J. Hall, 1888,) from *Hamilton*, *VIII c.*

Chonetes deflecta. *See Appendix.*

Chonetes granulifera. Owen, Geol. Rt. Wis., Iowa and



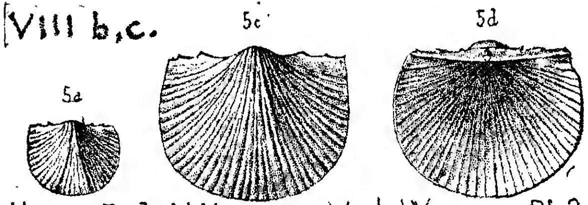
Minn., 1852, plate 5, fig. 12.—In Pennsylvania abundant in the *Green crinoidal limestone* (black shale) at water level at Pittsburgh. Stevenson Rt. K, p. 80.—Also profuse and well preserved in the same *Barren Measure* rock, near Incline Plane, Birmingham station, Lower St. Clair t., Washington Co. K, p. 310.—In Fayette Co. replaces entirely the *Chonetes mesoloba*, in Black Foss. L. 250′ below Pittsburgh Coal, in Williams ravine, 5 m. N. of Morgantown, Rt. L, p. 34, 36. See Specimens C1–2, C2–5, C2–9, all from near Harvey's Five Points, Westmoreland Co. (Report OO, p. 239)—*XIV.*

Chonetes illinoisensis. *See Appendix.*

Chonetes iowensis. Owen, Geol. Iowa, Wisc. and Minnesota, 1852, plate 3A, fig. 7, from the Devonian limestone of Iowa city.— *VIII c.*

Chonetes laticostata. **Chonetes mucronata.** *VIII a, c.*

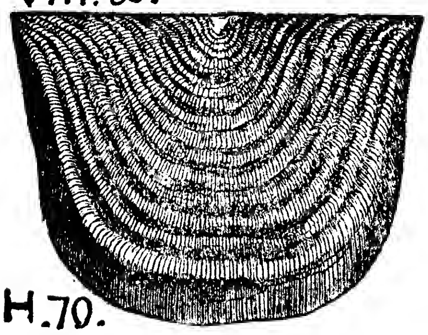
Chonetes lepidus. (Hall, 1857, 10th An. Rt. 1857; Pal. N. Y., Vol. IV, page 132, plate 21, fig. 5 *a*, *natural* size, 5 *b*, 5 *c*, *enlarged.* Marcellus and Hamilton) Claypole's list of fossils in Perry Co. Penn, Preface to Report F2, p. xiii. *Hamilton.* Also at



Rupert, and Bloomsburg, Columbia Co., Pa. White found it in bed 38, Sect. 13 (bed 4, Sec 79) *Chemung*.—See OOO, 1888, Cat. Collections. Claypole's specimens 2–7 (five); 2–20; 5–8, 22, 42, 47, 56, 58, 93 (thirty-five); 68–3, 4, 5, 6, 7; 75–2; 84–4; 97–8, 9; 99–28, 29, 30 (forty-six in all.)— *VIII c*, and *g*.

Chonetes lineatus.. (*Strophomena lineata.*) Hall, Geology of the Fourth District, N. Y., 1843, page 175, fig. 70, 3. Vanuxem, Geology of the Third District, N. Y., 1842, page 139, fig. 33, 6. Figure magnified twice. Vanux. (Also Conrad, 1839.) This shell is abundant in Seneca county, N. Y., but rare towards LakeErie. (Hall.) —*Corniferous limestone*, *VIII a*.

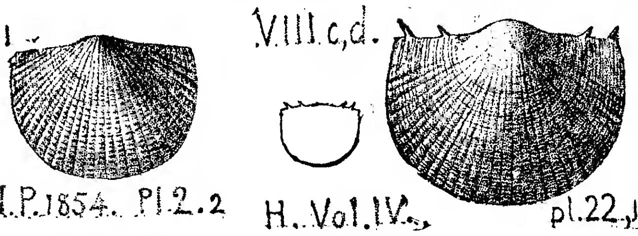
VIII. a.



H.70.

Chonetes logani. (Norwood and Pratten, 1854, Jour. Acad. N. S., Vol. 3, page 30, plate 2, fig. 12. Burlington group. Variety **aurora.** Hall 1867, Pal. N. Y. Vol. 4, page 137, plate 22, fig. 17. *Tully Limestone* and *Hamilton group.*) Claypole's list in Perry Co., Pa. F, 2.— *VIII*, *c.*, *d.*

XI. VIII.c,d.

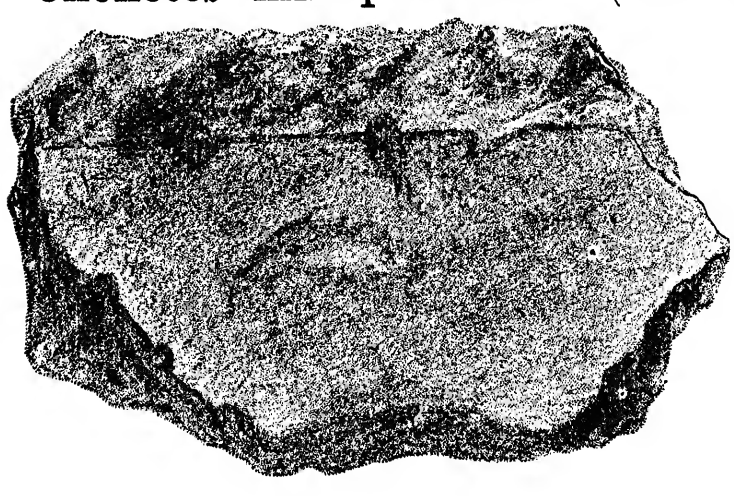


N.P.1854. Pl.2.2 H..Vol.IV.. pl.22,17

Chonetes logani, Var. **aurora.** *See Appendix.*

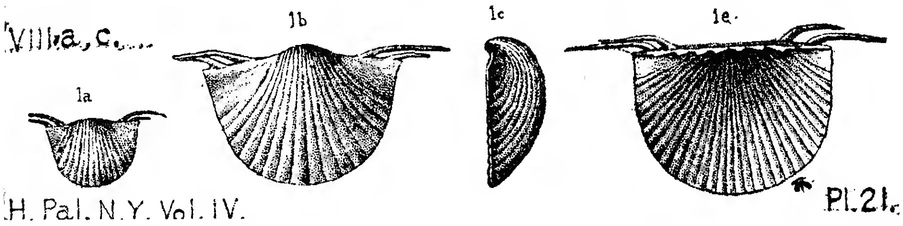
Chonetes mesoloba. *See Appendix.*

Chonetes millepunctata. (Meek [and Worthen, Proc. Acad. N. S. Phila. 1870, p. 35; Geol. Sur. Ill. Vol. 5, p. 566, pl. 25, fig. 3). Heilprin in An. Rt. Geol. Sur. Pa. 1885, page 452; plate-page 440, fig. 3; from one of several impressions, which must have been 4 inches wide, the fragment being 2½ in.; the pricks (punctæ) very fine and exceedingly numerous. Cabinet of Wyoming Hist. Soc. at Wilkes-Barre.—*Mill Creek limestone*, in anthracite measures, 1,000′ above Conglomerate. *XIV* or *XV*.



3 CHONETES MILLEPUNCTATA.

Chonetes mucronata. (Hall, 1843; Pal. N. Y. Vol. IV, page 124, plate 21, figs. 1*a*,*b*,*c*. *Corniferous* and *Hamilton.*—



Perry Co., Pa. Preface to report F2, page xiii. OOO, 1888, Cat. Claypole's spec. 110–22, collected 1 m. S. W. of New Bloomfield, Hamilton upper shale.—Columbia Co., Hemlock, in *Marcellus.*—In Monroe Co., Marshall falls, C. E. Hall collections 1875.—In Huntingdon Co., end of Jacks mountain, Ham. middle sandstone, T3, p. 111.—Specimens in Fellows' and Genth's collections, 1875, at Marshall's creek, Monroe Co., (OO, p. 235), 804–20–26, 29 (two); 39; 40; 49; 51 (two); 54; 70 (two); 86; 807–5 (two); all *Hamilton*, *VIII b* and *c*.

Chonetes productus. Quoted by I. C. White from Bush creek limestone, L. Economy t., Beaver Co. (Q, p. 179).

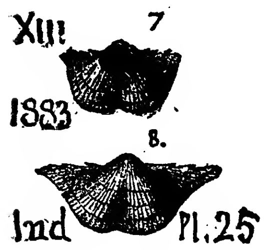
Chonetes scitula. Hall, 1857, 10th An. Rt. N. York. Specimens in Chance's collection from Marshall's creek, Monroe Co. (See OO, p. 235)—801–7. From Saddleback gap, Aughwick creek, Huntingdon Co., 802–2, 3. From Saddleback ridge, 893–9 (many specimens); 803–10; 803–11 (doubtful species); 803–12 (several on slabs); 803–15 (very doubtful species, and very poor specimens); 803–16, 803–19, 803–25; all from *Hamilton shale.*—881–1, in Hick's coll. from street cutting at foot of hill in Bradford, McKean Co., *Chemung* (?)—883–91, Howell's coll. in Tioga Co., N.Y.—*VIII c, g.*

Chonetes setigera. (*Strophomena setigera*). Hall, page 180, fig 71, 72. VIII b. Marcellus formation; also Hall, page 222, 94, 3 VIII c. Genesee formation.—In Pennsylvania, Perry Co., Claypole's specs. 5–156; 54–7,8; 58 B–8 233–10; 243–7 (seven in all). Hamilton, VIII *c*.—In Columbia Co. Little Fishing cr. Tully limestone, VIII *d.* (G7, 75)—Catawissa (G7, 289.)—Stony Brook, in Chemung, VIII *g* (G7, 69, 72, 287)—Fiddler's creek, in Upper Chemung, bed 21 of sect 96 (G7, 367).—In Huntingdon Co. at Huntingdon, in Ham. upper shales (T3, 109); near Grafton, 50′ beneath Tully L. (T3, 109); Hunt. Car Wks. in Marcellus (cornif?) limestone (T3, 115); 203d RR. post, top of Marcellus (T3, 113); Olive shales (T3, 264).—In Oil region, Upper Chemung? *VIII g—X?*

Chonetes smithii. *See Appendix.*

Chonetes syrtalis (**Chonetes carinata,** Conrad, which see) identified by Jas. Hall, 1888, in specimen 803–11, 803–25 (OO, p. 235) Saddleback, Orbisonia, *Hamilton shale*, *VIII c.*

Chonetes verneuiliana. (Norwood & Pratton, Jour. Acad. Nat. Sci., Phil., 1854, Vol. 3, plate 2, fig. 6). Collett's Indiana Rt. of 1883, page 128, plate 25, fig. 7, central view of common specimen; fig. 8 of another with mucronate sides.—*Coal measures.* Every county in Indiana with coal has furnished specimens of this species, which can be distinguished from other *Chonetes* by its middle groove, and the bilobed appearance of its ventral valve. (Collett).—*XIII.*



Chonetes —— ? Very small; found by I. C. White in Monroe Co., Pa., in abundance in *Lower Held. Decker's Ferry sandstone.* G6, p. 140, 222, 246.— *VI.*

Chonetes ——? Centre Co. *Marcellus*, T4, 434.— *VIII b.*

Chonetes ——? large species in Bedford Co. *Middle Hamilton* shales, bed 48 of Saxton section, T2, 231.— *VIII c.*

Chonetes —— ? more transverse in form than usual; specimen 881–1, (OO, p. 339) in Hicks' collections at Bradford, McKean Co., from *Chemung*, *VIII g.*

Chonetes ——? In Huntingdon Co., Juniata south shore section, bed 6, 50′ below Chemung upper (Lackawaxen) conglomerate, T3, 193. In Bedford Co., Yellow Cr. section, sand bed 30, 2957′ below Catskill. T2, 226.— *VIII g.*

Chonetes ——? Bedford Co., Ickes' gun shop, St. Clair t. *Chemung* clay beds, T2, 127; W. Providence T2, 216.— *VIII g.*

Chonetes ——? Centre Co. *Chemung*, T4, 433.— *VIII g.*

Chonetes ——? Warren Co., numerous in Randall sect. F. G, H. Carll's IIII, p. 305. See Rt. I, p. 53.— *VIII–IX.*

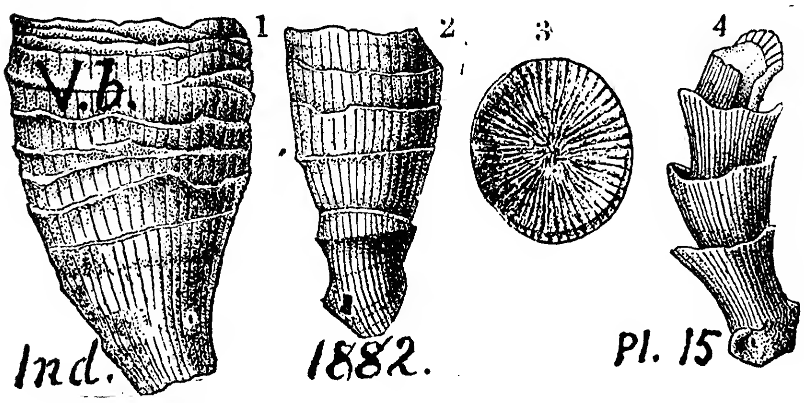
Chonetes and *Streptorhynchus* in Warren Co. ½ m. N. W. Sugar Grove, Oil group. Rt. O, 3366.— *VIII–IX.*

Chonetes and *fucoids* in Venango Co. on flags, Millers' farm, Oil creek, in Bedford shale, Rt. O, 3307.—IX? Also in brown SS. in Drift, Pine creek, near Oil creek. O 3061.

Chonetes, Palæoneilo, Sphenotus, and others, in Sp. 1000–18, White's coll. at Brookfield tunnel, S. W., of Sharon, Pa.—*X?*

Chonetes punctatus, *new species*, Simpson and J. Hall. See Proc. A. P. S. Phila., Dec. 1888, founded on Specimen 604–4,–5. For figure and description *see Appendix.*

Chonophyllum vadum. (Hall, Foss. Corals, Niagara and Upper Helderberg; 35th An. Rt. 1882.) Collett's Indiana Rt. of 1882, page 272, plate 15, figs. 2, 3, side views of two common specimens; fig. 3 the cup of fig. 2; fig. 4, an individual showing proliferous growth.—*Niagara formation* at Louisville, Ky.—*V b.*



Chonophyllum ——? Montour Co., Pa., Appleman section, bed 4, the lower *Stromatopora bed* above Bastard limestone (Lower Helderberg), G7, 300. In Huntingdon Co. abundant and characteristic of lower 50′ of *Lewistown limestone*, over Waterlime beds; T, 41; T3, 126; C. E. Hall's collections, 1875.—*VI.*

Chrestotes lapidea. Scudder. A neuropterid insect, found in a Mazon creek nodule of the Illinois coal measures. Zittel's Handbuch of Palæontologie, Vol. 2, p. 762, fig. 952, *natural size;* to show what may be found by cracking open the ironstone balls in our coal measure shales and clays.—XIII.

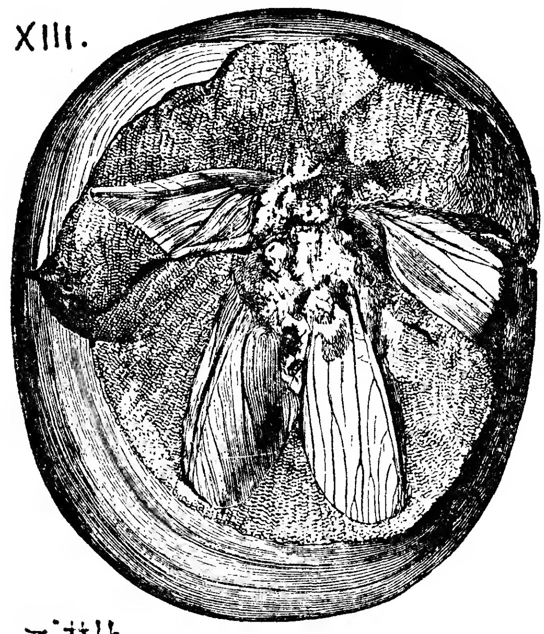


Fig. 952.

The description of this insect may be found in Vol. 3 of the Reports on the Geological Survey of Illinois, published in 1868, from which the figure in Zittel has been copied.

Cimitaria recurva. (*Cypricardites recurva*, Conrad, 1842, Jour. Acad. N. S. Phil., Vol. 8, *Hamilton.*) Specimen in Chance's collections from $1\frac{1}{2}$ m. N. of Craig's meadow, Marshall creek, Monroe Co., 801–21. (See OO, p. 235.)—*VIII c.*

Cladodus a genus of fish of Carboniferous times of which S. A. Miller catalogues the following species as described up to 1884: *Acuminatus*, *alternatus*, *angulatus*, *bellifer*, *carinatus*, *concinnus*, *costatus*, *deflexus*, *eccentricus*, *elegans*, *euglypheus*, *exiguus*, *exilis*, *ferox*, *fulleri*, *gomphoides*, *gracilis*, *grandis*, *hertzeri*, *intercostatus*, *ischypus*, *lamnoides*, *magificus*, *micropus*, *mortifer*, *newmani*, *occidentalis*, *pandatus*, *parvulus*, *pattersoni*, *politus*, *prænuntius*, *raricostatus*, *robustus*, *romingeri*, *spinosus*, *springeri*, *stenopus*, *subulatus*, *succinctus*, *turritus*, *vanhornei*, *wachsmuthi*, *and zygopus ;* most of them by Newberry in the Ohio Palæontology; many by St. John & Worthen in that of Illinois; some by Tuomy, Alabama survey; one by Leidy; and most of them in the Lower Carboniferous Strata.—In Pennsylvania, spines referable to this genus of fish are frequently found in the Meadville upper limestone at Glendale and elsewhere in Crawford Co. I. C. White's Rt. Q4, p. 83, 140.—*Waverly* or *Pocono* formation, *X*.—See also Carll's Rt. I, p. 70.—And for such in the *Subconglomerate* strata, see I, p. 67.—*XI? X?*—For figure *see Appendix*.

Cladopora cæspitosa ? A *Niagara* polypoid coral (Hall, 1852, Pal. N. Y. Vol. 2), which seems to be represented by specimen 610–8, in Billin's collections, 1876, from Warrior's ridge, Barree township, Hunt. Co., in *Lower Helderberg limestone*, *VI*.—For figure *see Appendix*.

Cladopora laqueata. (Rominger, 1876, Foss. Corals, *Niagara* formation). A. Winchell's Geol. studies, 1886, page 224, fig. 157.—*Niagara* formation. *V a*.—The figure is a small part of the beautiful fig. on plate 18, of Vol. 3, of the superb work of the late State Geologist of Michigan.

A.W. G.S. 1886. p.224

Cladopora multipora ? Hall. Pal. N. Y., Vol. 2, 1852, *Niagara limestone*, *V b*. Doubtfully identified in Pennsylvania by I. C. White, at Maurer's, Eck's, Limeridge and Appleton's quarries in the Montour district, in Lower Helderberg limestone, *over the Bastard beds*. Rt. G7, p. 89, 244, 247, 261, 300.—In Huntingdon Co., Coffee run section, *in Bastard bed* 44 T3, p. 172. Especially numerous in the McConnellsville cliffs. T3, 201.—G. B. Simpson, 1888, found a *Cladopora*, resembling *C. multipora*, as specimen 601–1, of Hale & Hall's, 1876, collections near Orbisonia, Huntingdon Co. (See OO p. 234), in *Low. Held. L. VI.*—For fig. *see Appendix.*

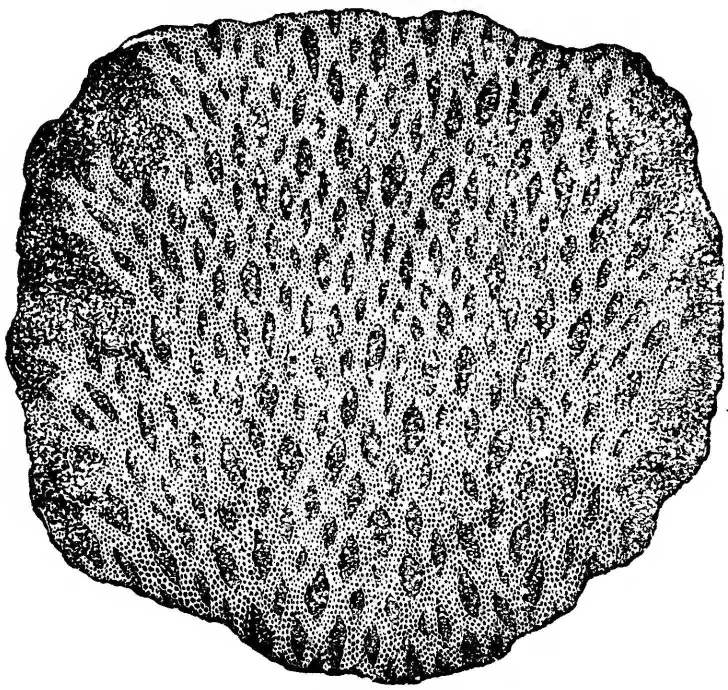
Cladopora rectilineata, *new species*, G. B. Simpson and J. Hall, Proc. A. P. S. Phil'a, Dec. 1888, based on OO, p. 234. Specimen 607–5, in Fellows collections near Bushkill, Pike Co., Pa., from river slope of Hogback, near road to Shawnee, Walpack bend, *Lower Helderberg*, *VI.* For description and figure *see Appendix.*

Cladopora, probably the same species. Spec. 607–5, from Tyrone city, Blair Co. (G. B. S.).— *VI.*

Cladopora, probably the same species. Spec. 607–9, from Tyrone city, Blair Co. (G. B. S.).— *VI.*

Cladopora, probably the same species. Specimen 601–1, (See OO, p. 234), from Hale & Hall's coll. at Orbisonia. (G. B. S., 1888.)— *VI.*

Cladopora reticulata. (Hall, Pal. N. Y., Vol. 2, page 141, plate 39, fig. 3 *a–c.*) Collett's Indiana report of 1881, page 384, plate 47, fig. 6 (Van Cleve); a portion of corollum imbedded on limestone. Has general aspect of a *Retepora ;* but on examination it will be seen to have pores on all sides, with round tubular cells, with circular mouths and a projecting lip on the lower side. Worn specimens show only the circular openings. Crystallized specimens only show a fibrous structure. Louisville, Ky., *Niagara formation*, *V b.*

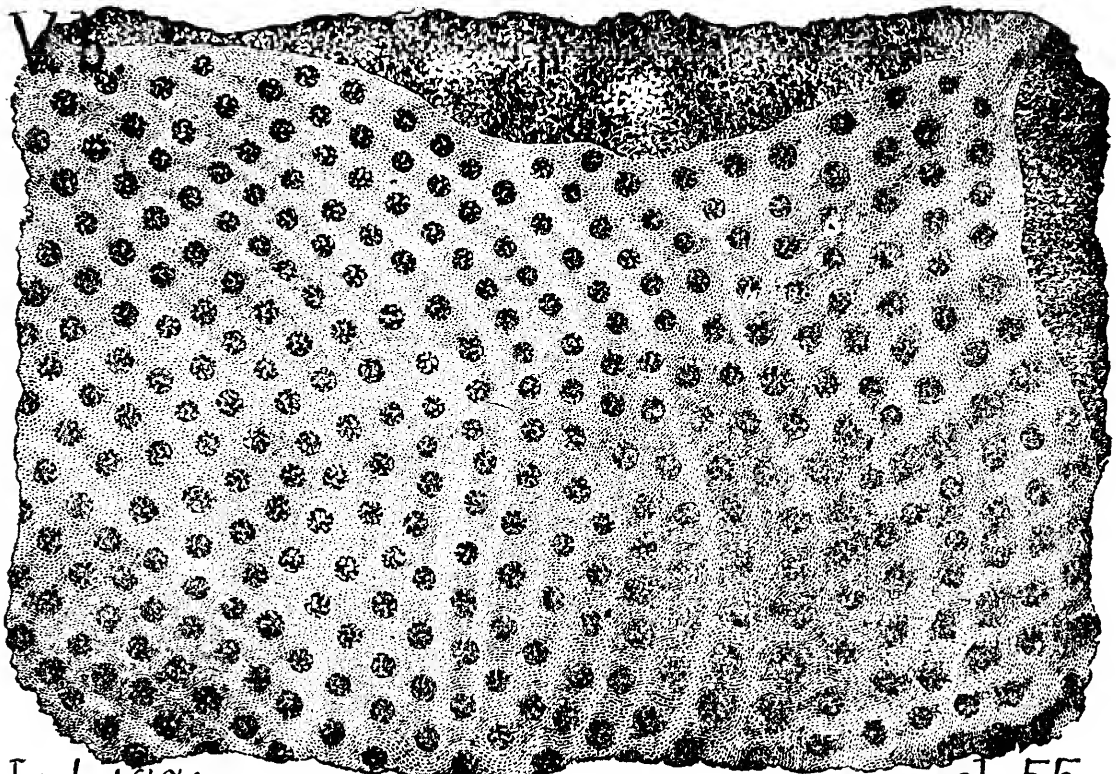


Cladopora —— ? branching, with cells ranged in regular order, eight rows on a branch. Spec. 601–31 *a.* (G. B. S.)— *VI.*

Cladopora, or *Trematospira*, in Perry Co., Clarks mill beds, Upper shaly beds of Lower Helderberg. OOO, Cat. spec. 6, X–6.— *VI.*

Clathropora frondosa. Hall. Pal. N. Y., 1852, Vol. 2,

V b.

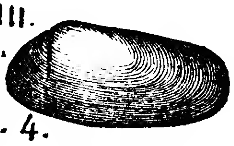


Ind. 1881. 3 pl. 55.

plate 40, B fig. 5 *a*, *e*. Collett's Indiana report of 1881 (Van Cleve), page 385, plate 55, fig. 3, part of a large frond (polypidom) embedded in limestone. *Niagara* formation. *V b.*

Cleidophorus oblongus. (*Nucula oblonga.*) Hall, page

VIII. c.

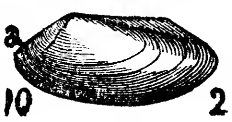


78. 4.

196, fig. 78, 4. *Hamilton* formation.—In Penna. Montour region, it is doubtfully identified by White in the Chemung, 50′ to 100′ above the Stony Brook beds; abundant; G7, p. 72, 73.—In Huntingdon there is a *Cleidophorus* in fragments of bed 6 of the Juniata river section, 50′ below the *Chemung* upper (Lax.) conglomerate. T3, 193.—*VIII c*, *g*.

Cleidophorus planulatus. (*Nuculites scitula.*) (*Nuculites planulatus.*)

III a



E. 110 2

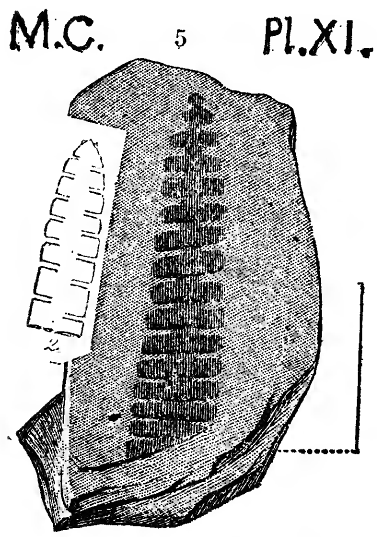
Emmons, page 399, fig. 110, 2. (Conrad, 1841, Ann. Report N. Y.) *Utica* formation, *III a*.

Clepsysaurus pennsylvanicus. (Or, perhaps, *Centemodon sulcatus.*)

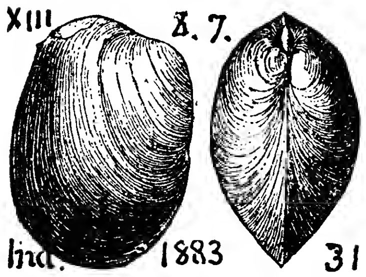
A tooth conjectured by Mr. I. Lea to belong to one or other of these large reptiles. Rogers, G. Pa., Vol. II, page 693, fig. 570. Found by Lea in the upper beds of Trias, near Milford, south border of Lehigh Co. Cope, in Proc. Amer. Phil. Soc. Philada., 1877.—At Phœnixville; *Trias*.

Clepsysaurus wheatleyanus. Cope. Proc. A. P. S. Phil., 1877. Fragments of bones of this reptile found in York Co.—*Trias.*

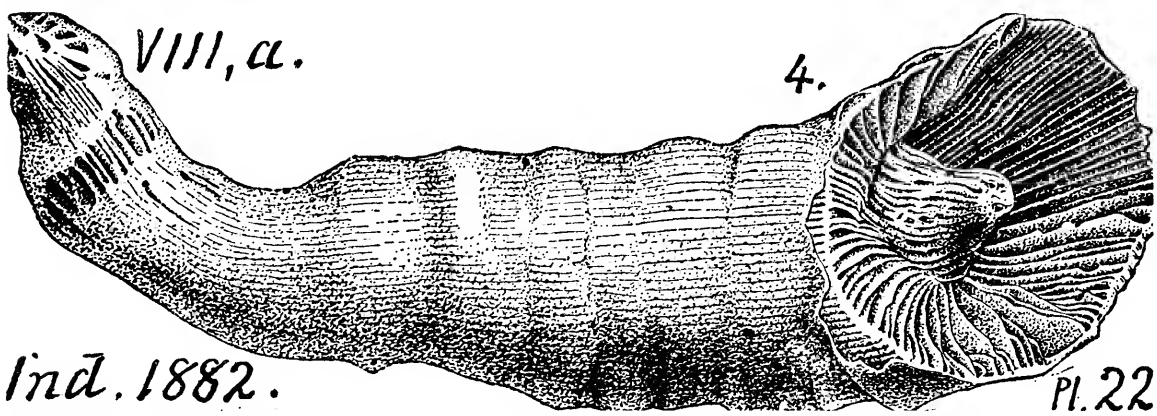
Climacograptus emmonsi. A solitary specimen of this graptolite, owned by E. Hurlbut, and figured by Walcott, in Bulletin U. S. G. S. No. 30, page 93, plate XI, fig. 5. Perhaps the same species figured by Emmons, in American Geology, Vol. 1, plate 1, fig. 2 (which I have superposed on Walcott's figure for comparison.) — *Lower Cambrian* (*Georgian*) formation, Parker's quarry, Vt., in shale holding *Diplograptus ? simplex*, *Mesonacis vermontana*, *Olenellus thompsoni*, and *Protocaris marshi.*—*M. C.* (now *L. C.*)*



Clinopistha radiata. (Meek and Worthen, Illinois Geol. Rt. 5, p. 584, plate 27, fig. 7. *Edmondia radiata*, Hall, Geol. Iowa, part 2, p. 716, plate 29, fig. 3.) Collett's Indiana Rt. of 1883, page 147, plate 31, fig. 6 and 7, right side and back views, *natural size.*—*Upper Coal Measures* of Indiana. *X V.*



Clisiophyllum conigerum. (*Zaphrentis conigera*, Rom-



inger, Foss. Corals, 1876, p. 149, plate 40.) Collett's Indiana Rt. 1882, page 299, plate 22, fig. 3, side view of a fine specimen six inches long (*omitted here*): fig. 4, back view of a smaller, showing the cup (calyx) with its central cone.—At the falls of the Ohio and elsewhere. *Corniferous limestone*, *VIII a.*

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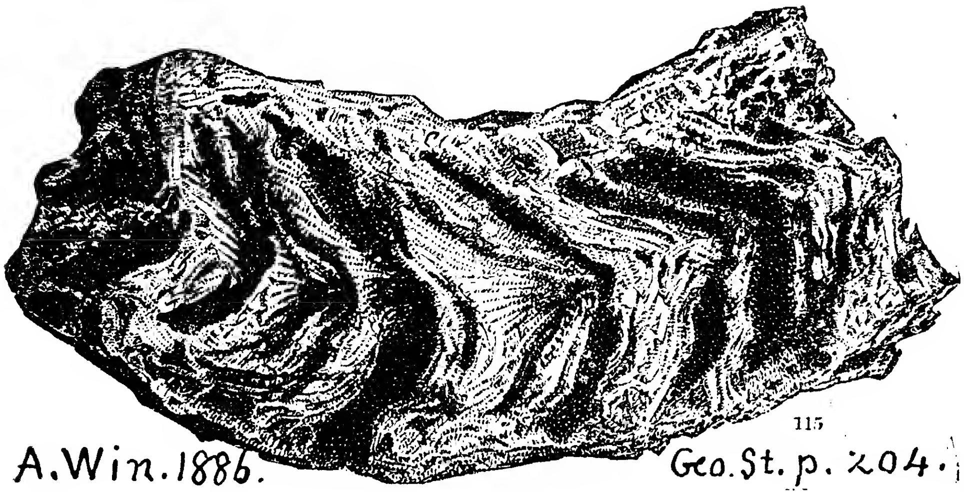
*Since the discovery of *Olenellus* beds *under* the *Paroxides* zone in Newfoundland, by Walcott, in 1888.

Clisiophyllum oneidense. (Billings Canad. Jour, 1859. *See* **Acrophyllum oneidense,** Thompson and Nicholson.) A. Winchell's Geol. studies, 1886, page 204, fig. 115, showing its internal structure. *Corniferous limestone* (Upper Helderberg) formation. *VIII a.*



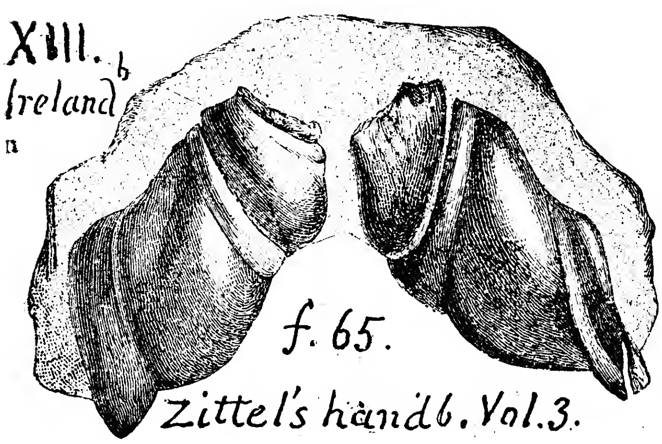
Clymenia complanata. See **Goniatites complanatus.** *VIII f.*

Coccosteus, a genus of Devonian fish of Europe, Agassiz, represented in America by only one species: *Coccidentalis,* Newberry, Ohio Pal. II, 1874, from the *Corniferous limestone VIII a.*—For figure *see Appendix.*

Coccosteus ——? and *Holoptychius,* occur at Warren in Pa. in the lowest 500 feet of the section; whereas the fish *spines* are always found in loose pieces of rock, 4 or 5 inches thick, in or at the top of the *First Mtn. Sand,* or Sub-Olean conglomerate, in the highest 200 feet of the Warren section. I, p. 54. White thinks that the *Coccosteus* bed at Warren is the *First Venango Oil Sand.* Q, note to p. 102.—*X.*

Cockroach in coal bed. See **Gereblattina.** G7, 41.—*XIII.*

Cochliodus contortus. (Agas.) Zittel's handbuch, Vol. 3, page 71, fig. 65. (Compare *Cochliodus vanhornii, Cochliodus leidyi,* and *Cochliodus obliguus,* in Illinois Geological Report, Vol. 7.) The European species of this genus of fish occurs in the sub-carboniferous of Ireland. The species *costatus, crassus,* and *nobilis* are found in the *Burlington* and *Keokuk* sub-carboniferous limestones of Illinois. *XI.*



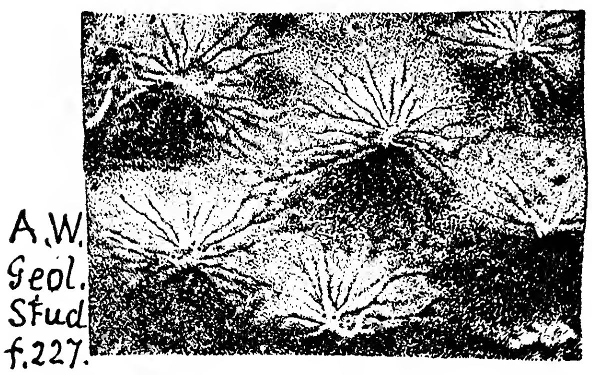
Codenites stelliformis. See figure under **Pentremites stelliformis.** D. D. Owen.

Coelacanthus ——? A fish spine in Carll's collections, Warren, Pa., *Upper Chemung.* C. E. Hall's Ms. Rt., Dec. 30, 1876.— *VIII–IX.*—For figure, *see Appendix.*

Cœlospira concava (*Leptocœlia concava*, Hall Pal. N. Y., Vol. 3, page 245, plate 38, figs. 1 to 7; may be considered a representative of the Russian brachiopod shell *Terebratula duboisii*, De Verneuil (Geol. Russ. pl. 10,) f. 16, but is rounder and more concave in the dorsal valve; surface with 14 to 17 striæ; concavity, produced by the middle groove widening rapidly from beak to margin, being deep midway.—Specimen 876–3a (OO, page 237) in Hicks' collections near Big Shanty, McKean county, Pa., was found not in *Lower Helderberg*, but in *Chemung* strata. Hall recognizes a difference between the similar shells in the *Lower Helderberg & Oriskany* (see Vol. 3, page 452) and calls the latter *Coelospira* (*Leptocœlia*) *dichotoma;* the *Chemung* species should perhaps have a different name.— *VI; VIII g.—See Appendix.*

Cœlospira dichotoma. See under old name *Leptocœlia dichotoma. VII.*—See also what is said under *C. concava.*

Cœnostroma monticuliferum. A. Winchell's Geological Studies, New York, 1886, page 322, fig. 227, drawn from nature. The figure is given here on account of its curious beauty, and to excite the curiosity of our collectors; as well as to invite attention to Prof. Winchell's excellent text books.

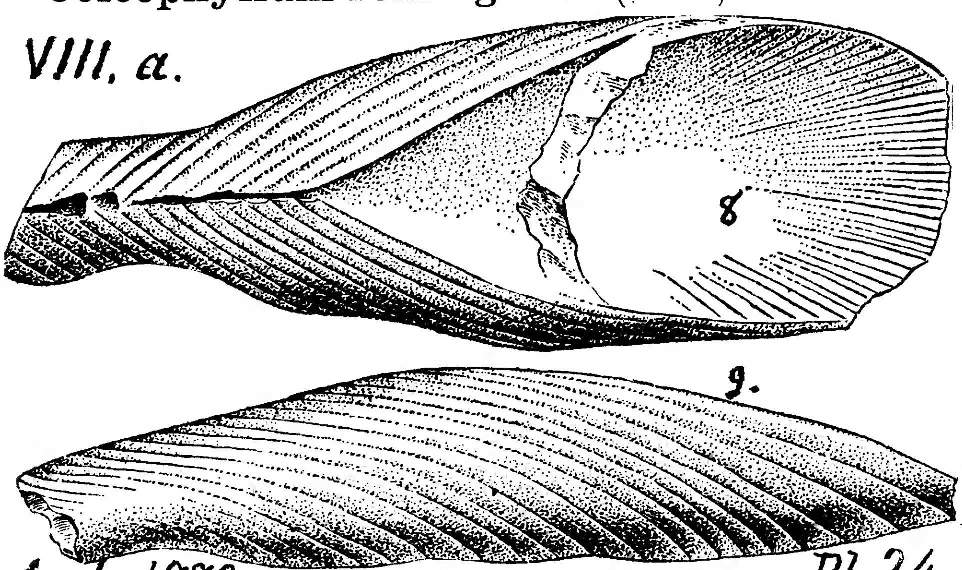


Coleolus aciculus. (*Orthoceras aciculum*, Hall, Pal. N. Y. Vol. V, part 2, p. 187, plate 82 A, fig. 11, *Genesee & Portage.*) Claypole's list of fossils in Perry Co., Pa. Preface to Report F2, p. xiv.—OOO, Cat. spec. 5–49, 163, from Barnett's mill, Perry [Co., Pa. *Hamilton upper shale;* also spec. 97–8, 9, from Stony Brook, near Bloomsburg, Colum-

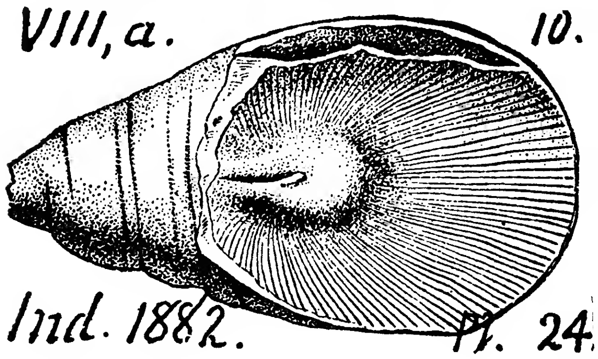
bia Co., Pa.—*Chemung*, *VIIIg*.—Also OO, p. 235, spec. 804–33 from Marshall creek, Monroe Co. (G. B. S., 1888). From *Hamilton rocks*, *VIII c*, *f*, *g*.

Coleolus tenuicinctus (*Coleoprion tenuicinctum.*) Hall, 1876, Illust. Devon. Foss.; Pal. N. Y. Vol. V, pt. 2, p. 185, plate 32 A, fig. 10. Cornif. & Hamilton). Claypole's list of fosssils in Perry Co., Pa. Preface to Report F2, p. xiii, xiv. *Marcellus & Hamilton*.—OOO, Cat., 1888. Spec. 5–94, from Barnett's mill, Perry Co. Upper shale, *Hamilton*. Spec. 19–25, from Clark's mill, Perry Co., upper shaly beds of *Lower Helderberg*.—Spec. 92–4, 9, 11, 13, 14, 15, 25, from Vanderslice's quarry near Bloomsburg, Columbia Co., Pa., *Hamilton*.—See G7, 229.—In lower part of *Selinsgrove upper limestone*, G7, 79, 362.— *VIII a*, *b*, *c*.

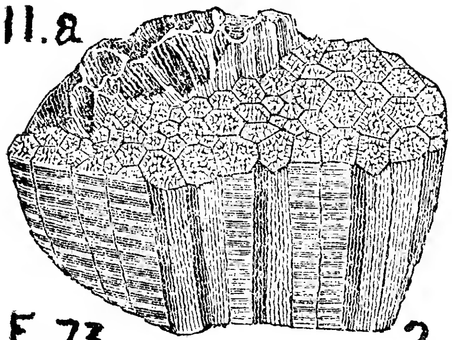
Coleophyllum romingeri. (Hall, 35th An. Rt. State Museum.) Collett's Indiana Rt., 1872, page 317, plate 24, fig. 4, back side showing calyx; fig. 5, side view.—Falls of the Ohio; *Corniferous* (*U. Held.*) *limestone*, *VIII a*.



Coleophyllum pyriforme. (Hall, 35th Report of State Museum, N. Y.) Collett's Indiana Rt. for 1872, page 318, plate 24, fig. 10, view of back side looking into the cup; compare some forms of *Cystiphyllum sulcatum*. Falls of Ohio. *Corniferous* limestone. *VIII a*.

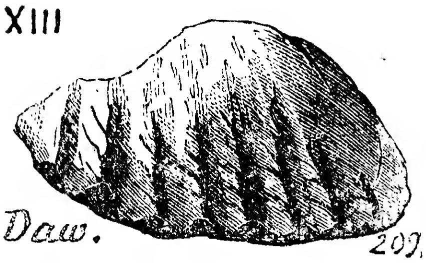


Columnaria ——. Emmons' Geology of the Second District, N. Y., 1842, page 276, fig. 73, 2. *Chazy* formation. (See *Columnaria incerta* from *Chazy;* Billings, Canad. Nat. Vol. IV, 1859.—See *Columnaria parva* from *Chazy*; Billings, Canad. Nat. Vol. IV, 1859.)—*IIb.*



Columnaria alveolata. *See Appendix.*

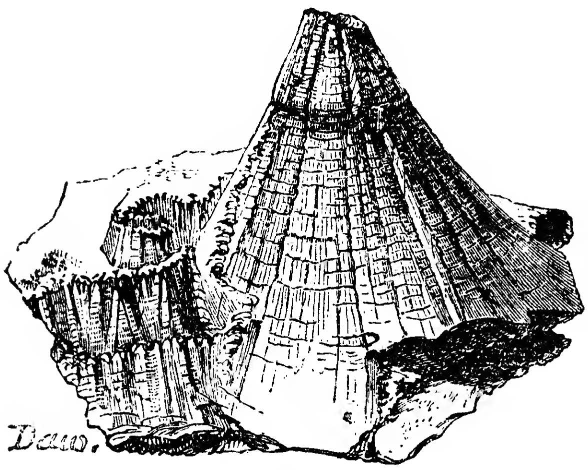
Conchodus plicatus, Dawson, Acadian Geol. 1868, page 209, f. 53, a fine fish tooth (which could easily be mistaken for a shell) from the Nova Scotia coal measures, at the Joggins. Apparently referable to McCoy's British genus *Conchodus.*—*XIII.*

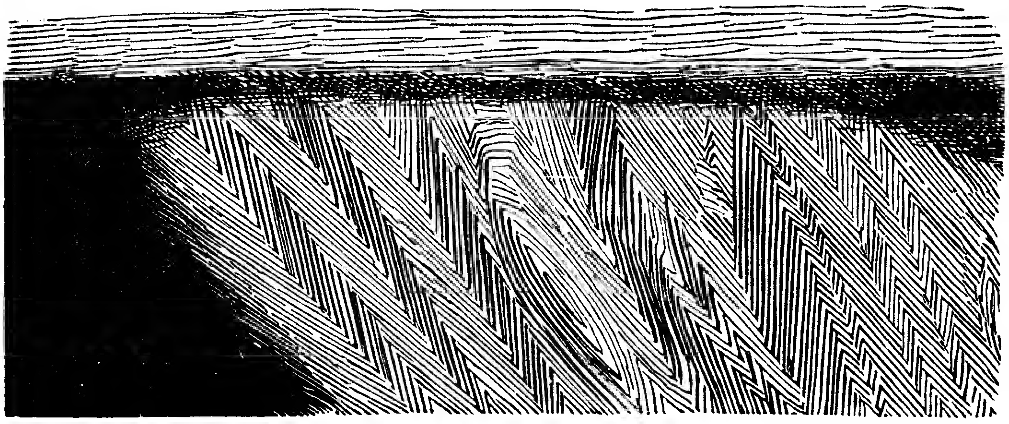


Cone-in-cone, or Tutenmergel. A curious arrangement of the material of a bed of clay, and of clay strata of various ages, often mistaken for some sort of fossil organism. Contradictory explanations are given of its origin. It has been often figured; the figure here given is one copied from Dawson's Acadian Geology.—A similar structure on a grand scale is sometimes seen in coal. Lesley's Manual of Coal, etc, 1856, page 164, fig. 59, the then exposed face of a mine 10 m. N. of the summit of the Nashville and Chatanooga RR. in Tennessee.—See also Owens Geol.,

XIII.

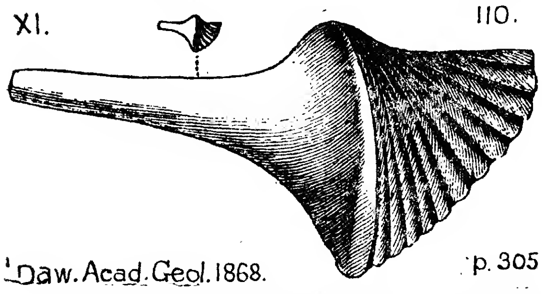
Cone-in-Cone.



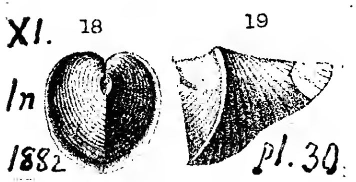


Wisconsin, &c., 1852, pp. 123, 127, etc.—*See Appendix* for a remarkable structure in anthracite, excessively rare, which must be referred to the same cause, but cannot be explained by reference to any known form, organic or inorganic.—See also an excellent figure of *Cone-in-cone*, in Hall, Geol. Fourth Dist. N. Y., 1843, page 232.—Also good figures in Winchell's Geol. Studies, 1886, page 257.—*See Appendix.*

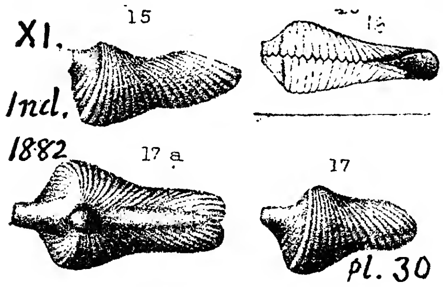
Conocardium acadianum, Hartt, Dawson, Acadian Geology, 1868, page 305, fig. 110, a curious minute shell of the *sub-carboniferous* limestone of Nova Scotia, with a long wing-like siphonal tube; figure *enlarged 10 times.—XI.*



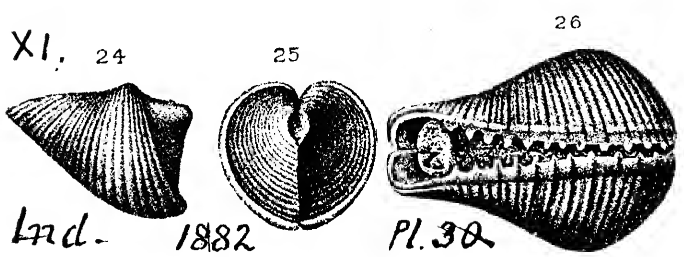
Conocardium carinatum. (Hall, Trans. Alb. Inst. Vol. 4, 1856, from *Warsaw* group. Whitfield, Bull. 3. Am. Mus. N. H. 1882, plate 7, figs. 18, 19). Collett's Indiana Rt. 1882, page 345, plate 30, fig. 18, 19, back and side views of an imperfect specimen, *enlarged twice.—Sub-carboniferous* beds at Spergen hill, Ind. *XI.*



Conocardium catastomum. (Hall, Trans. Alb. Inst. 1858, Vol. 4, from *Warsaw* group. Whitfield Bull. 3, A. Mus. 1882, plate 7; figs. 15, 16, 17). Collett's Indiana Rt. 1882, page 344, plate 30, figs. 15, 17, side views of two specimens, *magnified three times;* fig. 16, bottom view of 15.—*Sub-carboniferous*, Spergen hill. *XI.*

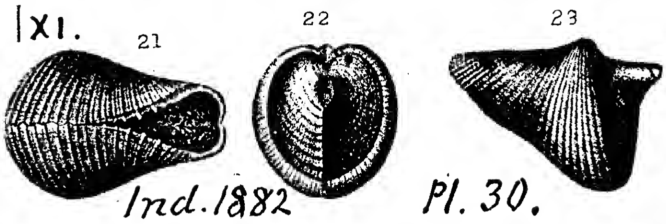


Conocardium cuneatum. (Hall, Trans. Alb. In. 4, 1856. Whitfield Bull. 3. Am. Mus. 1882, plate 7). Collett's Indiana Rt. 1882, page 345, plate 30, figs. 24, 25, side and back of Bloomington specimen; fig. 26 bottom of Spergen hill specimen; all *magnified twice. Sub-carboniferous* strata at various places. *XI.*

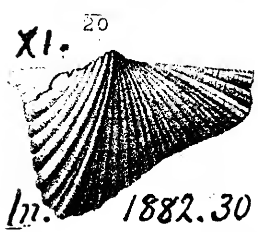


Conocardium cuneus. (*Pleurorhynchus cuneus*, Conrad, 1840, An. Rt. N. Y., *Up. Held.*) —Specimen 804–96, from Fellows & Genth's coll. on Marshall creek, Monroe Co., 1875, in *Hamilton shale*, (G. B. S. 1888).—*VIII a*, *VIII c*.

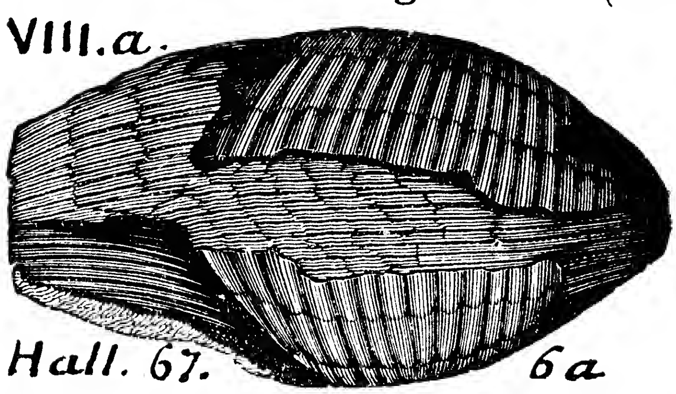
Conocardium meekanum. (Hall, Trans. Alb. Inst. Vol. 4, 1856. Whitfield, Bull. 3, Am. Mus. 1882, plate 7). Collett's Indiana Rt. 1882, page 347, plate 30, figs. 21, 22, 23, of a specimen from Alton, Ill.—*Sub-carboniferous* (*Warsaw*). *XI.*

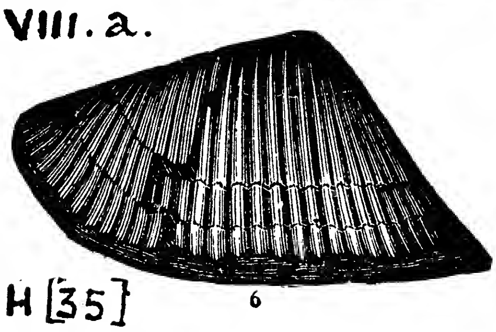


Conocardium prattenanum. (Hall, Trans. Alb. Inst. Vol. 4, 1858. Whitfield, Bull. 3, Am. Mus. 1882). Collett's Indiana Rt. 1882, page 347, plate 30, figs. 21, *enlarged 4 times*, unique specimen from Alton, Ill.—*Sub-carboniferous* (*Warsaw*) formation. XI.



Conocardium trigonale. (*Pleurorhynchus trigonalis.* Hall, page 171, fig. 67, 6, 6a. *Corniferous* of Upper Helderberg formation. In Pennsylvania, in Monroe Co., near Stroudsburg, south of McMichael's creek on the Gap road, and elsewhere, in the *Corniferous limestone*. White, F6, p. 120.—*VIII a*.—Hall remarks that this shell is certainly unlike the *Pleurorhynchus cuneus* of the Scoharie grit. (Geology of the Fourth District, N. Y., p. 172.)





Conocardium ——? Specimen 804–96, Marshall's cr., Monroe Co. *Hamilton*, *VIII c*,

Conocephalites adamsi. See **Ptychoparia adamsi.** *L. C.*

Conocephalites arenosus. See **Ptychoparia adamsi.** *L. C.*

Conocephalites aurora. See **Ptychoparia ouangondiana,** var. **aurora.** *M. C.* *See foot note to page 134, above.*

Conocephalites bayleyi. See **Conocoryphe bayleyi.** *M. C.*

Conocephalites chippewaensis. Owen. See **Lonchocephalus chippewaensis.** *Potsdam form. I.*

Conecophalites elegans. See **Conocoryphe elegans.** *M. C.*

Conocephalites formosus. See **Ptychoparia robbi.** *M. C.*

Conocephalites gemini-spinosus. See **Conocoryphe matthewi.** *M. C. See foot note to page 134, above.*

Conocephalites hamulus. See **Lonchocephalus hamulus.** *Potsdam formation. I.*

Conocephalites halli. See **Ptychoparia orestes.** *L. C.*

Conocephalites matthewi. See **Conocoryphe matthewi.** *M. C.*

Conocephalites miser. See **Ptychoparia miser.** *L. C.*

Conocephalites neglectus. See **Ptychoparia tener.** *M. C.*

Conocephalites teucer. See **Ptychoparia teucer.** *L. C.*

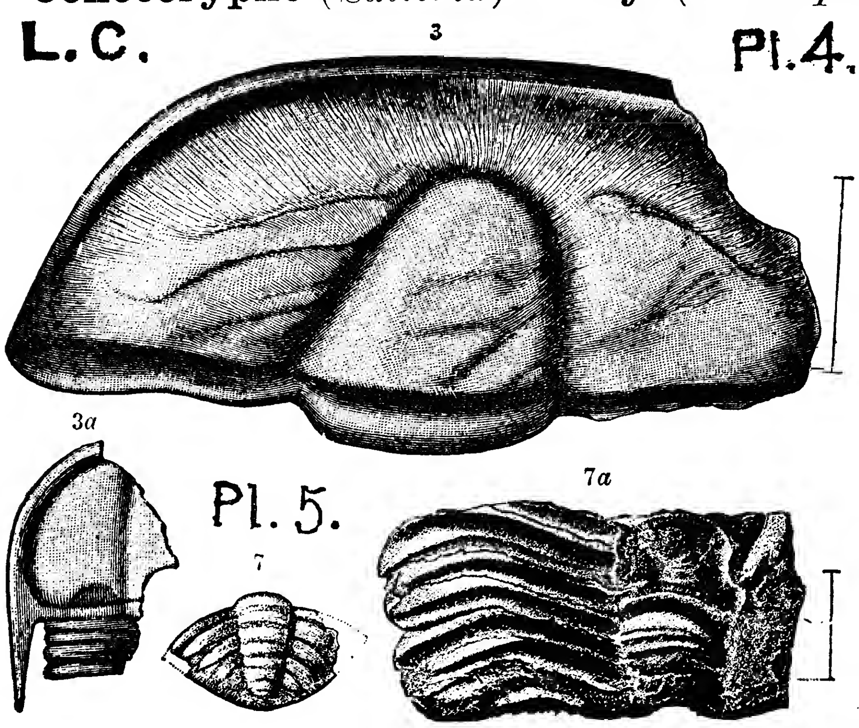
Conocephalites thersites. See **Ptychoparia orestes,** var. **thersites.** *M. C.* See page 134.

Conocephalites vulcanus. See **Ptychoparia vulcanus.** *L. C.* See foot note to page 134.

Conocephalites (Atops) trilineatus. See **Ptychoparia trilineata.** *L. C.* See page 134.

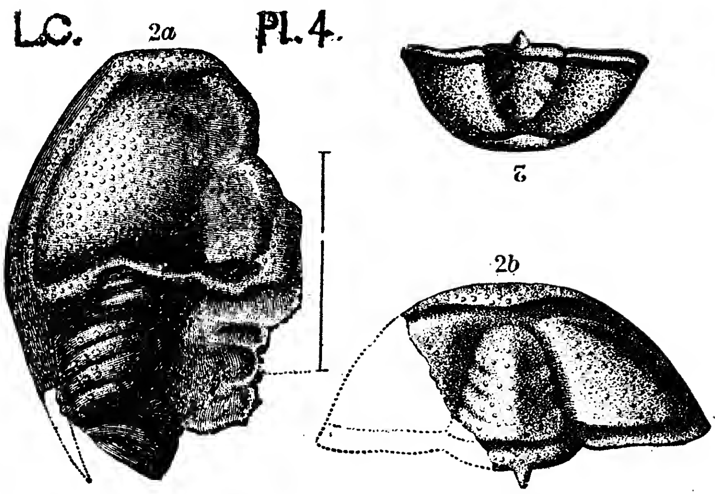
Conocoryphe . . Ford, 1880. See **Ptychoparia trilineata.** *L. C.* See foot note to page 134.

Conocoryphe (*Salteria*) **baileyi** (*Conocephalites baileyi*). Walcott. Bulletin U. S. G. S. No. 10, page 32, plate 4, fig. 3, (a large head, drawn *twice* its natural size); fig. 3 *a*, (side of head and cheek spine, *natural size*). Plate 5, fig. 7, (a tail-piece, pygidium); fig. 7 *a* (portion of

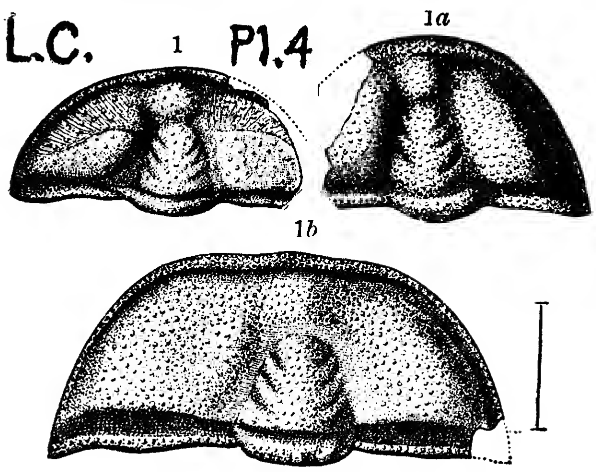


thorax, *enlarged twice.*)—*Middle Cambrian* (*Saint John*) formation, New Brunswick. (See Hartt, 1868, in Dawson's Acadian Geology, 2d Ed., p. 645.)—*M. C.* (Walcott, 1888.)

Conocoryphe elegans. (*Conocephalites elegans.*) Walcott, Bulletin U. S. G. S. No. 10, page 33, plate 4, fig. 2, 2 *b*, heads, both of *natural size*; fig. 2 *a*, side of head, with cheek spine, *twice* the natural size. (Fig. 2 *a*, may however belong to **Conocoryphe matthewi,** next below.)—*Middle Cambrian* (*Saint John*) formation, New Brunswick. (See Hartt, 1868, in Dawson's Acad. Geol., 2d Ed., page 650.)—*M. C.*



Conocoryphe matthewi. (*Conocephalites matthewi*, and also *gemini-spinosus.* Hartt, 1868, in Dawson's Acad. Geology, 2d Ed., pp. 646, 653.) Walcott, Bulletin U. S. G. S. No. 10, page 28, plate 4, fig. 1, a head of this trilobite compressed lengthwise; fig. 1 *a*, a head compressed a little sidewise, but nearly in its normal form; fig. 1 *b*, enlarged *twice*, to show the fine grains which roughen its surface. *Upper Cambrian* (*Saint John*) formation, New Brunswick. *U. C. See foot note to page 134, above.*

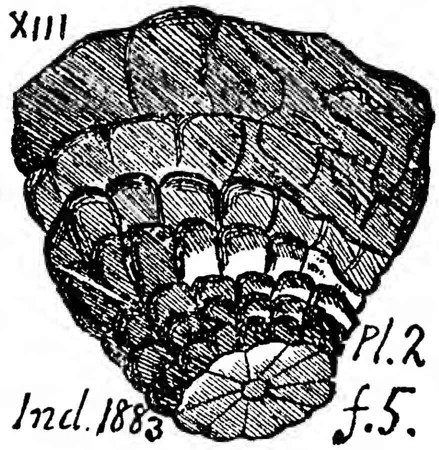


Conocoryphe walcotti, Matthew. R. Soc. Canada, May, 1884. Noticed in Walcott, Bull. 10, p. 30.—*Upper Cambrian. U. C.*

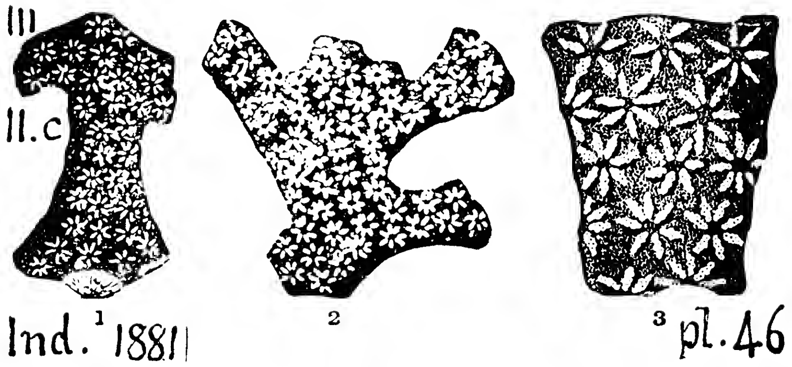
Conodonts, once thought to be the shagreen points of sturgeon skins; now the teeth of *leeches*, abundantly cover the surfaces of Cleveland shale at Bedford, Ohio. *Upper Chemung.* I, 75.—*VIII-IX.*—See **Worm-Teeth.**

Conophyllum. See **Chonophyllum.** Compare **Cystiphyllum latiradium.** *VIII a.*

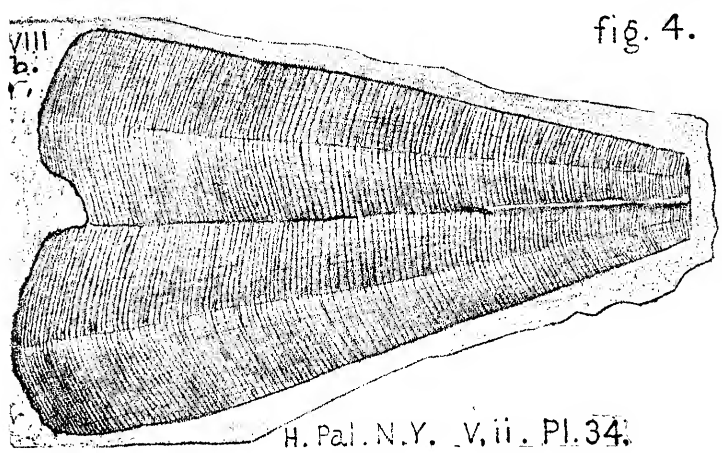
Conostychus ornatus. (Lesquereux, Coal Flora of Penn., 1880, page 17, plate B, fig. 4, quoting Geol. Rt. of Indiana, 1875, plate 1, fig. 6; and referring for comparison to Hall's Pal. N. Y., Vol. 2, plate 10, fig. 9 *a*, *b*, 10, as roots of *Buthotrephis.*) Collett's Indiana Rt. of 1883, page 35, plate 2, fig. 5. Coal Measure sandstone above conglomerate, i. e., *Clarion group* of Allegheny series in Pennsylvania. *XIII.*



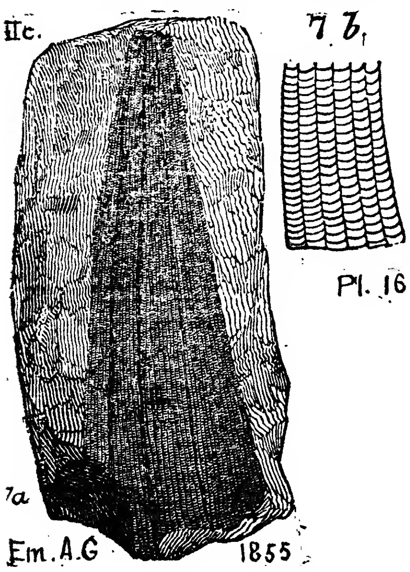
Constellaria (Stellipora) antheloidea. (Hall, Pal. N. Y., Vol. I, 1847, page 79, pl. 26, fig. 10. *Trenton* and *Hudson river* formations.) Collett's Indiana Report of 1881, page 379, plate 46, fig. 1, fragment of a coralline, *natural size;* fig. 2, another; fig. 3, a part *enlarged*. *Trenton* and *Cincinnati* (*Hudson River*) formations. *II c*, *III b*. Note. Hall's figures are of a unique specimen in Mr. Luke Wilder's collections at Lowville, Lewis county, N. Y., from *Trenton limestone.*



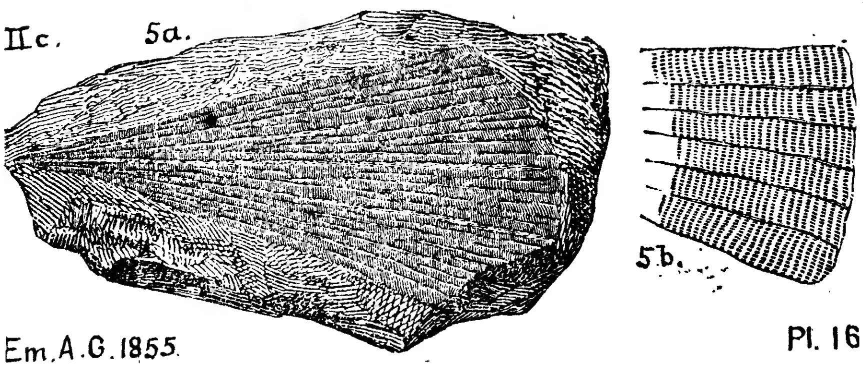
Conularia continens. (Hall, 1876, Illust. Devon. Foss.; Pal. N. Y., Vol. 5, part 2, p. 212, plate 34, fig. 4. *Marcellus* shale.) Claypole's list of fossils in Perry Co., Pa. Preface to F2, *Hamilton* formation. OOO Cat. collections, Claypole's specimen 109–7, is from north of Dellville, top of *Chemung.*— *VIII g.*—Species differs from all others in the interlocking of the striæ along the median line of each face. For its contrasts with *C. undulata*, *C. crebristiata*, *C. cayuga*, *C. congregata*, and *C. newberryi*. See Hall in place noted above.



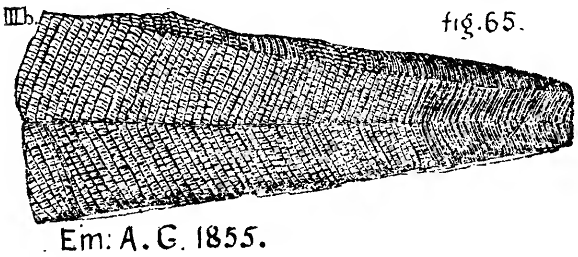
Conularia gracilis. (Hall, Pal. N. Y., Vol. I, 1847, Trenton group.) Emmons' American Geology, Vol. I, part 2, page 207, plate 16, figs. 7 *a*, 7 *b;* slightly arcuate; surface marked with deep wavy cross lines; the lines lengthwise rather indistinct. All the *conularias* are pyramidal pteropods, with delicate texture "like a woven fabric;" solid top (apex), "separated from the open shell above by a simple imperforate very convex septune." Emmons refers to a specimen in his collection to prove that there is no perforation.—*Trenton* formation. *II c.*—Hall says that this species is rare as compared with the abundant *C. trentonensis*, and that its shell seems very thin and fragile.



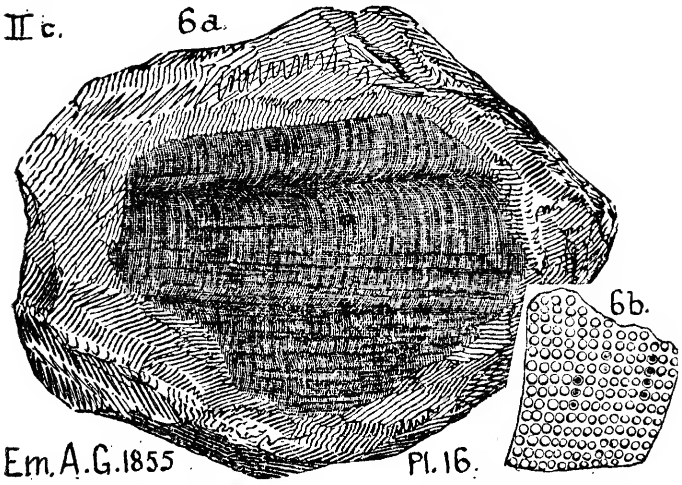
Conularia granulata. (Hall, Pal. N. Y., Vol. 1, 1847, Trenton.) Emmons' Am. Geol. I, ii, p. 207, plate 16, figs 5*a*, 5*b*. Angle marked by grooved lines and surface by striæ, crossed by finer lines lengthwise, giving a grained appearance to the shell under the microscope; see fig. 5*b*, magnified. *Trenton limestone* formation. *II c.*—The lines which traverse this shell lengthwise are probably wrinkles from pressure. Hall.



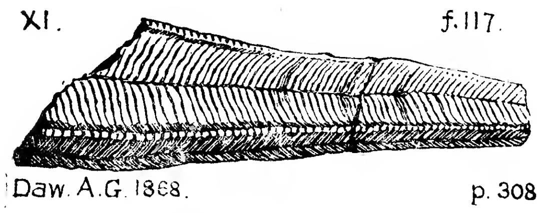
Conularia hudsoni. Emmons' American Geology, I, ii, 1855, p. 208, woodcut fig. 65; a long pyramid, with nearly equal sides; furrows meeting at 130°; edges of a side diverge at about 25°; both sets of striæ stronger than in *C. trent.*, and only half as many; fossil therefore coarser and larger.—*Loraine* (H. R.) *shale* formation, Jefferson Co., N. Y. *III b.*



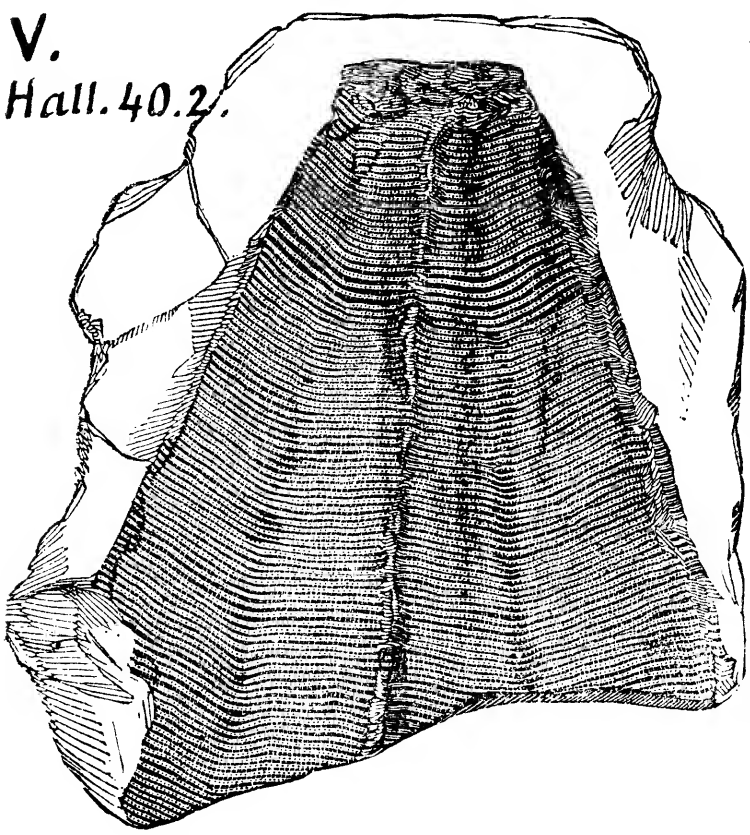
Conularia papillata. (Hall, Pal. N. Y., Vol. 1, 1847; Trenton; surface covered with minute knobs, *papillæ.*) Emmons' Am. Geol. Vol. 1, part 2, page 207, plate 16, figs. 6*a*; and 6*b*, which shows the rows of papillæ, or "lines of granulation, the spaces between which are elevated." The pustules were grains which when weathered out left pits; or were hollow. Hall, p. 224.—*Trenton*, *II c.*



Conularia planicostata, Dawson; Acad. Geol., 1866, page 308, fig. 117, from the *Carboniferous limestone* of Cape Breton and Nova Scotia (usually regarded as the shell of a *pteropod*, but possibly a *cephalopod*) flattened by pressure; shell exceedingly thin, especially at its rounded point.—*XI.*

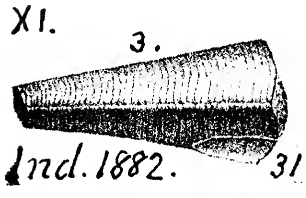


Conularia quadrisulcata. Hall, Geology of the Fourth or Western District of New York, 1843, page 110, fig. 40, 2. *Niagara* formation. (Miller, 1826, Min. Conch. 260, fig. 3, 4.—Hisinger P. S. 30, T. X, fig. 5. — Murchison, Sil. Res. page 626, XII, fig. 22.) It is crossed by obliquely transverse furrows & ridges, which are not always equal; the ridges finely & beautifully crenulated; the furrows crowned by grooves which are

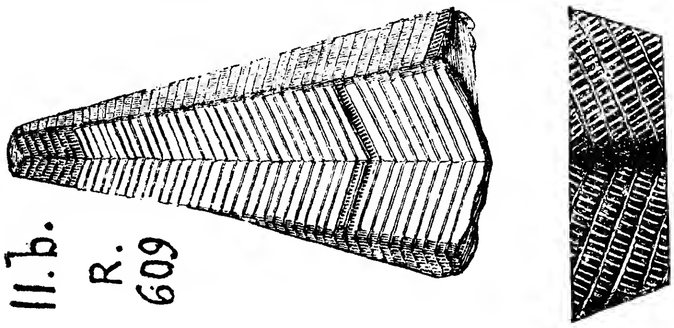


a continuation of the spaces between the crenulations of the ridges; shell compressed; in shale, much expanded and larger than specimens usually figured; ordinarily found in much smaller fragments. Lockport; Rochester.— *V b.*

Conularia subulata. (Hall, Trans. Alb. Inst., Vol. 4, 1856. Whitfield, Bull. 3, Am. Mus., 1882, plate 8, fig. 2.) Collett's Indiana Rt., 1882, page 272, plate 31, fig. 3, side view, *magnified twice.* — *Subcarboniferous* (*Warsaw limestone*) formation at Alton, Ill.—*XI.*



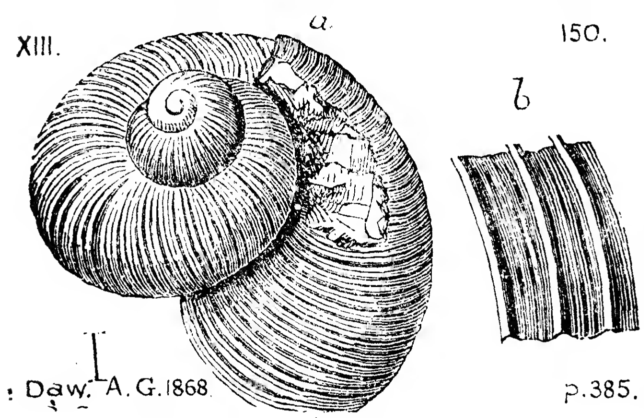
Conularia trentonensis. Rogers, page 818, fig. 609. *Trenton* formation. (Hall, Pal. N. Y., 1847, Vol. I, page 222, plate 58, figs. 1 *a* to *f.* There is little difficulty in identifying this curious and beautiful fossil, which is quite abundant in the *Trenton limestone*, *middle* and *upper* beds, at Trenton falls, Jacksonburgh, Middleville, etc., N. Y., by its oblique ridges and nearly vertical striæ (more prominent in the depressions than on the ridges). Shell grooved along the angles. Sephuncle excentric; cast smooth, with deep groove at angles, and shallow groove on the center of cast face of the pyramids.) *Trenton* and *Hudson river* formations.



Conularia, mostly of undescribed species, abound in the Meadville upper limestone, at Glendale, Crawford Co., Pa., with many other shells, and in many other exposures of that formation. Q4, 83, 140.—*Subcarboniferous.*—*XI.*

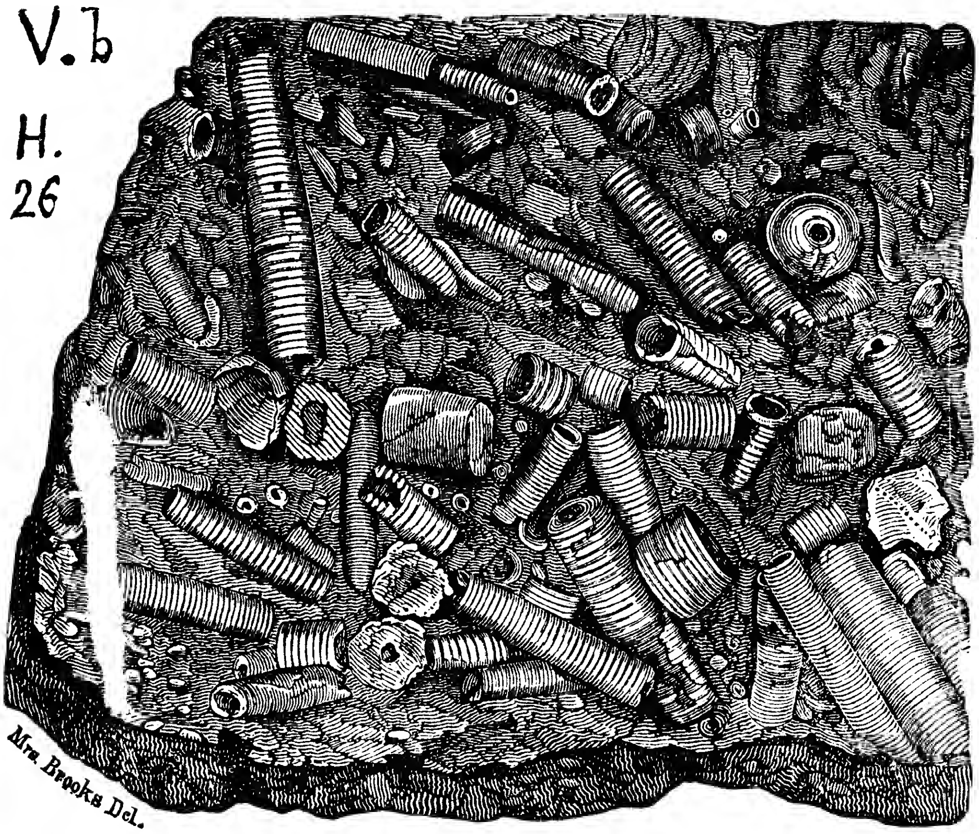
Coprolites. (Dung of fish.) *See Appendix.*

Conulus priscus. Carpenter. Dawson, Acad. Geol., 1868, p. 385, f. 150, a *land* snail shell, $\frac{3}{16}$ in. long, found by Dawson in the *pupa layer* of the *Coal Measures*, Nova Scotia, mentioned under **Pupa vetusta.** Fragments of another snail shell? were got in 1866.—*XIII.*



Corals in *Niagara limestone*, *V b*, at Lockport, N. Y. Lower beds (*Encrinital Limestone*, No. 1, of Hall's section) wholly made up of broken & worn stones & plates of *Caryocrinus ornatus* & other corallines, weathering in relief. Hall, page 90, fig. 26.—In Pennsylvania, corals of obscure structure abound in some of the finer grained "wormeaten" *Trenton limestone* of the interior valleys. (T, p. 57.) See H. D. Rogers' section at Bellefonte, Centre Co., Pa., beds e, g, h, j, k. (T, 56.) *II c.*—In the *Lower Helderberg*, (VI) coral reefs are abundant along the Pike & Monroe outcrop, in the lower beds (G6, p. 133); in the Stormville beds (G6, p. 134, 199, 219, 230, 244, 268) the same coral reef horizon has extensive outcrops in the Danville-Selinsgrove region, as at Appleman's quarry, Chillis. t., Northumberland Co. (G7, p. 334); and so west through Middle Pennsylvania, in Huntingdon Co., Powell's quarry, Cove Station, 35′ to 50′ beneath the Oriskany (T3, p. 123); in *Bastard limestone*, 44 of Coffee Run section, small branching coral, especially *Chœtetes* and *Cladopora* (p. 172); very abundant in McConnellstown cliffs (p. 201); in Juniata Sand Co.'s quarry cliff on Mill Cr. Corals of other forms than *Favosites* and *Zaphrentis*, occur among masses of *Stromatoporidœ*. (p. 269.) In Bedford Co. corallines abound in the cherty beds of *VI*, in Martin's ridge near State line (T2, p. 159). In Blair Co. corals are absent from lower, but abound in upper beds of *VI*. (T,

V.b
H.
26

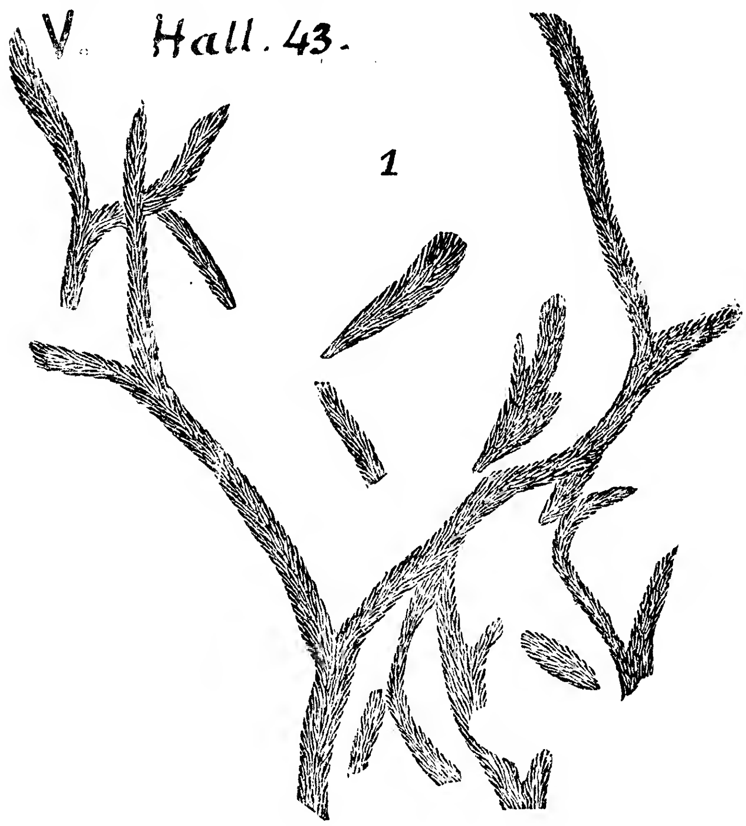


Fragments of Encrinital columns in Limestone.

p. 41.)—In *Marcellus* (*Corniferous? VIII b.*) Claypole collected corals at Center Mills, Madison t., Perry Co. (Cat. Spec. 223–9.)—In *Hamilton sandstone* (*VIII c*) White found corals in Pike and Monroe (G6, p. 111, 271, 305.) A *coral reef* comparable to those of L. Held. age, occurs near the top of the *Hamilton upper shales*, 120′ beneath Tully limestone, at Cove Station, Huntingdon Co. (T3, p. 107.) In the *Tully limestone*, in Pike and Monroe (G6, p. 109); and under the Genesee slates, in the Mapleton section, Huntingdon Co., is a bed of *Heliophyllum* and *Cystophyllum*, 6 inches thick (T3, p. 273).—In the Warren Co. district, corallines are numerous *in and above the oil measures* (I, 43, 103, J, 104).—In Mercer and Lawrence counties, corals occur in the *Mercer upper and lower limestones*, between the Upper and Middle divisions of the *Conglomerate No. XII* (QQ, 57, 83, 129, QQQ, 109, 110).—In the *Pittsburgh series* (Barren measures *XIV*) a few corals and crinoids are mixed with many shells in the Black Fossiliferous limestone. (K3, 308.)—See **Encrinites.**

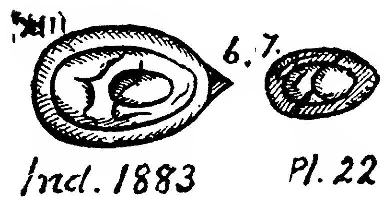
Numerous fragmental specimens may be found in Chance's Coll. on Marshall's creek, Monroe Co., 1874, marked 601–35 (see OO, Pal. Coll. p. 235); also spec. 606–11, got at the same place by Fellows in 1875.—*Lower Helderberg*, *VI.*

Coral? or plant? of the *Niagara* age, the figure of which is given by Hall, in Geol. of the 4th District of New York, 1843, page 116, fig. 43, 1. "The fossil is completely flattened, presenting no solid substance, except a thin carbonaceous film," a collection of fine hairs arranged obliquely on a central axis like an animal's tail; structure like some of the *solid* corals, where the pores are oblique, etc. *Niagara*, *V b.*



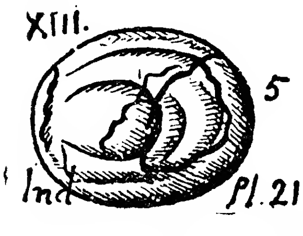
Cordaianthus flexuosus, rugulosus, spicatus. Three species of the flowers of *Sigillariæ*, found at the base of Pottsville conglomerate XII, under Campbell's ledge, Lacoe's collections, Pittston, Luzerne Co., Pa. (G7, p. 40.) One species of male and two of female flowers from the roof of the Darlington (Kittanning) coal bed at Cannelton, Beaver Co., Pa. Mansfield's collections. (Q, p. 55)—*XIII.*

Cordaicarpus apiculatus. (Lesquereux Coal Flora, page 551, plate 83, figs. 6, 6 *a*. Seeds related to the European *C. congruous* and much like *Rhabdocarpus lineatus* of Gœpp. and Berg.) Collett's Indiana Rt. of 1883, plate 22, figs. 6, 7.—*Coal Measures*, Allegheny Series, Kittanning Coal at Cannelton, Beaver Co., Pa. *XIII.*



Cordaicarpus costatus. See **Cordaites costatus.** *XIII.*

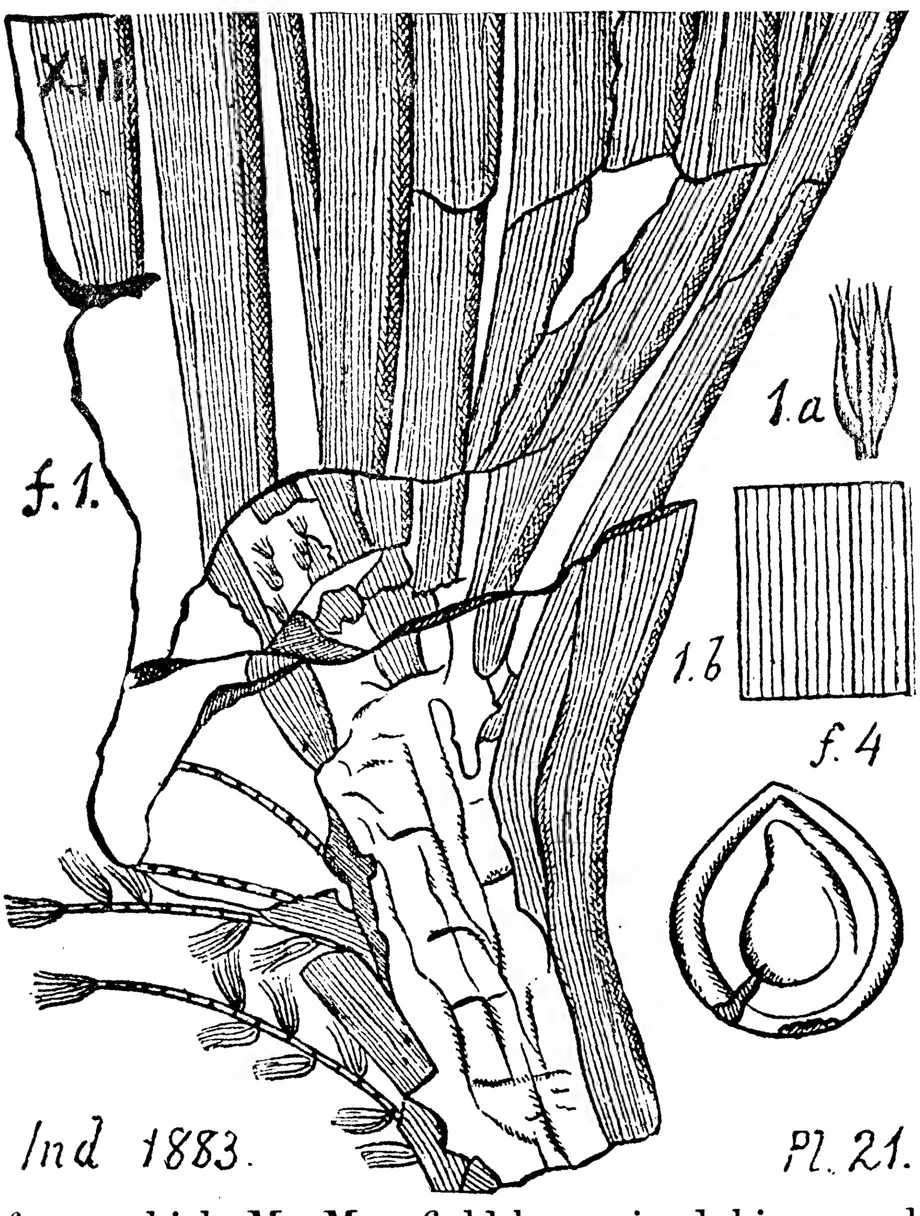
Cordaicarpus gutbieri. (Geinitz. Versteinerungen, plate 21, fig. 23; Grand Eury's Flora Carbonif., p. 236, pl. 26, fig. 19; Lesquereux's Coal Flora of Pa. and U. S., page 549, plate 83, figs. 8 to 11.) Collett's Indiana Rt., 1883, plate 21, fig. 5. Coal Measures (*Allegheny series*) Cannelton, Pa. *XIII.*



Cordaites abundant in roof shale of the *Cook bed*, Broad Top, Huntingdon Co., Pa., T3, p. 278; and in bed 24, at the bottom of the Hopewell section, Bedford Co.—(T2, p. 260.) In Lawrence Co., Pa., under Tionesta SS., at Eckert's bridge (Q2, 85); under *Connoquenessing SS.* (Q2, 96.)—In Mercer Co., under Scrubgrass coal (Q3, 79, 80); in *Sharon Coal* roof, (Q3, 53, 123, 126, 160, 197).—In the Oil region, Carll's Coll. specimens, Venango Co., O, 2836, in black mic. shale; 2848, gray SS.; 2882, shaly SS.; 2895, Congl. SS.; 3086, black shale above 2d Mtn. SS.—In Warren Co., 2931, in Yellow brown SS.; 3114 in shale over 2d Mtn. SS.—Crawford Co., 3195 in black slate, *Olean Cong.*—Westmoreland Co., 3064, in Brown SS. over *2d Mtn. SS.*—*X, XII, XIII.*

Cordaites borassifolius. (*Flabellaria borassifolia*, Sternberg). Lesq. coal flora, 1880, p. 532, plate 73, figs. 3, 3 *b*, found in Lacoe's collections from sub-conglomerate coal, Luzerne Co., Pa. G7, p. 40, 43.—*XI.*—Also, immense numbers of it (and other species?) with *Cardiocarpa*, and *Odontopteris neuropteroides*, Newb. (probably), in roof shale of small coal of Mercer group, under Homewood SS. top member of XII, at Beatty's mine and elsewhere along Beaver river, Q, p. 68.—*XII.*—Also in Mansfield's collections, Kittanning bed, Cannelton; and under Freeport lower coal, on Soap run, Franklin t., Beaver Co.,Q, p. 55, 220.—*XIII.*

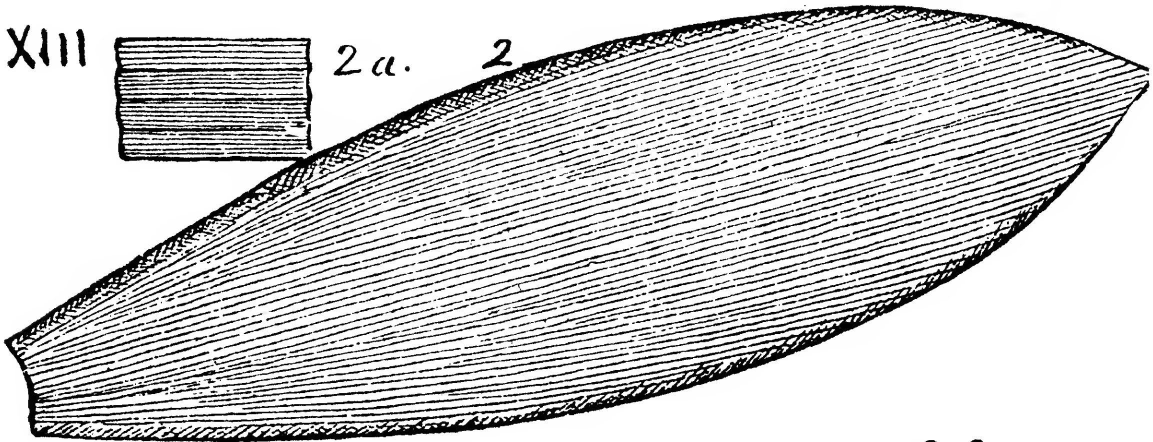
Cordaites costatus. (Lesquereux. Proc. Am. Phil. S. Phila. 1878, page 323, plate 4, fig. 1 to 3. *Cordaicarpus costatus*, Lesq. same, plate 3, fig. 1, 2. Coal Flora of Pa. & U.S. 1880, page 540, plate 80, figs. 1 to 3; 87, 1 and 2.) Collett's Indiana Rt. 1883, page 99, plate 21, figs 1, 1 *a*, 1 *b*.—Common in the *Kittanning Coal* bed, at Cannelton,



from which Mr. Mansfield has mined his superb collections. Among the specimens so obtained have been discovered "three kinds of racemes of *male flowers*, attached to stems bearing leaves of *Cordaites lingulatus*, *mansfieldi* and *costatus*, with the *fruits* of the last two species, found in their normal position, attached to their supports." Lesquereux Coal Flora, page 544, where he gives a lithographed plate (86) of a *branch bearing fruit.*—*XIII.*

Cordaites foliatus of Europe. Compare **Cordaites lacœi.** *XIII.*

Cordaites lacoei. Lesquereux, Coal Flora, page 535, plate



Ind. 1883. Pl. 21.

87, figs. 2 to 4, (bound in between pages 560 and 561,) closely allied to the European *C. foliatus* of Grand'Eury. Collett's Indiana Rt. of 1883, plate 21, figs. 2, 2*a.*—Coal bed E roof-shales, Northern Anthracite basin, Pittston, Pa. *XIII.*

Cordaites lingulatus. See **Cordaites costatus.** *XIII.*

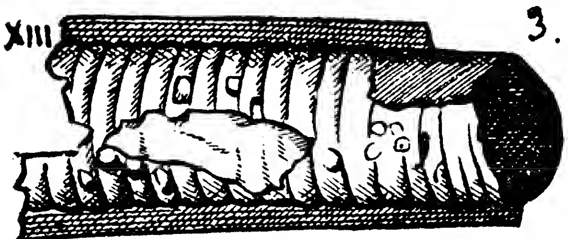
Cordaites mansfieldi. See **Rhabdocarpus mansfieldi.** *XIII.*

Cordaites principalis, Goeppert. Permian species. (No species of cordaites ever found by Lesquereux above the Pittsburgh bed, Coal Flora, p. 528). Reported by White from the *Darlington Coal*, Beaver Co., Pa., Q, p. 55. *XIII.*

Cordaites reflexa. Reported by White from the *Darlington Coal*, Beaver Co., Pa., Q, p. 55. *XIII.*

Cordaites robbii. *See on page 152.*

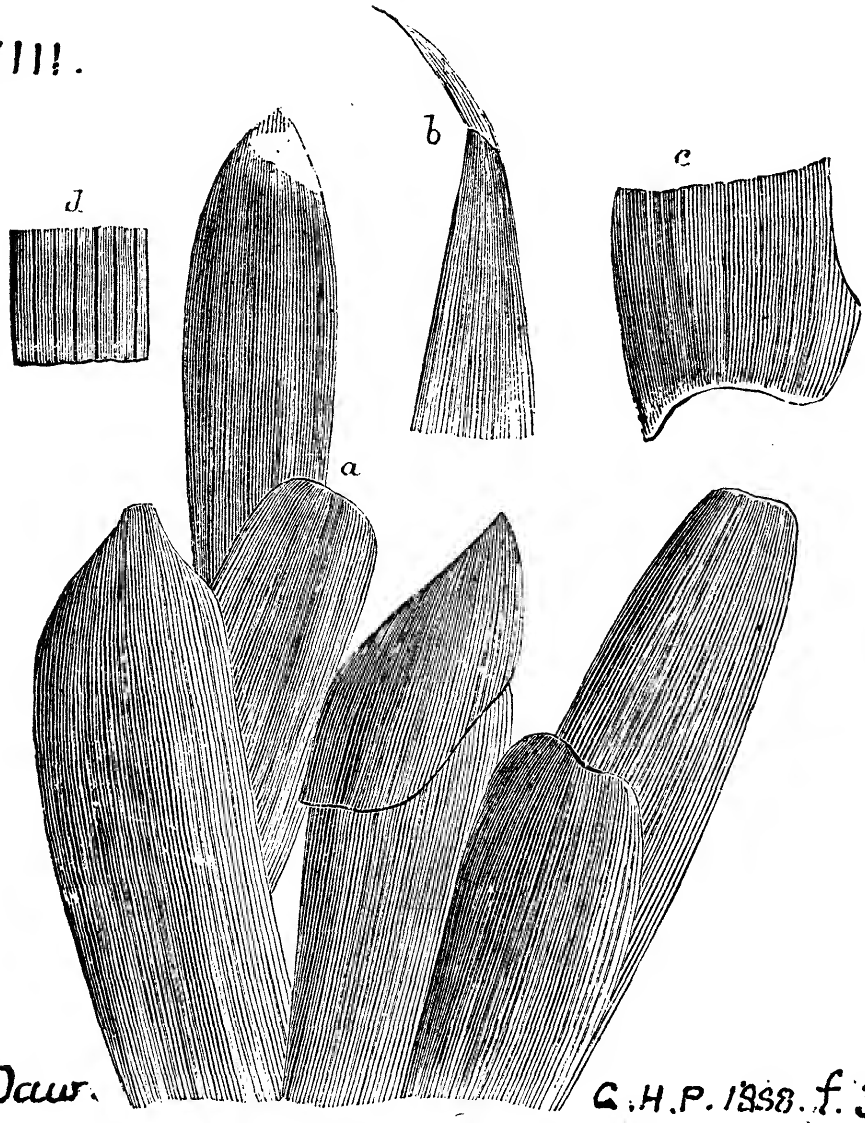
Cordaites serpens; the pith or woody cylinder; *Artisia*, or *Sternbergia*, Lesquereux, Coal Flora, page 542, plate 79, figs. 1 to 4. Many specimens from Mansfield's Kittanning coal bed at Cannelton, Beaver Co. Pa. (Dawson figures a branch of *Artesia* abruptly terminating in a short cone, and refers it probably to *Dadoxilon*, a coniferous tree.) Collett's Indiana Rt. of 1883, page 100, plate 21, fig. 3—Coal Measures (*Allegheny river series.*) *XIII*



Ind. 1883. Pl. 21.

Cordaites robbii. Dawson. Geological History of Plants, ed. 1888, page 81, fig. 30; *a* a group of young leaves; *b* point and *c* base of a leaf; *d* the venation magnified. — Erian or Devonian) of New Brunswick. *VIII.*

VIII.



Daw. G.H.P. 1888. f. 30.

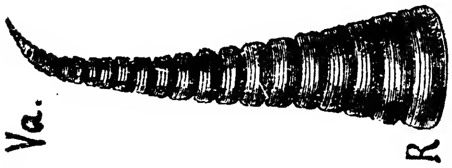
Cornulites arcuatus. Hall Geological Report on the Fourth District N. Y. 1843, page 109, fig. 39–3. *Niagara* formation. (Conrad, Journ. Acad. Nat. Sci. Phila. Vol. viii, 1848. Plate 17, fig. 8.) Compare **Tentaculites.** It is composed of a series of cup-like discs, inserted one within another at their margins; rounder than those of the English Wenlock fossil *Cornulites serpularius* (Sil. Research, p. 627, pl. 26, f. 5) and is easily distinguished from any other fossil of the Silurian system. Occurs as isolated specimens in the Rochester limestone; in groups of specimens at Lockport, in cavities partly filled with spar. Usually nearly destroyed; invested with crystals; sometimes only the central tube remains (Hall).— *V b.*

V.b.

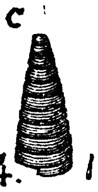
H.39.3.
V.b.

Cornulites proprius. *See Appendix. V b.*

Cornulites ——? (? *Tentaculites*) Roger's Geology of Pennsylvania, 1858, Vol. 2, page 822, fig. 627. A curious animal form of unknown character, a slender cone, composed of rings, transversely striated, is occasionally met with in the *Surgent* (*Clinton*) *ore sandstone* above the fossil ore bed of Frankstown in Blair county. It seems to differ from Hall's *Cornulites flexuosus.* (Rogers).— *V a.*

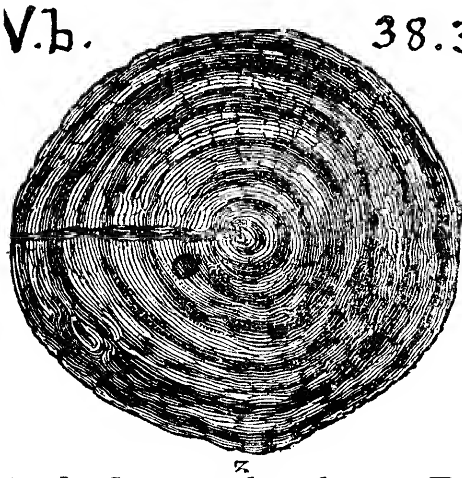


Cornulites ——? (? *Tentaculites*) Hall, page 137, fig. 54, 1. *Salina* (or *Onondaga*) formation; differing from the *Niagara* species in being smaller, straight, and with upper edges of rings thinner and not horizontal, but depressed on one side uniformly, making a sort of continuous groove. Newark, N. Y.— *Vc.*

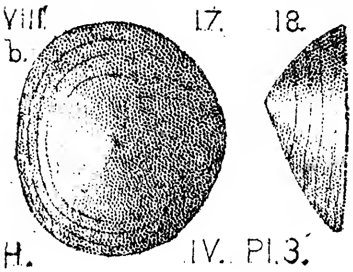


Cornulites flexuosus, Hall, 1852, Pal. N. Y. Vol. 2, *Clinton. V a.*—G. B. Simpson finds twenty-eight specimens of it in Fellows' collection of 1876, from the bluff on Little Juniata below covered bridge, above Tyrone forges, Huntingdon Co., marked 211–8 (OO, p. 232), in *Trenton limestone.—II c.*

Crania corrugata. (*Orbicula corrugata.*) Hall, page 108, fig. 38, 3. *Niagara formation.* Geology of Western District of New York, 1843, page 108, fig. 38, 3; surface strongly wrinkled and covered with finer concentric wavy lines; muscle-scar on under valve very distinct, and often extending half way down to the circumference. Fossil easily recognized; several cases of both valves being found nearly attached to each other. Rochester, Lockport, &c.— *V b.*



Crania hamiltoniæ. (Hall, 1860, 13th An. Rt.; Pal. N. Y. Vol. 4, p. 27, plate 3, figs. 17, 18. Marcellus.) In Pennsylvania, Perry Co. (F2, xiii) in Hamilton formation. Claypole's collections (OOO, 1888) Specimens 5-162, 163, 164, 171, at Barnett's mill, upper slates; 110-(1), Brick field, S. W. of New



Bloomfield; (Spec. 77d-4, 16, are from Ithaca, N. Y.) *VIII c.* —Also in Carll & Randall's collections from Venango and Warren Co. C. E. Hall, P. A. P. S. Jan. 5, 1876.—*VIII-IX.*

Crania leoni, Hall, 13th Annual Report, N. Y. 1860, *Chemung.* Recognized by Simpson in Specimen 9569 (OOO) of Randall's collections at Warren, Pa. in *Chemung, VIII g.*

Crania lodensis. See **Discina lodensis,** *VIII e.*

Crania modesta, White & St. John, Trans. Chicago Acad. Sciences. Two under-valves attached to specimen of **Athyris subtilita** (which see above), Collett's Indiana report of 1883, plate 35, fig. 9. *Coal Measures, XIII.*

Crania prima, Owen. Geol. Wisconsin, Iowa & Minnesota, 1852, plate 1 B, fig. 13, 16, 17, 18, 19; from the lowest layers at the Falls of the St.-Croix

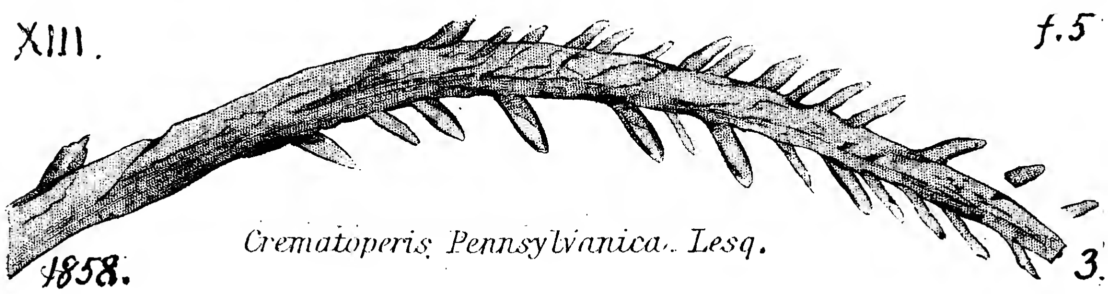
This *St. Croix sandstone* has always been considered to be the *Potsdam sandstone* of the West; but the fossil forms are different. See another *Crania* among the *Orbicula prima* (middle figure) in Owen's fig. 8 of plate 1 B.—Base of the *Silurian,* or top of *Cambrian System.* I.

Crania setifera. *See Appendix. V b.*

Crania siluriana. *See Appendix. V b.*

Crania spinigera. *See Appendix. V b.*

Crematopteris pennsylvanica. Lesq. Geol. Pa. II, 868,



pl. 3, f. 5; not well enough preserved to remove all doubt as to the genus. Found by the Revd. Mr. Moore of Greensburg, Westmoreland Co., Pa., in black shale above the 4th coal bed at base of *Pittsburgh series* (*Barren Measures*); shale covered with marine shells; plant therefore perhaps a seaweed. Lesquereux found at the same spot many fragments of ferns and reeds, especially a *Sphenopteris*. Top of *Allegheny series* of coal measures.—*XIII–XIV.*

Crenipecten caroli, (**Aviculopecten caroli,** Winchell, Proc. Acad. Nat. Sci. Philada. 1863.) Redescribed and figured in Hall's Pal. N. Y. vol. 5, part 1, 1884, page 29, plate 9, fig. 5, in which (a cast) the small spine-like projections from the concentric lines (described in Winchell's original paper) do not appear. More circular than *Avic. striatus*, blunter beak, stronger rays. Smaller wings than *Avic. elongatus*. *Waverly yellow sandstone*, Newark, Ohio. *X?*—Recognized by J. Hall, Dec., 1888, in Specimen 9577 of Randall's Collections at Warren Pa. *IX–X?—See Appendix, under the original name* **Aviculopecten caroli.**

Crenipecten winchelli. Hall, Palæontology of New York, Vol. 5, part 1, Lamellibranchs, 1884, page 89, plate 9, figs. 1, 2, 4, 25 to 30. (*Aviculopecten winchelli*, Meek, Pal. Ohio, Vol. 2, 18̄75, p. 296, pl. 15, figs. 50, 56.) Recognized by J. Hall, Dec., 1888, in Pennsylvania Specimen 9550 (Report OOO) of Randall's Collections at Warren, Pa., from the Chemung–Catskill? (*VIII–IX?*) *See Appendix.*

Crepicephalus. See **Ptychoparia haguei,** its type species. *Middle Cambrian. M. C.*

Crepicephalus iowensis. See **Ptychoparia iowensis.** *Middle Cambrian. M. C.*

Crinoidea. *Stone lilies.* An order of sea animals, mostly growing like plants, with jointed flexible stems, supporting cup shaped heads, set with flexible jointed arms, fringed with jointed flexible hair, for the gathering of food. Six families, *Cyathocrinidæ*, *Actinocrinidæ*, *Calceocrinidæ*, *Ancyrocrinidæ*, *Edriocrinidæ*, *Brachiocrinidæ*, include a large number of genera, with a very great number of named species. They grew like submarine prairies, and were sometimes overwhelmed together, making fossil limestone beds of mixed broken and perfect specimens, in vast numbers. They died also individually, and fell apart; their joints, separated and ground together by currents, were heaped on shores, or scattered far and wide over the sea bottom; consequently they are among the commonest, most easily recognizable, and most beautiful fossil forms that are found; and always in the limestone rocks, or in lime shales, or in limy sandstone strata, of all ages. The best collecting ground has thus far been at the Falls of the Ohio, where they can be got in their perfection and of extreme beauty. In Pennsylvania the separated joints or discs of the stem are most commonly found, oftentimes in multitudes, exposed on the faces of the rock layers, or pervading the limestone beds.

In *Trenton limestone*, crinoidal (encrinital) stems were found by Prof. Prime, in Lehigh Co., Pa., in lime quarries just south of Ironton (D2, 57) and in Northampton Co., Knock's farm, near Dech's quarry, 1¼ m. S. W. of Bath, (D3, 161): abundant at Christian Spring, and eastward all the way beyond Nazareth, in the limestone and shale outcrops, but only visible on the weathered surfaces; sparingly seen at A. Knecht's, ¼ m. S. W. of Stockertown, close to the Bushkill; abundant in upper beds of Churchville quarry, dimly visible even on fresh fracture, with *Leptæna sericea*, *Orthis testudinaria* and *O. pectinella;* in several lime outcrops on Ackerman's farm, ¼ m. E. of Keller's tavern, only one genus (D3, 163); close to cement beds at Nazareth, (p. 165); at J. I. Miller's quarry, S. side the Portland anticlinal (p. 167.)—In Centre Co., Pa., they appear in H. D. Rogers' Bellefonte Section, bed *K*, *Trenton*, (T, p. 56.)—Specimens in the Cabinet (see OO, p. 231) 203–4, a slab covered on one side with crinoid stems, ends only visible; 203–26, small fragments; 203–29, mostly ends; 203–34, fragments; 203–38 *a*, stems; 203–39, stems, mixed with bits of *bryozoa*; 203–43, stems, fragments; 210–22, stems, mostly fragments, poor; 210–116 *a*, stems, many fragments; all from near Bellefonte. *Trenton, II c.*

In *Loraine* (*Hudson river*) *shale* formation, crinoid stems are found in Raver's Gap, Tussey Mtn., Bedford Co., Pa. (T2, p. 178).—Specimens in the Cabinet (see OO, p. 232) 302–1, very poor fragments; 304–1, ends, of no value; 304–5 (eight impressions, poor); 304–7 (two impressions); from Henrietta mines, Blair Co.; 305–1 (nine stem impressions, decomposed, poor) from Leathercracker cove, Blair Co. All from *Hudson river slate. III b.*

In *Medina sandstone?* Stevenson found encrinal stem-casts in a block of softened sandstone, at the summit of Evitts mtn. Bedford Co., on road into Friend's cove (T2, 170).—See also OO, Spec. 5113, sandstone showing crinoidal marks found in Swatara creek, Lebanon Co., Pa., which had come from *IV*, or some higher sandstone formation.

In the *Clinton formation*, crinoid impressions are in olive shades, 700′ beneath fossil ore bed, at Three Springs, Huntingdon Co., and in the middle of the Ore SS, under the ore bed, at Orbisonia, (T3, 141;) crowd the bottom layers of the Ore SS (600′ above IV) in Brush ridge, Jackson township (T3, 241)—Specimens in the Cabinet (OO, p. 233) 502–4, McKee's, Mifflin Co., frag. stems; 502–33, poor stems; 509–1, stems, ends, impressions, Orbisonia. *Clinton shale, V a.*

In the *Lower Helderberg* formation, crinoid fragments fill beds 100′ to 130′ below Oriskany (VII) at Powell's quarry, Cove Station, Huntingdon Co. (T3, 123); also the limy slates, 320′ under VII, at Weaver's run (T3, 157); largely make up bed 45, 225′ under VII, the most esteemed flux (T3, 160); especially numerous in the McConnellstown lime cliffs (T3, 201); fill, (with shells) the fetid limestone bed, top of No. 2, of Heffricht's quarry section, in West and Logan townships (T3, 227).—In Bedford Co. numerous in limestone bed 44 of Hyndman Sect. 87′ below VII, on Wills creek (T2, 104); stems in grey cherty limestone 100′ below VII, Bedford section (T2, 149).—In the Montour region, abundant at Russell's, Derr's, Appleman's, Eck's quarries, (G7, 88, 300, 311, 313)—Spec. 607–2 (OO, p. 234) stems and *bryozoa*, poor, from Tyrone City, *Lower Helerberg limestone, VI.*

In the *Marcellus* formation, crinoids appear in Pike and Monroe Co: (G6, 116, 241, 255, 268, 271)—*VIII b.*

In the *Hamilton* formation in Pike and Monroe, crinoidal fragments occur in the fossiliferous layers (G6, 112). In the Montour region they are numerous at the base, just over the Marcellus (G7, 217); also in the upper beds, at Paxinos Station, Shamokin t., North. Co.; and 100′ below the top at Vanderslice's flag quarry, near Bloomsburg, (Claypole's Cat. OOO, 1880, specs. 92–1, 2, 3).—In Huntingdon Co. they abound in all the beds of the Hamilton upper shales (30′ to 40′ thick, T3, 100); as at Cove Station in flags (p. 107); on Coffee run 355′ below Genesee (p. 169); on Shoup's run (p. 179); in the lime beds No. 23 of Patterson section (p. 184); in the sandy bed No. 4, McConnelltown section (p. 199); in the cliff sandstone where RR. crosses Crooked creek (p. 211); in bed 11 of Mapleton section (p. 273) see Claypole's Spec. 201–24, OOO, 1880.—In Bedford Co. in the Hamilton middle beds, No. 51 and 58, of Saxton Section (T2, 231.) Also in bed 30, Yellow Cr. sect. 2957′ below top of IX (p. 226); and stems in bed 38, Saxton sect. 1500′ below *Allegrippus conglomerate* (p. 230).—Specimens in the Cabinet (OO, p. 235) 804–11, cast of stem; 804–20, stem poor. 804–38, casts of stems; 804–55 ditto; from Marshall Cr. Monroe Co.; 805–9, 23, casts of stems, poor, from Bell's Mills, Blair Co.; 807–8, *beautiful* end of crinoid stem; 807–9 (cast, poor); 807–17, imp. of stem and a few plates; 807–22 (poor); 807–35, end of stem; 807–46, poor bits of stems; 807–50, ditto; 807–56, *very beautiful end of stem, to be drawn;* 87–63 (poor); 808–11 (very poor); all from Kintner's farm, Marshall creek, Monroe Co., *Hamilton shale VIII c.*

In the *Tully limestone*, crinoidal fragments appear in Pike and Monroe (G6, 109); in Northumberland Co. (G7, 339); in Huntingdon, bed 21 of the Patterson Section (T3, 184), and in flags, 70′ *under* the *Tully limestone* (?) bed 5 at Mapleton (p. 273).—*VIII d.*

In the *Portage* (or lower division of the Chemung) crinoidal fragments appear in bed 71 of the Catawissa Section (G7, 286); and at the base of the Chemung, in sandstone, Greenwood t., Col. Co. (p. 210.)—In Bedford Co. at the top of the Portage, bed 19 of the Saxton section, 4 inches thick, 425′ below the Allegrippus (Chemung lower) conglomerate, on Yellow creek (T2, p. 80); and stems in flags on Tonoloway creek, Thompson township, Fulton Co. (p. 276.)—*VIII f.*

In the *Chemung*, in the Montour region, many in beds 14 and 41, Rupert sect. (G7, 68); bed 37, lower Chemung, sect. 96 (p. 367); and beds 45, 47, 50, Catawissa sect. (p. 286.)—In Perry Co. (O, Spec. 3619, 3620) stems in shaly SS. E. of Newport; a plate from Dorrance's Narrows (OOO, spec 118–31); 1 m. N. of

Dellville (OOO, three spec. 109–8.)—In Huntingdon Co. numerous in lowest 70′ of the 300′ sandy shales under All. Cong. on Shy Beaver creek (T3, 163); 350′ below the Chemung upper conglomerate, near the base of the Haun's bridge section (p. 194); columns and separated joints (stems and discs) in bed 42 of P. RR. Huntingdon section (T3, 264); numerous fragments in bed 8, Juniata river S. bank section, 250′ below All. Cong.—Stony Brook group of Montour region (p. 193).—In Bedford Co. plates numerous, with *Ambocœlia*, in All. Cong. Mowry's mill hillside, King township (T2, p. 133); stem-casts numerous in shale over All. Cong. in many layers, valley between Polish Mtn. and Ragged ridge, Smith township (p. 205); occasional single plate in flags, near Diehl's house, Napier township (p. 117); stem casts, below Ickes gunshop, Napier (p. 127); crinoids with *spirifera disjuncta*, near top of group 19, Yellow creek section, say 1200′ below IX (p. 225); stems in fossil layer under All. Cong. Saxton RR. cut, 1550′ below IX (p. 230).—Tioga Co. stems in bluish SS., Tioga village (O, spec. 3609).—*Specimens* 872–3 (two slabs with columns about ¼ inch in diameter); 872–5 (a mass of very short bits of stems); 872–26 (ditto); 873–53 (a slab composed of small fragments of stems); all in R. Howell's coll. at Nichols, Tioga Co., N. Y. OO, p. 237, from *Chemung strata.*—883–3–5 (impressions of stems), 883–19 (beautiful ornamentation), 883–42 (two specimens, impressions, surface markings very pretty), 883–50–54, (imp. of stem ends), 883–63 (stem, ¼ inch wide, knotty surface), 883–73 (stems), all in Howell's coll. at Nichol, Tioga Co., N. Y. from *Chemung*, *VIII g.*—891–2 (two impressions of ends of stems) Sherwood's coll. near Linden, Lycoming Co., from shale next to iron ore at top of *Chemung*, *VIII g.*

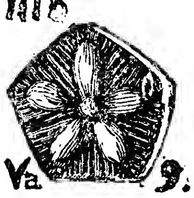
In the *passage beds of Chemung into Catskill* in Huntingdon Co. over the 500′ of red shale, 1100′ above the Chemung upper conglomerate, crinoids occur in a coarse conglomerate at Patterson (T3, 183) and in Olive shales on Coffee run (p. 168) 2400′ below the base of X (p. 89). Also in Catskill beds No. 8, 9, of the P. RR. sect. below Huntingdon (p. 263). In the Montour region, at Catawissa, etc., in the Stony Brook series (G7, p. 64, 65, 197, 238, 239).

In the *Pocono* (subcarboniferous) formation, No. X, in the oil regions, crinoids abound, in divisions F, G, H, of Dr. Randall's Warren section (IIII, p. 305); stems and flower-heads interspersed promiscuously with pebbles, a mile from two wells near N. Y. State line, Elk township, Warren Co. (p. 335) and in a peculiar local conglomerate, *under* the Sub-Olean, at Mrs. Krupp's 2 m. S. W. from Warren (p. 345); at Sneider's summit, beds 3, 5 (p. 331); in the Third Mtn. Sand (p. 273); "Starfish crinoids," *Cystidea*, *Archæocidaris*, etc., in the Subcarb. middle 200′ of Randall's Warren section (I, p. 53); crinoids rare in the lower 500′ (p. 54); see specimens of stems in Cat. of Coll. (O, 3227, 3315, 3321, 3398, 3399, 3400) in Warren, Venango and McKean Co., mostly in sandstone, but at various horizons. *VIII–IX–X*; also Spec. 3281, 3334 of crinoid impressions in sandstone, with *Spirifera* and *Orthocaras*, ½ m. N. of Warren. Stems and discs are numerous in the flags of Mill run at the Meadville oil well, fine specimens in Carll's collections (Q4, 171); and in the Saegertown ravine, sandstone, Woodcock, Crawford Co. (p. 196). Furrowed stems cover the underside of bottom layer of *Third Oil Sand* at the Carroll quarry, Le Boeuf, Erie Co. (p. 240). Stems were found by Stevenson in the gaps of the Conemaugh and Youghiogheny (K3, p. 310).—*IX, X, XI.*

In the *Pottsville conglomerate* (*Mercer upper and lower limestones*), in Mercer and Lawrence Cos. (QQQ, 37, 41, 97, 109, 110, 138); abundant in Wayne t. (p. 62, 100, 129); these probably furnished the minutely broken-up discs of the sand pumpings of the Boyds-hill gas-well at Pittsburgh, from top of blue rock at 642′, *i. e.* 900′ beneath the Pittsburgh Coal (Report L, p. 225).—*XII.*

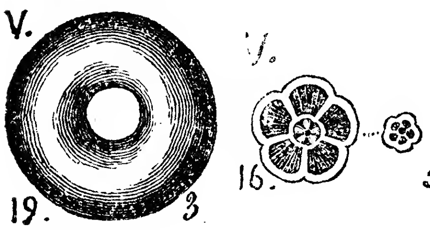
In the *Lower Productive coal measures* (*Allegheny river series*) *Ferriferous limestone*, in Beaver Co. abundant on Whistler's run, Fanporte, etc. (Q, p. 60, 61, 193); in Mercer and Lawrence Cos. at Wampum and elsewhere (QQ, 47, 106; QQQ, 25, 78). Also in the *Pine creek limestone* in McCandless township, Allegheny Co. (Q, p. 33, 168, 179).—*XIII.*

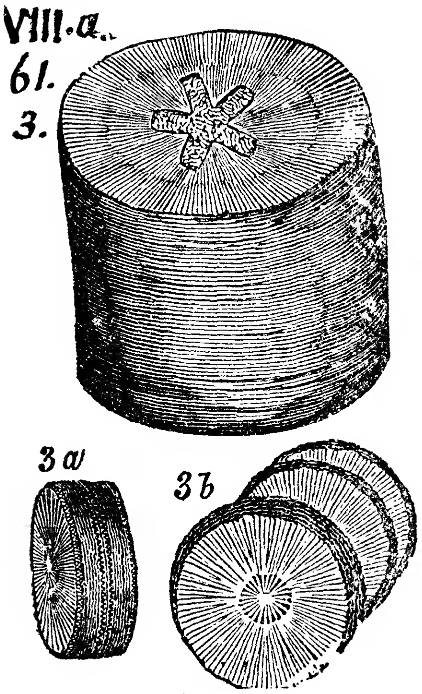
In the *Barren measures* (*Pittsburgh series*), *Crinoidal* (*Black fossiliferous*) *limestone*, 250′ beneath Pitts. C. (K, 76, 79, 80, 82), stems, half-inch thick, abundant in W. Va. (Trans. A. P. S. XV, 26, and L, 21); a few near top, Fayette Co., Pa. (L, 36); crowded, at M. Scott's, Donegal, Westmoreland (K3, 117); innumerable white stems on black slate, top layer, Menohers, Ligonier, Westd. (p. 139); plates, the only fossil seen in bed 4, Sect. 102, P. RR. cut, St. Clair, Westd. (beds 2 and 3, being full of shells; p. 170); a few crinoids and corals among multitudes of shells (p. 308); crowded with fragments, on Bigger's run, Robison, Wash. Co. (p. 272); multitudes of plates and stems, with ten species of shells, at Thompson's station, Mifflin, Wash. Co. (p. 303); also Baldwin t. 300′ below Pitts. C. (p. 306, 309); Temperanceville (p. 311); Minnick's station tunnel (p. 312); Pike bridge, Chartiers Cr., Robinson, Wash. Co. (p. 326); Moon run and Meek run, Allegheny county, (p. 328, 331); in S. Beaver Co. (K, 334, 337, 338, 340, 342); crowded (p. 344); and also one mile above Georgetown, Ohio river (p. 346, 348).—*XIV.*



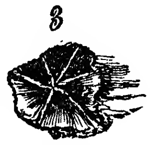
Crinoid joint; called by mistake *Pentacrinites hamptoni*, in Emmons' Geology of the Second district N. Y. 1842, p. 402. f. 111, 3. Vanuxem, Geology of the Third district, 1842, p. 65, f. 9, 3. Abounds in the upper layers of the *Loraine* (*Hudson River*), formation, at Hampton, Pulaski, Saratoga, &c.—*III b.*

Crinoid joint. Hall, Geology of the Fourth district, N. Y. 1843, page 71, fig. 16, 5 (natural size and magnified); and page 77, fig. 19,3. Vanuxem, Geology of the Third district, p. 79, fig. 11, 5, joint rounded by solution.—*Clinton, V a.*





Crinoid stem, and joints. Hall, Geology of the Fourth district, N. Y. 1843, p. 157, figs. 61, 3, 3 a, 3 b (showing the five sided canal, or syphuncle, and the crenulated, or toothed edges of the plates). *Upper Helderberg* formation, *VIII a.*



Crinoid head, very abundant in upper part of *Calciferous SS.* Emmons' Geology of the Second district of N. Y. 1842, page 179, fig. 53, 3. Vanuxem, Geol. Third Dist. N. Y. 1842, page 36, fig. 2, 3.—*II a.*

Crinoid stem. (Tricyclus?) Vanuxem, Geology of the Third district of N. Y. 1842, page 182 fig. 49,6.

VIII g. Van. 49. 6.

Hamilton formation. VIII g.

Crustacea.—(1.) Fifteen families of *Trilobites*, named from the typical genus of each family: *Acidaspis*, *Aglaspis*, *Agnostus*, *Asaphus*, *Bronteus*, *Calymene*, *Ceraurus*, *Conocephalus*, *Cyphas*, *Harpes*, *Lichas*, *Paradoxides*, *Phacops*, *Prœtus*, *Trinucleus*.—(2) Insects in shells, like *Cythere* and *Beyrichia*.—(3) Prototypes of the lobsters, like *Eurypterus*. (4) Many other forms of articulated animals, more or less covered with shells.—*Trilobites* appeared in the earliest ages, in immense numbers and of great variety, and continued to flourish into the Coal Age, when the last species disappeared from the earth.—The others appeared, so far as we know, much later, and have also ceased to exist or been changed into other forms of the same style of construction.—The minute bivalve crustaceans are vastly abundant in the *Clinton fossil iron ore beds* (see **Beyrichia.**) They are equally abundant in the highest coal measures of Washington and Greene counties, in nearly all of the limestone beds of the *Upper Barren measures* (K, p. 47) especially in the Upper (white) *Washington limestone* (No. 6 of Stevenson's series) and in the *fish bed* over the Washington Lower limestone (No. 2) K, pp. 48, 50; also in *black shale*, Negro run (p. 111), at Washington (p. 149); *black shale* over L. 6, Pursley run (p. 152); black shale parting in L. 2, Ten Mile Village (p. 188); black shale over L. 3 (p. 225); *black shale*, 110′ below Jolleytown coal (p. 225); in L. 2 & 4, Washington tunnel and 20′ over L. 6 (p. 242); vast numbers in the *fetid* L. 6 (p. 243); in slate partings of L. 6, under coal (p. 261); in L. 6 (p. 281).—The larger crustaceans are occasionally seen in the shales between the first and second *Mountain sands* of Venango County, (*Subcarboniferous*) (I, p. 37); in Randall's Warren Section, division R, over the "Reds" (III, p. 306). The *trail* of one of these crustaceans is noticed by White (Q 2, 70) on a flagstone, near Newcastle, Lawrence Co., Pa., which contained many of the characteristic subcarboniferous *Spirifers*, *Producti*, *Allorisma*, &c., and many seaweeds; showing that crustacean tracks can be distinguished from genuine fossil sea weeds; which has been denied.

Cryphæus calliteles. See **Dalmanites calliteles,** *VIII c.*

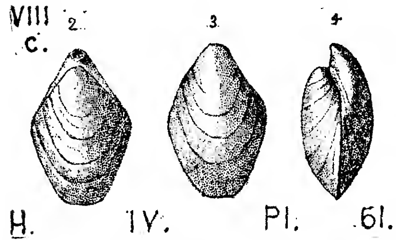
Cryptozoon proliferum. Hall. 36th An. Rt. N. Y. 1884,

plate 6. Covers extensive surfaces of limestone rock. Long known under the wrong name of *Stromatopora*, it is an older form and of quite different growth, viz: starting from a point below and growing and expanding upward in concentric layers, like a reversed cone. Greenfield, Saratoga Co., and Little Falls, Herkimer Co., N. Y.—*Lower Silurian. II.*

Cryptonella (*Terebratula*) **eudora.** *See Appendix.*

Cryptonella planirostra. (*Terebratula planirostra. See Appendix for figure and description.*

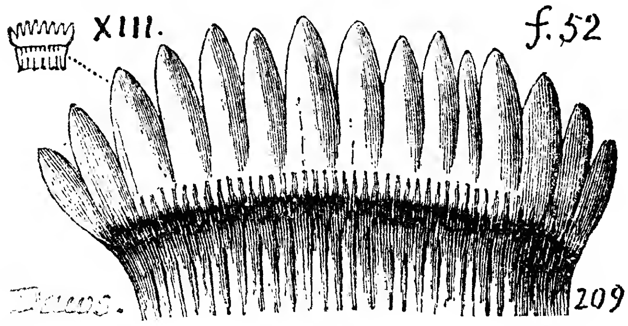
Cryptonella rectirostra. (*Terebrutula rectirostra.*) Hall, 1860, 13th An. Rt.; Pal. N. Y. Vol. 4, p. 394, plate 61, figs. 3, 4, 5. *Hamilton* group. Collected by Claypole (F2, xiii) at Barnett's mill, Perry Co., from *Hamilton upper slates*, see Catalogue of Collections, OOO, Spec. 5–152.—*VIII c.*



Cryptonella ——? in Carll's collection of 1875; C. E. Hall, Ms. Rt. Dec. 30, 1876. Oil Region, Northwest Pennsylvania, Upper Chemung rocks.—*VIII–IX.*

Cryptopora mirabilis. See **Fenestella** moulds.

Ctenoptychius cristatus, Dawson. Acadian Geology, 1868, p. 209, fig. 52, "comb-like" tooth of a fish of the Coal Measures; very small; *fig. magnified* to show its 14 points, much compressed, on a narrow base.—*XIII.*



Ctenacanthus formosus. *See Appendix with figure.*

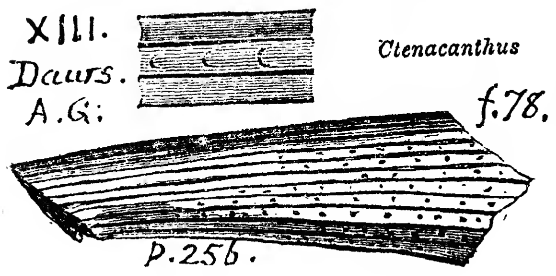
Ctenacanthus marshii. *See Appendix with figure.*

Ctenacanthus triangularis. *See Appendix with figure.*

Ctenacanthus vetustus. *See Appendix with figure.*

Ctenacanthus. Several species of these fish occur in Div. A, B, C, D, E, of Randall's section at Warren. (Rt. IIII, p. 318.) Fish spines were found by White, in Meadville upper limestone (Q4, 83.)—A fine fish spine, found by White, in the Sharpsville upper sandstone (between the Meadville upper and lower limestones), Crawford Co. (Q4, p. 86.)—*X.*

A Ctenacanthus spine, partly *magnified*, from Dawson's Acadian Geology is given in the figure under **Acrolepis hortonensis,** in the Appendix. *Fig. 78 g, spine of Ctenacanthus,* h, portion of spine magnified.



Ctenoptychius—— ? . A fish found in the *Crinoidal* (Black Foss.) *limestone* 250′ below Pittsburgh coal, in Stevenson's W. Va. sect. Trans. A. P. S. Phil. XV. part. 2. (L, 36)—*XV.*

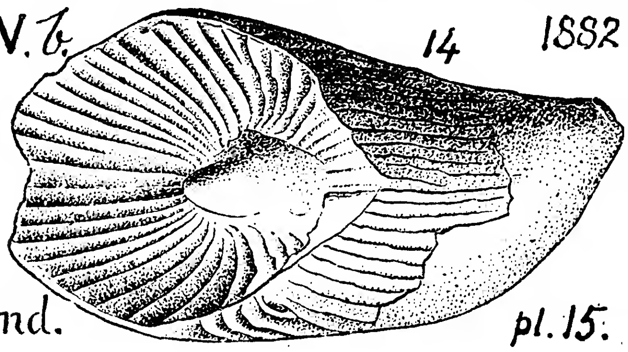
Cucullea opima. See **Nucula lirata.** *VIII c.*

Cuneamya, spec. No. 9576, in Randall's collection at Warren, Pa., in Division J. flaggy sandstone, 150′ to 200′ below Subolean conglomerate (OOO).—*VIII-IX.*

Cyathaxonia distorta. Compare with **Lophophyllum proliferum.** *XIII.*

Cyathaxonia herzeri. (Hall, 35 An. Rt. N. Y. Mus. 1882.)

V. b. 14 1882



Ind. pl. 15.

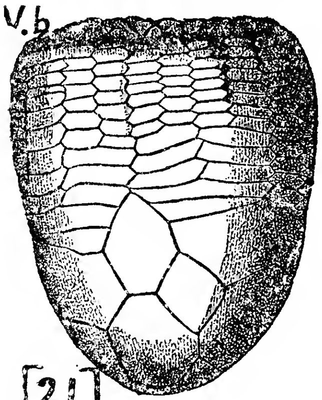
Collett's Indiana Rt. 1882, page 275, plate 15, fig. 14, back view and cup.—*Niagara* limestone, at Louisville, Ky. *Vb.*—The figure shows the conical columella at the bottom of the cup; and 100 lamellæ.

Cyathaxonia prolifera. See **Lophophyllum prol.** *XIII.*

Cyatheites unitus. See **Pecopteris unitus.** *XIII.*

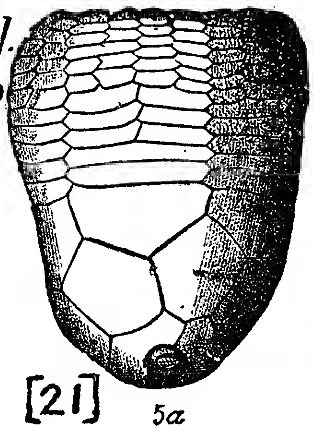
Cyathocrinus. . . . . Hall, Geol. Fourth Dist. N. Y., 1843, plate fig. [21, 4,4a, 5, 5a, 5b.] *Niagara* formation. (Figs. 21, 5, 5a, 5b show the cup without arms. Fig. 21, 4 shows the arms attached, but in a broken condition. Fig. 21, 4a shows the anatomy of the cup, or the arrangements of the plates which make the cup.)—*V b.*

V. b



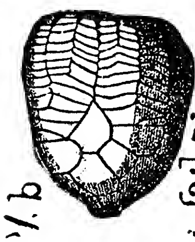
[21.] 5

V. b



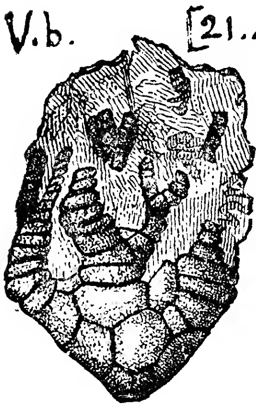
[21] 5a

V. b

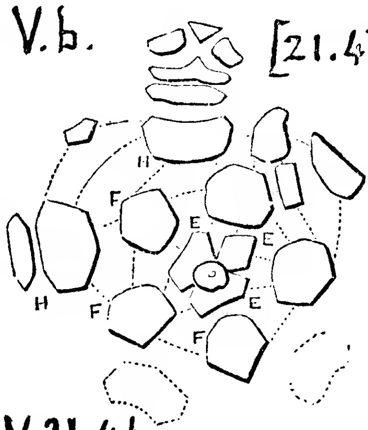


V. [21] 5b.

V. b. [21. 4 V. b.

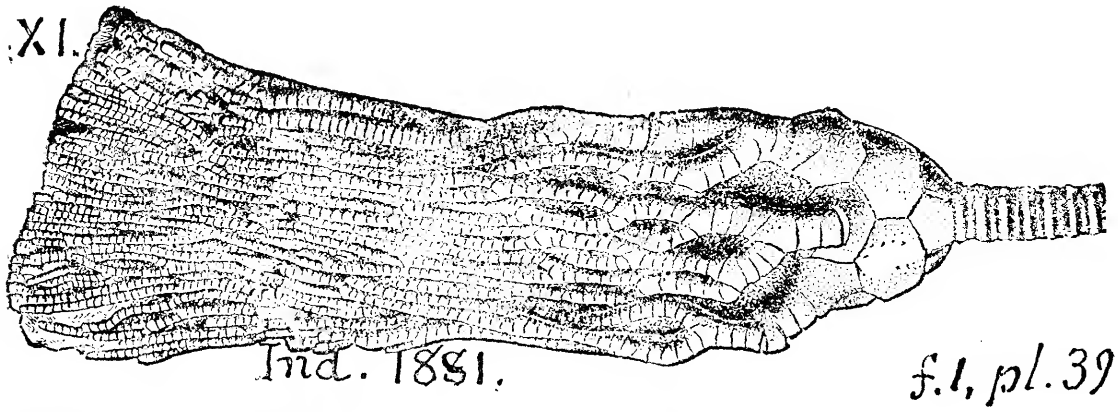


[21. 4b

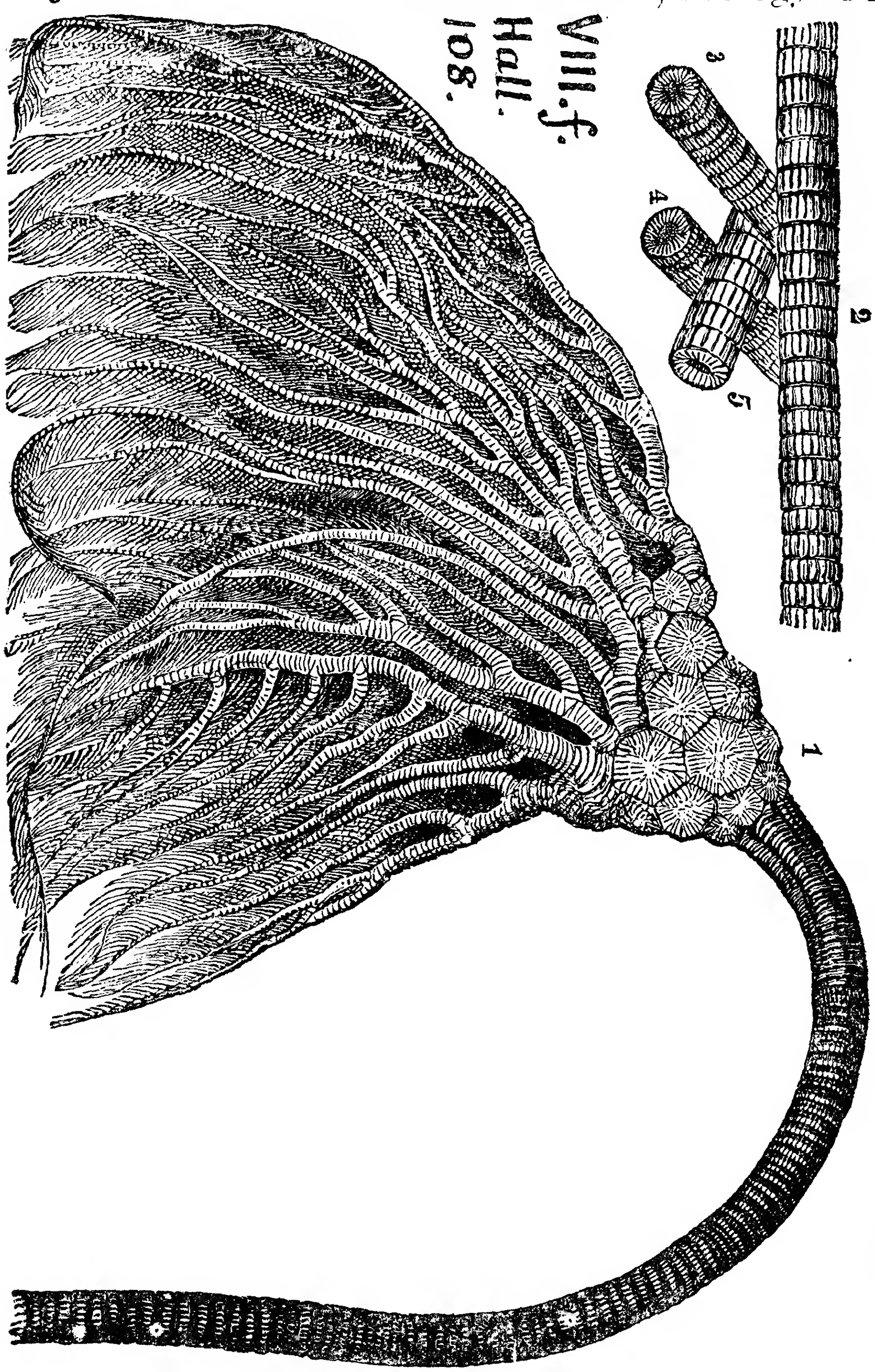


V. 21. 4. b.

Cyathocrinus multibrachiatus. Lyon & Casseday, 1859.

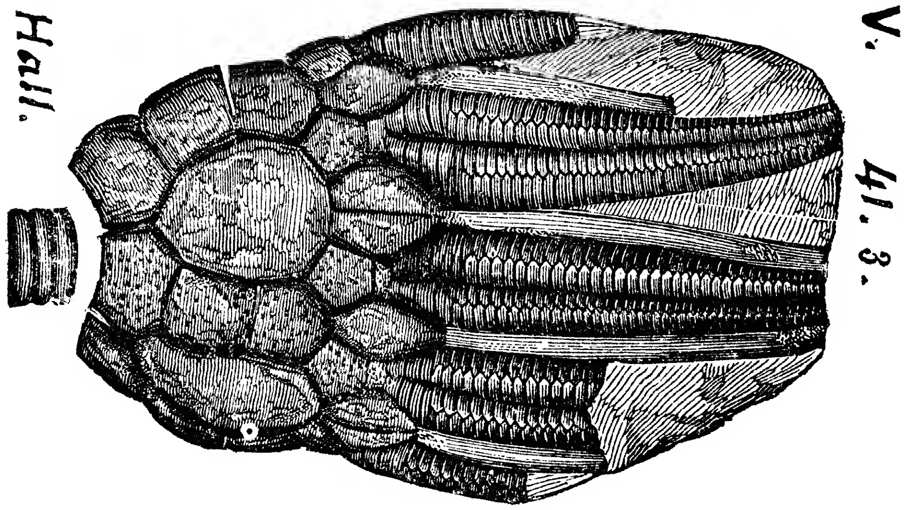


Cyathocrinus ornatissimus. Hall, Geology of Fourth District, N. Y., 1843, page 247, fig. 108, 1, 2, 3, 4, 5. *Portage* formation. (Figs. 1, 2, 3, 4, 5 show sections of the stem at various heights from the base or root of the stem.) It occurs on the shores of Lake Erie, in the town of Portland, only in one bed of rock, only six inches thick, and extending only ten



feet; a lens-shaped layer of closely packed crinoidal stems; a result of the sudden and complete destruction of a small, isolated grove of these stone-water-lilies.— *VIII. f.*

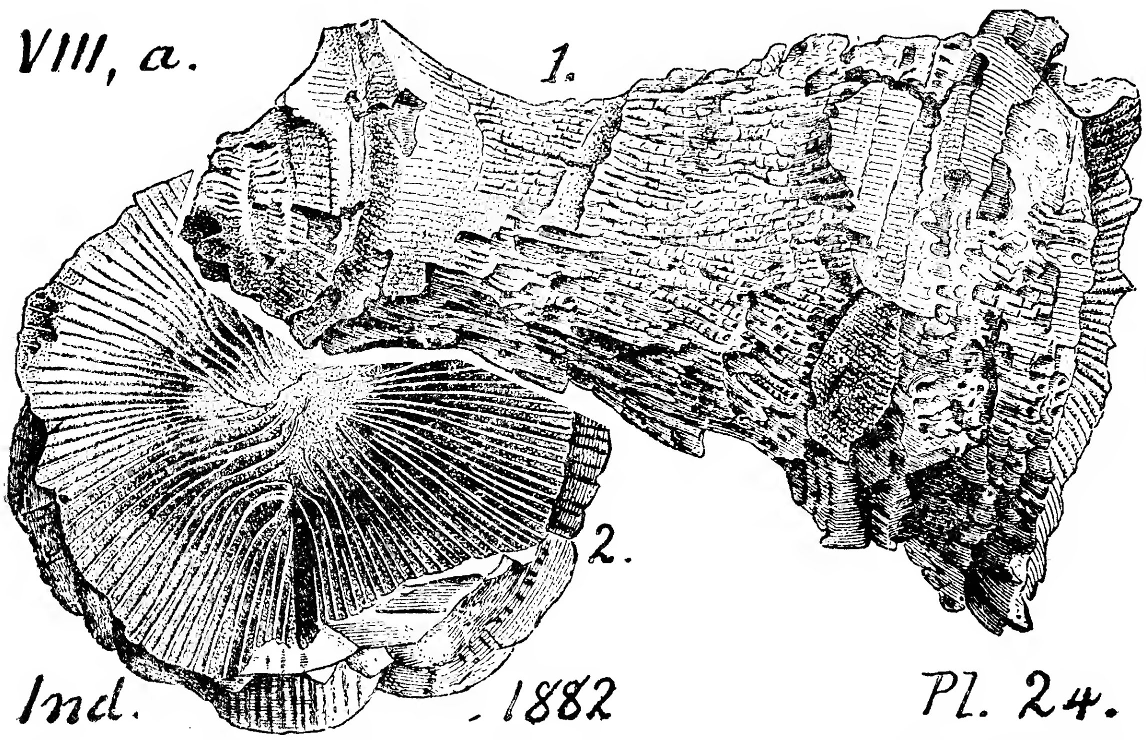
Cyathocrinus pyriformis. (*Ichthyocrinus lævis* of Conrad; Jour. Acad. N. S. Phila. Vol. 8, page 279, plate 15, fig. 16.—See Murchison's Silurian Researches, page 672, plate 17, fig. 6.) *Niagara* formation. *V. b.*



Cyathocrinus ——— ? in *Decker's creek shale*, under the Mahoning sandstone, at the top of the *Allegheny* series, at Morgantown, W. Va., Stevenson. (L, p. 36.)—*XIII.*

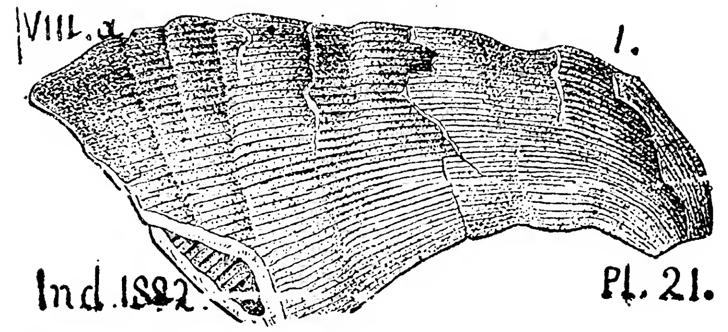
Cyathophyllum ammonis, Europe. See **Heliophyllum corniculum,** *VIII a.*

Cyathophyllum arctifossa. (Hall, 35th An. Rt. N. Y.



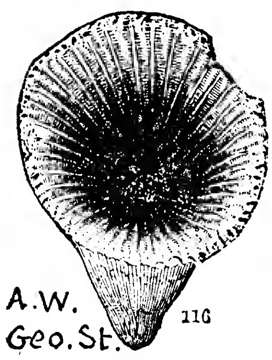
Mus. 1882, page 444.) Collett's Indiana Rt. 1882, page 297, plate 24, figs. 1, 2, back and cup of the coral. Fossette deep, narrow; lamellæ 120, alternating in length, the longer ones becoming bundles as they near the bottom.—*Corniferous limestone* at Falls of Ohio.—*VIII a.*

Cyathophayllum concentricum. (Hall, 35th An. Rt. N. Y. Mus. 1882, page 146.) Collett's Indiana Rt. 1882, page 316, plate 21, fig. 1.—fossette extends from near center to front margin; lamellæ 100, of nearly uniform size at margin, alternating below; when skinned the specimen shows internal striæ crenulated or united by septa. *Corniferous limestone* (U. Held.) formation at Falls of the Ohio river. *VIII a.*

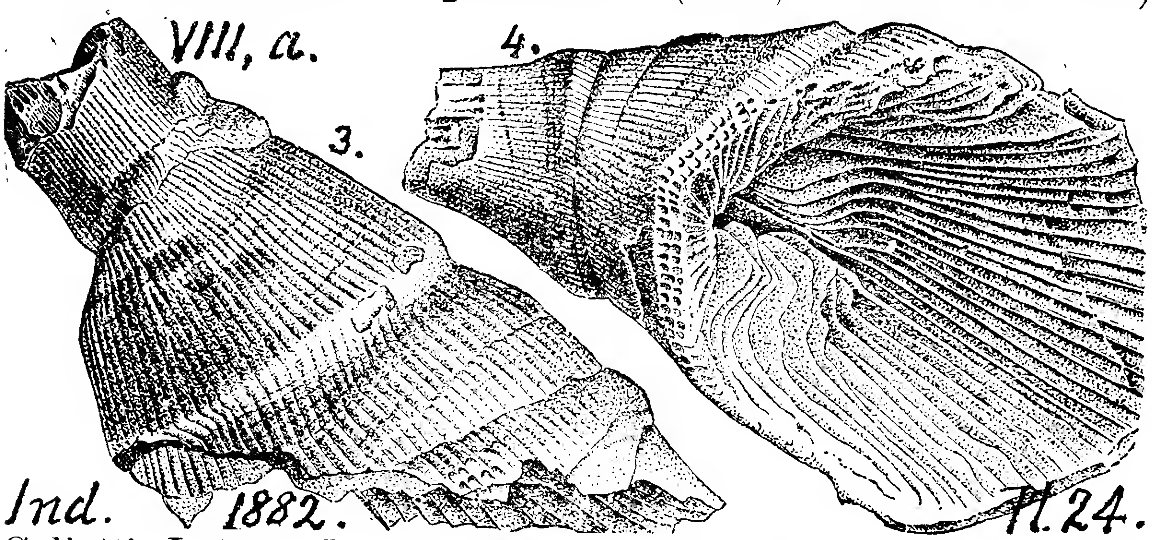


Cyathophyllum conitum. Europe. See **Heliophyllum corniculum.** *VIII a.*

Cyathophyllum corniculum. A. Winchell's Geological Studies, New York, 1886, page 204, fig. 116.—See **Heliophyllum corniculum.** *VIII a.*—Prof. Winchell, on page 206 gives a figure (117) of a cross section of a cup, showing the outer wall, the inward converging partitions (*septa*); but it is the cup of *Zaphrentis prolifica;* which see.

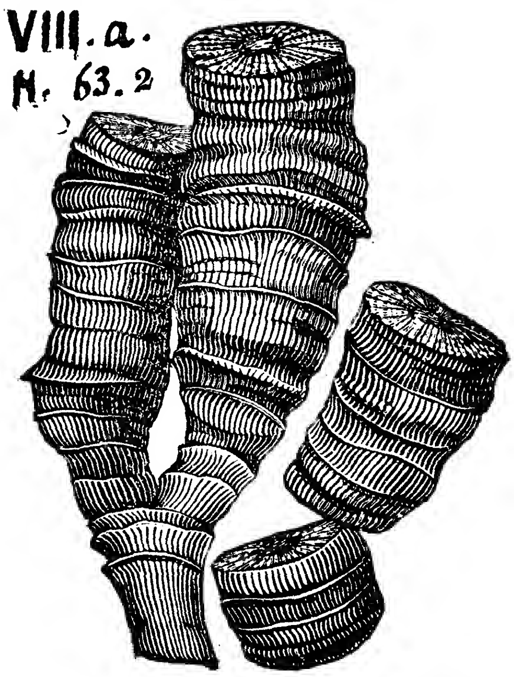


Cyathophyllum depressum. (Hall, 35th An. Rt. 1882)



Collett's Indiana Rt. of 1882, page 298, plate 24, fig. 3, 4, side and back views of the coral —*Corniferous limestone* formation, at Falls of the Ohio, Ky. *VIII a.*

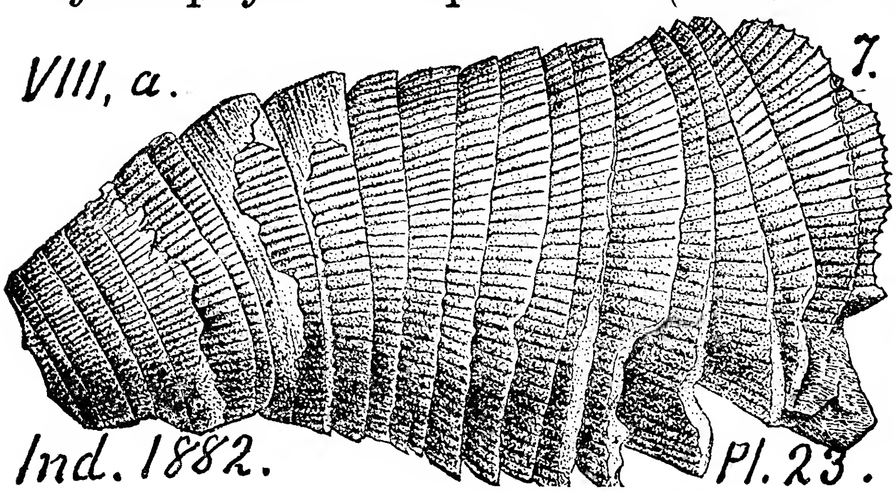
Cyathophyllum dianthus, Goldfuss, Petref. 1826, p. 54, pl. 15, fig. 13; pl. 16, fig. 1. Hall, Geology of the Western District of New York, 1843, page 160, fig. 63, 2. *Upper Helderberg* (*Onondaga*) formation. (Murchison, Sil. Research, page 690, pl. 16, figs. 12, 12a, 12 c.) Usually shows in large silicified bunches projecting from the weathered surfaces of the limestone rocks. The figure is a small portion of one of these masses of coral. Abundant at Caledonia, Livingston county, N. Y., Williamsville, LeRoy, &c.—*VIII a.*



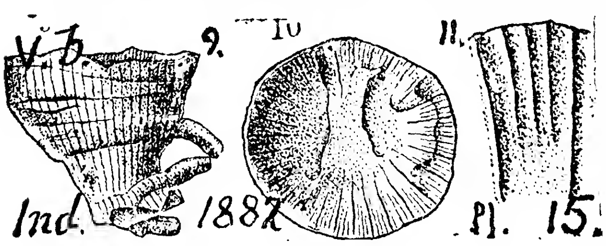
Cyathophyllum gigantea. Vanuxem, p. 133. *VIII a.*

Cyathophyllum (*Strombodes*) *helianthoides.* See **Heliophyllum halli.** *VIII c.*

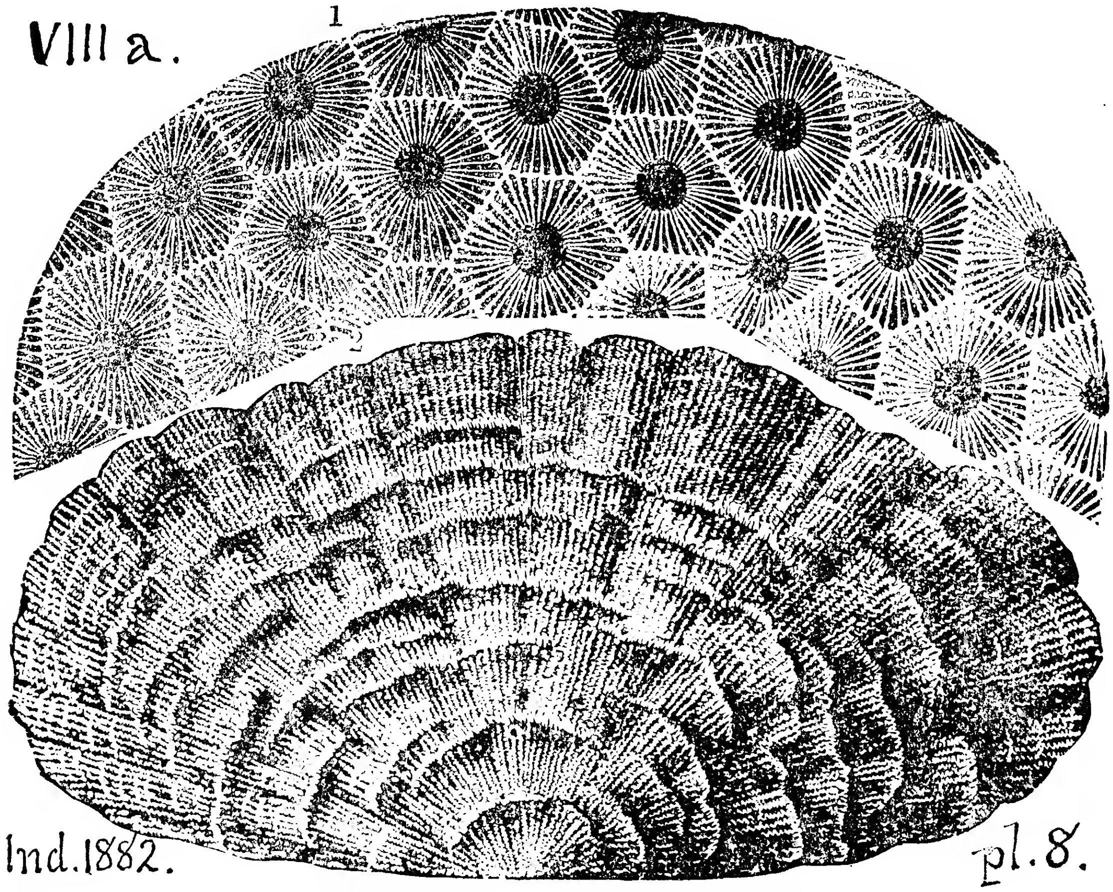
Cyathophyllum impositum. (Hall, 35th An. Rt.) Collett's Indiana Rt. of 1882, page 299, plate 23, fig. 7.—*Upper Helderberg* (*Corniferous*) limestone, at Falls of Ohio. *VIII a.*



Cyathopohyllum intertrium. (Hall 35th Am. Rt. Mus. 1882) Collett's Indiana Rt. of 1882, page 273, plate 15, fig. 9, 10, side and top views of the coral; fig. 11, *enlarged* to show the three finer rays which intervene between two stronger ones, and give it its name (*intertrium.*)—*Niagara* formation at Louisville, Ky. *V b.*



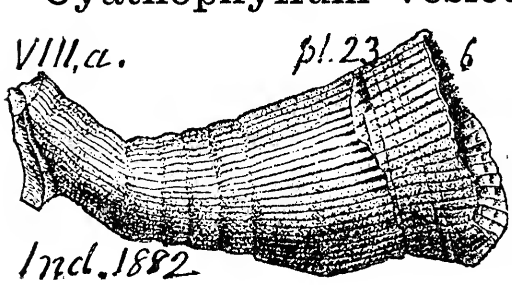
Cyathophyllum rugosum (?) Edwards and Haime, 1851,



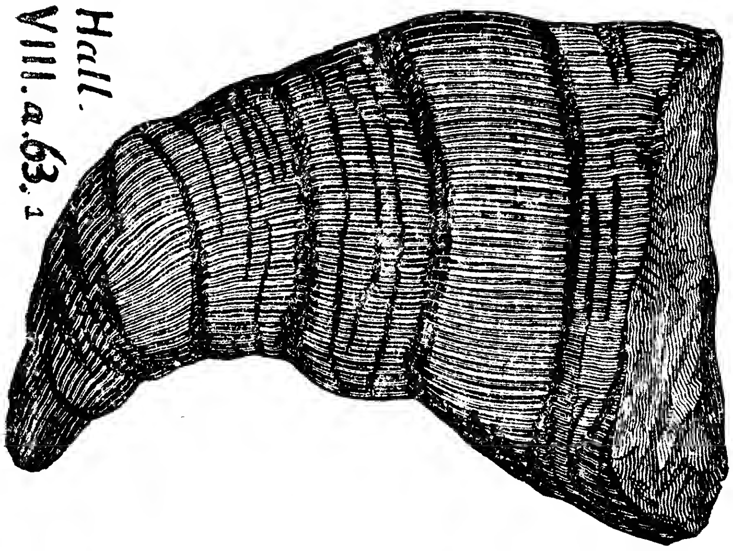
Pal. Foss. des Terr. Pal. Cornif. (*Astræa rugosa.* Hall, 1843,)—Collett's Indiana Report of 1882, page 260, plate 8, fig. 1, (Van Cleve) upper side of coral colony; fig. 2 lower side, showing concentric lines of skin and interior radiating structure. Common in *Corniferous limestone* in Ohio, Kentucky, Indiana and elsewhere. *VIII a.*

Cyathophyllum turbinatum. See **Heliophyllum halli.** *VIII c.*

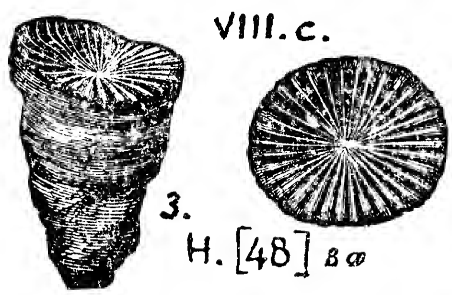
Cyathophyllum vesiculatum. (Hall, 25th An. Rt. N. Y. Mus., 1882). Collett's Indiana Rt. of 1882, page 297, plate 23, fig. 3. Looks somewhat like a *Cystiphyllum. Corniferous limestone* formation at Falls of the Ohio. *VIII a.*



Cyathophyllum, or **Strombodes**, Hall, Geology of the Fourth or Western district of N. Y. 1843, page 160, fig. 63, 1; one of the common and abundant forms of the *Onondaga* division of the Upper *Helderberg* formation; associated with *Cyathophyllum flexuosum* and *Cyathophyllum ceratites.*—See White's Report on Monroe and Pike county, G6, p. 120.—*VIII a.*



Cyathophyllum ——? Hall, Geol. Fourth dist. N. Y., 1843, plate fig. [48, 3a.] *Hamilton* formation. (Rare in Western New York; strongly marked. Hall). See section at Chemung narrows, as a specimen section with cup and other corals, in bed 15, copied in Rt. I, p. 93.—*VIII g.*

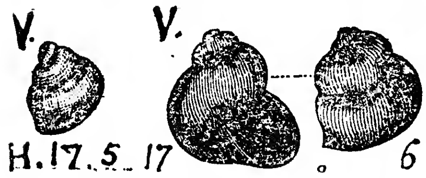


Cyathophylloid (*cup leaf*) *corals* appeared very early; for Stevenson finds them, but too obscure for identification, in the *Calciferous* (or perhaps *Chazy*) dolomitic limestone formation, say 2,000′ beneath the *Utica slate*, in Friends Cove, Bedford Co., Pa. (T2, p. 164); 1771′ below Utica slate on the Juniata river (p. 94).—*II a.* or *b.*—Of Devonian times, fragments too poor to identify occur as specimens 804–28, 90, 95; 805–4, 34, in Fellows' and Genth's collections on Marshall creek, Monroe Co., and C. E. Hall's at Bell's Mills, Blair Co., all in *Hamilton shale*, *VIII c.*—Later; specimens 860–6 (cast of calyx) from Mansfield, Tioga Co., Pa., in *Chemung*. Also spec. 883–1 (surface cast), 883–47 (cast of calyx,) 883–48, from Nichols, Tioga Co., N. Y., also in *Chemung*, *VIII g.*

Cyclocladia ornata (European species). Compare **Halonia tuberculata.** *XIII.*

Cyclonema bilix. (*Pleurotomaria bilix.*) Rogers, page 821, fig. 620. *Loraine* formation. (Conrad, Jour. Acad. N. Sci. Phila. Vol. 8, 1842. *Trenton* and *Hudson river* formations) *IIc, IIIb.*— The genus *Cyclonema* (thread-wound) was established by Hall in Pal. N. Y., Vol. 2, 1852, page 89; *bilix* being its type species.

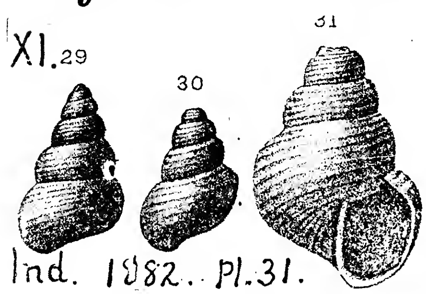
Cyclonema cancellatum. (*Littorina cancellata.*) Hall, Geol., 1843, page 72, figs. 17, 5, a young individual finely and beautifully cancellated over its whole surface. This marking became obliterated as the animal grew old, see figs. 6, front and back views. Abundant in the Sodus and Rochester green (*Clinton*) shale; also in the Rochester and Medina *Pentamerus* strata.— *Va.*



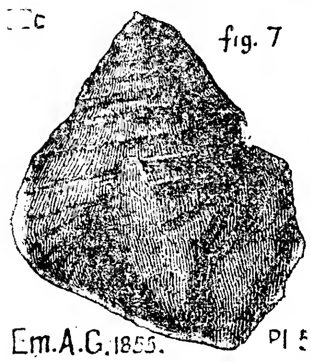
Cyclonema concinnum (*Concinna*). *See Appendix.*

Cyclonema hamiltoniæ. *See Appendix.*

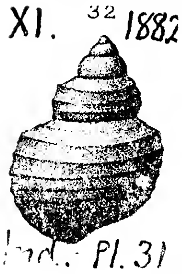
Cyclonema leavenworthana. (*Pleurotomaria leavenworthana*, Hall, Trans. Alb. Ins. Vol. 4, 1856.—Whitfield, Bull. 3, Am. Mus. N. H. 1882, plate 8.) Collett's Indiana Rt. 1882, page 363, plate 31, figs. 29, *magnified twice;* fig. 30, *natural size;* fig. 31, *magnified twice* and showing opening to chamber.—*Subcarb. limestone* at Alton, Ill., and Spergen Hill, Lanesville and Bloomsburg, Ind. This shell varies its form greatly with age, the young being rounder, the old with longer spires. It is not a *Pleurotomaria*, nor a *Murchisonia*, because it has no special spiral band. It is near *Pleurotomaria trilineata.* *XI.*



Cyclonema percarinatum. (*Pleurotomaria percarinata.* Hall, Pal. N. Y. Vol. 1, 1847, Trenton and Hudson river groups.) Emmons, Amer. Geol. I, ii, page 223, plate 5, fig. 7; like other gasteropods (snails) of the Trenton limestone at Middleville, N. Y., rarely smooth and perfect; therefore hard to identify; associated with *Atrypa hemiplicata*, *Cyrtolites compressus*, and *Cyrtolites trentonensis.*— *Trenton*, *IIc.*

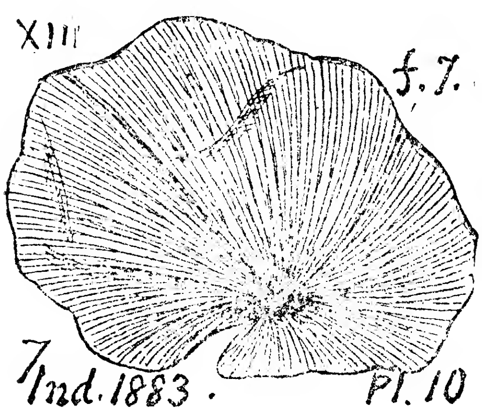


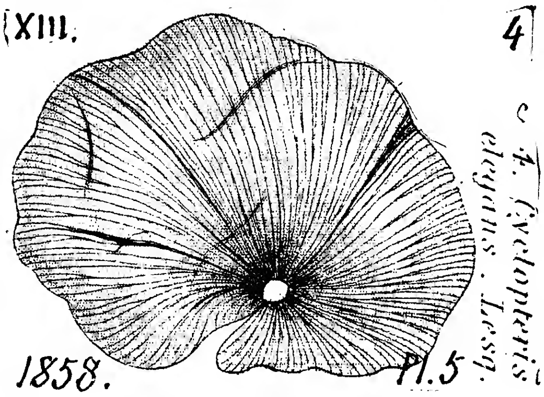
Cyclonema sub-angulatum. (*Pleurotomaria sub-angulata*, Hall, Trans. Alb. Inst. Vol. 4, 1856. Whitfield Bull. 3, Am. Mus. N. H., 1882, plate 8.) Collett's Indiana Rt. of 1882, page 364, plate 31, fig. 32.—*Sub-carboniferous* limestone of Spergen Hill, etc., Ind. This species of *Cyclonema* can be distinguished from all the other species of the genus, by the flattish, shelf-like upper part of each whorl, with a sharply angular edge. This is the distinguishing feature of the *casts* of the shell. No striæ parallel to the lines of growth have been observed. There are traces of finer striæ between the coarser revolving striæ, which latter are unequal in size and distance from each other. Compare *C. yvanii*, Leville. (Hall.)—*XI.*



Cyclopteris digitata. Europe. Near **Whittleseya elegans.**—Note. The first specimen of *Cyclopteris leaf attached to the leaf stem* (rachis) recorded, may be seen in A. C. Seward's fine lithograph page-plate X, facing page 344, of the London Geological Magazine for August, 1888, No. 290.—*XIII.*

Cyclopteris elegans. (Lesquereux. Boston Jour. Soc.





Nat. Hist. Vol. 6, page 416. Geol. of Penn. 1858, page 856, plate 5, fig. 4, afterwards identified by Lesq. with *Neuropteris tenuifolia* of Brongniart, described in Coal Flora (Report P), page 100. Grand'Eury and Saporta are inclined to place it and other species in a new genus *Doleropteris*; see Coal Flora page 522.) Collett's Indiana Rt. of 1883, page 52, plate 10, fig. 7, where it is made identical with *Neuropteris loschii.*—Found by Lesquereux in the *Darlington bed* at Cannelton, Beaver Co., Pa. *XIII.*

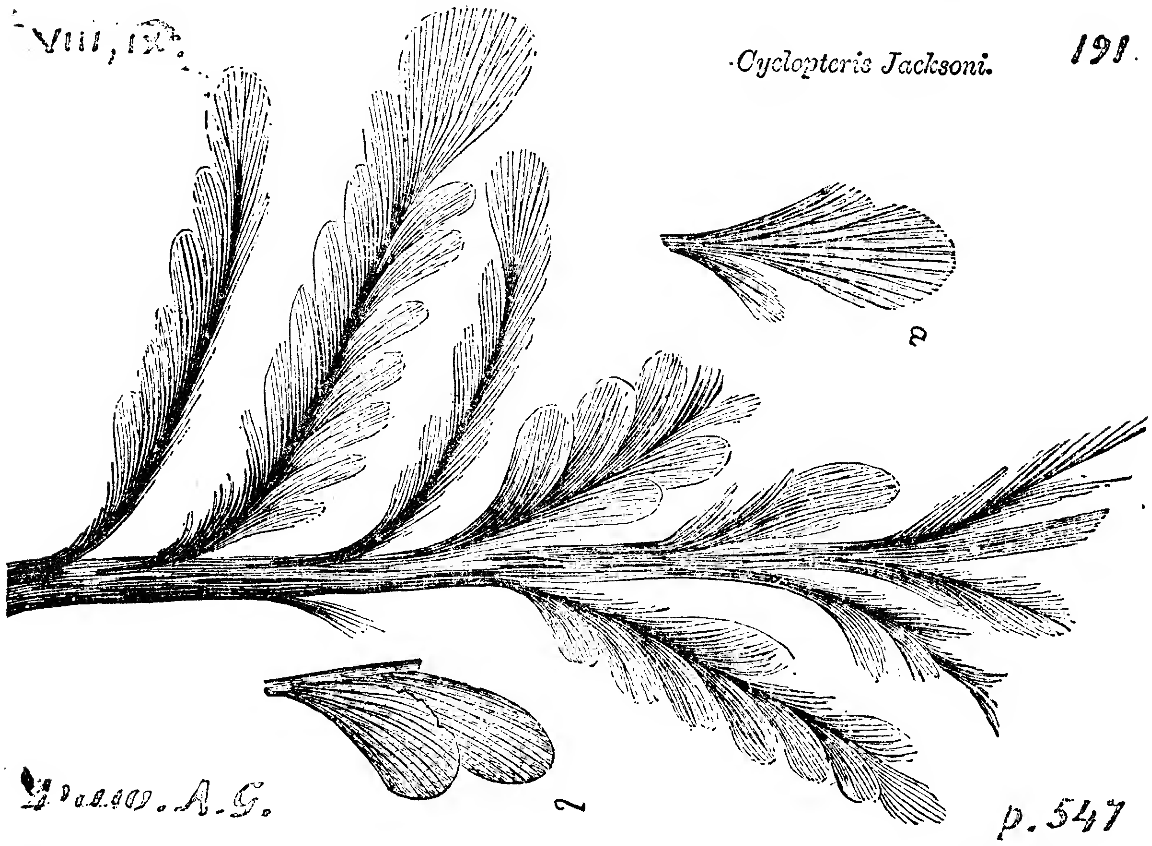
Cyclopteris fimbriata. See **Neuropteris fimb.** *XIII.*

Cyclopteris germari. See **Neurpoteris germari.** *XIII.*

Cyclopteris laciniata. See **Neuropteris laciniata.** *XIII.*

Cyclopteris undans. See **Neuropteris dentata.** *XIII.*

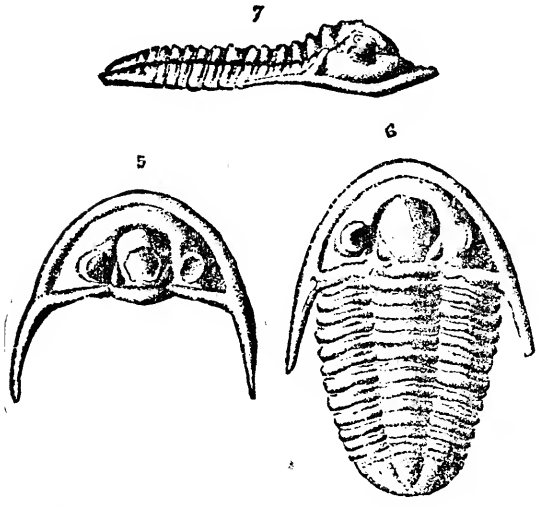
Cyclopteris jacksoni, Dawson's Acadian Geology, 1868, p. 546, f. 191; Canad. Nat. Vol. 6, p. 173, fig. 9, from Perry & St. John; as in the *Chemung-Catskill* strata about Montrose, Susquehanna Co., Pa., as described by Hall. *VIII–IX.*



Cyclopteris valida. *See Appendix.*

Cyclostoma pervetusta. See **Pleurotomaria pervetusta,** (also *Euomphalus pervetustus.*) *IV.*

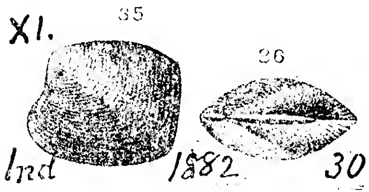
Cyphaspis christyi. (Hall, Trans. Alb. Inst. 1863, Vol. 4.) Collett's Indiana Rt. 1881, page 333, plate 34, fig. 5, head *enlarged twice*; fig. 6, entire trilobite, *enlarged twice*; fig. 7, profile of same. Thorax (body) has twelve segments, highly convex, deeply lobed. Species differs from all others by its long head, and proportions of body. Hall.—*Niagara* formation. *V b.*



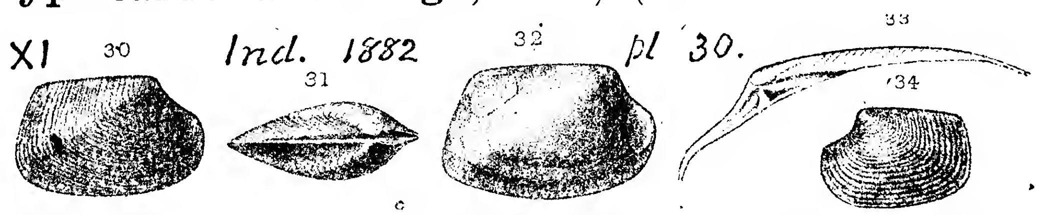
Cyperaceæ seeds are fossilized in the peat bogs in which the curious elastic black mineral *dopplerite* is found, as at Scranton, Pa. (An. Rt. 1885, p. 649). At Zurich Prof. Heim of the Technological University in Switzerland, has a remarkable suite of specimens of this mineral. (J. P. L. 1888.)

Cypricardella elliptica? See **Microdon ellipticus.** *XI.* —Note. *Microdon*, Conrad, 1842; name preoccupied by Agassiz for a genus of fish, 1833. (S. A. Miller.)

Cypricardella nucleata. (Hall, Trans. Alb. Inst. Vol. 4, 1856); Geol. Rt. Iowa, plate 23, fig. 10? 1858; *Microdon nucleata*, Whitfield, Bull. 3, Am. Mus. 1882, plate 7.) Collett's Indiana Rt. of 1882, page 339, plate 30, figs. 35, 36, *magnified four times*, side and hinge views. (Compare *Cypricardella oblonga*).—Spergen Hill, Ind. etc., in *Subcarboniferous* strata, *XI.*



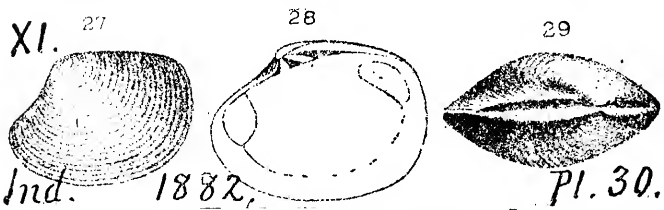
Cypricardella oblonga, Hall, (Trans. Alb. Inst. 1856.



Microdon oblonga, Whitfield Bull. 3. Am. Mus. N. H., Central Park, N. Y., 1882, plate 7.) Collett's Indiana Rt. 1882, page 340, plate 30, figs. 30, 31, *enlarged twice*, side and hinge of type specimen, mistaken at first for *C. nucleata*; fig. 32, a cast, showing the spots where the muscles were attached to open and close the shells; fig. 33, an *enlarged* hinge of an odd shell; fig. 34, *natural size* of an unusually large shell.—*Subcarboniferous limestone* formation, at Spergen Hill and other places in Indiana. *XI.*

Cypricardella plicata. See **Sarguinolites plicata.** *XI.*

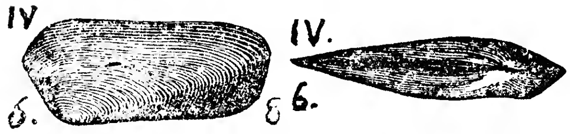
Cypricardella surelliptica. (Hall, Trans. Albany Inst. Vol. 4, 1856); *Microdon subelliptica*, Whitfield, Bull. 3, 1882. Am. Mus., plate 7.) Collett's Indiana Rt. of 1882, page 339, plate 30, figs. 27, 29, *enlarged 3 times*, side and hinge; fig. 28, *3 times*, another specimen.—*Subcarboniferous limestone* from Spergen Hill, Ind.—*XI.*



Cypricardia ——? in Horner Run conglomerate, Warren Co. and at other points in Pennsylvania. Carll's Rt. IIII, p. 250, 319; III, p. 29.—*X*, *XI.*

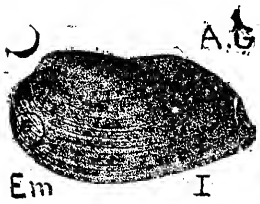
Cypricardia angusta. See **Cypricardites angustus.** *V a.*
Cypricardia angustata. **Modiomorpha angustata.** *IX.*
Cypricardia angustifrons. **Modiolopsis modiolaris.** *III b.*
Cypricardia contracta. **Cypricardites contractus.** *VIII g.*
Cypricardia obsoleta. See **Cypricardites obsoletus.** *V.*

Cypricardia orthonota. (*Unio orthonota.*) Hall, Geology of the Fourth district of New York, 1843, page 48, figs. 6, 8, 9, a cast. *Medina.* *IV b.*



Cypricardia rhombea. **Cypricardites rhombeus.** *VIII g.*
Cypricardia subplana. See **Edmondia ? subplana.** *XI.*
Cypricardia wheeleri. See **Schizodus wheeleri.** *XIII.*

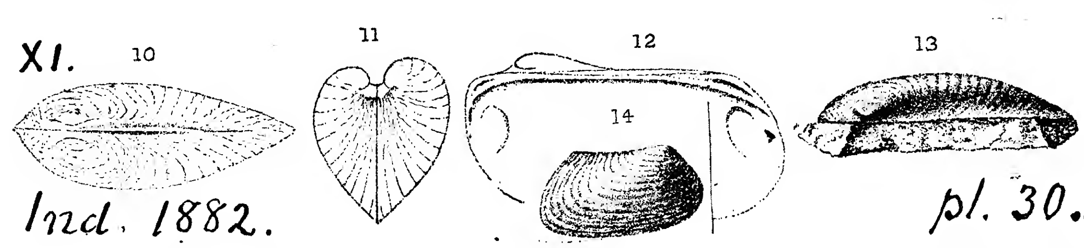
Cypricardia ——— ? found by Emmons in the white friable shales of Virginia, with *Obolus*, *Orbicula excentrica and Lingula striata.* Amer. Geol. I, part 2, p. 113, plate 1, fig. 1.—*Lower Silurian*, or *Cambrian ?*



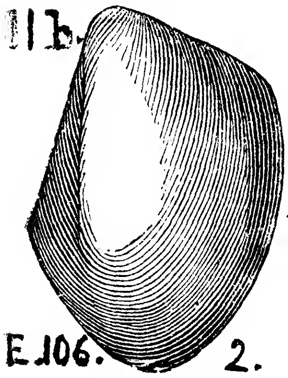
Cypricardinia arata. *See Appendix.*

Cypricardinia indenta. (Conrad, Jour. A. N. S. Phil. Vol. 8, 1842.) Collected by Claypole in Perry Co. at Barnett's mill and Drumgold's tannery; and in Huntingdon county at Mapleton (OOO, spec. 5–29, 63, 65; 99–16; 201–25), all in *Hamilton upper shales.* *VIII c.*

Cypricardinia indianensis. (Hall. Trans. Albany Inst., Vol. 4, 1856.) Collett's Indiana Rt. of 1882, page 342, plate 30, fig. 10, *magnified four times*, hinge view; fig. 11, end view to show the unequalness of the two valves; fig. 12 (*magnified three times*,) hinge view of another specimen; figs. 13, 14, hinge and size views of specimens from another locality.—*Subcarboniferous limestone ;* Spergen Hill, etc., Ind. *XI.*



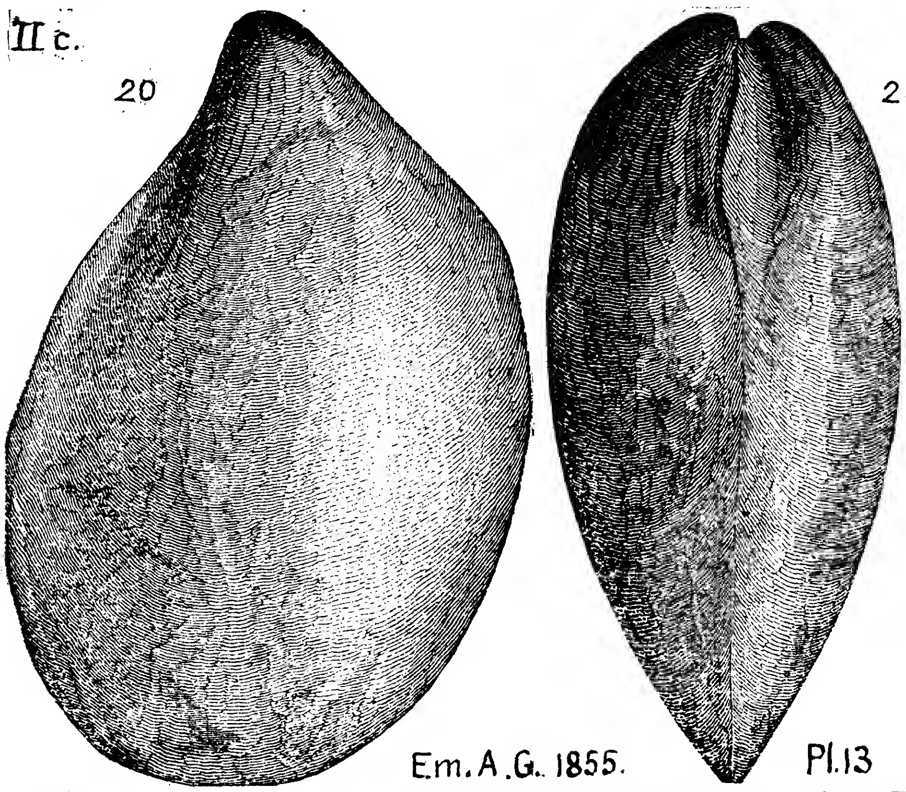
Cypricardinia inflata. (*Nuculites inflata.*) Emmons, Geology of the Second or Northern district of New York, 1842, page 395, fig. 106, 2. A rare species found at Watertown, N. Y., in the *Trenton limestone*, the lowest formation in which any of the numerous species of the somewhat allied genus *Pterinea* exists which furnishes so many species to the Palæozoic formations. (Emmons.)—II *c*.



Cypricardinia lamellosa (Hall, Pal. N. Y. Vol. 3, 1859, p. 266, plate 49 A. fig. 1 a, *natural size*, 1b *enlarged three diameters*, 1c, (another specimen was twice the size of this one); with Spirifers, Rhynchonellas & Atrypas, in the *Lower Helderberg shaly limestone*, Albany county, N. Y., *VI*. —Found in Perry county, Pa., by Claypole (Report F2, preface) in *Chemung* strata. *VIII g*.

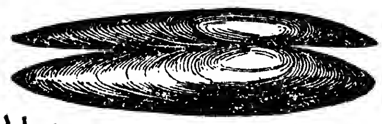
Cypricardinia—— ? characterizes a bed (with *Orthis*, *etc*.,) in *lower Pocono* or *upper Catskill*, at the east mouth of Sideling hill railroad tunnel, E. Broad Top RR. Huntingdon Co., Pa. (T3, p. 87.)—*IX* or *X*.

Cypricardites amygdalinus. (*Ambonychia amygdalina.* Hall, Pal. N. Y. Vol. 1, 1847, *Black river* and *Trenton group*.) Emmons Am. Geol. I, ii, 177, plate 13, figs. 20, 21, of a *cast*, with smooth surface and a few obscure undulations. He calls the shell *Posidonomya amygdalina*, using Brown's European generic name.—*II c*.



Cypricardites angustus, (*Cypricardia? angusta.*) Hall

V.



H.18 6.

Geology of the Fourth or Western District of N. Y., 1843, page 76, fig. 18, 6. Concentric folds more prominent and fewer on front edge. *Clinton, Va.*

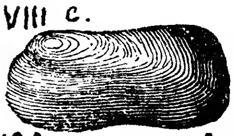
Cypricardites angustata. See **Modiomorpha angustata.** *IX.* See **Amnigenia catskilliensis.** *VIII f.*

Cypricardites catskilliensis. See **Modiomorpha catskilliensis,** *IX.* See **Amn. catskilliensis.** *VIII f.*

Cypricardites chemungensis. See **Sanguinolites chemungensis,** *VIII g.*

Cypricardites contractus (*Cypricardia contracta*). Hall,

VIII c.



139 4

Geology of the Fourth or Western district of N. Y., 1843, page 291, fig. 139, 4 (Lower Carbonifer ous, Hall; but in reality *Upper Chemung*). Abundant in the Panama conglomerate of Western New York (Carll, in Rt. III, p. 70).—*VIII g.*

Cypricardites indenta. **Cypricardinia indenta.** *VIII c.*

Cypricardites marcellensis. See **Lunulicardium marcellense.** *VIII b.*

Cypricardites modiolaris. See **Modiolopsis nasuta.** *III b.*

Cypricardites obsoletus. (*Cypricardia obsoleta*). Hall,

V

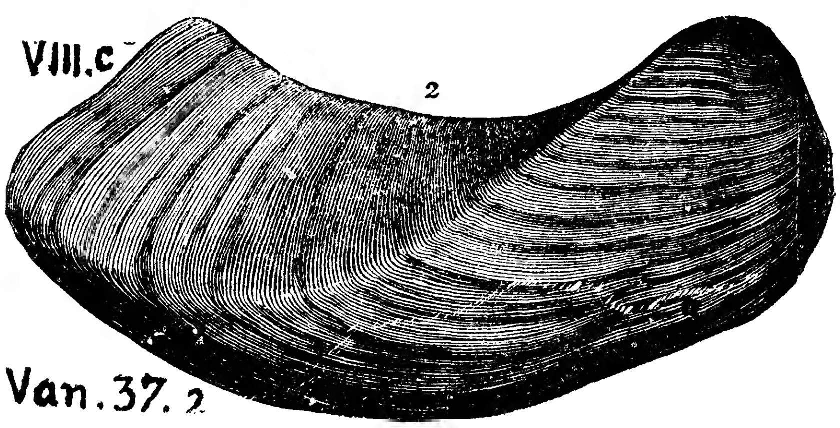
18. 3.

Geology of the Fourth or Western district of New York, 1843, page 76, fig, 18, 3. Beak very prominent; shell faintly lined, and scarcely striated; decayed look of the shell, *Clinton. Va.*

Cypricardites ovata. See **Modiolopsis modiolaris,** *III b.*

Cypricardites recurvus. Vanuxem, Geology N. Y., 1842,

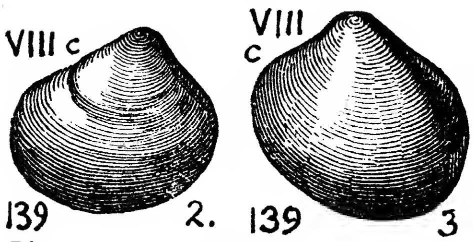
VIII.c



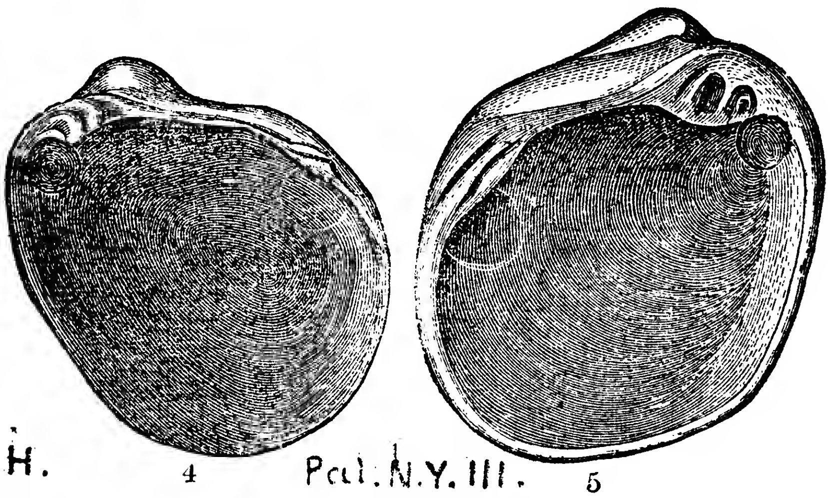
Van. 37. 2

152, fig. 37, 2. (Conrad, Jour. Acad. Nat. Sci. Philada. Vol. 8, 1842). This curious looking shell is very characteristic of the formation; in act, in Vanuxem's district it and *Orthoceras constrictum and Obicula grandis* are found only in the *Hamilton*. *VIII c.*

Cypricardites (*Schizodus*) **rhombeus.** (*Cypricardia rhombea*, Hall, Geol. Fourth dist. N. Y., 1843, page 291, fig. 139, 2, 3, with very prominent beak and smooth shell, found (in company with *Euomphalus depressus* and *Cypricardia contracta*) at one single locality, about four miles north of Panama, Chatauqua county, N. Y. [Of course these shells are not *Carboniferous* nor even *Subcarboniferous*, for the Panama conglomerate is the third oil sand at the top of the *Chemunq*. (Hall, Prelim. Not. Lamell. 1870; Carll, Report III, p. 70; the fossil abundant *in the Panama conglomerate*). Found by Hicks, Spec. 886–2, on Kinzua creek, near west line of McKean Co., Pa., in *Upper Chemung*. Found in crowds by Claypole (Report F2; also Proc. A. P. S. Phil. April 6, 1883; also Report OOO, three specimens, 36–7) in the *King's Mill sandstone* of Perry Co., *Chemung-Catskill* formation.—*VIII–IX*.



Cypricardites saffordi. (*Palœarca saffordi*, Hall, Pal. N. Y., Vol. 3, p. 271, fig. 4, interior of right valve, showing hinge teeth, etc. Fig. 5, left valve, showing wider ligamental area, front teeth less and back teeth more strongly defined than in the other valve, etc., etc. Occurs like *Cyp. ventricosa* in the Trenton limestone strata of Tennessee, and approaches in form the New York species, of which the hinge structure was unknown in 1859. (Hall.)—*II c*.

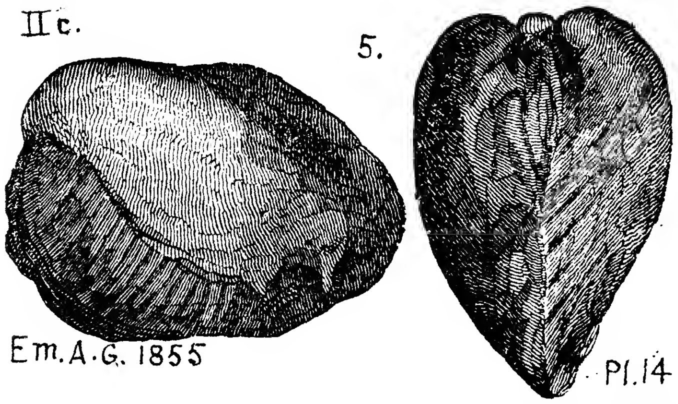


Cypricardites sinuata. **Modiolopsis anodontoides.**—*III a*.

Cypricardites subtruncatus (*Edmondia subtruncata*, Hall, 1847, Pal. N. Y. Vol. 1. *Black river and Trenton*). Specimens 210–58 (a fair example with margins much broken); 210–61 (doubtful, two impressions); in Fellows' collections of 1876, at Bellefonte, from *Trenton limestone*.—*II c*.

Cypricardites truncata. **Sanguinolites trunc.** *VIII c.*

Cypricardites ventricosus. (*Edmondia ventricosa.*) Hall, Pal. N. Y. Vol. 1, 1847. *Trenton.*) Emmons Amer. Geol., vol. 1, part 2, page 174, plate 14, figs. 5 and 6. (For two other smaller figures, see Appendix.)—See fig. also under old name of *Palæarca ventricosa.*—Specimens 210–113 (two); 210–137 (twenty-one); 210–139 (one good example); these occur in Fellows' collections in 1876, at Bellefonte, Centre Co., from *Trenton limestone*, *II c.*

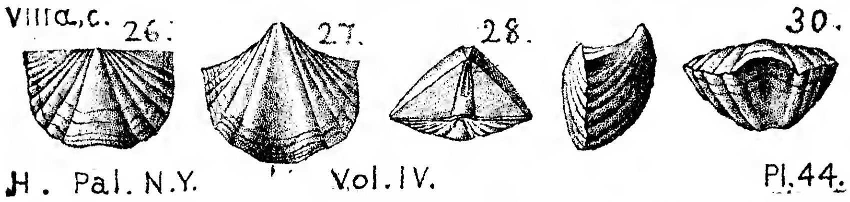


Cyperus and **Carex** of several species make the peat bogs. Q4, p. 40, 161.—*Recent.*

Cypris, or allied ostracoid shells, often abound and are sometimes the only fossil seen in the Upper Barren Coal Measure limestones of Greene and Washington counties, Pa. K3, p. 306.—*XVI, XVII.*

Cyrtia rostrata. See **Cyrtina rostrata.** *VIII.*

Cyrtina hamiltonensis (*Cyrtia hamiltonensis* Hall, 1857. 10th An. Rt.; Pal. N. Y., vol. 4, p. 268, plate 44, figs. 26 to 30. *Schoharie grit*, *Cornif. lime* and *Hamilton.*) Claypole's list of fossils in Perry Co., Pa., shows it also in the *Chemung*; and Carll's collections from Chemung to Pocono in the northwest have it also. (F2, xiii, xiv). Barnett's Mill, Perry Co., *Upper Hamilton* shale (OOO, 5–61).—Between Newport and Baileysburg (29–2, four); 2½ m. N. of Liverpool (37–6, 9); near New Bloomfield (39–3, 4); road to Carlisle (53–22, 25); all in *Chemung.* Junkins' farm, *Catskill-Chemung* (57–27, 30, 31, 33, 45, 46, 47, 48, 53). In Montour Co., opposite Bloomsburg, in *Chemung* (68–20, 48, *a* 5, 29, 48).—Perry Co., Drumgold's tannery, *Hamilton* upper shales (99–37); Rambo's, *Hamilton SS* (107–1); E. of Montebello narrows, in *Chemung* (144–2).—In Centre Co., in *Chemung.* (T 4, 433.)—*VIII c,g.*



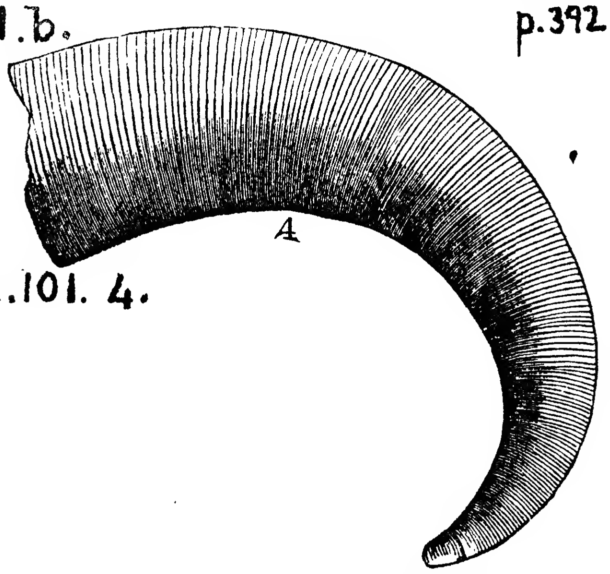
Cyrtina rostrata. (*Cyrtia rostrata.*) *See Appendix.*

Cyrtina triplicata, new species, Simpson and J. Hall, Proc. A. P. S. Phila. Dec. 1888, founded on a fine specimen, 9476, in Randall's collections at Warren, Pa. from *Chemung* strata. *VIII g. See Figure and Description in Appendix.*

Cyrtoceras expansus. *See Appendix.*

Cyrtoceras filosum. (See *Cyrtolites filosus.* Conrad.)

II.b.

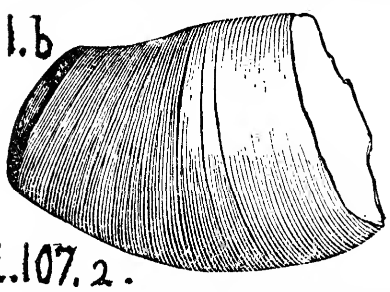


E.101. 4.

p.392 Emmons' Geology of the Second District of the State of New York (north and east of the Hudson river, including the Adirondack and Taconic regions) 1842, page 392, fig. 101, 4, a unique specimen from the *Trenton limestone*; its surface finely and thickly covered with lines arched on its back.—*II c.*

Cyrtoceras tremtonense. (*Orthoceratites trentonensis.*)

II.b

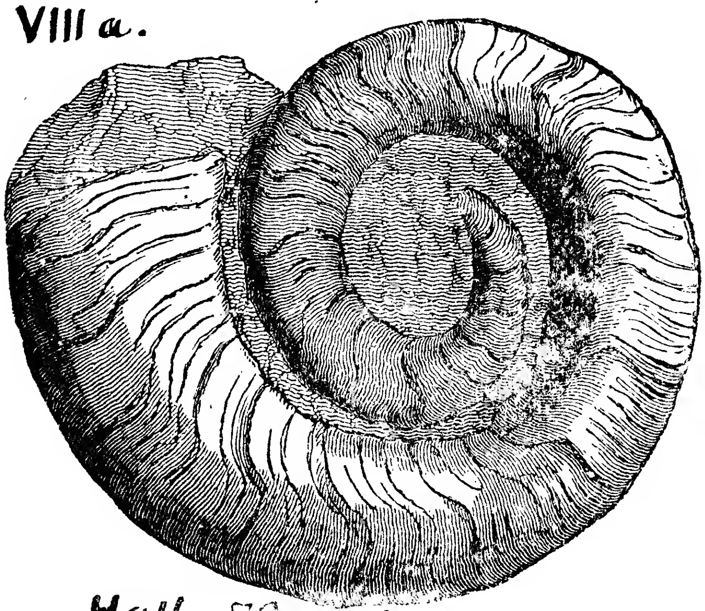


E.107.2.

Emmons, page 396, fig. 107, 2. *Trenton* formation.—Collected by C. E. Hall, from Trenton limestone strata in Nittany Valley, Huntingdon Co., along the Little Juniata river. (Proc. Amer. Phil. Soc. Phila. Jan. 5, 1876.)—*II c.*

Cyrtoceras undulatum. (*Gyroceras? undulatum.*) Hall,

VIII a.



Hall, 70.

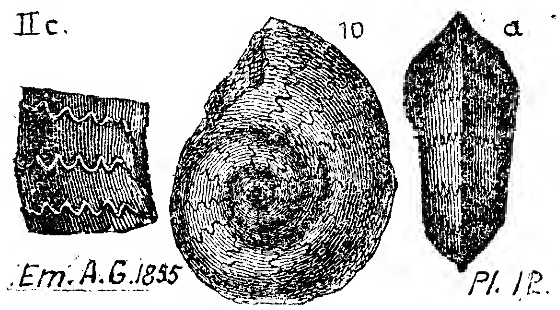
page 175, fig. 10, 2. Vanuxem, page 139, fig. 33, 2. *VII, Schoharie grit* (but not so abundant in this formation in western New York as further east.) See Hall's Illustrations of Devonian fossils. Found by I. C. White in Monroe Co. on McMichael's creek on the Stroudsburg and Water Gap road, and at other places along the *Corniferous* outcrops. (G6, 121.)—*VIII a.*

Cyrtoceras ——? Found by Stevenson in the *Subconglom erate* strata on the anticlinals in the gaps of Westmoreland and Fayette Cos., Pa. (KKK, p. 311.)—*X*.

Cyrtoceras ——? Found by Stevenson in the richly fossiliferous *Lower Helderberg* strata at Mann's quarry, Monroe township, Bedford Co., Pa. (T2, p. 187).—*VI*.

Cyrtolites biloba. See **Bellerophon bilobatus.** *II c.*

Cyrtolites compressus. (*Phragmolites compressus*,

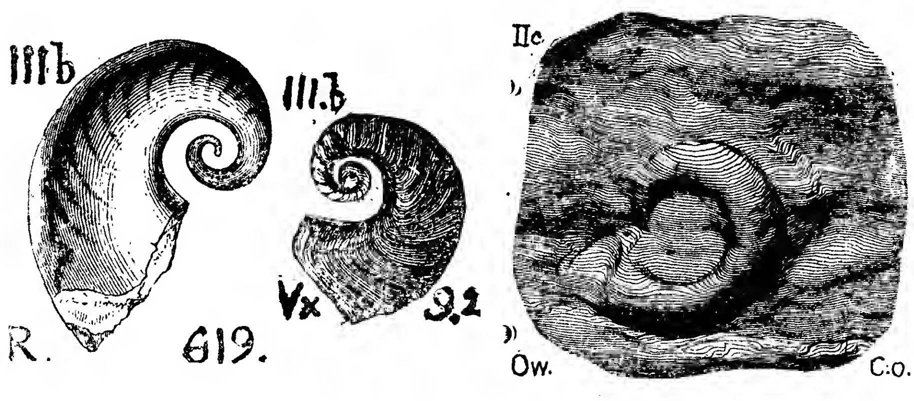


Conrad's Annual Rt., N. Y., of 1838. *Black River* and *Trent.*). Emmons, Amer. Geol. I, ii, 167, plate 12, figs. 10, a, b; flat; whorls slightly compressed and disjointed; back sharply keeled, with sharp zigzag plates "which only penetrate through the shell."—*Trenton limestone* formation. *II c.*

Cyrtolites expansus. Hall, Pal. N. Y., Vol. 3, 1859, page 479, plate 94, Fig. 4,5; shell obliquely depressed-conical; apex incurved, but making scarcely or no more than a single volution, very rapidly expanding from the apex; aperture nearly circular; surface marked by faint transverse ridges, and finer longitudinal striæ. Only two specimens seen by J. Hall, from Albany and Schonarie Cos., N. Y., in the *Oriskany.*—Specimens (OO, p. 235) 702–8 (two) and 703–13, from Royer ridge, Orbisonia, Huntingdon Co.—*VII*.

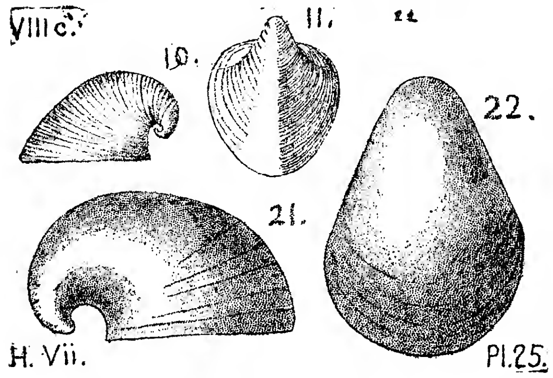
Cyrtolites filosus. See **Cyrtoceras filosum.** *II c.*

Cyrtolites ornatus. Rogers, page 821, fig. 619.—Vanuxem



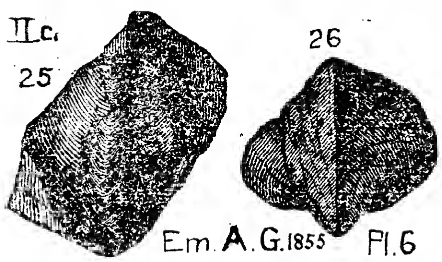
page 65, fig. 9, 2.—Emmons, page 402, fig. 111, 2. —Owens' Wisc. Iowa and Minn. (1852) plate 2B, fig. 1, from the lead bearing beds on the Mississippi 3 m. above Fort Snelling.—*Trenton limestone* II *c*.

Cyrtolites (*Cryptonella*) **pileolus** Hall, 15th An. Rt. 1862, plate 6, fig. 10, 11; Pal. N. Y. Vol. 5, part 2, plate 25, figs. 21, 22. *Hamilton.*—In Pennsylvania it was recognized by Claypole in Perry county (report F2, on Perry county, preface, p. 14) in *Hamilton* strata. *VIII c.*



Cyrtolites sinuosus. *See Appendix.— V b.*

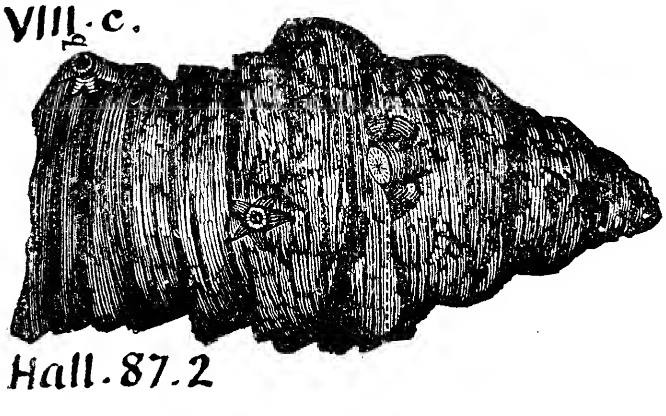
Cyrtolites subcarinatus. (Not recognized by S. A. Meller as an American species) Emmons' Amer. Geol. Vol. 1, part 2, 1855, page 167, plate 6, figs. 25, 26; "Somewhat patelliform; compressed, or sub-angular toward the base; apex incurved; mouth widely expanded."—*II c.*



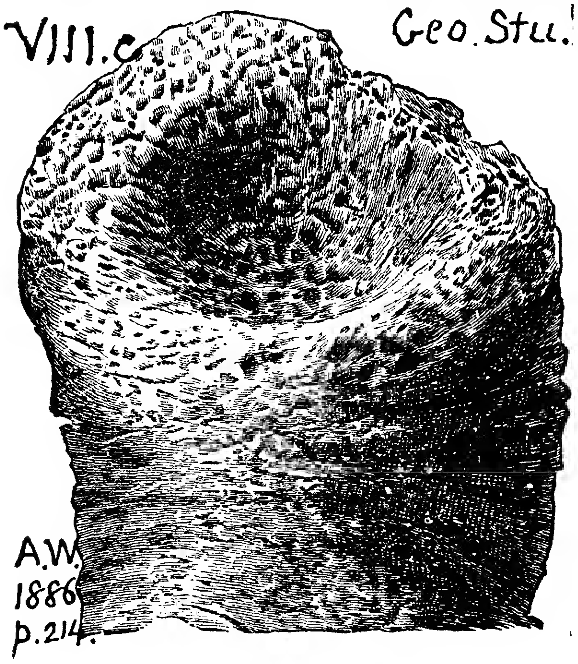
Cyrtolites trentonensis. (Conrad, Journal Acad. Nat. Sci. Phila. Vol. 8, 1842, *Trenton.*) Emmons' Amer. Geol. I, ii, page 167, plate 5, fig. 22; curvature somewhat variable, from a short curve to nearly a circle, as in fig. 38, for which *see Appendix.* Section across the shell triangular; shell quite thick.—Collected in Pennsylvania by C. E. Hall, (Ms. Rt. Dec. 30, 1876).—*II c.*

Cystidea; free crinoids, without stems and arms, and like sea urchins now living; found in the second 200′ of Randall's section at Warren, Pa., under the First Mountain Sand of the Venango Oil region, i. e., in *Pocono* (Waverly, sub-carboniferous) strata. (Carll's Rt. I, p. 53.)—*X.*

Cystiphyllum americannum. Hall, Geology of the Fourth or Western District of New York, 1843. page 209, fig. 87, 2, *Hamilton* formation. (Edwards and Haine, Monogr. Pal. Foss. 1851. Not Lonsdale's *Cystiphyllum cylindricum* of England.)— *VIII c.*

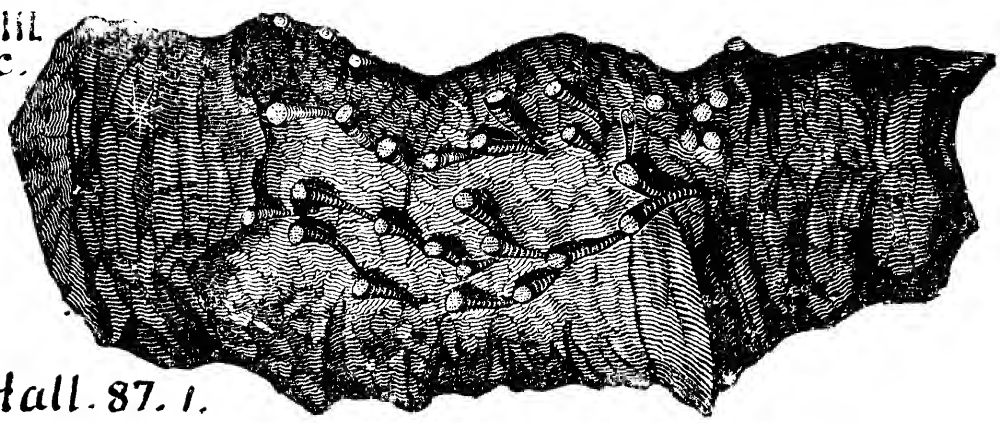


Cystiphyllum americanum continued. A good example of the species is given in Winchell's Geological studies, 1886, page 214, fig. 134; upper end of a large specimen of this common coral of the *Hamilton* formation. *VIII c.*



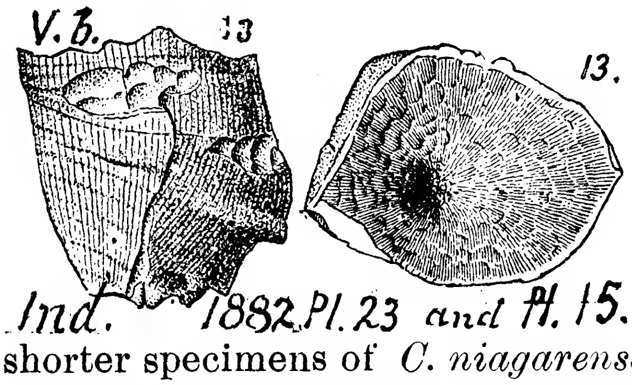
Note. The preceding figure was given by Professor Hall together with the figure next following and under the same name of *C. cylindricum*, in his volume of 1843.

Cystiphyllum cylindricum (with the bases of crinoidal



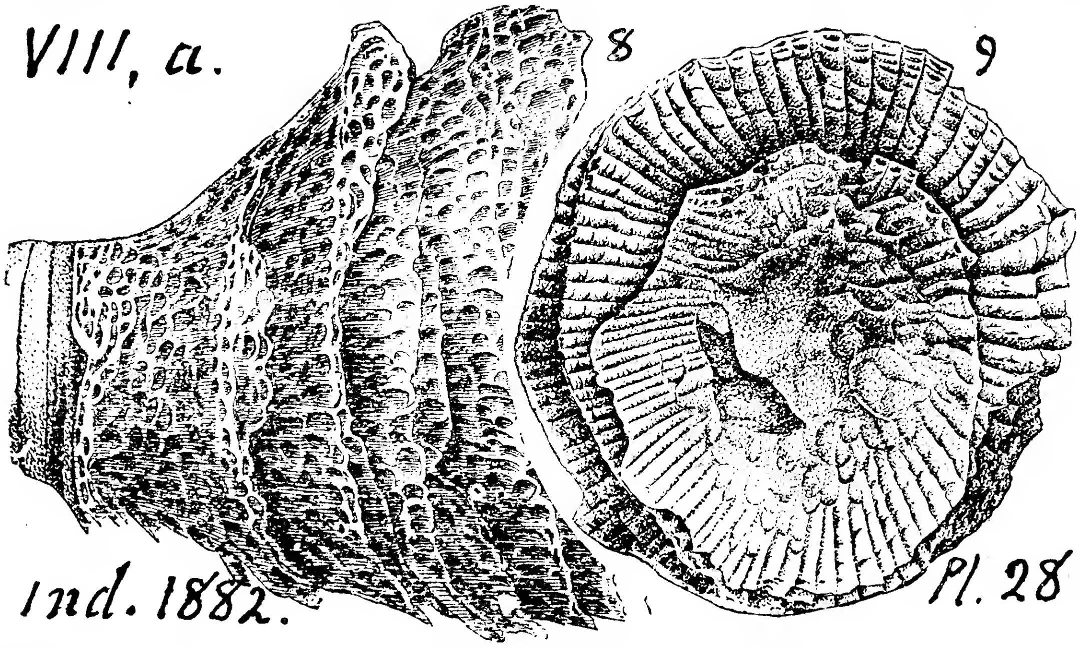
columns or stone-lily stems growing upon it.) Hall, Geology of Western New York, 1843, page 209, fig. 87, 1. Cylindrical; straight or curved; outside very rough and striated; inside wholly vesicular. *Hamilton* formation. (See Lonsdale Sil. Res., p. 691, XVI, bis. figs. 3, 3a, 3b.) *VIII c.*

Cystiphyllum granilineatum. (Hall, 25th An. Rt. N. Y. Mus. 1882.) Collet's Indiana Rt. 1882, page 274, plate 15, fig. 13, side view of an imperfect specimen, and plate 23, fig. 13, its cup (calyx.) Has a close general resemblance to the



shorter specimens of *C. niagarense*, but its lamellæ and denticulations are much finer.—Louisville, Ky. *Niagara.* V *b.*

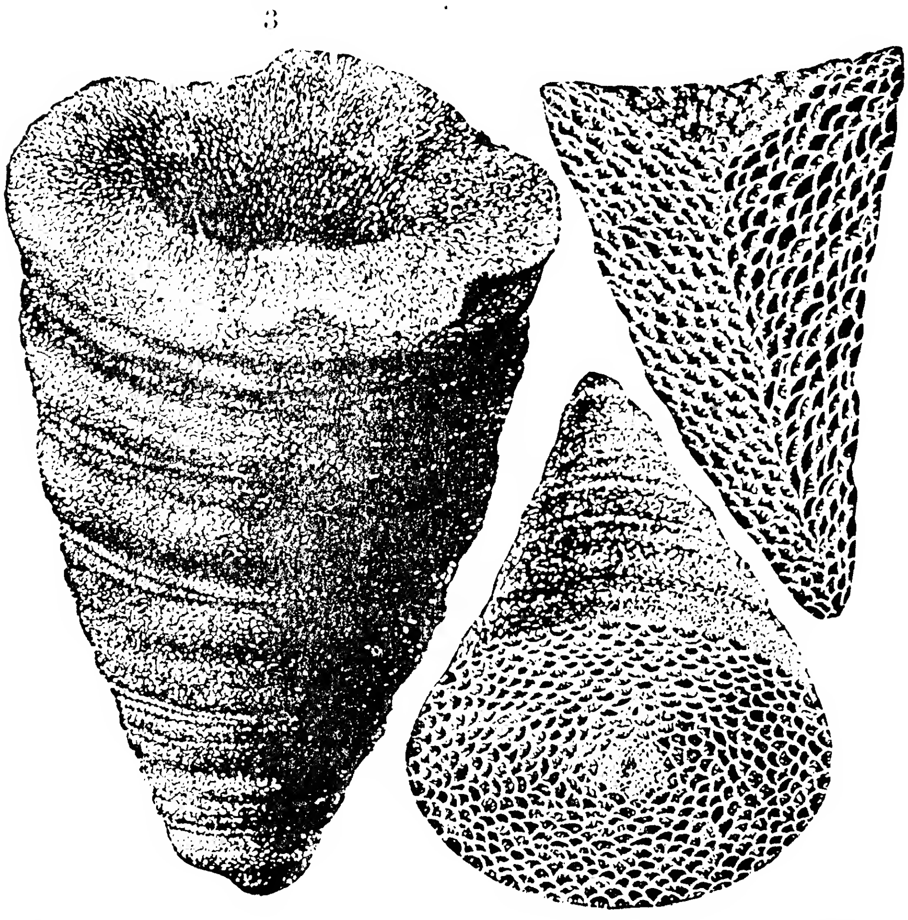
Cystiphyllum latiradium. Hall, 35th An. Rt. N. Y. Mus.



1882.) Collett's Indiana Rt. of 1882, page 304, plate 28, figs. 3, 4. Grows and looks (near its edge) like a *Chonophyllum.*—*Corniferous* limestone. Falls of the Ohio. *VIII a.*

Cystiphyllum niagarense. Compare **Cyst. granilineatum** of the *Corniferous*, above.—*V b.*

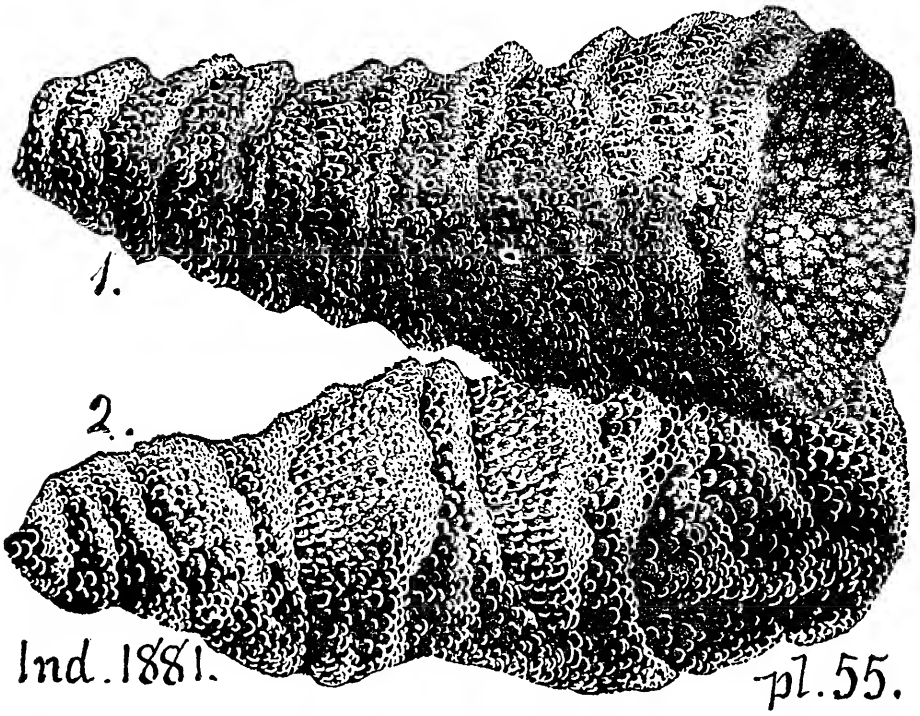
Cystiphyllum cystalatum. (Hall, 1882, Foss. Corals of



Niagara and U. Helderberg, p. 58) Collett's Indiana report of 1882, page 262, plate 9, figs. 3, side view, *natural size;* fig. 4, cross section; fig. 5 long section, (perhaps of a different species.) Van Cleve's drawings.—*Corniferous limestone*, at the Falls of the Ohio river. *VIII a.*

Cystiphyllum sulcatum. Compare **Coleophyllum pyriforme.** *VIII a.*

Cystiphyllum vesiculosum. (Goldfuss.) A widely distributed species on both sides of the Atlantic. (Nicholson. Pal. of Ontario, 1874, p. 37.) Collett's Indiana Report of 1881, page 391, plate 55, figs. 1, 2, two specimens



with much of their skin (epitheca) dissolved, drawn by Van Cleve.—Form very variable; but sack or little bladder-like interior structure always well marked. Characteristic of the *Devonian rocks.* *VIII.*

Cystiphyllum ——? in the *Genesee coral bed* (No. 8) of the section at Mapleton, Huntingdon Co. (T3, 273)—*VIII e.*

Cystiphyllum ——? in the *Hamilton upper shale* coral bed, 120′ beneath what is supposed by I. C. White to be *Tully* limestone, in the Cove station section, in Huntingdon Co., Pa. (T3, p. 107)— *VIII c.*

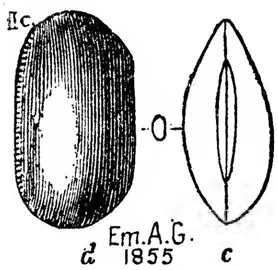
Cythere ——? See figures, *natural* size and *magnified*, under **Leperditia okeni.** *XI.*

Cythere and *Cytherina carbonaria.* See **Leperditia carbonaria,** *XI.*

Cytherellina glandella. (Whitfield, Bull. 3, Am. Mus. N. H. 1882) Collett's Indiana Rt. of 1882, plate 32, figs. 28, 29, *greatly enlarged.* Subcarboniferous limestone (Warsaw) formation, *VI.*

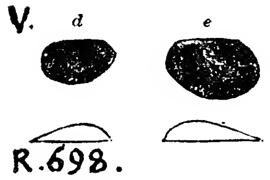
Cytherina alta. See **Leperditia alta.** *VI.*

Cytherina crenulata. Emmons' American Geology, Vol. 1, part 2, page 220, woodcut fig. 75, d, c, greatly *magnified* (see the little oval between the figures) representing the hinge or dorsal side. Valves extended back, and forming apparently a groove.—*Trenton* limestone formation at Middleville, eastern New York. *II. c.*



Cytherina fabulites. See **Leperditia fabulites.** *III. b.*

Cytherina pennsylvanica. See **Leperditia pennsylvanica,** and **Beyrichia pennsylvanica.** Rogers, page 823, fig. 699 *V a.*—The figures here given are Rupert Jones' *Lep. gibbera*, var. *scalaris*, found in black *Salina* shale. *V c.*



Cytherina pusilla. Ireland. Compare **Leperditia carbonaria.** *XI.*

Cytherina and other fossils in the *Lower Silurian* limestones of Nittany Valley in H. D. Rogers' Bellefonte section, Centre Co., Pa. (T, 56.)—*II.*

Dadoxylon serpens. See **Cordaites serpens.** *XIII.*

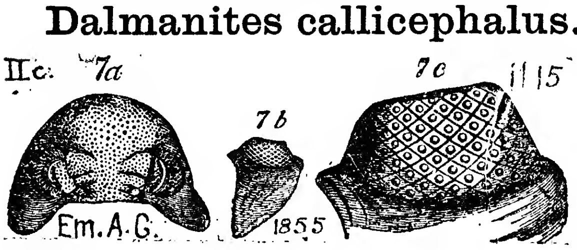
Dalmania. See **Dalmanites.**

Dalmanites (Odontocheile) ægeria (*Dalmania ægeria* Hall, 15th An. Rt. 1861, Upper Helderberg, *VIII a.*) Collected in Pennsylvania by C. E. Hall, from *Marcellus* and *Genesee.* (Ms. Rt. Dec. 30, 1876)—*VIII b, e.*

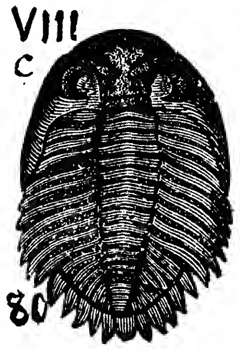
Dalmanites bicornis. *See Appendix.*—*V b.*

Dalmanites boothii (*Cryphœus boothi*, Green, 1837, Jour. Acad. Nat. Sc., Vol. 7, *Hamilton.*) Two specimens, 801–25 (OO, p. 235) collections of H. M. Chance, on Marshall's creek, Monroe Co.; 804–42 (head and tail); 804–73 (four specimens); 804–74 (four tails); 804–75 (one body); all in the collections on Marshall's creek, in *Hamilton shale*, *VIII c.*

Dalmanites callicephalus. (*Phacops callicephalus* Hall, Pal. N. Y., Vol. 1, 1847.) Trenton) Emmons' Am. Geo., Vol. 1, ii, page 214, plate 15, figs. 7*a*, *b*, *c*; 14 or 15 rings in the body lobe, and 9 in the side lobes, ending in a smooth border; 7 *a* the head of this beautiful trilobite; 7 *c* one of its eyes *highly magnified.*—*Trenton formation.* *II c.*

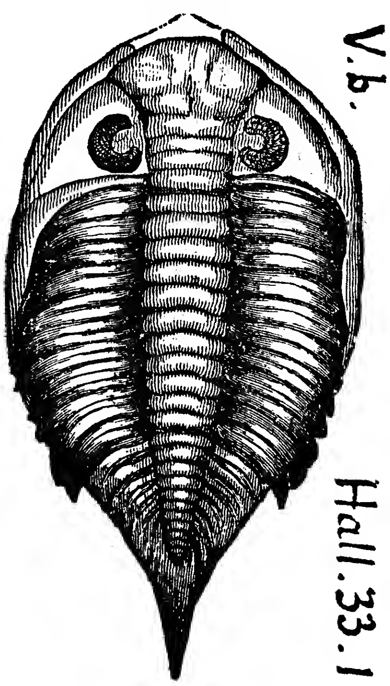


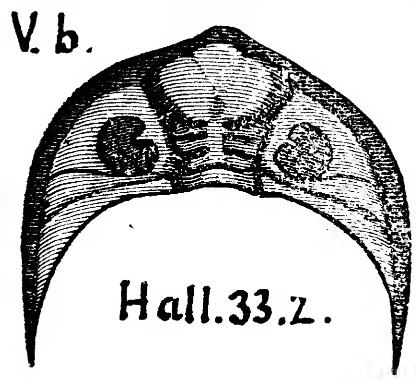
Dalmanites calliteles. (*Cryphæus calliteles*) Hall, page 200, fig. 80, 2. Hamilton formation. (Green, Amer. Jour. Sci. and Arts, Boston, 1837)—Claypole, Report F2, xiv; also OOO, 1888, collections in Perry Co., Pa. (Spec. 2–2), five spec. from Comp's mill, 2½ m. S. E. of New Bloomfield; (5–8, 47, 135) nineteen from Barnett's mills; (77 *d*–14, 99–13, 14) five from Drumgold's tannery; 110–25, two from Brickfield, 1 m. S. W. of N. B.; (118–10, 12, 13) three from N. end of Dorran's narrows, all from *Hamilton upper shales.*—Also, Huntingdon Co. near Grafton (214–5) one, from 50′ below top of Hamilton, and at Huntingdon and Mapleton. (See T3, p. 109)—In the Montour region White found it 100′ below top of *Hamilton* (G7, p. 76, 229.) Also in *Tully limestone*, Little Fishing creek section (p. 75); in Madison, Columbia Co. (p. 207, 229); Liberty, Montour Co. (p. 310); near Northumberland (p. 339); and at South Danville (p. 352).—Specimen 804–94 and 804–99 (OO, p. 235) in Marshall's creek collections, Monroe Co., 1a.—*VIII c, d.*



Dalmanites dentatus, Barrett, Amer. Jour. Sci. & Arts, Vol. XI, 1876, Lower Helderberg; found by him in the Delaware river outcrops, Pike Co., Pa., and Port Jervis, N. Y. (G6. p. 132).—*VI. See Appendix.*

Dalmanites limulurus (*Asaphus limulurus*, Green,) Hall, page 101, figs. 31, 1; 31, 2. *Niagara formation.* V *b.* (The head is found separately and very abundantly in western New York.)—Possibly Murchison's *Asaphus longicandatus.* Hall, 1843.)—In Pennsylvania collected at Orbisonia, Huntingdon Co., in limestone layers, in 133′ shale, over *Clinton fossil ore* bed. (T3, p. 141.)—By Stevenson, at Dunning's Narrows, Bedford Co., in yellow shales over Old Weaverling tunnel fossil ore bed. (T2, 150.)—*Va.*





Specimens in the cabinet. (OO, p. 233) examined by G. B. Simpson, 1888:—From shale roof of *Clinton ore bed*, McKee's mine, Mifflin Co., 501–5 (very good cast of head); 501–9; 501–11 (two); 501–26, impression of eye (b); 501–33 (three); 501–38 (tail); —— from the same outcrop, 502–3 (casts of fragments); 502–13 (cast of tail); 502–14 (a good head); 502–22 (fragment of head); 502–27 (a very small tail); 502–29 (cast of a tail); 502–38 (tail); —— from ore bed roof at Orbisonia, 504–3 (a fairly good tail); 504–6 (cast of tail); —— at McKee's bank; 505–2 (two good tails); 505–3 (perfect impression of head); 505–6; 505–15 (good head); 505–17 (head perfect except the eyes); 505–18 (head, fair); 505–22 (head, good); 505–26 (bit of tail); 27, ditto; 505–29, *h*; —— at Bell's Mills, 506–18; 506–24 (tail); —— at Matilda Furnace, 507–10 (bit of tail); 507–11; 507–14 (body & tail); 507–26. *b*; —— and at Orbisonia, 508–13 (fragment of check); 508–11; —— all from the *Clinton ore shales*, *V a*.

Dalmanites micrurus (*Asaphus micrurus*), Green, Monograph Trilobites, 1832, Lower Helderberg).—Specimen 702–12 (OO, p. 235). Collected by C. E. Hall, in Huntingdon Co. Pa. at Orbisonia, end of Royer's ridge and end of Sandy ridge, and at Three Springs, in RR. cut.—*Oriskany SS. VII.*

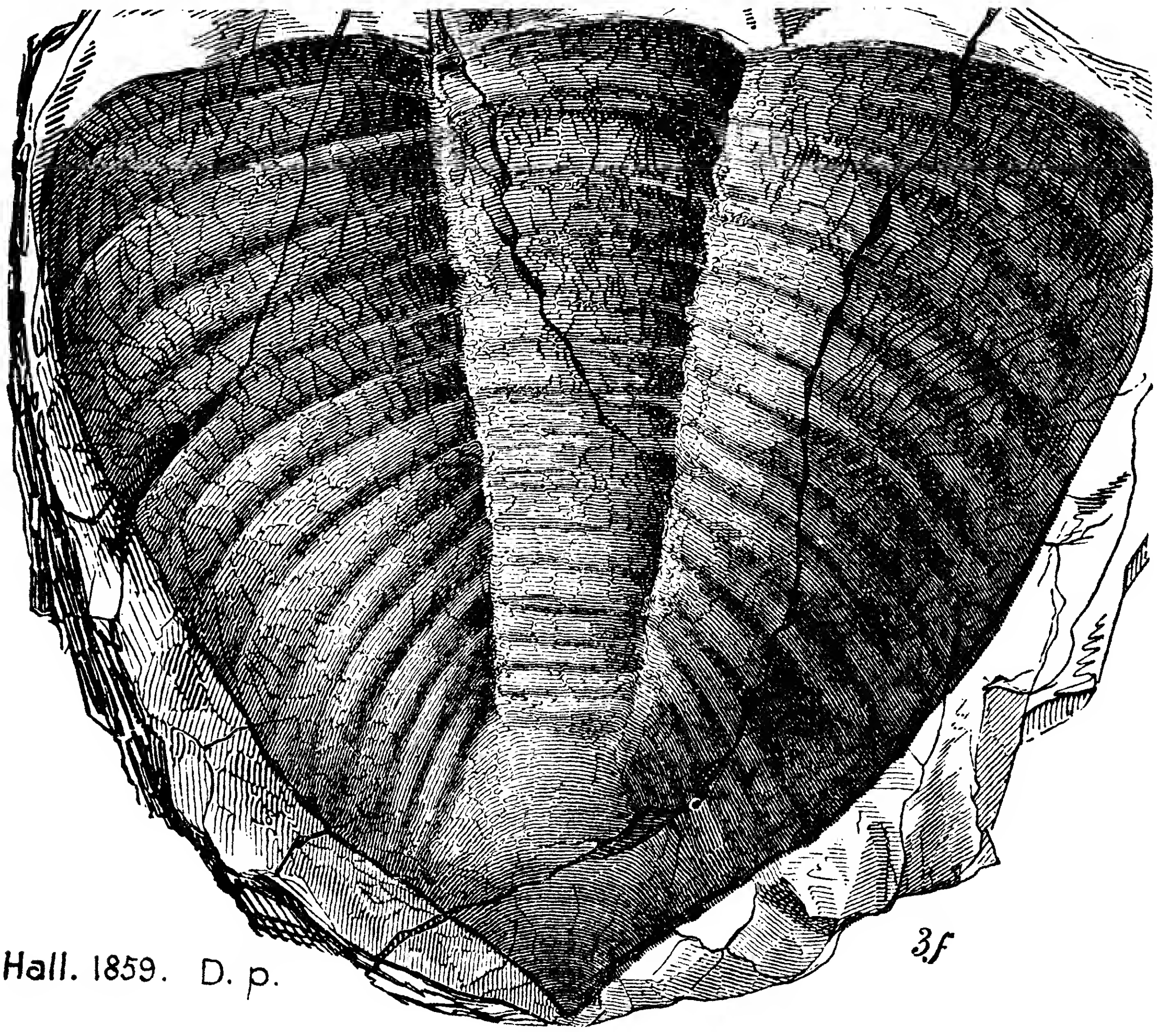
Dalmanites myrecophorus ? (*Asaphus myrecophorus*, Green. Mon. Tril., 1832, Upper Helderberg). Specimens 18–12, in Cat. OOO, 1888, collected by Claypole, in Perry Co., Pa., near the house of the Misses Barnett, in New Bloomfield, in what he calls *Marcellus limestone*, which I consider *Upper Helderberg*. J. P. L.—*VIII a.*

Dalmanites nasutus (*Asaphus nasutus*, Conrad, An. Rt. N. Y., 1841), or else—

Dalmanites pleuropteryx (*Asaphus pleuropteryx*, Green, Mon. Tril., 1831). Hall, Pal. N. Y., Vol. III, p. 359, woodcut fig., 3 f.—In Pennsylvania, Perry Co., Claypole's collections, specimens 11–5 from the Lower Helderberg chert beds, and 187–3 from the same, 3 m. E. of Ickesburg; also in Pike Co., at Port Jervis, by Dr. Barrett, in the L. Held. *Stormville shales* (G6, p. 132, 134).—*VI.*—Specimens 606–13 (three in number) from Hogback, Walpack Bend, Pike Co. Fellows' Coll., 1876 (OO, p. 234).—*Oriskany sandstone*, *VII.*

Note. *For figures see page 190.*

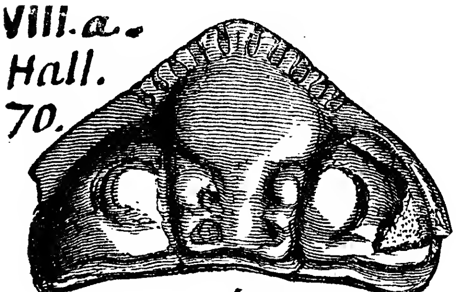
Dalmanites pleuropteryx. *See page 189.*



Hall. 1859. D. p.

Dalmanites selenurus (*Asaphus selenurus*, Eaton; *Odontocephalus selenurus.* Conrad). Hall, Geology of New York, 1843, page 175, fig. 70, 1. Vanuxem, Geology of New York, 1842, page 139, fig. 33, 1. *Corniferous* formation. (Eaton's Geol. Text Book, 1832.) More abundant in Middle than in Western New York. Hall says the lower half of the body and the tail are of especially frequent occurrence. The heads and tails are so universally found separate that Vanuxum specifies a case of finding one entire animal; before which the heads and tails were thought to belong to district tribolites, head to *Calymene*, tail to *Asaphus*.

VIII.a. Hall. 70.



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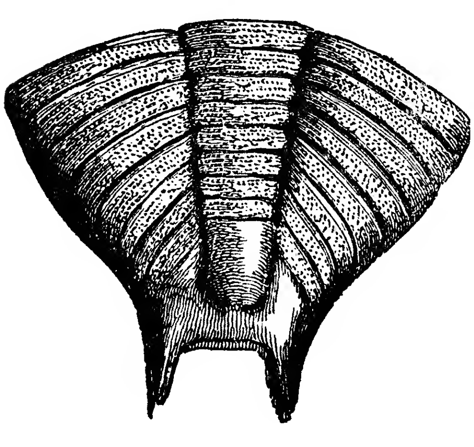
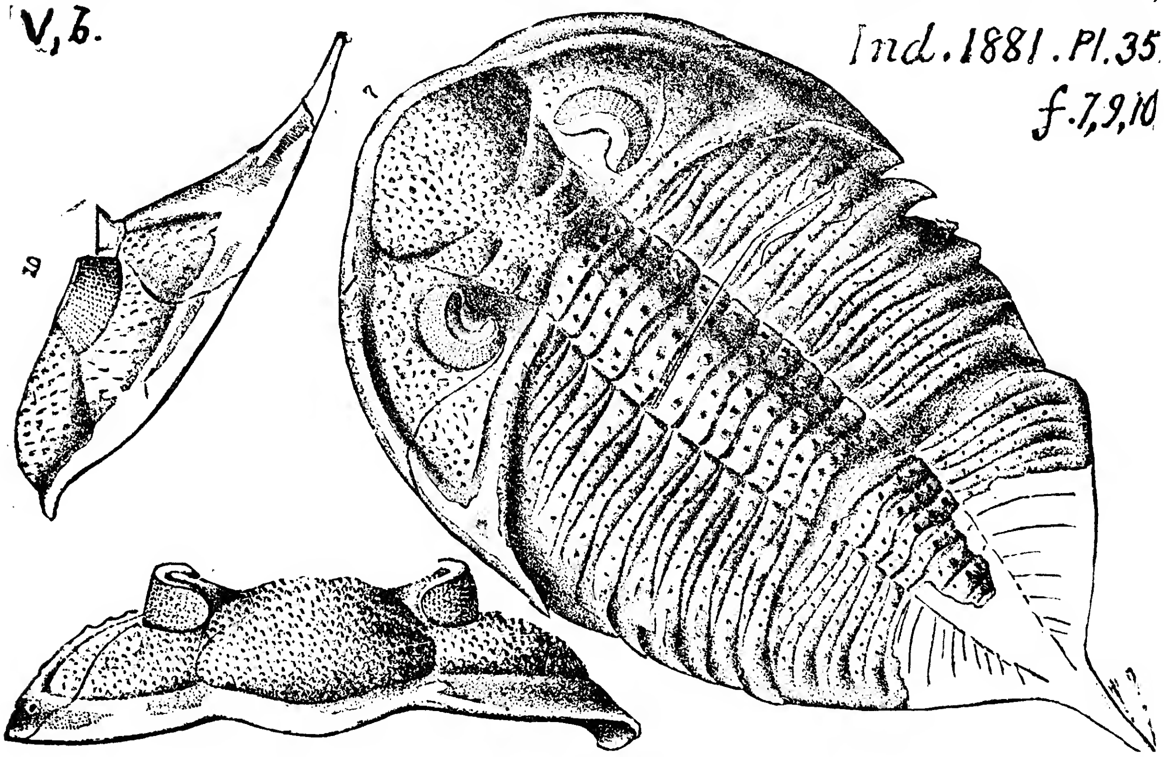


Dalmanites verrucosus. (Hall, 1863, Trans. Alb. Inst.,

V, b.

Ind. 1881. Pl. 35 f. 7, 9, 10



Vol. 4.) Collet's Indiana Rt., 1881, page 341, plate 35, fig. 7, back of a large individual, well marked; fig. 9, front view of another nearly perfect head, somewhat larger than the average, showing the suture on the left cheek; fig. 10, side view, showing the extension of the suture backward. Heads common; bodies mostly in scattered fragments, in the *Niagara limestone*, *Vb.*—Note. For other figures, 5–17, *see the Appendix.*

Dalmanites vigilans. *See Appendix.*

Dalmanites —— ? Collected by C. E. Hall at Marshall's Falls, Monroe Co. Pa. Proc. A. P. S., Jan. 15, 1876.—*VIII.*

Dalmanites —— ? A fragment, seen by I. C. White, in Clinton lower shales, Point township, Northumberland Co. Pa. G7, p. 341.—*V a.*

Dalmanites —— ? a fragment, seen by I. C. White, in Lower Helderberg strata, Centre township, Columbia Co. Pa. G7, p. 261.—*VI.*

Dalmanites —— ? Specimens 40–12, ten in number, got by Claypole at Slipping rocks, west of Mexico P. O. on Pa. RR. Perry Co., Pa., in *Marcellus* (*Corniferous !*)—*VIII a, b.*

Dalmanites —— ? in Clinton limeshales over County Farm fossil ore bank, Bedford Co., Pa. Stevenson, T2, p. 140. Also in shale in ore bed, Wolfsburg, p. 144.—*V a.*

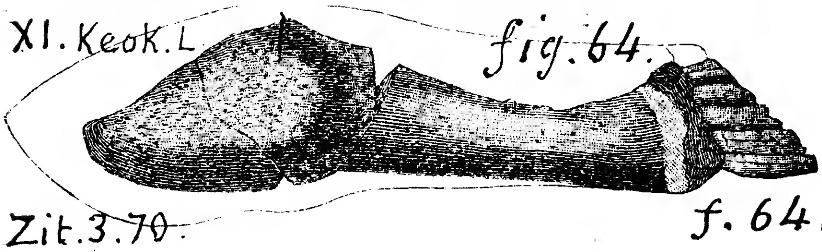
Deer, fossil. See **Cariacus dolichopsis.**
Delthyris acanthoptera. See **Spirifera disjuncta.** *VIII g.*
Delthyris acuminata. See **Spirifera acuminata.** *VIII g.*
Delthyris arenosa. See **Spirifera arenosa.** *VII.*
Delthyris brachinota. See **Spirifera brachinota.** *V a.*
Delthyris cardiospermiformis of Hisinger & Dalman. See

Delthyris complicata.

Delthyris congesta. See **Spirifera congesta.** *VIII c.*
Delthyris cuspidata. See **Spirifera disjuncta.** *VIII g.*
Delthyris crispa of Hisinger & Dalman, p. 122, III, fig. 6. See *Delthyris staminia*, and **Spirifera staminea.** *Vb.*
Delthyris decemplicata. See **Spirifer decemplicata.** *Vb.*
Delthyris disjuncta. See **Spirifera disjuncta.** *VIII g.*
Delthyris duodenaria. See **Spirifera duodenaria.** *VIII a.*
Delthyris expansus. See **Pterotheca expansa.** *II b.*
Delthyris fimbriata. See **Spirifera fimbriata.** *VIII c.*
Delthyris granulifera. See **Spirifera granulifera.** *VIIIc.*
Delthyris inermis. See **Spirifera disjuncta.** *VIII g.*
Delthyris lævis. See **Spirifera lævis.** *VIII f.*
Delthyris lynx. See **Orthis lynx.** (Rogers, pp. 820). *V a.*
Delthyris macropleura. See **Spirifera macropleura.** *VI.*
Delthyris medialis. See **Spirifera medialis.** *VIII c.*
Delthyris mesacostalis. **Spirifera mesacostalis.** *VIII g.*
Delthyris mesastrialis. See **Spirifer mesastrialis.** *VIII g.*
Delthyris mucronatus. See **Spirifera mucronata.** *VIII c*
Delthyris niagarensis. See **Spirifera niagarensis.** *V b.*
Delthyris prolata. See **Spirifera prolata.** *VIII g.*
Delthyris radiatus. See **Spirifera radiata.** *V b.*
Delthyris sculptilis. See **Spirifera sculptilis.** *VIII c.*
Delthyris sinuatus. See **Spirifera decemplicata.** *V b.*
Delthyris staminea See **Spirifera Staminea.** *V b.*

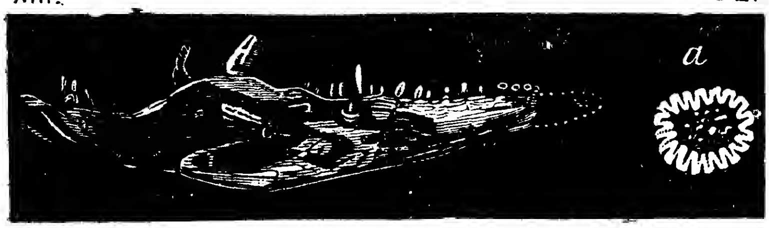
Deltodus——? (See the fishes of Illinois by Newberry, in Geol. Ill. Vol. 2, 1866, Vol. 4, 1870, for figs. of twelve species.) Recognized by Stevenson in *Crinoidal limestone*, Pittsburgh series (Barren coal measures,) Fayette Co., Pa. (L, p. 36).—*XIV.*—Also in *Decker's Cr. shale*, under Mahoning sandstone, at Morgantown, W. Va. (L, p. 37)—*XIII.*

Deltoptichius wachsmuthi. St. John & Worthen, in Illinois Reports. Zittel's handbuch, Vol. 3, page 70, fig. 64.—Subcarboniferous (*Keokuk*) limestone formation. (*Trough creek limestone.*) *XI.*

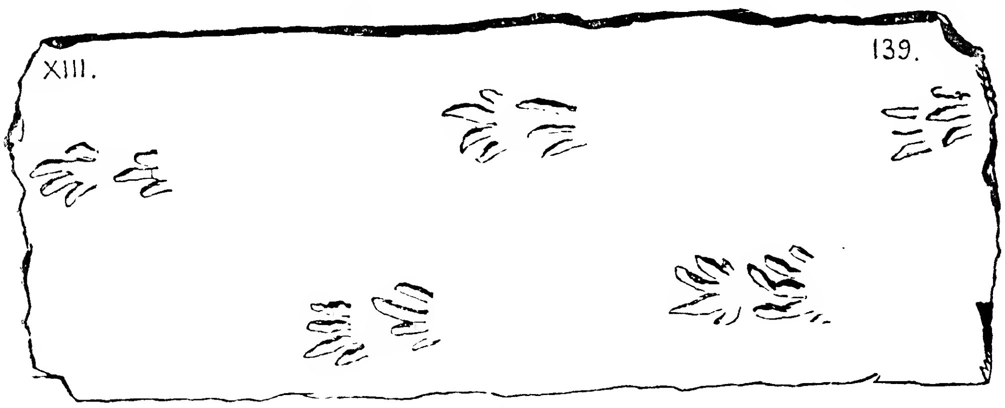


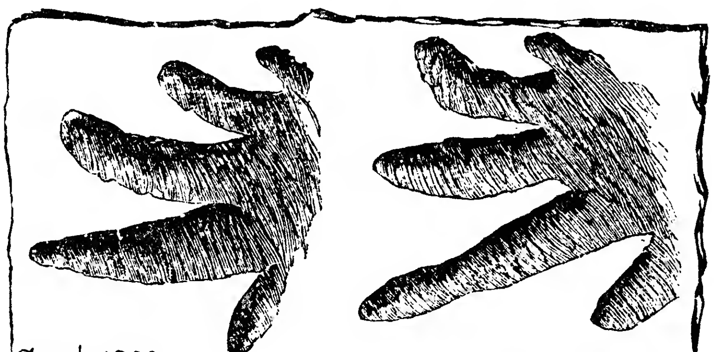
Dendrerpeton acadianum. Owen, Quar. J. Geol. Soc. 1853, Vol. 9; Dawson's Acadian Geology, 1868, p. 189, fig. 32, the jaw of a small lizard (*erpiton*) found in one of the Calamite tree stumps (*dendron*) in the cliffs of the Bay of Fundy (subdivision XV of Logan's section of the coal measures of the Joggins) by Lyell & Dawson in 1852; with two other small reptiles, *Hylonomus* and *Hylerpeton*, land shells, etc.; the first reptilian remains ever found in rocks so old as the coal-measures.—The footprints of this or similiar reptile were first found by Logan in 1841, in the Lower Coal measures of Horton Bluff, Nova Scotia, abstract of his paper in Trans. Geol. Soc. London, 1842), two years before Von Deck-

XIII. 32.



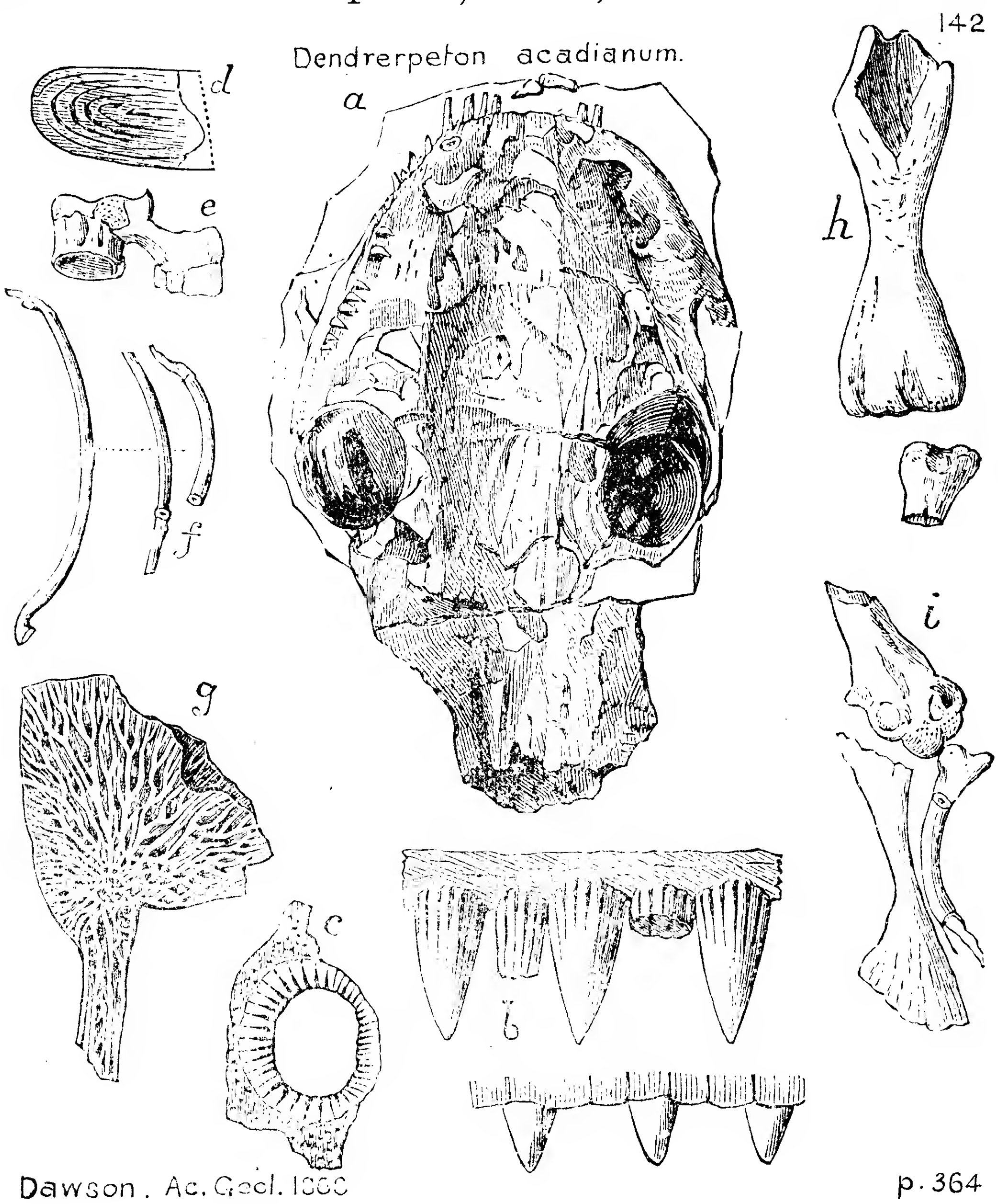
Dawson. Acad. Geol. 1868. p. 189.





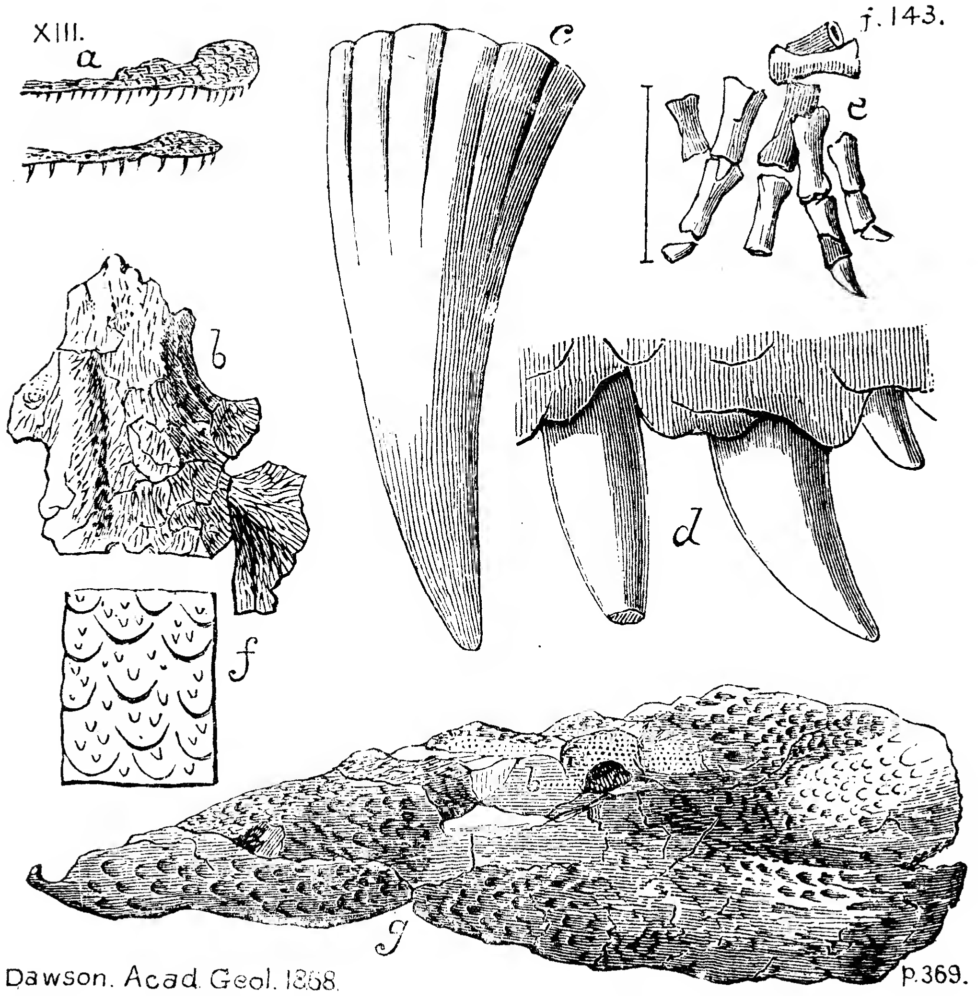
Daw. Ac. Geol. 1868. p. 356.

en's discovery of reptile bones at Saarbruck in Europe (1844), and Dr. King's discovery of footprints in Westmoreland Co., Pa. (1844); the original slab is still unpublished in the Logan collection, Museum of the Canada Survey. More footprints were found in 1844 near Tatamagonche, eastern Nova Scotia, in Upper Coal measures, with worm burrows, rain drops and suncracks; one kind made by clawed feet, the other flat-footed. Then Dr. Harding, of Windsor, found the tracks here figured, on a slab from Parrsboro', now in King's College Museum; Lower Carboniferous?; ripple marked; in which Mr. Jones afterwards found larger *Sauropus* tracks. Dr. Brown, of Sydney, then found a fine slab (now in McGill Coll. Mus. Montreal) having tracks of a large animal, with a foot three inches wide, short and broad, with five toes. See *Sauropus sydnensis*. (Dawson's Ac. Geol. p. 356, f. 139).—The head and various



parts of the skeleton are given in fig. 142, page 364, from Lyell and Dawson's joint paper in Jour. Geol. Soc. London, Vols. 9 and 10, on "The remains of a reptile and land shell discovered in the interior of an erect tree, etc.," and Dawson's paper on "The Coal measures of the South Joggins."

Dendrerpeton oweni. Dawson, Acadian Geology, 1868, p. 369, f. 143, a small reptile found in one of the erect trees (Calamites) of the Nova Scotia Coal Measures, S. Joggins section; perhaps the young of *Den. acadianum*, but more probably a smaller species, because teeth as small as these have been found quite different from them, and quite like the large teeth of *Den. acadianum*. Fig. 143 *e* is very interesting as a somewhat enlarged picture of the group of bones in the most perfect *foot* of one of these creatures ever found (1868), the pointed toe-nails of which would undoubtedly have made mud tracks like those shown under *Dend. acadianum*.



Dendrites, a mineral (Manganesian) precipitation in cracks and between layers of sandstone; mistaken for plants; occurs in all formations; e. g. on limestone at the Cornwall ore bank, Lebanon Co., Pa. (O, p. 187, spec. 4056.) *II c.*—Lower Held. limestone bed, 19, Dunnings Narrows, Juniata river gap, Bedford Co. (T, p. 192,) *VI;*—In Pocono sandstone at Mauch Chunk and a thousand other localities. *X, XI.*

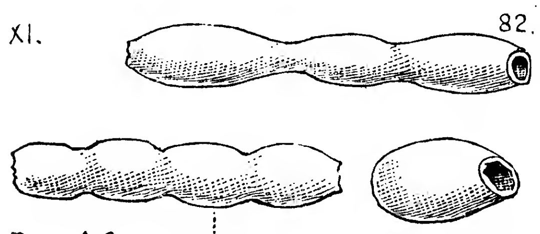
Dendrocrinus ancilla. *V b. See Appendix.*

Dendrograptus novellus. *V b. See Appendix.*

Dendrophycus desorii. Lesq. (*Desmarestia.* Rogers, pages 830, 884, plate 23.) Found at Mauch Chunk, Pa., in the top beds of the Red shale formation (No. XI) or in the bottom beds of the Conglomerate (No. XII), fifty years ago, and afterwards abundantly in the Susquehanna gap above Pittston, and lately (1884) discovered in "splendid specimens" in a clay dyke traversing Corniferous limestone beds (For. *VIII a*) at Davenport, Iowa. A type of seaweed far more highly developed than any of the more ancient algæ. Lesq. Coal Flora, Vol. 3, 1884, p. 700, pl. 88, fig. 1.—Prof. Balfour's letter to Prof. Rogers, in Geol. Pa., 1858, suggested its affinity to *Desmarestia;* which Lesquereux does not accept, preferring the strong, rooting, horizontal *Caulerpæ*, or *Syphonaceæ.*—Dawson says that it is probably not a plant at all, but a fossil cast of the rill-marks which little waves make in retreating to the edge of the shore; and he includes the *Aristophycus*, *Clæphycus*, and *Zygophycus* of Miller & Dyer from the Lower Silurian. See Geol. Hist. of Plants, 1888, p. 33.—Reported by White (G7, p. 60) in bed 28, of Catawissa section, Catskill strata; in bed 21 and 32 of the Coxton section along the river above Pittston (G7, p. 61).—*Catskill IX.—For figure see page 197.*

Dentalina priscilla. Dawson, Acadian Geology, 1868, page 285, fig. 82, *natural* size, and also *magnified six times;* a little shell very abundant on the surfaces of bed *b* of the Lower Carboniferous limestone of Windsor, N. S.—*XI.*

XI. 82.



Daw. A.G. 1868. p.285.

Desmarestia. Se **Dendrophycus desorii.** *XI.*

Desmidiaceæ, and **Diatomaceæ**, perhaps took part in the production of petroleum. (Rt. I, p. 107.)

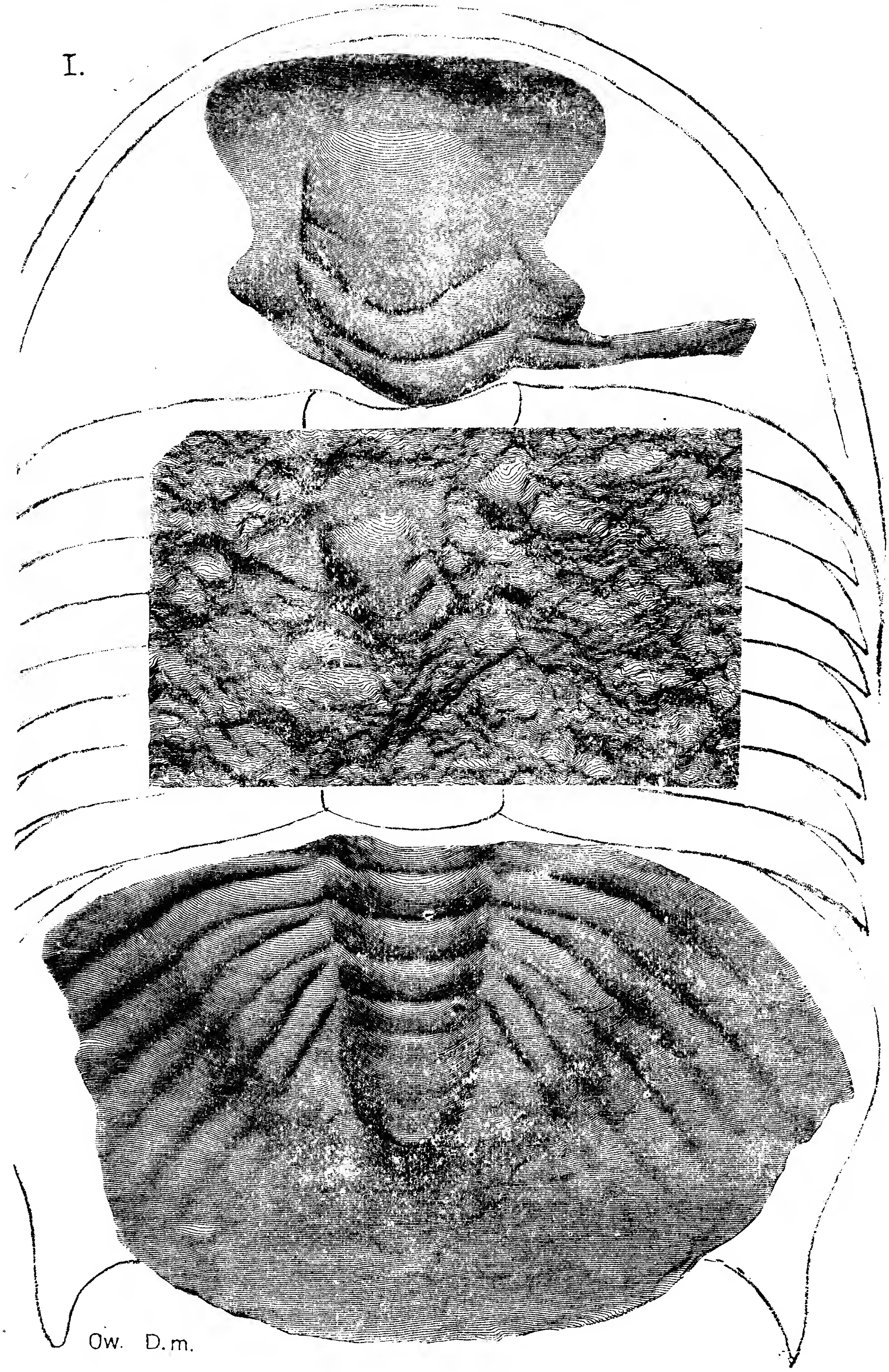
XI

H.D.R. 1858. *A Desmarestioid plant.* Pl. 23

Dicellocephalus hartii. *See on page 199.*

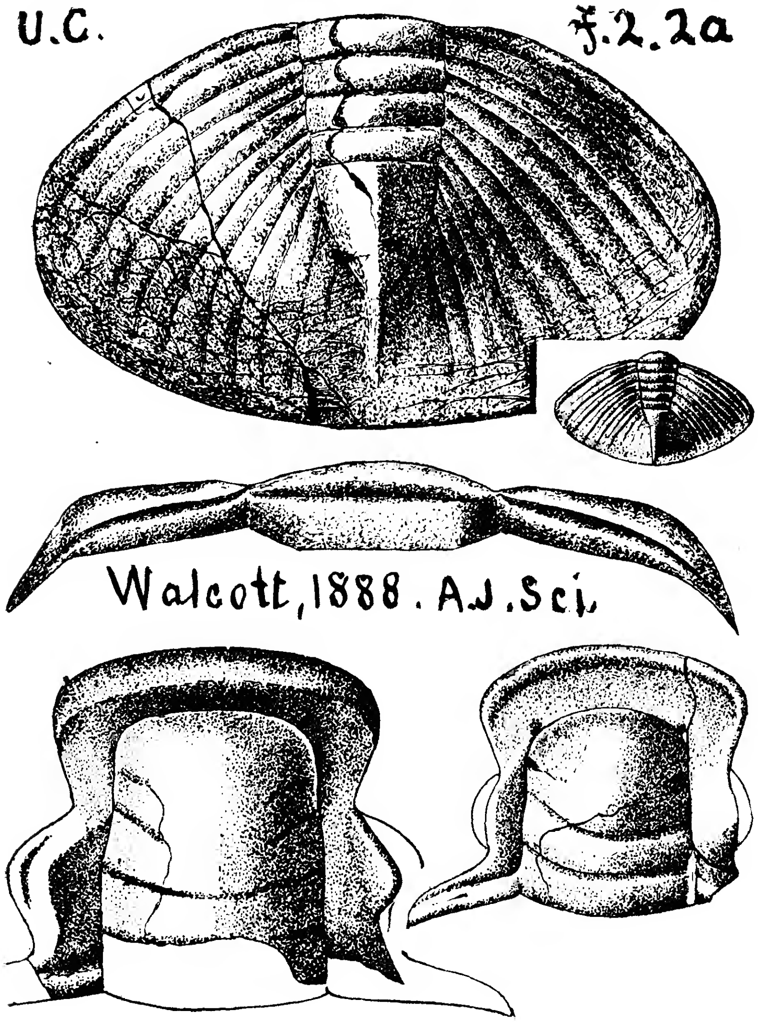
Dicellocephalus minnesotensis. Owen. Geol. Wis. Iowa

I.



and Minn. 1852, pl. 1, fig. 1, to show form and size; pl. 2, fig. 1, to show embedment in a hand specimen, "fifth trilobite bed," St. Croix river, Stillwater, Minn.—*Potsdam*, *I.*

Dicellocephalus Hartti. Walcott. Potsdam fauna of Saratoga Co., N. Y. 1888, fig. 2 and 2 a. See Bull. 30, U. S. G. S., page 62. Confined to the *Upper Cambrian* (Potsdam) formation, at Saratoga, N. Y. To be looked for in Pennsylvania along the north side of the South Mountains, and along the North and South Valley Hill ranges east and west of Chester county.—*I.*



Dicellocephalus? marcoui. See **Olenoides ? marcoui.** *Lower Cambrian.*

Dicellocephalus minnesotensis. *See on page 198.*

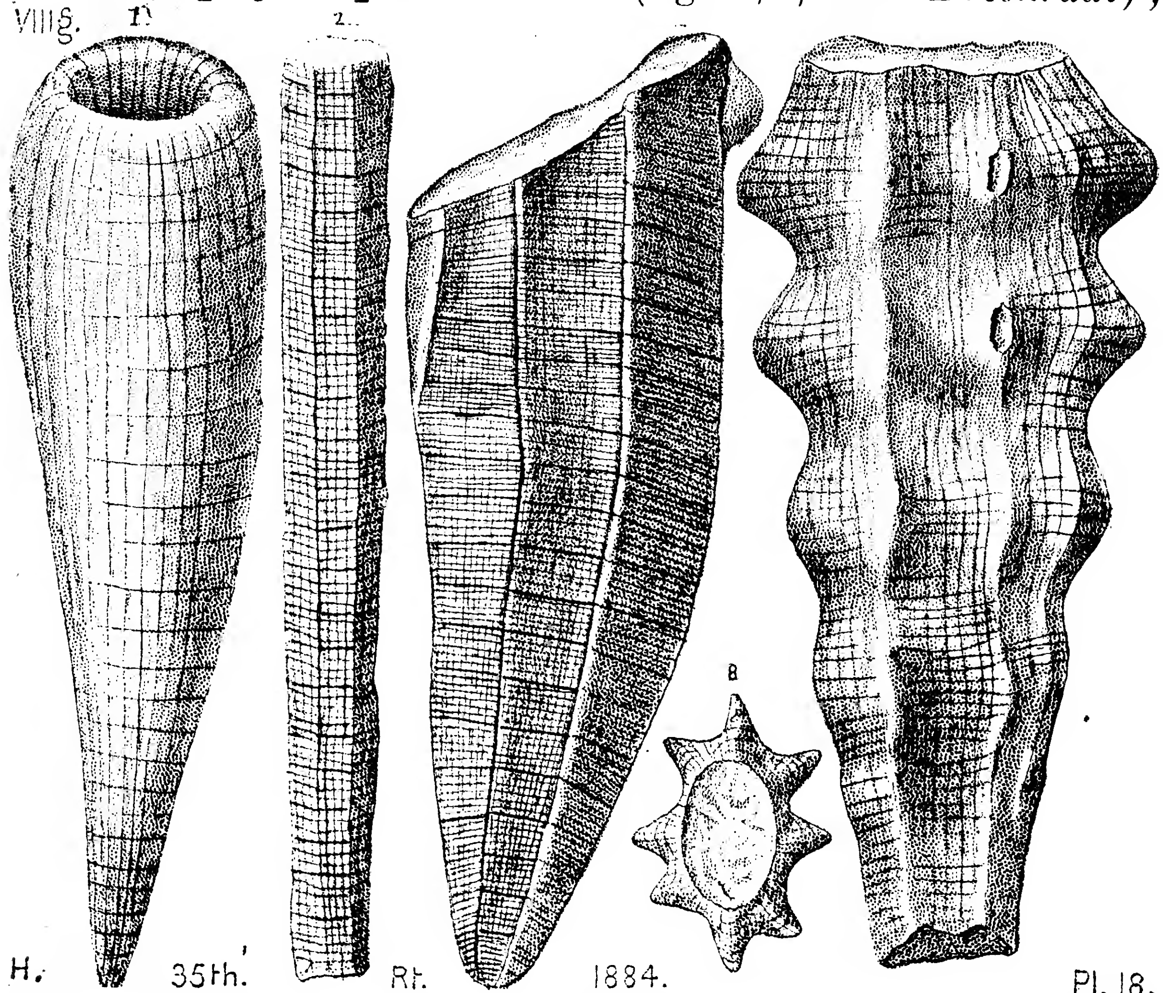
Dicolomus crassa. See **Obolella crassa.** *Low. Camb.*

Dicranophyllum dichotomum. Lesq. Coal Flora, 1880 p. 553, pl. 87, figs. 9, 9*a* (bound between folios 560 and 561 ;) a most remarkable brush like plant found by Mr. Mansfield in the roof of his Darlington (Kittanning) coal bed at Cannelton, Beaver Co., Pa. *See Appendix.*

Dicranophyllum dimorphum, is another species from the same coal bed, figured by Lesq. in Coal Flora, p. 554, pl 83, figs. 1, 2, 3. The genus, established by Grand'Eury, is allied to *Cordaites.* Lesq. p. 555.—Specimen (C, 4–7) in White's collections (OO, p. 239) on Muddy Creek, Greene Co., Pa., from roof shale of *Waynesburg Coal.—XV.*

Dictyophyton fenestratum. Hall, 16th An. Rt. 1863, Chemung; collected by Carll from Upper Chemung in the Oil Region. C. E. Hall's Ms. Rt. Dec. 30, 1876.—*VIII–IX.*

Dictyophyton prismaticum (figs. 2, 3, 4 like *D. conradi*) ;



and **D. tuberosum** (fig. 7.) selected from a range of forms given by Hall in the 35th An. Rt. N. Y. State Museum, 1884, plate (17) 18, figs. 1 to 8, showing how all the forms of this ancient sponge are naturally developed from *Cyathophycus reticulatus* of Walcott.—Abundant at many places in northern Pennsylvania and southern N Y. in *Chemung*, *VIII g*.

Dictyophytum ramosum. Lesquereux. Additions and Corrections to Coal Flora, 1884, page 827. Possibly a variety of *Dictyophyton tuberosum*, Hall, 16th An. Rt. 1863, page 90, plate 3, fig. 1 ; none of the tubercles of which are prolonged as branches; but Lesquereux's specimens have them so prolonged and inflated into half round knots at the apex. The ribboning of the stems and branches are parallel and distinct. Charleston, Tioga Co., Pa. *VIII–IX*. *See Appendix*.

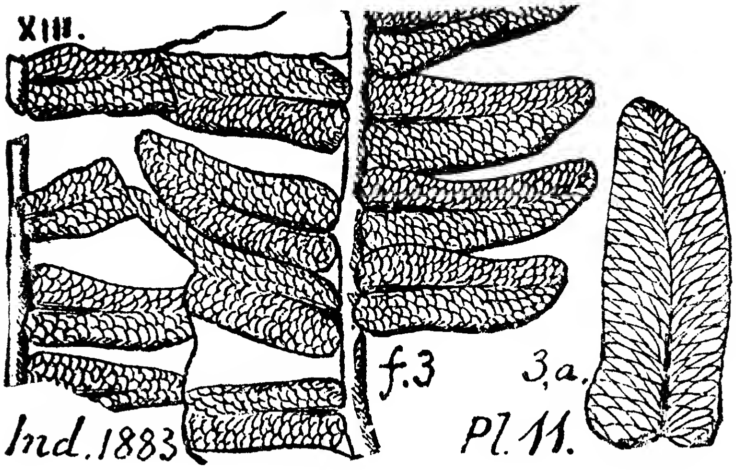
Dictyophptum redfieldi. Collected by Carll in Oil Region. (C. E. Hall's Ms. Rt. Dec. 30, 1876)—*VIII–IX*.

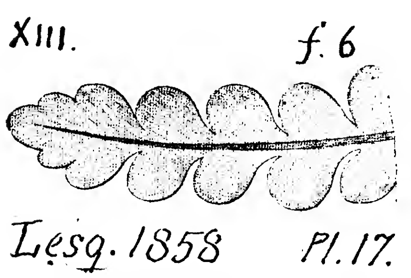
Dictyophytum tuberosum (Hall). See **D. ramosum**. Collected by Carll (C. E. Hall's Ms. Rt. 1876).—*VIII–IX*.

Dictyophyta abound in F and H of Randall's section at Warren, Pa., above and below the *Sub-olean*.—*X*, *XI*.

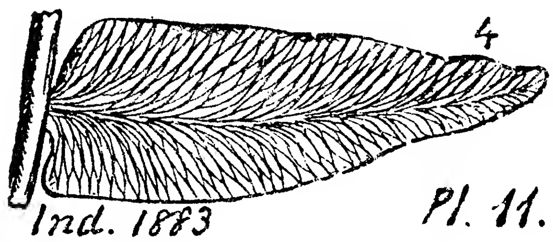
Dictyophytum —— ? New species. C. E. Hall, Ms. Rt. on Carll's collections of 1875. See Cat. of Specimens O, p. 148, 3314, in argill. SS. from Nelson farm, 3 m. N. W. of Pleasantville, Venango Co., Pa.—Bedford shale. *IX?*—Spec. 856–7, a fragment two inches long, is in Sherwood's coll. at Mixtown, Tioga Co. (OO, p. 236) from *upper Chemung*, *VIIIg.*

Dictyopteris obliqua. (Bunbury, Coal Formation of Cape Breton, Q. J. G. S. Vol. 3, plate 22, 2; Lesquereux, Geol. Penn., 1858, page 861, plate 8, fig. 6; Geol. Rt. Arkansas, plate 5, fig. 10; Report P, Coal Flora of Penn, and U. S., 1880, p. 146, plate 23, figs. 4 to 6). Collett's Indiana Rt., 1883, page 55, plate 11, fig. 3.—*XIII.* Coal measures; remarkable for its great range and long life, as it is found from Sub-Conglomerate up to Pittsburgh and St. Clairville coal beds; and everywhere in all our coal fields; so abundant in a bed at Treverton, Pa., that it makes it a mere mat of leaves; Salem vein, Pottsville; rare in Arkansas; frequent in Mazon creek nodules; also at Cannelton; Pittston; Wilkes-Barre; in Rhode Island &c. Lesq.—*XI* to *XV.*



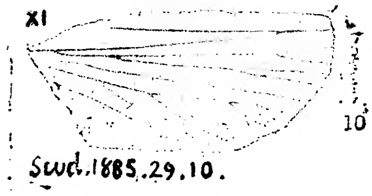


Dictyopteris rubella. (Lesquereux. Coal Flora, page 145, plate 23, figs. 7 to 10; Geol. Rt. Illinois, Vol. 4, pl. 7, fig. 2 to 6.) Collett's Ind., 1883, page 55, plate 11, fig. 4.—Low coal at Murphreysboro'. Lesquereux. —*XIII.*



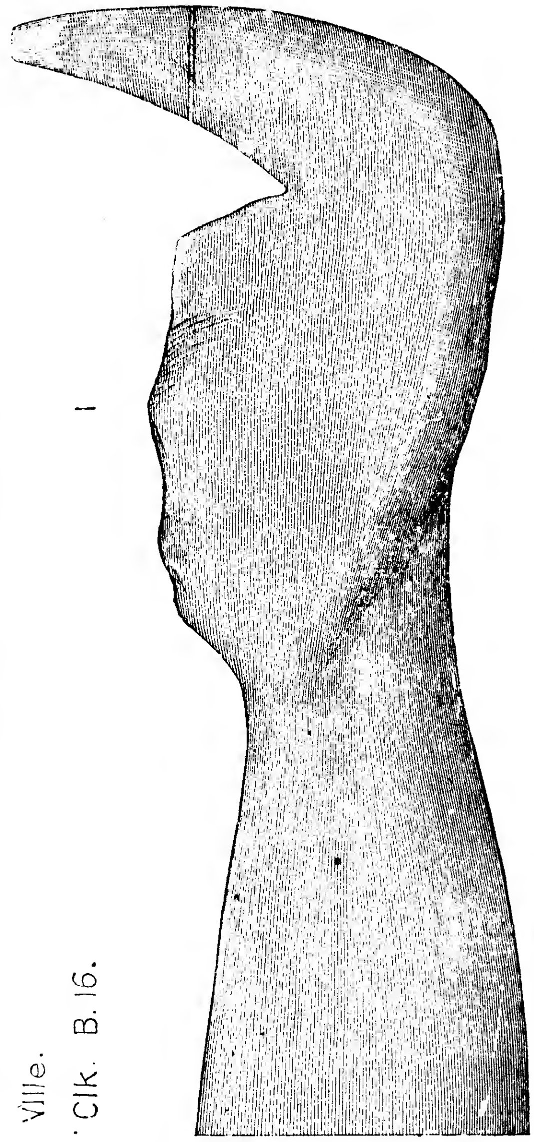
Dictyopteris scheuchzeri. Hoffm. In Roem. Pflauz. Hartze, Pal. IX, pl. 32, f. 1, Lesquereux's Additions to Coal Flora, 1884, P, p. 832. One specimen from Port Griffith; the other from Penn. Anthracite C. Co.'s mine at Moosic, Lackawanna County, Pa.—*XIII.*

Dieconeura rigida. Scudder. Mem. Bost. S. N. H., 1885 plate 29, f. 10, insect's wing, found in sub-conglomerate black slate in the Pittston gap, Luzerne Co., Pa. Lacoe's collection. —*XI.*



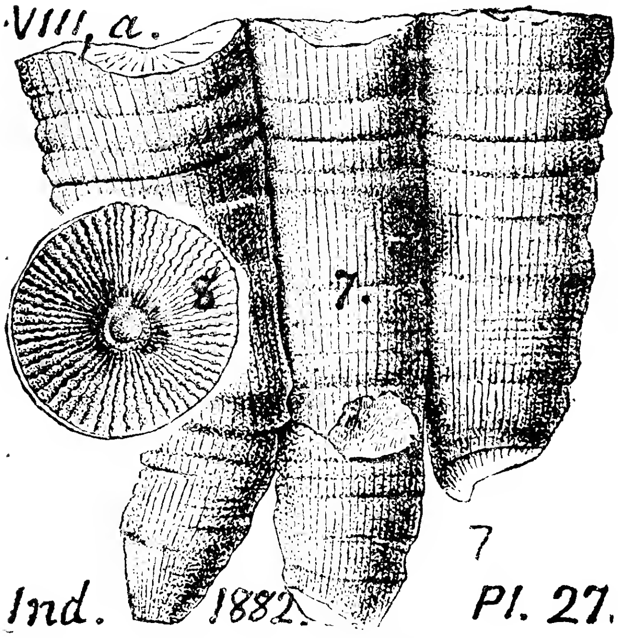
Dinichthys herzeri. (Newberry. Pal. of Ohio, Vol. 1, 1873, page 316, plate 30, fig. 1, ($\frac{1}{3}$ of the natural size in the original drawing, i. e. about 2 feet long; and again *reduced* $5\frac{1}{2}$: 4,) inside face of jaw, set with small teeth, and ending in a large tooth. —VIII *b* (? VIII *e*) Delaware, Ohio, Huron shale. *VIIIb* (*VIIIe?*)

Dinichthys newberryi. Clarke, Bull. 16, U. S. G. S., 1885,



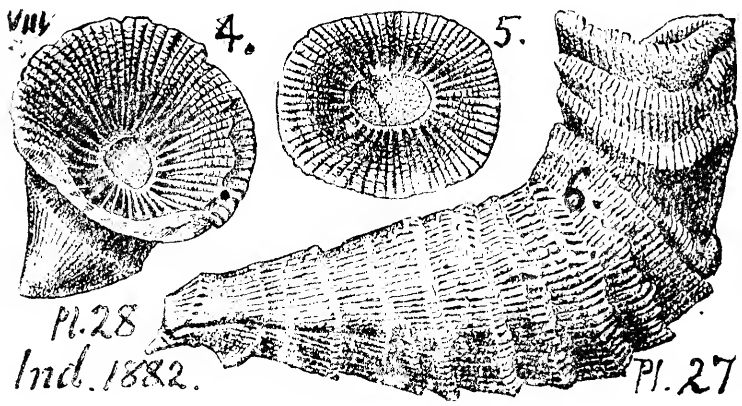
p. 17, 18, plate 1, fig. 1, the front ⅔ of lower jaw, *reduced to one-half its natural size*, from [a] concretion in the *Styliola bed* (*Genesee*) in Blacksmith gully, Bristol Centre, N. Y.—VIII *e*.—Note. The tooth bearing edge has no teeth but is like a knife edge, like *Din. terrelli* but the jaw is stout like *Din. herzeri*. Newberry's specimens (described 1873), were from the *Huron shale* (*Genesee*) of Ohio. See also a new *Dinichthys* from the Portage of West N. Y. by E. N. S. Ringueberg, Am. Jour. Sci., Vol. 27, June, 1884.—*VIII e*.

Diphyphyllum adnatum. (Hall, 35th An. Rt. Mus. 1882.) Collett's Indian Rt., 1882, page 303, plate 27; figs. 7,8.—Falls of Ohio, *Corniferous limestone*.—*VIII a*.



The genus is Lonsdale's. Hall's description of the species on page 458 of the 35th An. Rt. is as follows: "Corallum sub-cylindrical, simple or compound, increasing by lateral gemmation, frequently in contact for their entire length; exterior with very regular annulations and concentric striæ; longitudinal striæ distinct; diameter varying from 12 to 20 mm.; calyx bell-shaped, depth about 10 mm.; number of lamellæ 50, of uniform thickness, alternate lamellæ continuing to internal wall; space inclosed by vertical wall, 3 mm. in diameter."

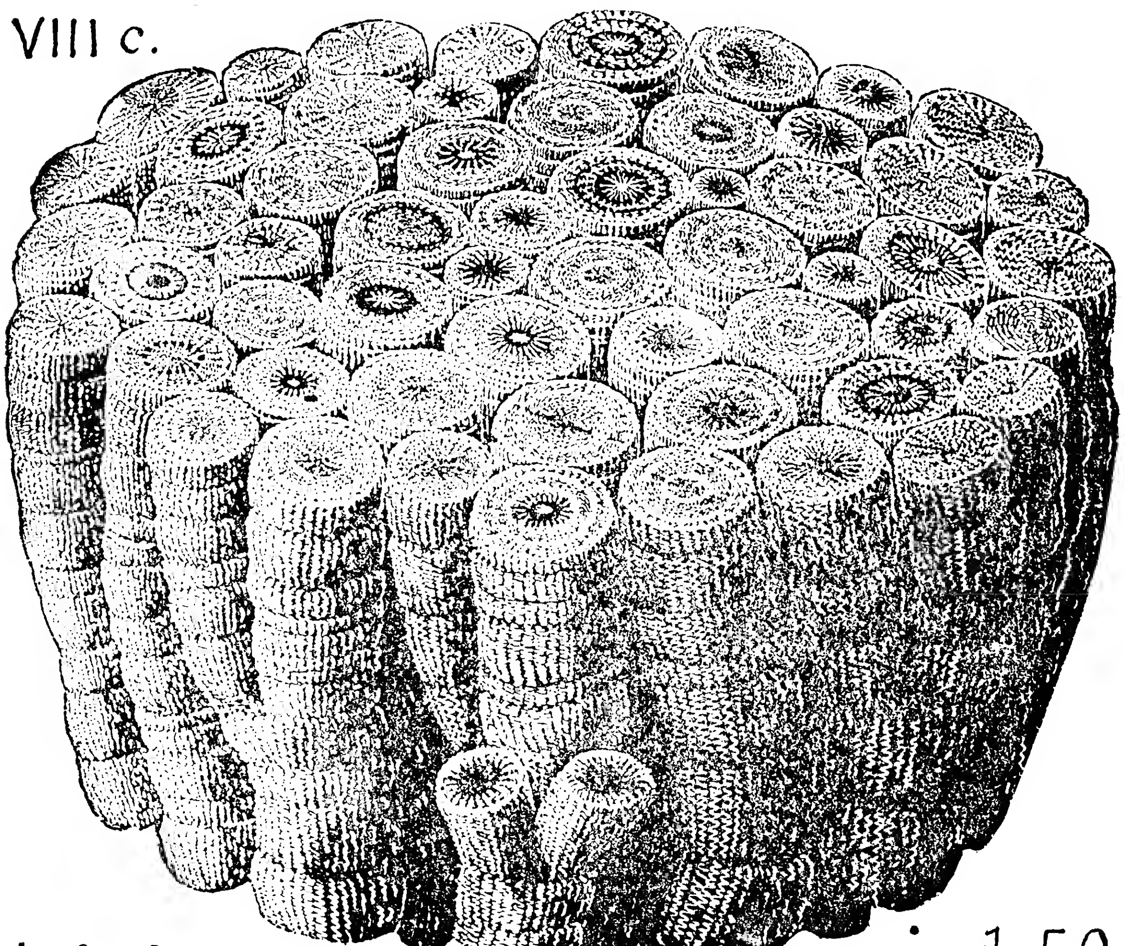
Diphyphyllum apertum. (Hall. 35th An. Rt. Mus. N.Y., 1882) Collett's Indiana Rt. 1882, page 303, plate 27, fig. 6, side view, plate 28, fig. 4, back view looking into calyx; fig. 5, calyx. Falls of Ohio. *Corniferous limestone*. — *VIII a*.—



The description given by Hall (35th Annual Report of the New York State Museum, 1884, page 458) is "Corallum simple, sub-cylindrical, straight or curyed, gradually or more rapidly expanding; when decorticated presenting a distinct invaginated appearance; length of one individual 60 mm.; calix bell-shaped, diameter 20 mm., depth 10 mm.; number of lamellæ from 60 to 70, of nearly uniform size at the margin, alternating below, the principal ones extending to the vertical internal wall; denticulations prominent, 10 in the space of 5 mm.; inclosed internal area oval or horse shoe-shaped, from 4 to 6 mm in diameter, anterior side indented by a deep, narrow fossette.—*Formation and locality.* Corniferous limestone, Falls of the Ohio. —*VIII a.*"

Diphyphyllum archiaci. Billings. Collett's Indiana Re-

VIII c.

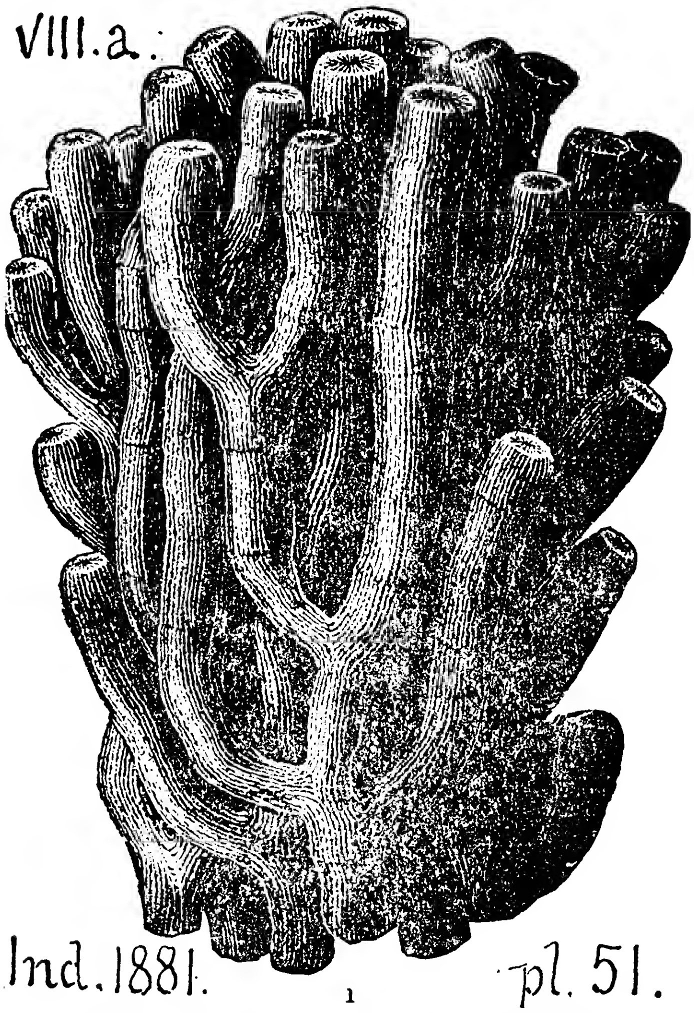


Ind. 1881 pl 50.

port of 1881, page 387, plate 50, fig. 1, side of corallum and upper ends of corallites cut off. *Hamilton* in Canada. (Found in all the Devonian strata of Indiana. Collett.)—*VIII c.*

Diphyphyllum arundinaceum. Billings. Collett's Indiana Report of 1881, page 389, plate 51, fig. 1. Side view of a mass of corallites. (Allied to *D. stramineum*, but is larger, Nicholson.)—*Corniferous limestone* in Iowa.—*VIII a.*

VIII.a.



Ind. 1881. 1 pl. 51.

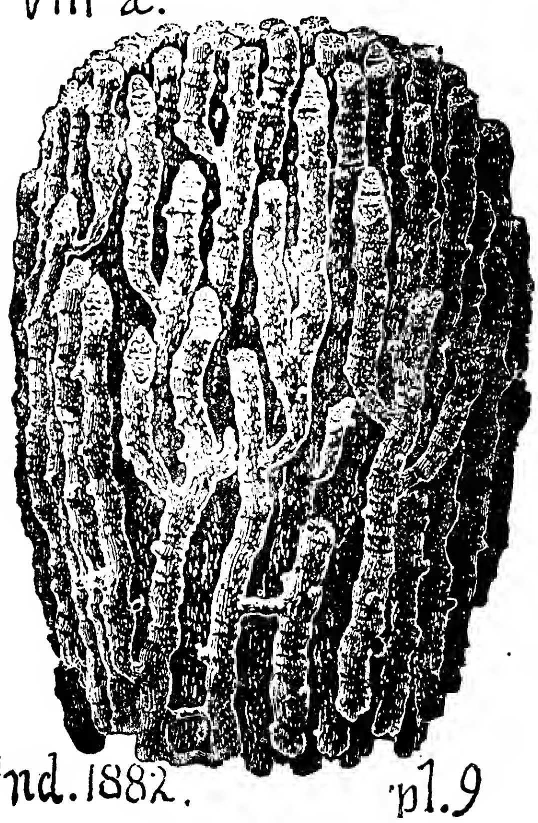
Diphyphyllum breve,
Hall, 35th Rt.

Diphyphyllum Cylindraccum,
Hall, 35th Rt.

Diphyphyllum tumidulum,
Hall, 35th Rt.
all VIII a.

Diphyphyllum stamineum. Billings. Collett's Indiana Report of 1882, page 261, plate 9, fig. 2.—*Upper Helderberg* (*Corniferous limestone*) *formation*, *VIII a*,—Several specimens of an undetermined species of *Diphyphyllum* are noted by G. B. Simpson (1888), in Hale & Hall's collections of 1875, from near Orbisonia, Hunt. Co., Pa. (OO, p. 234) 601–30 ; 605–3 ; and a very large specimen, 610–9, from Miller's farm, on Warrior ridge, Barre township in Huntingdon County by C. E. Billin; all from the *Lower Helderberg formation*, *VI.*

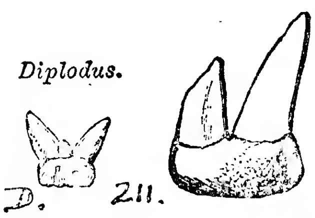
VIII a. 2



Ind. 1882. pl. 9

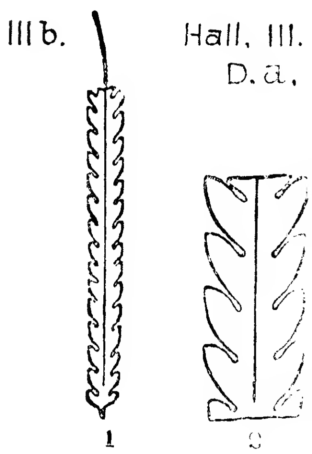
Dipleura dekayi. See **Homalonotus dekayi**. *VIIIb. c.*

Diplodus *fish teeth*. Dawson's Acad. Geol. 1868, p. 211, fig. 57, *Diplodus penetrans* from the Pictou coal mines; and fig. 58, *Diplodus acinaces*, from the roof shales of the Main coal at Pictou, N. S.—*XIII.*

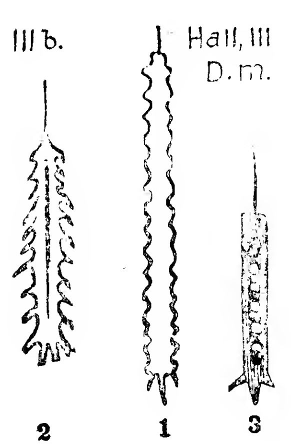


Diplodus ? *fish tooth*, from the Upper Barren coal measure (Washington Middle) limestone No. 4. of the Washington County Group, in Prof. Adney's collection at W. & J. College; a fragment from the middle layers of the limestone. Stevenson searched in vain for other examples; but the lower layers in the RR. cut to first tunnel east from Claysville yielded a *fish spine*; and Prof. Jones has a fine *spine* from a boulder of the same. (K, p. 49.)—*XVI.*

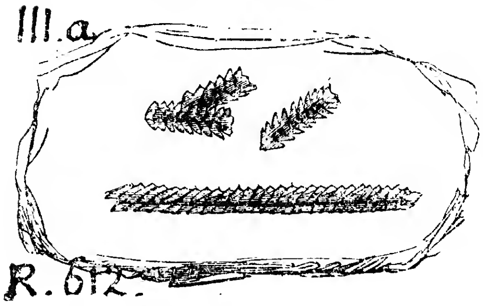
Diplograptus (Graptolithus) **angustifolius,** Hall Pal. N. Y. Vol. 3, p. 515, wood cut fig. 1, a single stipe, twice the natural size; fig. 2, a portion still farther enlarged. The midrib projects beyond the serrated portion like a single hair. The saw teeth (serratures) are arranged in the proportion of about 28 to 30 in the space of an inch. Portions of the teeth differ from those of any other species in the formation, and often are more like those of fossil ferns, and are not always quite opposite to each other. *Hudson River slate*, *III b.*



Diplograptus (Graptolithus) **marcidus**. Hall, Pal. N. Y. vol. 3, p. 514, 515, wood cuts, 1, a specimen more contracted than usual, with blunt teeth; 2, one more expanded, with distinct teeth at the lower end and a minute radical below; 3, a young form with teeth undeveloped or flattened in the line of their direction, and minute fibres or radicles at the base well preserved. Species not absolutely well determined. This and *D. angustifolius*, *G. whitfieldi*, *G. spinulosus*, *and Reteograptus geinitzianus*, are found together near Albany in *Hudson River slate*, *III b.*

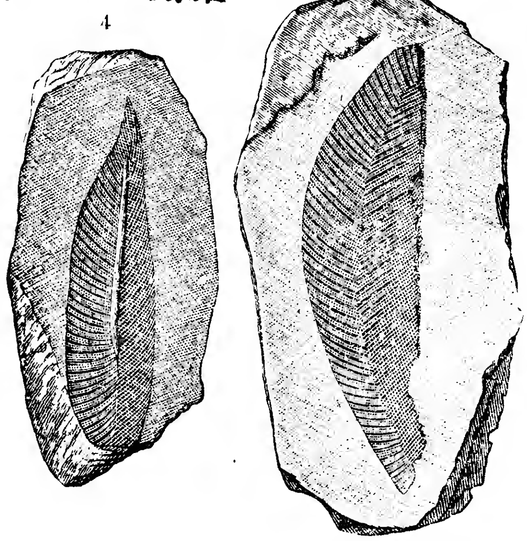


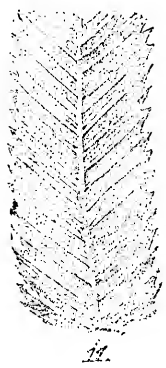
Diplograptus pristis. (*Graptolithus pristis.*) Rogers, page 820, fig. 612. *IIIb.* Lorraine (Hudson River) formation. (Hisinger's *Prionotus pristis*, Leth. Suec. S. A. Miller). (Note. This as *Diplograpsus*, is not a Hudson River fossil, but occurs in the *L. C.* Lower Cambrian (Georgian) formation of eastern New York and Vermont; but its presence in the slates of No. III in Pennsylvania argues that either it continued to live into Hudson river (Lorraine) times, or that Walcott's view of its habitat is erroneous. It must be observed, however, that this, or some other *graptolite* is found in a graphitic (?) calcareous slate in Sinking Valley, Blair Co., Pa., 5,000 feet beneath the bottom of the *Utica slate.* (T, p. 245).—*II a.*



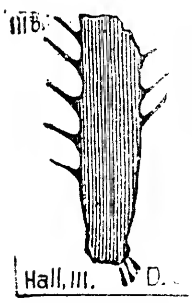
Diplograptus ? simplex. (*Fucoides simplex*, Emmons; *Fucoides secalinus*, Eaton; *Graptolithus secalinus*, Hall; *Diplograpsus simplex*, Emmons, Amer. Geol. Vol. 1, part 2, page 104, plate 1, fig. 11, added here for comparison.) Walcott, Bulletin U. S. G. S. No. 30, page 92, plate 11, fig. 4, 4*a*, natural size.—*L. C. Lower Cambrian* (*Georgian*) formation, Parker's quarry, Vt.—(See also Em mons' Taconic system, 1844, plate 5, fig. 1.)

M.C. Pl.XI.



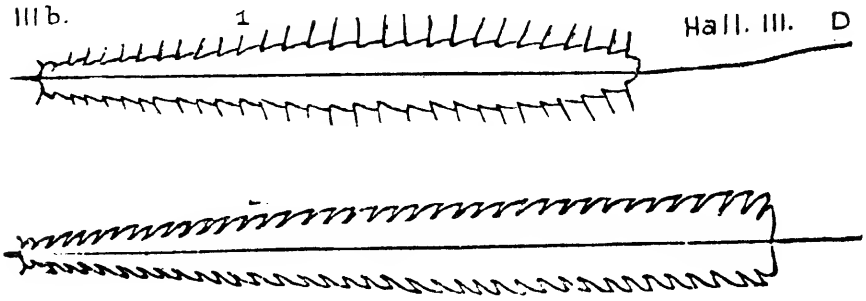


Diplograptus (Graptolithus) **spinulosus.** Hall, Pal. N. Y. Vol. 3, p. 517. Wood cut of a fragment of this species of graptolite *enlarged to twice its natural size*, found with the preceding species near Albany in the slates of the Hudson River formation, *III b.*



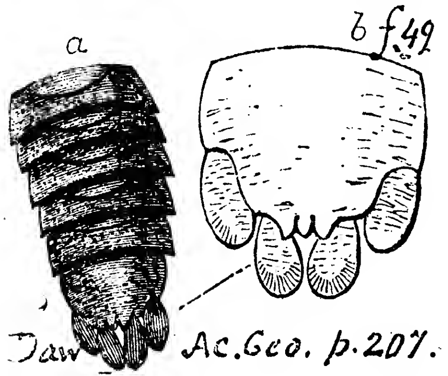
NOTE.—This species exhibits no distinct saw teeth (serratures) above its edges; but only undulations as bases of the hair like spines which take the place of teeth in other species.

Diplograptus (Graptolithus) **whitfieldi.** Hall, Pal. N. Y. Vol. 3, p. 516. Wood cuts, 1, 2. Hudson river formation. *III b.*



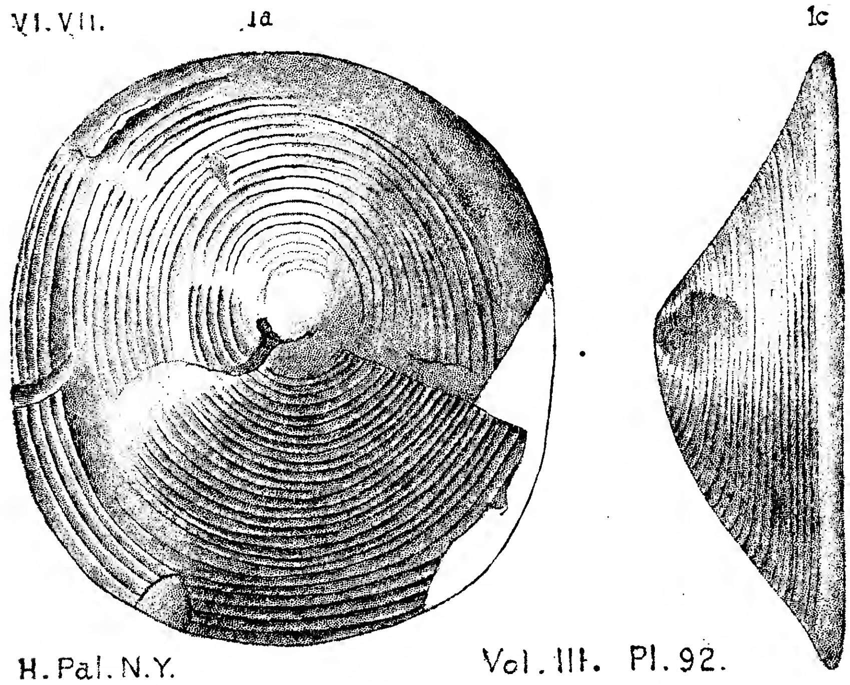
Dipterus —— ? found in the *fish beds*, horizon N. of Randall's section at Warren, Pa. (*IIII*, p. 306; See Cat. OOO, 1880.) *Chemung-Catskill*, *VIII–IX.*

Diplostylus dawsoni, Salter. Dawson's Acadian Geology, 1868, page 207, fig. 47a, *natural size*, the end of the body of a crustacean of the *Eurypterus* family, found in the coal strata of the Joggins, Nova Scotia, in a plant bed in the middle of the series; *b*, the last joint *enlarged.—XIII.*



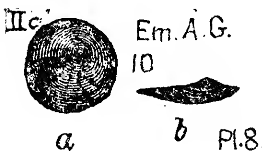
Discina alleghania. Hall. *See Appendix.*

Discina (*grandis*) **ampla.** (Hall, 1867, Pal. N. Y. Vol. 3, p. 406, plate, 92, figs. 1*a*, 1*c*. Oriskany SS.) Claypole's list of fossils in Perry Co., Pa. Preface to F, 2, page xiii. VI, Lower Helderberg formation.—Spec. X–6.—Also, found by White, in Montour Co., Cooper township, in Oriskany SS. (G7, p. 86, 297.)—*VII.*—Specimens 804–14, 804–30, (OO, p. 235) in the Cabinet, are reported as collected by Fellows & Genth, in 1875, at Marshall's Creek, Monroe Co., from

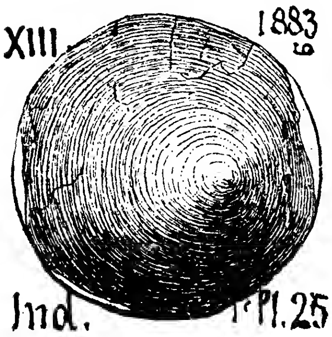


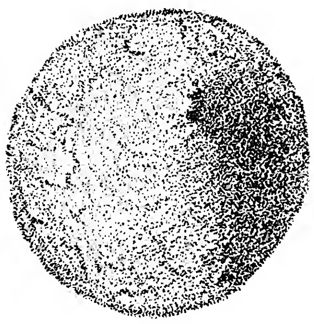
Hamilton strata, *VIII c.* Spec. 858–17 (too poor to identify with certainty) from Mansfield, Tioga Co. *Chemung.* *VIII g.*

Discina circe. (Billings, Pal. Foss. Vol. 1, 1862, *Discina lamellosa*, Hall, 1847; *Orbicula lamellosa*, Broderick, 1833.) Emmons, Am. Geol. 1855. I, ii, 200, plate 8, fig. 10.—*Trenton limestone formation.* *II c.*



Discina convexa. (Shumard, Trans. St. Louis Acad. Sc. Vol. 1, 1858, p. 231, from the Upper Coal Measures of Kansas.) Collett's Indiana Rt. 1882, page 121, plate 25, fig. 9, *natural size*, upper side of upper valve—Coal measures of Vermillion Co., Ind.—*XIII.* The second figure is from a specimen in Coll. Wyoming Hist. Soc. at Wilkesbarre, from anthracite coal measures, Mill Creek limestone, 1000′ above Conglomerate No XII. Two of these impressions are seen on the rock piece, one unmistakeably of this species; an inch across, a third of an inch high; concentric lines well indicated. The other may be *D. newberryi* but the two species are much alike. Heilprin, An. Rt. Geo. Sur. Pa., 1858, page 452, f. 18.—*Monongahela series.* *XV.*





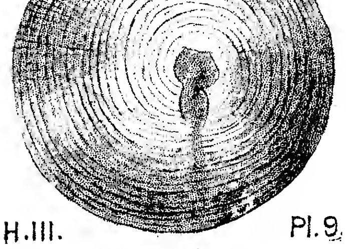
18 DISCINA CONVEXA.

Discina conradi. Hall. *See Appendix.*

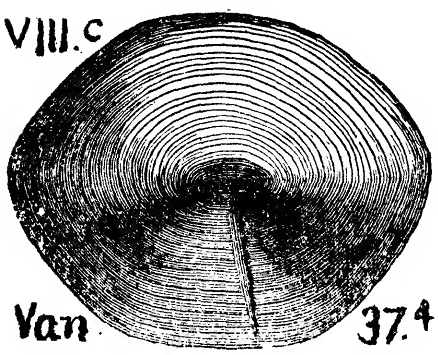
Discina convexa. Shumard, Trans. St. Louis Acad., 1858, Coal measures; doubtfully identified by Heilprin among the Wyoming Hist. Soc. collection of anthracite fossils found near Wilkesbarre, Pa. An. Rt., 1885, p. 452.—*XIII.*

Discina ——— ? both valves convex. Specimen 807–38 (OO, p. 235) Fellows and Genth's Coll. on Marshall's Creek, Monroe Co., in *Hamilton*, *VIII c.*

Discina discus. (Hall, 1859, Pal. N. Y. Vol. 3, p. 195, plate 9, fig. 13, Low. Held.) Claypole's list, Perry Co. F2, xiii. Specimens X–10, 16, 20, twenty-one in all, Lower Helderberg shale. Found also by Dr. Barrett near Port Jervis, in the Stormville shale division of the *Lower Helderberg formation*, White's Pike Co., Rt. G6, p. 132.—*VI.*



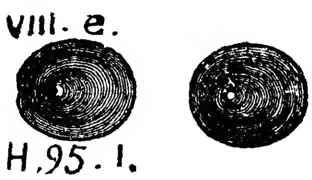
Discina grandis. (*Orbicula grandis.*) Vanuxem, page 152, fig 37,4. Hamilton formation. *VIII c.*—In Pennsylvania, collected by C. E. Hall, at Marshall's Falls, Monroe Co., Proc. A. P. S. Jan. 15, 1876.—By Claypole in Perry Co. Spec. X–6.—By Stevenson in the subcarboniferous in the Fayette and Westmoreland Co. gaps (KKK, p. 311).—*VIII–IX.*



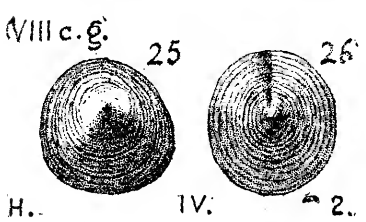
Discina jervensis. (Barrett. Annals N. Y. Acad. Sciences, Vol. 1, No. 4.) In the Oriskany shales near Port Jervis, White's Report on Pike Co., Pa., (G6, p. 123.)—*VII.*

Discina lamellosa. See **Discina circe.** *II c.*

Discina lodensis. (*Orbicula crania.*) Hall, page 223, fig. 95,1. Vanuxem, page 168, fig. 42,1. Genesee formation.—Doubtfully identified by White, as the only fossil seen in the Genesee shales at Selinsgrove, Northumberland Co., Pa. (G7, p. 76, 78, 359, 361.)—*VIII e.*



Discina media (Hall, 1863, 16th An. Rt.; Pal. N. Y. Vol. 4, p. 26, plate 2, fig. 25, 26. Ham. and Chem.). Claypole's lists of Perry Co., Pa., F2, p. xiii. A large variety, specimens 5–25, collected at Barnett's mills in Hamilton upper slate; and spec. 67–1, in Columbia Co., Pa., near Bloomsburg, 50′ below top of Hamilton (G7, p. 75, 76, 230); also at Danville in upper Chemung rocks (G7, p. 308); and in Northum. Co. Friedler's sect. bed 21, upper Chemung (G7, p. 367).—*VIII c, g.*—In Huntingdon Co. in Marcellus (? Corniferous) limestone at the Hunt. Car Works (T3, p. 115)—*VIII b (a ?).*—Specimen 804–16–36 (poor), collected by Fellows and Genth in 1875, on Marshall's creek, Monroe Co., is labeled from *Hamilton strata, VIII c.* [?]



Discina minuta (*Orbicula minuta*). Hall, page 180, 71, 9. Rogers, page 826, fig. 653.—*Marcellus. VIII, b.*—Claypole, Report F2, Perry Co. Pa. Hamilton specimens 2–11, 20, collected at Comp's mill, 2½ m. S. E. of N. Bloomfield (with *Chonetes lepidus*).—In Marcellus (Cornif. ?) limestone at Cove St., Huntingdon Co. (T3, p. 115).—*VIII b, c.*

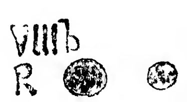
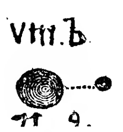


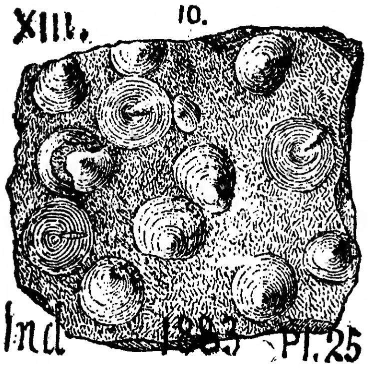
FIG. 653.—Orbicula minuta.



Discina newberryi. Hall. *See Appendix.*

Discina nitida. (*Orbicula nitida*, Phillips, Geol. of Yorkshire, Vol. 2, plate 11, fig. 10 to 13.—Meek and Worthen, Illinois Reports, Vol. 5, plate 25, fig. 1). Collett's Indiana Rt. of 1883, page 121, plate 25, fig. 10, *natural size*, a hand specimen showing several separate upper and lower valves. This little shell is abundant in the Kittanning coal shales at Cannelton, Pa., and throughout the western States to Iowa.—*XIII.*

XIII. 10.

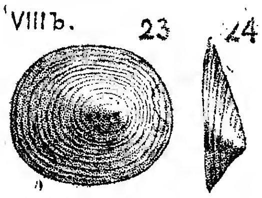


Ind. 1883 Pl. 25

Discina pleuritis. *See Appendix.*

Discina seneca. (Hall, 1863, 16th An. Rt., Pal. N. Y., Vol. 4, p. 20, plate 2, figs. 23, 24. *Hamilton*). Claypole's Perry Co. lists. Preface to F2, p. xiii. *Marcellus* formation, Specimen 5–192, from Barnett's mills, Perry Co. and 223–4, twenty-four specs. from Center mills, Madison township.—This may be White's *Discina* near the top of the *Marcellus*, in G7, p. 76, 230, Montour region.—*VIII b.*

VIII b. 23 24



H. IV. Pl. 2.

Discinæ in Centre Co., in *Oriskany ?*. Ewing. (T4, p. 431.)—Also in *Marcellus* (T4, p. 432.)

Discinæ in Mercer Co., in Berea grit? I. C. White (QQQ, 158.)—Also in Bedford shales (p. 196.)—In Crawford Co., in *Meadville upper limestone*, in many places they abound; mostly undescribed species of Kinderhook (sub-carboniferous) aspect; as on Grass run at Meadville, and at Glendale (Q4, 83, 126, 140).—In the *Orangeville shale* near Meadville; at Smith's ravine; at Biter's (over the Corry SS.), Richmond township; at Pfeiffer's, Woodcock; at one mile W. of Venango village; and below Hayfield, they abound. At the last locality *Discinæ* and *Lingulæ* together fill 88′ of Orangeville shale from top to bottom, with no other fossils present. (Q4, 170, 172, 195, 199, 202, 220.)—*X.*

Discina —— ? large; in Erie Co., Pa., among the mass of shells in the Spirifer bed over the Third Oil sandstone of the Carroll quarry, Le Bœuff. (Q4, p. 240.)—*VIII–IX.*

Discinæ occur in the sub-Olean conglomerate of Crawford Co., mostly broken and indistinguishable. (Q4, p. 79.)—*X.*

Discinæ numerous, with *spiriferæ*, in the Olean (Garland) conglomerate (bottom division of XII) at Dennison's quarry, S. W. Crawford Co.; fine specimens in Carll's collection (III, p. 55.)—*XII.*

Discina, spec. 3107, (cat. O) in loose piece of gray shaly SS, 1½ m. N. E. of Sharon, Mercer Co., over 2nd mtn. SS.—*X.*

Dithyrocaris carbonarius. (Meek & Worthen, Proc.

XIII 3.

Ind 1883. 39

Acad. Nat. Sc. Phila, 1869; Illinois Rt., Vol. 5, 1873, pl. 32, fig. 1.) Collett's Indiana Rt., 1883, page 178, plate 39, fig. 3, *natural size*, upper view of telson and stylets (tail spikes) by which alone this rare crustacean of the Coal Age is known—*XIII.* Original specimen found in coal measures at Danville, Ill.—Specimen in Randall's Warren collection, Pa., recognized by C. E. Hall, Proc. A. P. Soc., Phil., Jan. 5, 1876—*VIII-IX.*

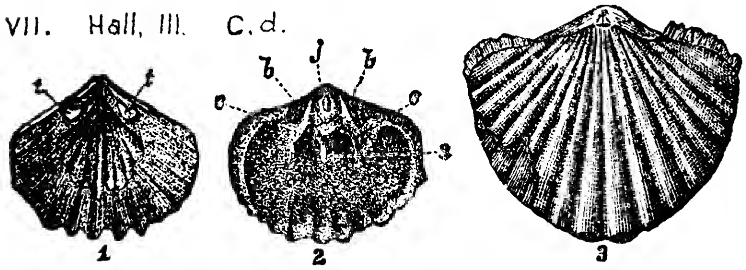
Doleropteris. See **Cyclopteris elegans.** *XIII.*

Drepanacanthus *fish spine* occurs in the Meadville upper limestone. I. C. White, Q4, p. 83.—*X.* *See Appendix.*

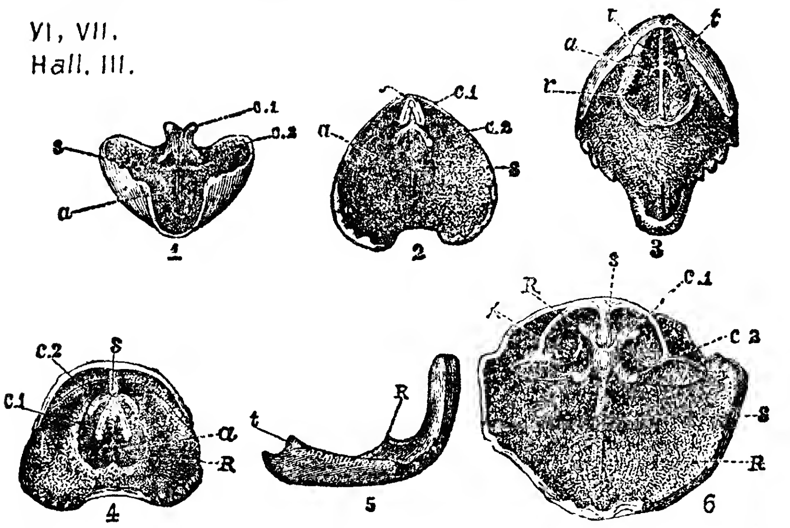
Dicotyles pennsylvanicus. Leidy. Notice and Desc. of fossils in caves and crevices of the limestone rocks of Penn. in An. Rt. Geol. Sur. Pa., 1887 '8 (published 1889), upper and lower jaws of a young extinct Peccary, (first found in Indiana, Jour. Acad. Nat. Sci., Phil., Vol. 7, 1869, p. 385), from Hartman's cave (Crystal Hill cave) near Stroudsburg, Monroe Co., Pa. *See figure in Appendix.*—*Glacial*, or early *Human* age.

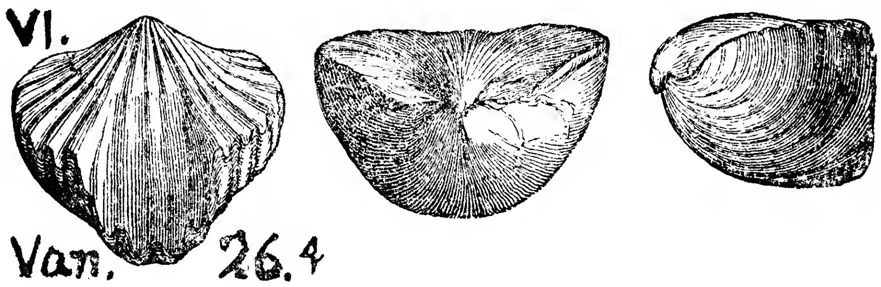
Eatonia medialis. (*Atrypa medialis.*) Vanuxem page 120, fig. 26, 4. Lower Helderberg formation.—*VI.* On the Delaware, Dr. Barrett finds it in White's *Stormville limestone*, under Stormville conglomerate. (G6, p. 134)—*VI.*—In Perry Co. Claypole collected it from 3 m. east of Ickesburg (spec. 187–5, one.)—For the internal structure of *Eatonia medialis*, *eminens*, *singularis*, and *peculiaris*, see Hall's Pal. N. Y., Vol. 3, 1857, page 435, wood cuts, fig. 1 to 6.—*VI.*

VII. Hall, III. C.d.



Eatonia medialis, *eminens*, *singularis* and *peculiaris ;* internal structure and shell markings contrasted by Hall, Pall., N. Y., Vol. 3, 1857, page 435, wood cut, figs. 1, 2, 3, 4, 5, 6. For external of shells see figs. under the respective names in preceding pages.





(*Atrypa medialis*, Vanuxem, 1842, p. 120, fig. 26, 4. *L. H. VI. See Appendix.*

Eatonia peculiaris. (*Atrypa peculiaris.*) Hall, page 148,

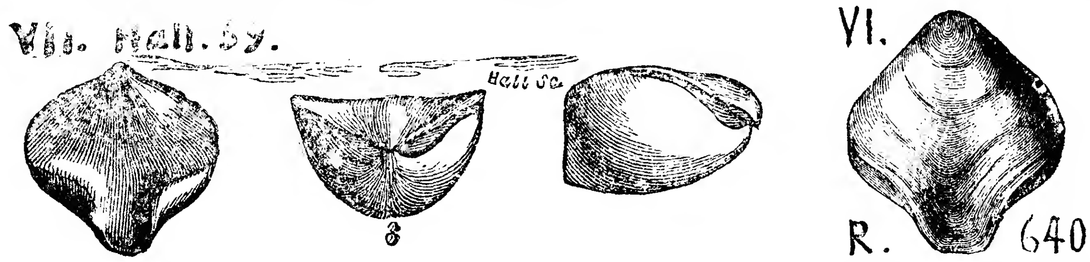
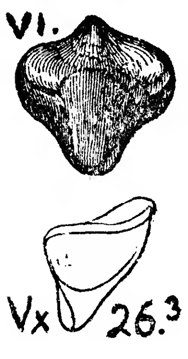


fig. 59, 3. Vanuxem, page 123, fig. 28, 3. Rogers, page 825, fig. 640. (Conrad, An. Rep. N. Y. 141.) Rogers reports it from VI in the Aughwick valley; but C. E. Hall collected it from Oriskany, VII, at Orbisonia and Three Springs; and White at Mapleton (T, 35; T3, 119.)—Stevenson in Bradford Co. (T2, 132; Claypole's spec. 200 8.)—and White, at Carpenter's Point (G6, 123.)—*VII.*

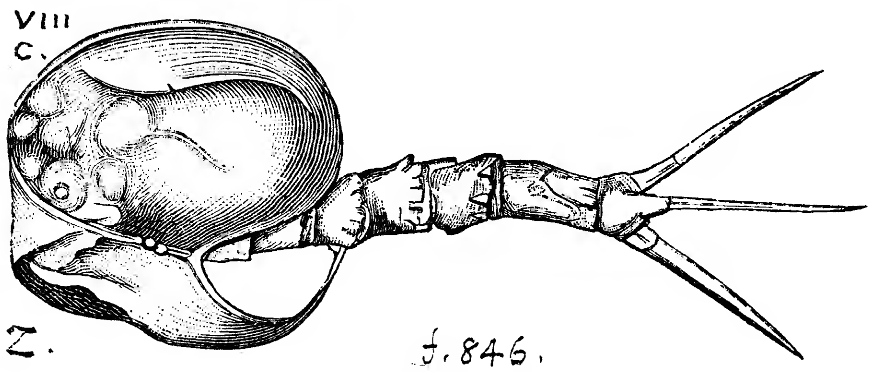
Eatonia singularis. (*Atrypa singularis.*) Vanuxem, page 120, fig. 26, 3. Lower Helderberg formation.—*VI.* Dr. Barrett collected it from Stormville limestone (White's Pike Co. Rt., G6, 134.)—Claypole in Perry Co., from Chert beds in Lower Held. (Specs. 216—6, 7, three.)—Stevenson in Bedford Co., at Hyndman, bed 38, 104′ to 168′ below top of Oriskany, VII, on Will's cr. numerous (T2, 104); and



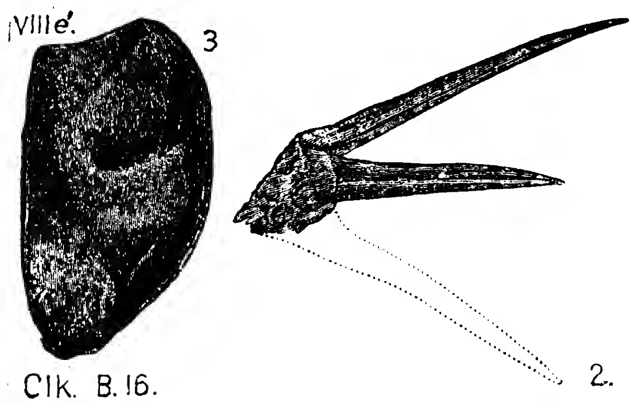
also in the Lower Held. chert beds, Pine ridge, Beaver dam run road, King township (T2, 134.)— *VI*, *VII.*

Eatonia —— ? in *Upper Chemung strata*, Tioga Co., Pa. Sherwood's collections, specimen 854–33 (fair condition) Charleston township.— *VIII g.*

Echinocaris punctata. Hall, Hamilton group, at Delphi, N. Y. Zittel's Handbuch der Pal., 1885, Vol. 2, p. 658, fig. 846, after Beecher's drawing.— *VIII c.*



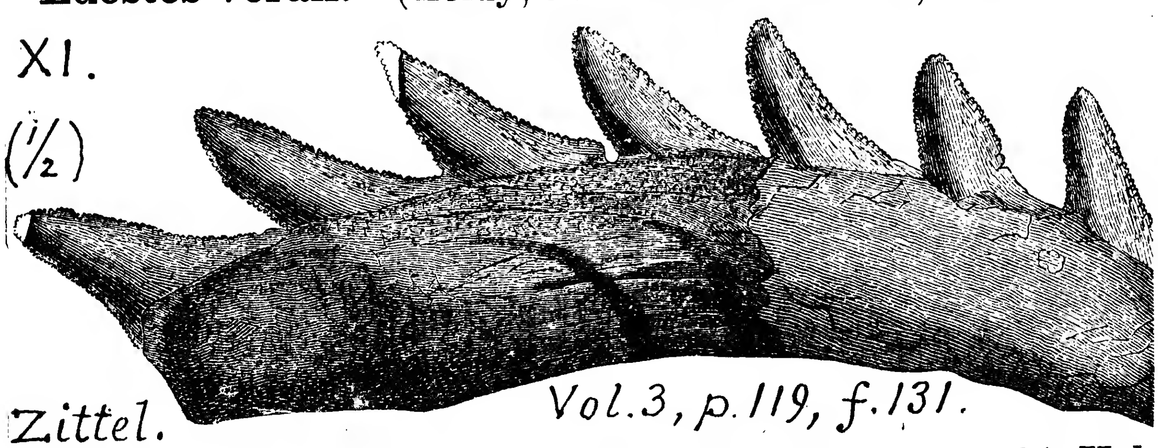
Echinocaris whitfieldi. Clarke, Bull. 16, U. S. G. S., 1885, page 45, pl. 2, fig. 3, shield (carapace) *natural size*; fig. 4, tail and sines, *natural size*, of a crustacean of the Naples (Upper Genesee), shales of Hatch hill, Ontario Co., N.Y.— *VIIIe.*



Echinocaris socialis. *See Appendix.*

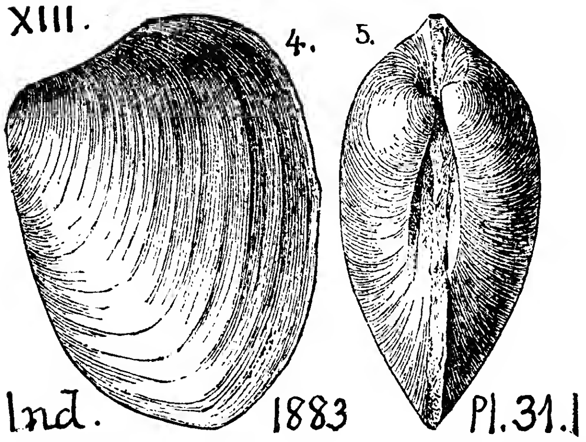
Ectinodesma birostratum. Claypole's specimen 57–22. 23, in Perry Co., Jenkins farm, 5 m. S. of New Bloomfield, Chemung-Catskill.— *VIII*, *IX.* *See Appendix.*

Edestes vorax. (Leidy, Jour. Acad. Nat. Sc., Phil. Vol. 3



1856, page 159, Survey of Illinois, Pal. Vol. 2, page 84, Vol. 4, p. 350.) Zittel's Vol. 3, p. 119, f. 131.—*Subcarboniferous.* *XI.*

Edmondia aspenwallensis. (Meek. Nebraska U. S. Survey, 1872, plate 4, fig. 2.)



Collett's Indiana Report 1883, page 148, plate 31, fig. 4, 5, right side and back views, *natural size.*—Middle and upper coal measures from W. Virginia to Nebraska. *XIII.* —J. J. Stevenson, Trans. Am. Phil. Soc., Phil., Vol. XV, Article 2, 1872, in Crinoidal (Black Foss.) limestone, 250′ below Pittsburgh Coal, W. Va. (L, 35.)—In Beaver Co., Pa. White finds it in Brush creek limestone (middle of Mahoning SS. 510′ below Pittsburgh Coal), Q, p. 34.—*XIII-XIV.*

Edmondia burlingtonensis. White and Whitfield, Proc. Bost. N. H. S. 1862, Vol. 8, Kinderhook group; doubtfully identified among the specimens from anthracite measures, in cabinet of Wyoming H. Soc. Wilkes-Barre, by Heilprin, An. Rt. Geol. Sur. Pa. 1885, page 451. *XIII*—Also by C. E. Hall in Carll's collections of 1875, in Upper Chemung. Abundant in and characteristic of the LeBoeuf conglomerate (White's Third Oil Sand) stone quarry, Erie Co., Pa. (Q4, 110, 249)—*VIII-IX.*

Edmondia concentrica. See **Astartella concentrica.**

Edmondia philipi, Hall, Prel. Not. Lam. 1870, Chemung —Spec. 854–3 (six specimens in fair condition), Charleston t. Tioga Co. and 855–27 (left valve, in good condition), Sullivan t. Tioga Co., Sherwood's coll. 1875. *Upper Chemung VIII g.* —*See Appendix.*

Edmondia radiata. See **Clinopistha radiata.** *XV.*

Edmondia subovata. (OO, p. 236). Sherwood's 1875 collections: Spec. 854–49 (good) Charleston township.—Spec 856–25b, Sherwood's Mixtown collections, Tioga Co., Pa., from *Upper Chemung VIII g,* or *VIII-IX. See Appendix.*

Euomphalus (*Straparollus*) **clymenioides,** Hall, 15th Annual Rt. N. Y. 1862, page 54, 166, plate 6, fig. 3; recognized among the Pennsylvania collections as specimen 883–37 of Robt. Howell, at Nichols, Tioga Co. N. Y. from *Chemung* rocks, *VIII g.—See Appendix.*

Edmondia ? subplana. (*Cypricardia subplana*, Hall, Trans. Alb. Inst. Vol. 4, 1856. Whitfield, Bull. 3. Am. Mus. 1882, pl. 7). Collett's Indiana Rt. 1882, page 342, plate 30, fig. 38, *natural size.* Genus very doubtful. Subcarboniferous strata at Spergen Hill, etc.—*XI.*

Edmondia subtruncata. Hall, 1847, Pal. N. Y., Vol. 1, *Black river* and *Trenton.* Spec. 210–37 (OO, p. 231), is a poor impression, in the Reedsville (Kishicoquillis valley) *Trenton limestone*, *II c.* *See Appendix.*

Edmondia ———? in Crinoidal limestone 250′ below Pittsburgh coal, Fayette Co., Pa. (L, 36).—*XIV.*

Edmondia ———? C. E. Hall, in Sherwood'scollections in Tioga Co., Pa., Chemung.— *VIII g.*

Eichwaldia reticularis. *See Appendix.*

Elephas primigenius. *See Appendix.*

Ellipsolites ? ———. Emmons' Report on the Geology of Northeast New York, 1842, page 385, fig. 97, 1. *Birdseye limestone.* Not in S. A. Miller's list)—*II b.*

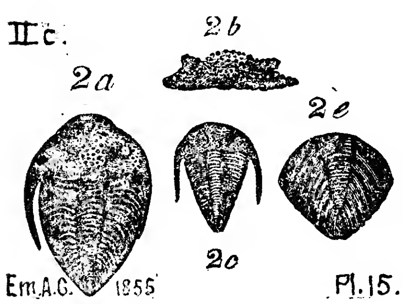
Elliptocephalus asaphoides. See **Olenellus asaphoides.** *M. C.*

Elymocaris siliqua. *See Appendix*

Embolimus rotundatus. See **Bathyuriscus howelli.** *M. C.*

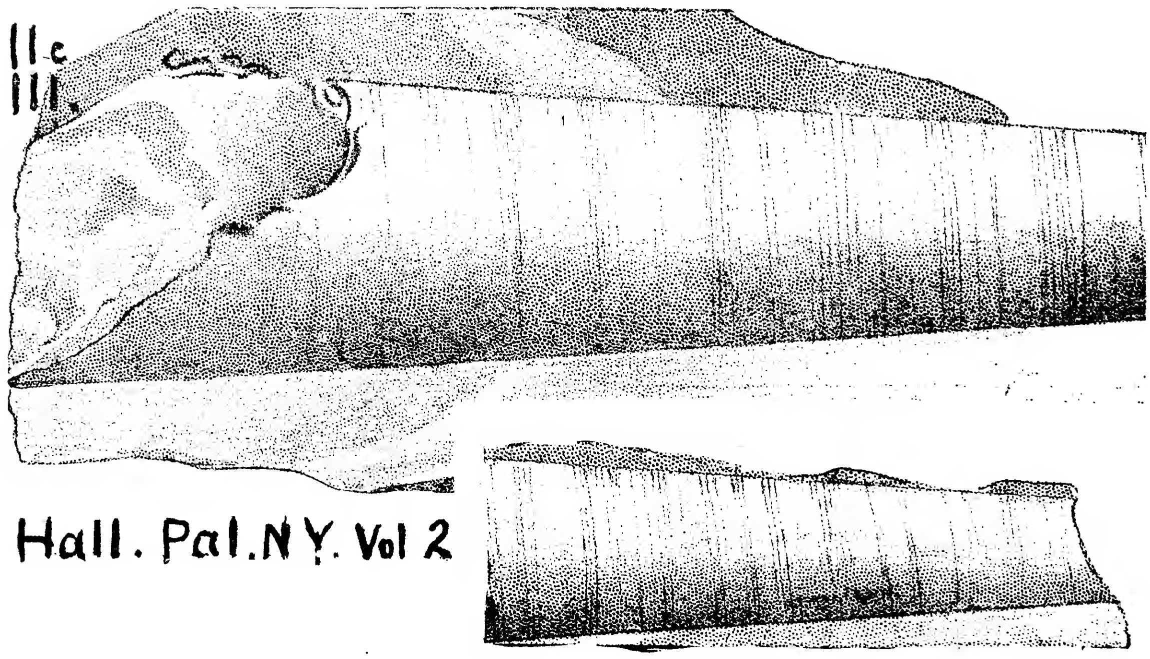
Embolimus. **Olenoides spinosus**; and **Zacanthoides spinosus.** *M. C.*

Encrinurus vigilans. (*Ceraurus vigilans*, Hall, Pal. N. Y., Vol. 1, 1847. Bl. Riv. and Trenton). Emmons' Amer. Geol. Vol. 1, pt. 2, p. 217, plate 15, figs. 2 *a*, *b*, *c*; small; shield granulated, with long flat spines; 11 throat rings; many body rings, every third tuberculated, ending in a point; 9 side ribs.—Middleville, N. Y. A common trilobite in the *Trenton limestone*, *II c.*



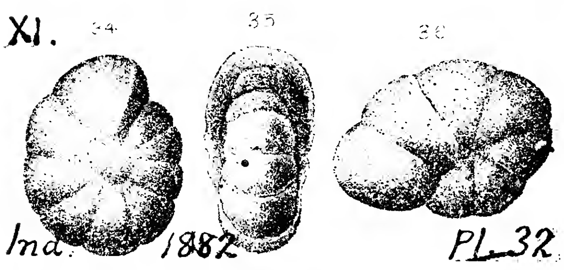
Encystites ? longidactylus, Walcott (Dec. 1888), *M. C.*

Endoceras proteiforme, var. **tenuistriatum.** Rogers,



page 821 (no figure) III b. Loraine formation. Hall, Pal. N. Y. Vol. 2, plate 25, fig. 1. *Trenton* and *Hudson River formations, II c* and *III b*. Other varieties are *elongatum*, *lineolatum*, *strangulatum*, and *textuitextum*, all described in Hall's Pal. N. Y. Vol. I.—Specimens in the cabinet of the Pennsylvania survey (OO, p. 231) are 204–9 (doubtful, poor impression); 204–11 (very poor); 204–14 (fairly good, showing the septa); 204–20 (shell mostly gone, and species doubtful); all collected by Fellows, from Kishicoquillis creek, just above Reedsville mill dam, Mifflin Co., from *Trenton limestone, II c.*

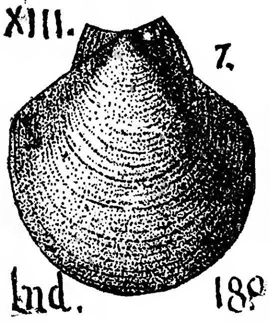
Endothyra baleyi. (*Rotalia baleyi*, Hall, Trans. Alb. Inst. Vol. 4, 1882. Whitfield, Bull. 3, Am. Mus., 1882, plate 9. Compare *E. bowmani* Phillips; and *Involutina lobata*, Brady, Palæog. Soc. Lond. Vol. 30, plate 5.) Collett's Indiana Rt. page 321, plate 32, figs. 34, 35, *greatly enlarged*, usual, and fig. 36 unusual forms. Spergen Hill, etc. Ind. Alton, Ill. *Subcarboniferous limestone, XI.*



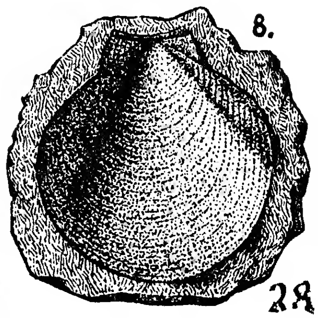
Endothyra bowmani. English. Compare **Endothyra baleyi.** *XI.*

Entolium aviculatum. (*Pecten aviculatus*, Swallow, Trans. Acad. Sc. St. Louis, 1858;—Meek, Nebraska U. S. Survey, 1872, plate 9.) Collett's Indiana Rt. of 1882, page 142, plate 28, fig. 7, *natural size*, left valve; fig. 8, inside of left valve, showing hinge, etc., many parts of Indiana and elsewhere, *Coal measures*. *XIII–XV.*

XIII. 7.



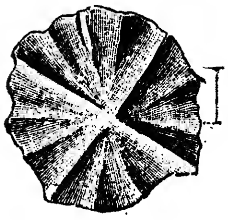
8.



Ind. 188. 28

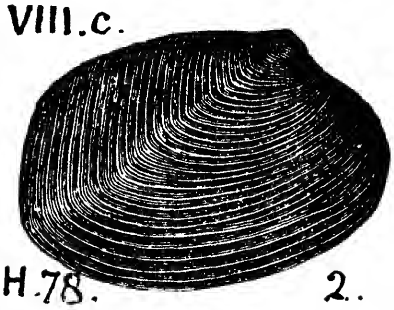
Eocystites primævus. (Billings, 1868. Dawson's Acad. Geol. 2d. Ed., 643.) Walcott, Bulletin, U. S. G. S., No. 10, page 15, plate 1, fig. 2, a single plate of the coralline, *enlarged fourfold*. Evidently similar in general type to Hicks's Welsh Menevian fossil *Protocystites menevensis*.—New Brunswick. *Saint John formation*, *M. C.*

L.C. Pl. 1.



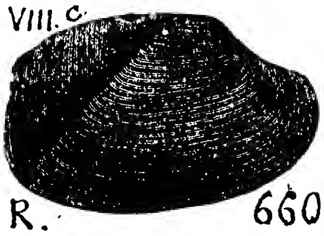
Eodon bellistriatum. (*Microdon bellistriatum*. Conrad.) Hall, 1843, page 196, fig. 78, 2; also Pal. N. Y. Vol. 5, part 1, 1877, plate 73, fig. 10.—Rogers, page 827, fig. 660. (See Conrad, Journ. Acad. N. S Philada. Vol. VIII, page 247, xiii, fig. 12, 1842.) Hamilton formation.—Claypole's lists in Perry Co. F2. (Specimens collected: 2–1 (five), W. Comp's mill, Perry Co., $2\frac{1}{2}$ m. S. E. of N. Bloom.; 5–147, 159, Barnett's mill; 68–3 to 7, Bloomsburg. Montour Co., Pa.; 92–4, 9, 11, 13, 14, 15, 25, Vanderslice's quarry, Montour Co., Pa.; 94–17, Crawley hill, Perry Co.; 99–1, Drumgold's tannery; 144–9, Montebello narrows; 197–11, three, Mapleton, Huntingdon Co) 100′ and 250′ below top of Hamilton (G7, 76, 229) Rupert (p. 69); Catawissa (p. 287), Bloomsburg (p. 290.)—*Ham.* U. shales, Mapleton (T3, p. 109); also *Chemung* olive shales, Pa. R. R. section below Huntingdon (T3, 264.)—Also found in the *Hamilton flags*, at Muncy, Lycoming Co., Pa. (T, p. 32)—*VIII c, g.*

VIII.c.



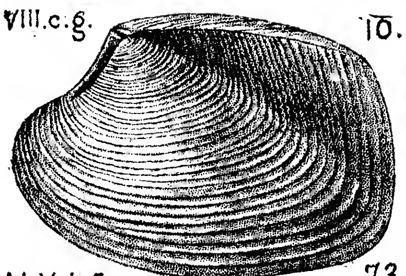
H.78. 2.

VIII.c.



R. 660

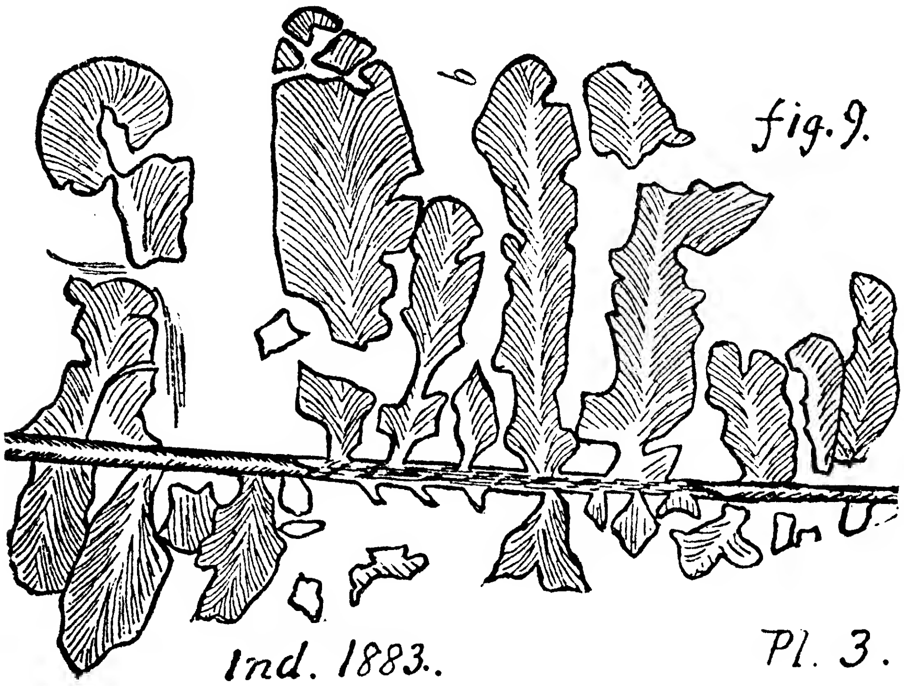
VIII.c.g. 10.



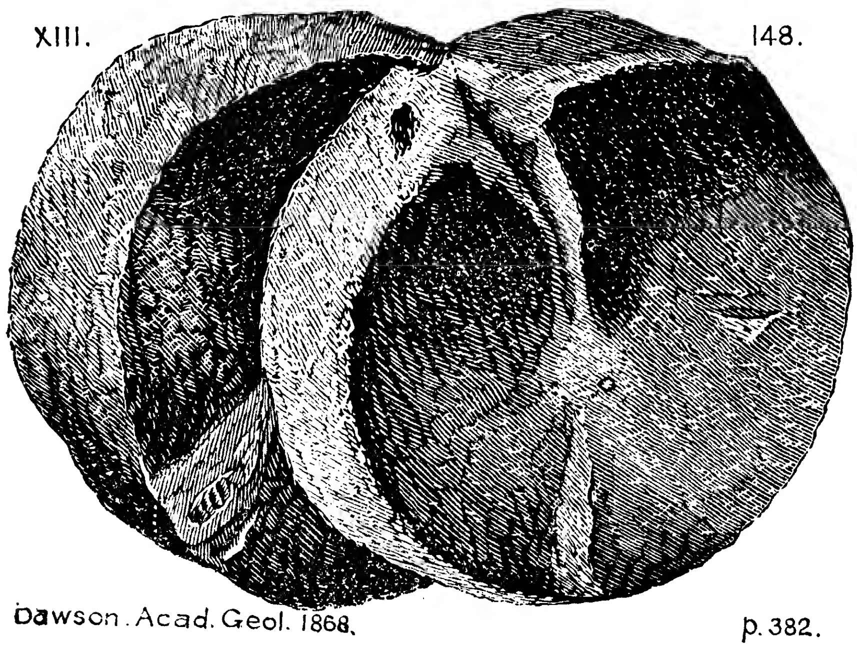
H.Vol.5. 73.

Eodon tenuistriatus. (Hall.) *See Appendix.*

Eopteris morieri. (Saporta.) Collett's Indiana Rt. of 1883, page 48, plate 3, fig. 9.—In Europe, "at the base of the Middle Silurian near Angers, France." In America no *ferns* have been found in strata older than Devonian; but our Devonian ferns are so well developed that it is reasonable to expect the discovery of ferns in our Silurian strata at least as old as those of Europe. (Collett.)



Eosaurus acadianus. Marsh, Canadian Naturalist, Vol. 7, 1862; Dawson, Acadian Geol., 1868, p. 382, fig. 148, two vertebræ of the backbone of a *Coal measure* crocodilian, found in shale, in group XXVI of the Joggins sect'n, Nova Scotia, 800′ above the bed with *Baphetes planiceps;* resemble somewhat the vertebræ of *Ichthyosaurus;* discovered in 1855; described in Silliman's Journal, 1859, as probably an *Enaliosauria* (great sea lizard); Huxley suggests that they possibly belong to Labyrinthodont batrachians like *Anthracosaurus russelli.*—*XIII.*



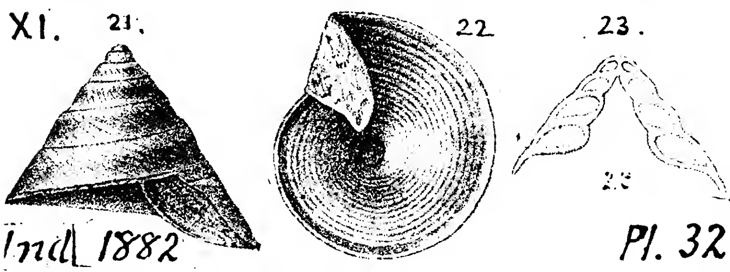
Eoscorpius carbonarius. Meek and Worthen. A scorpion of the Coal measures of Illinois, found in a nodule on Mazon Creek. Zittel's Handbuch der Palæontologie, 1885, Vol. 2, p. ¯39, fig. 916, *natural size.* Note. The earliest scorpions known came in with the Lower Helderberg deposits, where we find the earliest lobsters (*Eurypteri.*) The discovery was made first in New York (See **Proscorpius osborni**), and soon afterwards in Scotland and Sweden.—*XIII.*

XIII.

Zittel. Fig. 916.

Eotrochus concavus. (*Pleurotomaria concava.* Hall, Trans. Alb. Inst. Vol. 4, 1856. Name preoccupied and therefore changed by Whitfield Bull.3, Am. Mus., 1882, plate 9. *Pleurotomaria tenuimarginata*, proposed by Miller in Cat. Am. Pal. Foss., 1877, p. 245, and corrected on p. 301, second edition.) Collett's Indiana Rt. 1882, page 365, plate 32, figs. 21, 22, 23, side, bottom and section, *enlarged twice.*—Spergen Hill, etc. Subcarboniferous limestone, *XI.*

XI.

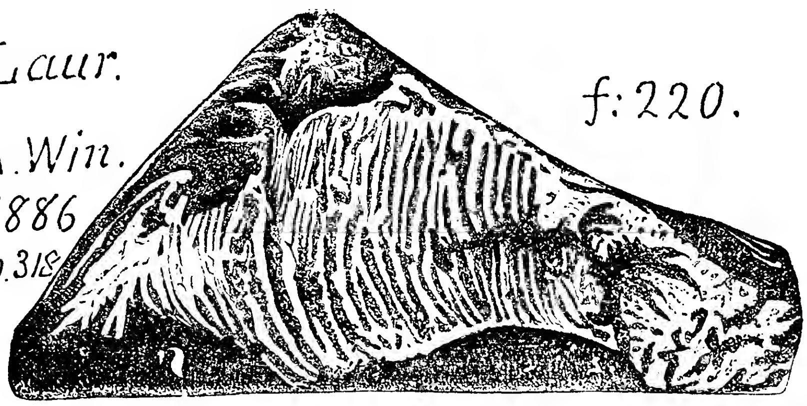


Ind. 1882 Pl. 32

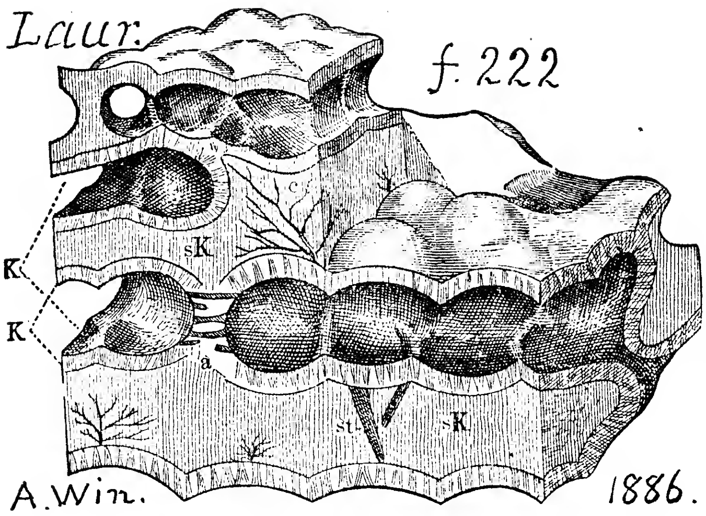
Equisetum stellifolium. See **Annularia longifolia.** *XIII.*

Eozoon canadense. (Dawson, Canadian Naturalist [2], Vol. 2, 1865; since when great contention whether it be really a fossil organic form of life (*rhizopod, &c.*); or a

Laur. A. Win. 1886 p.318



f: 220.

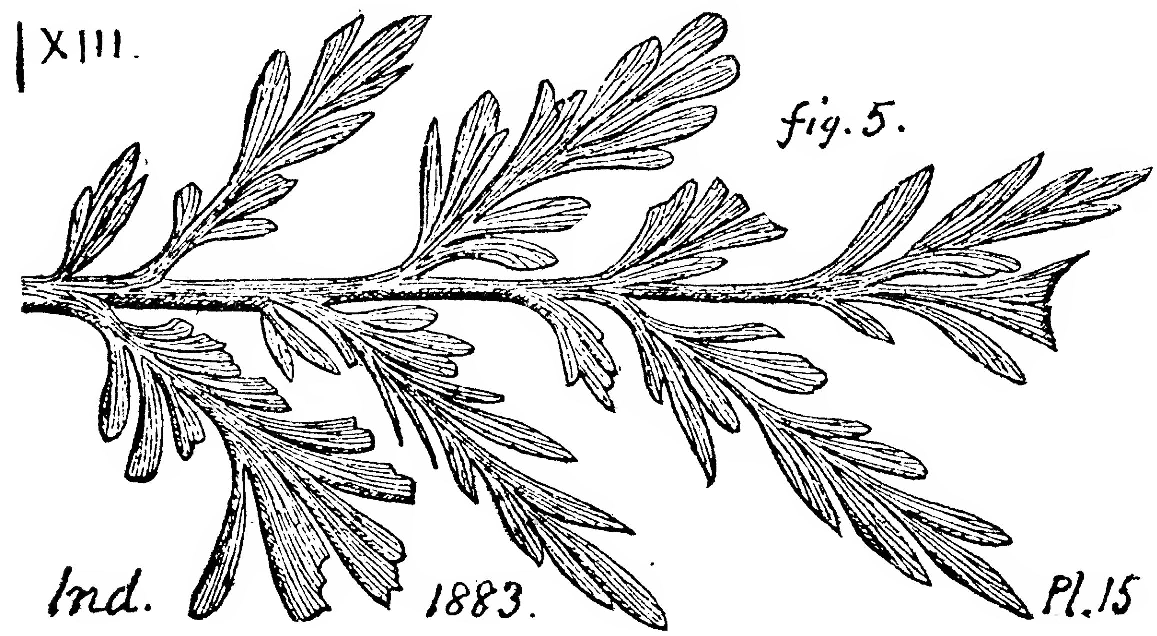


mode of mineral secretion, magnesian silicate; Dr. Carpenter of London being one chief advocate for its organic character.) A. Winchell, in Geological Studies, 1886, page 318, fig. 220 copies one of Carpenter's figures of a weathered specimen; and, page 320, f. 222, Bütschli's diagram (after Carpenter) of its supposed structure; K, chambers, in layers, with perforated walls of fine shell, etc.—Found in so-called *Laurentian limestone*, at Truro, Canada. Similar forms found in the oldest rocks of Bohemia, Scandinavia, Massachusetts, etc.—*L.*

Eozoon canadense. Dawson, London Geological Magazine, [3] Vol. 5, Feb., 1888, page 51, figs. 1, 2, showing the weathered surface of a specimen from the limestone of Côte St. Pierre, showing the funnel-shaped, or spinning-top shaped growth.—*See figure on page 222.*

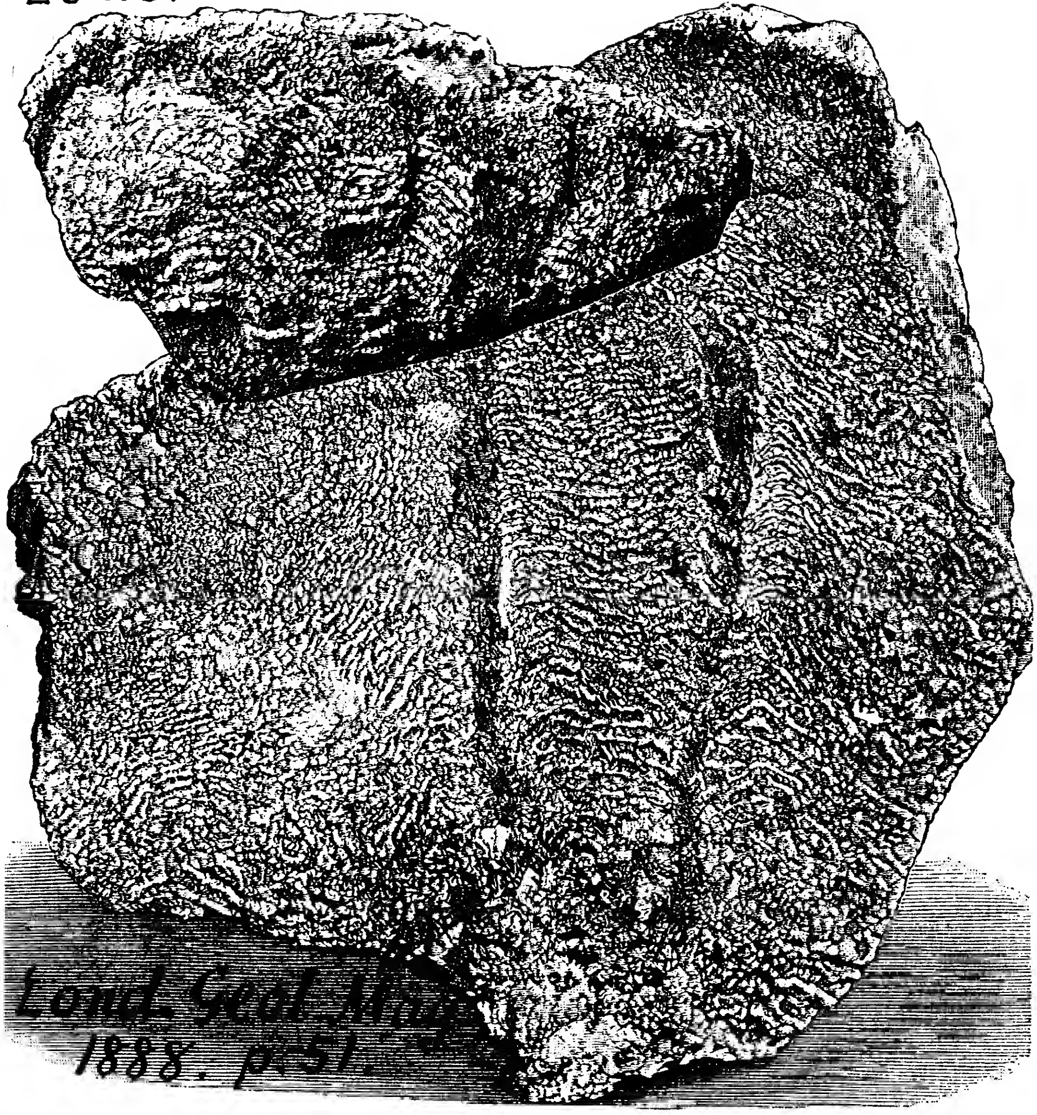
Equus. The foot bones of two species of extinct horse, slenderer and smaller than our domesticated European breeds, were found with the Mastodons, Sloths, Armadillos, etc., in the Port Kennedy Cave, Chester Co., Pa. See Cope. Proc. A. P. S., 1871, p. 95.—*Quarternary* or *Human age.*

Eremopteris artemisiæfolia. (*Sphenopteris artemisiæ-*



Laur.

Fig. 1. Fig. 2.



Eozoon canadense.

V. 6.

Ind. 1882. pl. 3, fig. 6.

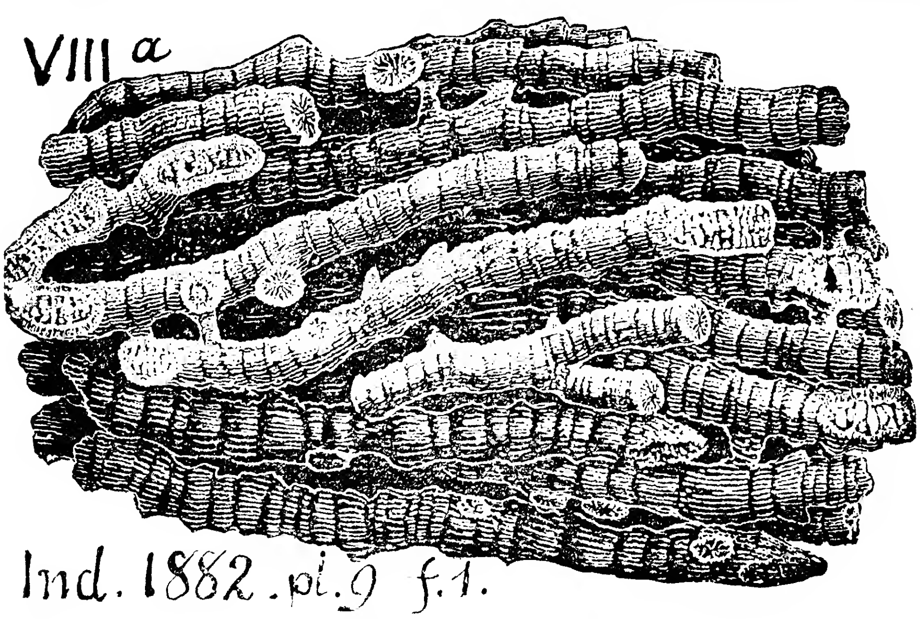
Eridophyllum rugosum.

folia. Brongniart.—*Sphenopteris erithmifolia*, Lind. & Hutt.—*Sphenopteris stricta*, Sternberg.—Lesquereux, Coal Flora, Rt. P, Geol. Sur. Penna., page 293, plate 53, figs. 5, 5*a*, 6. A rare fern everywhere, but found in the Hollenback mines at Wilkes-Barre, and in Mansfield's mine at Cannelton, Pa. Also in the Morris coal shale, Ill., Hazlegreen, Ky., and Helena coal, Arkansas.) Collett's Indiana Rt. of 1883, plate 15, fig. 5, gives it another locality.—*XI*, *XII*, *XIII*.

Eremopteris ? marginata. (*Sphenopteris marginata*, Andrews, Pal. Ohio, Vol. 2, page 422, plate 52, f. 1, 2. Lesquereux suggests that it be placed in a new genus after *Megalopteris*. Coal Flora, page 296.) Collett's Indiana Rt. 1883, page 70, plate 9, fig. 5. Related to *Adiantites*. (Collett.)—Perry Co., Ohio, in the Sub-conglomerate coal measures, *XI*.

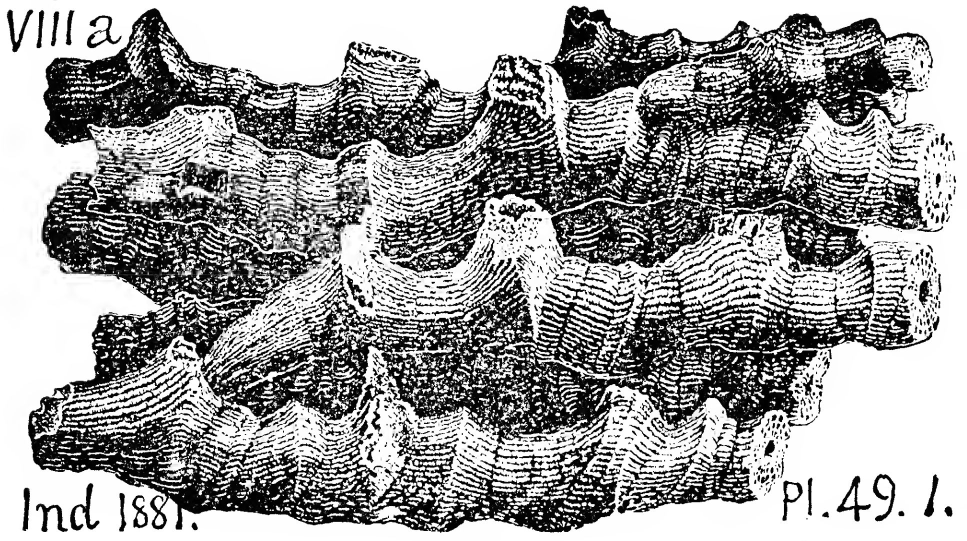
Eridophyllum rugosum. Edwards & Haime, Pal. Foss 1851. Collett's Indiana Report of 1882, page 255, plate 3. fig. 6.—In Indiana and Kentucky, common in *Niagara formation*. *Vb*.—*See figure on page 222.*

Eridophyllum simcoense. (Billings, Canadian Jour. Nat. Sci., Vol. 4, 1859.) Collett's Indiana Report, 1882, page 262, plate 9, fig. 1. (Van Cleve.) In many regions it is common, in the Upper Helderberg (*Corniferous*) limestone formation, *VIII a*.

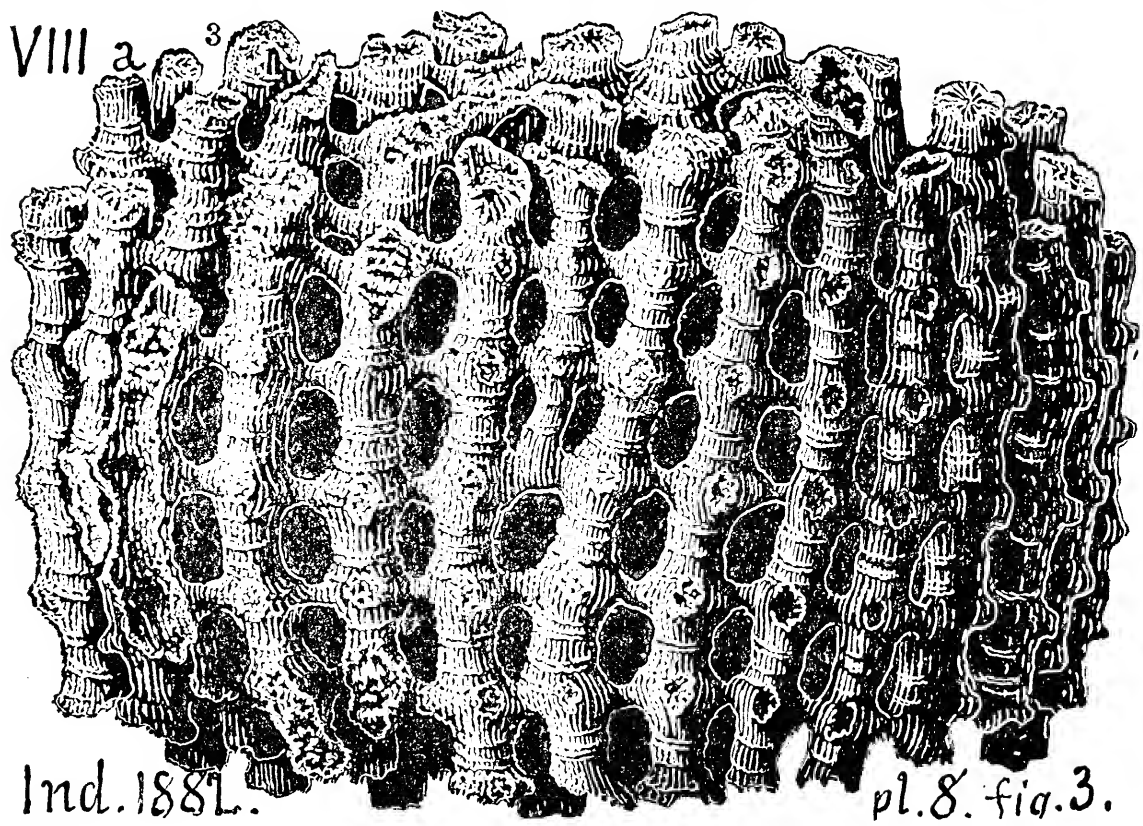


NOTE. The greek work *Eridos* means of or in dispute. This genus of radiate polyps (order *Zoantharia*,) is placed among the *Cyathophylloid corals*. Besides the four species here figured there is a fifth, *E. vennori*, Billings.

Eridophyllum strictum. (E. & H.) Collett's Indiana Report of 1881, page 390, plate 49, fig. 1, side view of small mass of the coral. Common in U. S. and Canada; (see Nicholson's Rt. Pal. Ontario, p. 74, 1875), variable in form; showing conspicuously the rings of growth from which the processes are developed in a whorled manner (Collett.)—*Corniferous limestone*, *VIII a*.



Eridophyllum verneuillianum. (Edwards & Haime, 1851; Nicholson, Pal. Ohio, Vol. 2, p. 239) Collett's Ind. Report of 1882, page 261, plate 8, fig. 3, side view of a specimen which does not quite agree with the type; corallites smaller; processes less irregular. (See Collett's note on fig. description facing plate.)—*Corniferous* in Ohio, Ind. Kentucky. *VIII a.*



Erisocrinus ? ——— in Decker's creek shale under Mahoning sandstone, at Morgantown, W. Va. and in Fayette Co. coal measures (L, 36; KKK, 309).—*XIII.*

Erithizon cloacinum, Cope. Proc. A. P. S. 1871, p. 93, fig. 19, nat. size, found in the Port Kennedy cave, Chester Co., Pa. Post-tertiary (Pre-glacial ? Post-glacial?).

Escharopora recta. Hall, Pal. N. Y. Vol. 1, Trenton; found by C. E. Hall, at Tyrone forges, Huntingdon Co. (OO, p. 232). Specimens 212–2 (*a*) poor fragments; 212–3 (*b*) fragments in fair condition; 211–7 (*a*) good specimens; 211–8 (eleven specimens).—*Trenton*, *II c.* *See Appendix.*

Estheria. See **Posidonia.** *VIII.*

Estheria ? See figures, natural size, and *magnified* to show sculpture, under **Leperditia okeni,** *XI.*

Ethmophyllum minganense. Walcott. Bulletin, U. S. G. S., No. 30, p. 77; wood cut, fig. 6, is a specimen of this cyathophylloid sponge figured by Billings as *Archæocyathus minganensis*; figure 7, a piece of the surface *enlarged* to show the pores; fig. 8, the needles (spiculæ) *enlarged fifty times.* (Fig. 2, on Walcott's plate 4 (described page 87), is a diagrammatic vertical section through the center on the line of the septa, to show the writer's view of the poriferous system. If the outer wall is removed, the large pores on the line of the septum would be shown as in fig. 1, pl. 4, and fig. 2, pl. 5. The inner wall is perforated by smaller openings, and fewer of them, than the outer wall." *Lower Cambrian. L. C.*

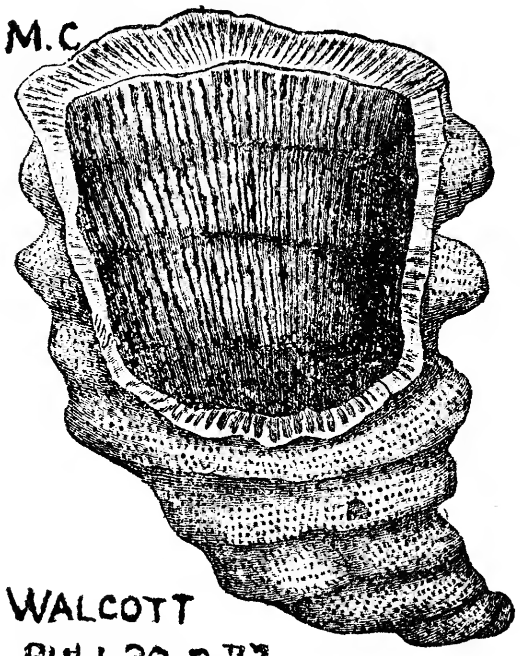


FIG. 6.

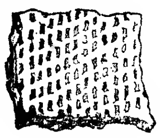
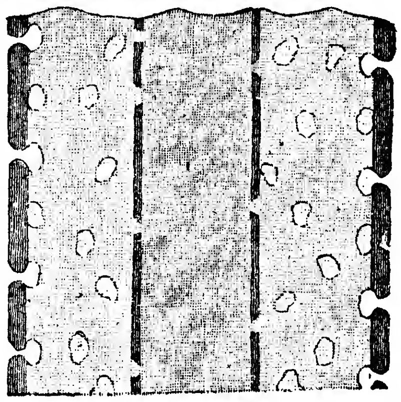
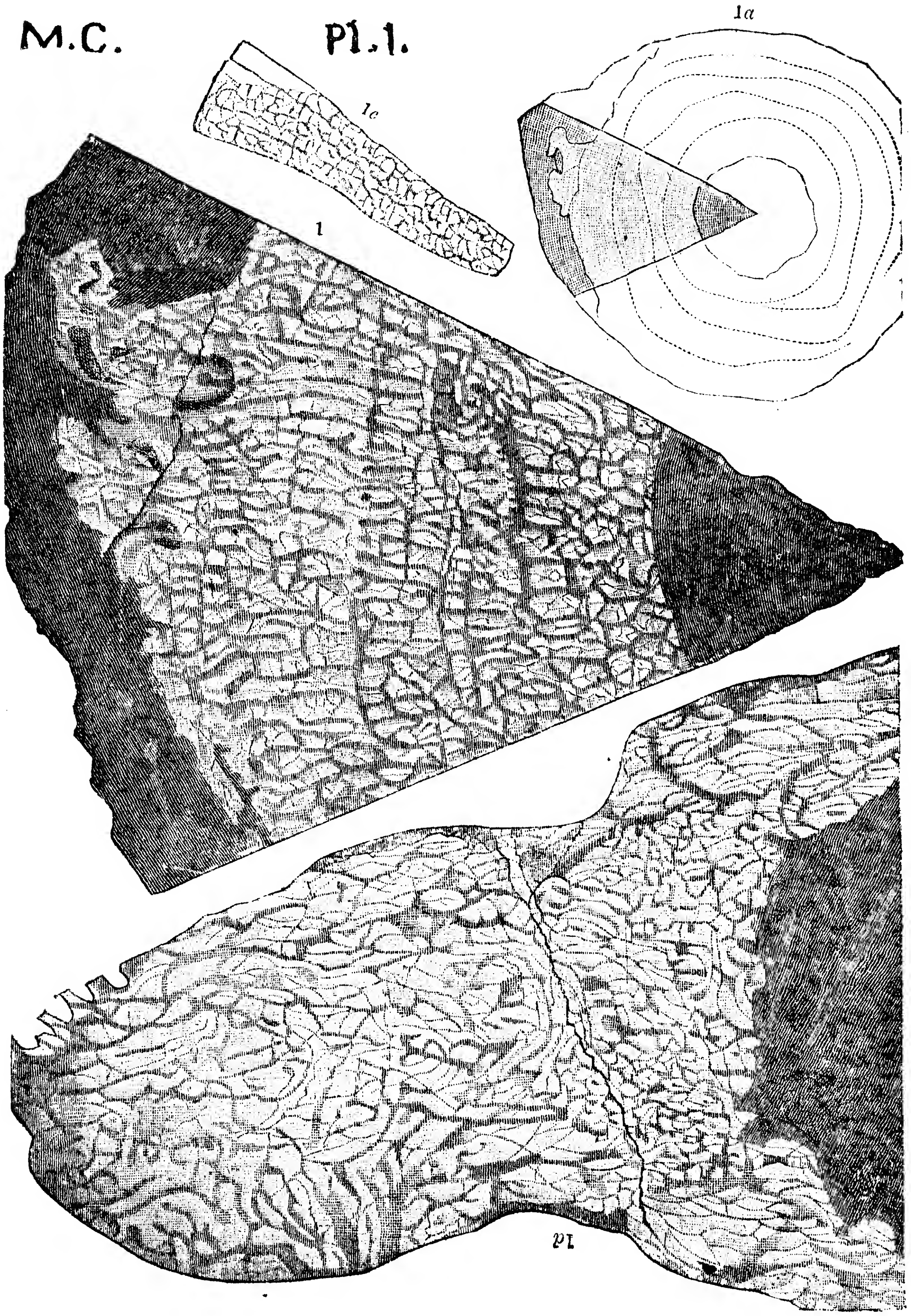


FIG. 7


FIG. 8.

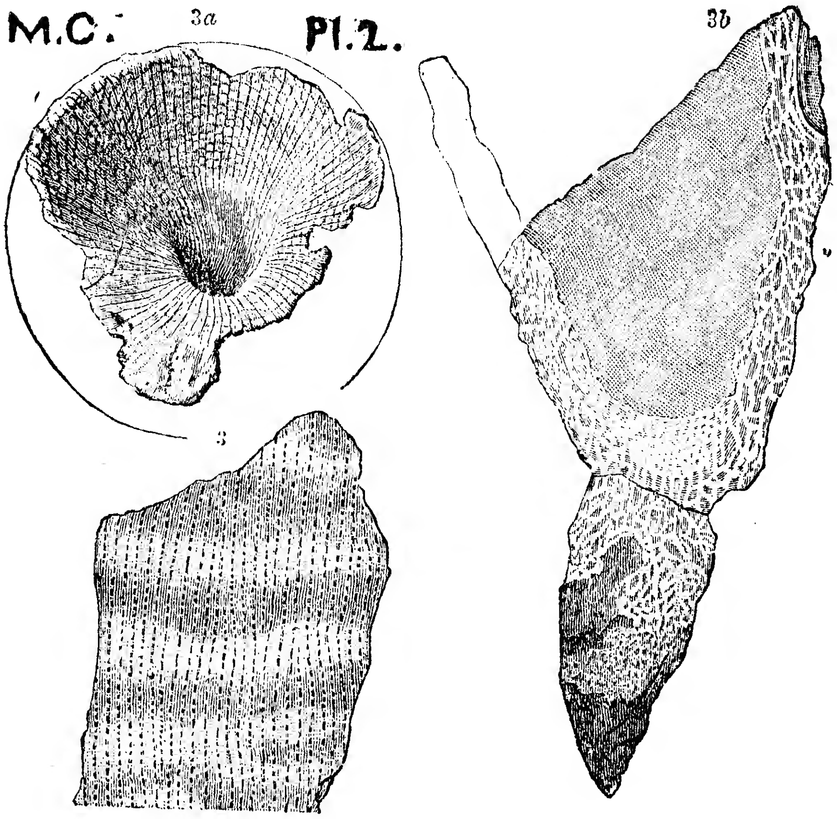


Erimophyllum profundum.—*See page 227.*

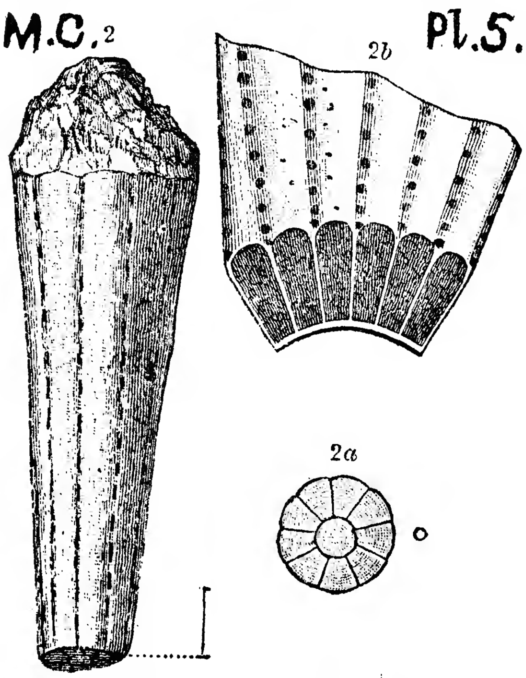


NOTE.—The lower figure of Walcott's plate 1, viz: fig. 1 *d*, has been inverted and cut to get it on the page.

Ethmophyllum profundum. (*Archæocyathus profundus*, Billings, 1865, Foss. Pal. I, 4). Walcott Bulletin, U. S. G. S. No. 30, p. 84.—Plate 2, fig. 3*a*, cup of a small specimen; fig. 3, cast of inside surface of wall; fig. 3*b*, section of cup, filled with cellular tissue.—Plate 1, fig. 1*d*, *enlarged drawing* of the pointed stem of the cup, to show its anatomy; fig. 1*a*, an outline cross section, showing the segment, of which fig. 1 is an *enlarged drawing*. Fig. 1c, is a section of solid stem, *natural size*. (*For these figures see opposite page, 226.*)—Labrador, L'Anse au Loup, Straits of Belle Isle. *Lower Cambrian, L. C.*—[*See foot note on page 134 above.*]



Ethmophyllum rarum. (*Protocyathus rarus*, Ford, 1878, Amer. Jour. Sci. [3] XV, figs. 1*a*, *b*,) Walcott, Bulletin U. S. G. S., No. 30, page 87, plate 5, fig. 2, the outer surface entirely removed; fig. 2*a*, section of the lower or small end, showing nine septa; f. 2*b*., Ford's drawing of his type specimen, outer surface removed, about 21 septa. Ridge east of Troy, N. Y. Conglomerate limestone, *Lower Cambrian, L. C.*—[All these figures were marked *M. C.* before the change to Lower Cambrian had been made by Walcott after his study of the Newfoundland section in 1888.]



Ethmophyllum rensselæricum. (*Archæocyathellus rensselæricus.* Ford, A. J. S., 1873, I, fig. 1.) Walcott, Bulletin U. S. G. S., No. 30, page 85.

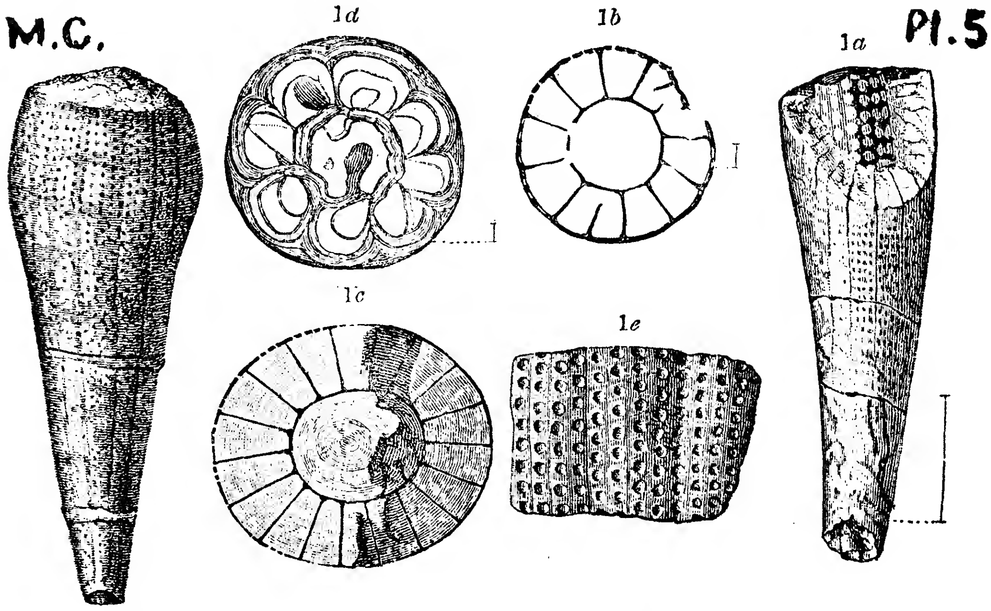
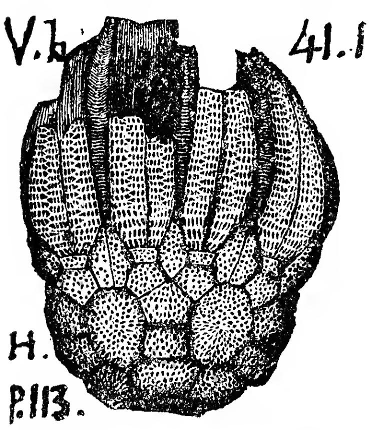


plate 5, fig. 1, nearly perfect specimen, *magnified three times*, showing outside porous surface; 1*a*, another, *magnified four times*, with portions of outer wall removed to show septa and poriferous surface of inner wall; 1*b*, cross section, 12 septa, and pores of inner and outer walls, *enlarged;* 1*c*, cross section of upper end of 1*a*, with 18 septa; *d* cross section where the walls are thickened by additional layers.—Near Troy; species apparently limited to the Conglomerate limestone. *L. C.*

Eucalyptocrinus cælatus. (*Hypanthocrinites cœlatus.*) Hall, Geology of the Fourth district, N. Y., 1843, page 113, fig. 41, 1, showing 5 equal bottom (*pelvic*) plates, supporting 5 square (*costal*) with 5 large nine sided intermediate (*intercostal*) plates, making the second row; the third row is more complicated, a beautiful arrangement for sustaining the flexible arms of the coral. The species resembles *Euc. decorus*, but it is smaller, and its plates are covered with tubercles, and its arms deeply wrinkled. Found in N. Y. at Lockport, in *Niagara* limestone, *Vb.*—*See Appendix.*



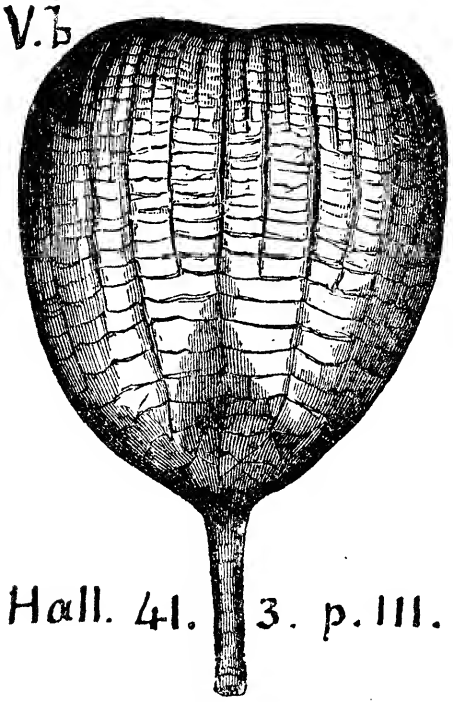
Eucalyptocrinus constrictus. *See Appendix*

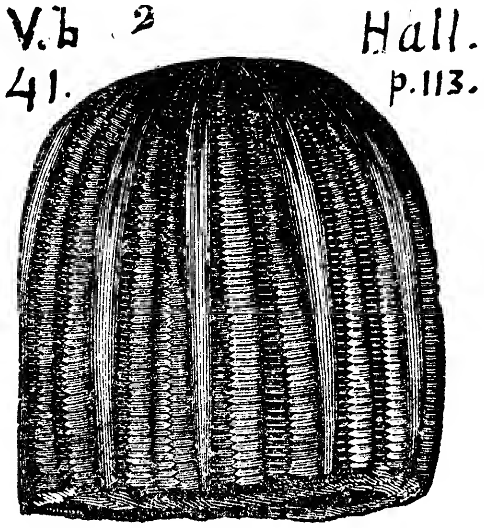
Eucalyptocrinus crassus. *See Appendix.*

Eucalyptocrinus ovalis. *See Appendix.*

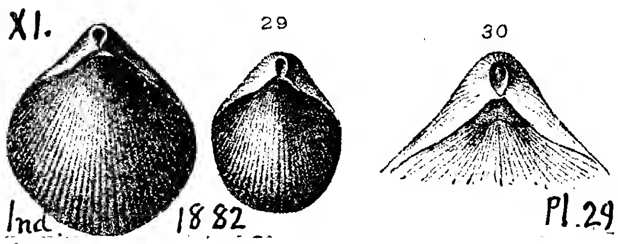
Eucalyptocrinus *roots. See Appendix.*

'**Eucalyptocrinus decorus.** (*Hypanthocrinites decorus.*) Hall, Geol. Fourth district, N. Y., 1843, page 113, figs. 41, *bis*, 2, 3. (See Phillips Silurian Researches, page 672, pl. 17, fig. 3.) Differs from the last species in deep grooving of arms at upper ends. Fig. 2 shows the internal cavity where the head has been broken across. *Niagara. Vb.*

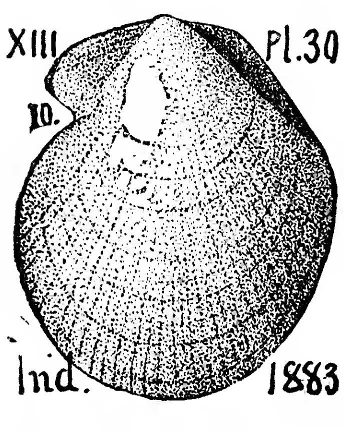




Eumetria verneuiliana. (*Retzia verneuiliana*, Hall, Trans. Alb. Inst., Vol. 4, 1856; Iowa Rt., 1858, plate 23, fig. 1; Whitfield, Bull. 3, Am. Mus., 1882, plate 6,) Collett's Indiana Rt. of 1882, plate 29, fig. 28, *twice enlarged*, from Spergen Hill; fig. 29, one from Paynter's Hill; fig. 30, hinge *enlarged*.—Note. It stands next to Shumard's *Terebratula* (*Retzia*, *Eumetria*) *Marcyi* of Marcy's Rt. on Red River; and De Koninck's Belgian *Terebratula serpentina*. Collett.—*Subcarb. limestone*, *XI.*



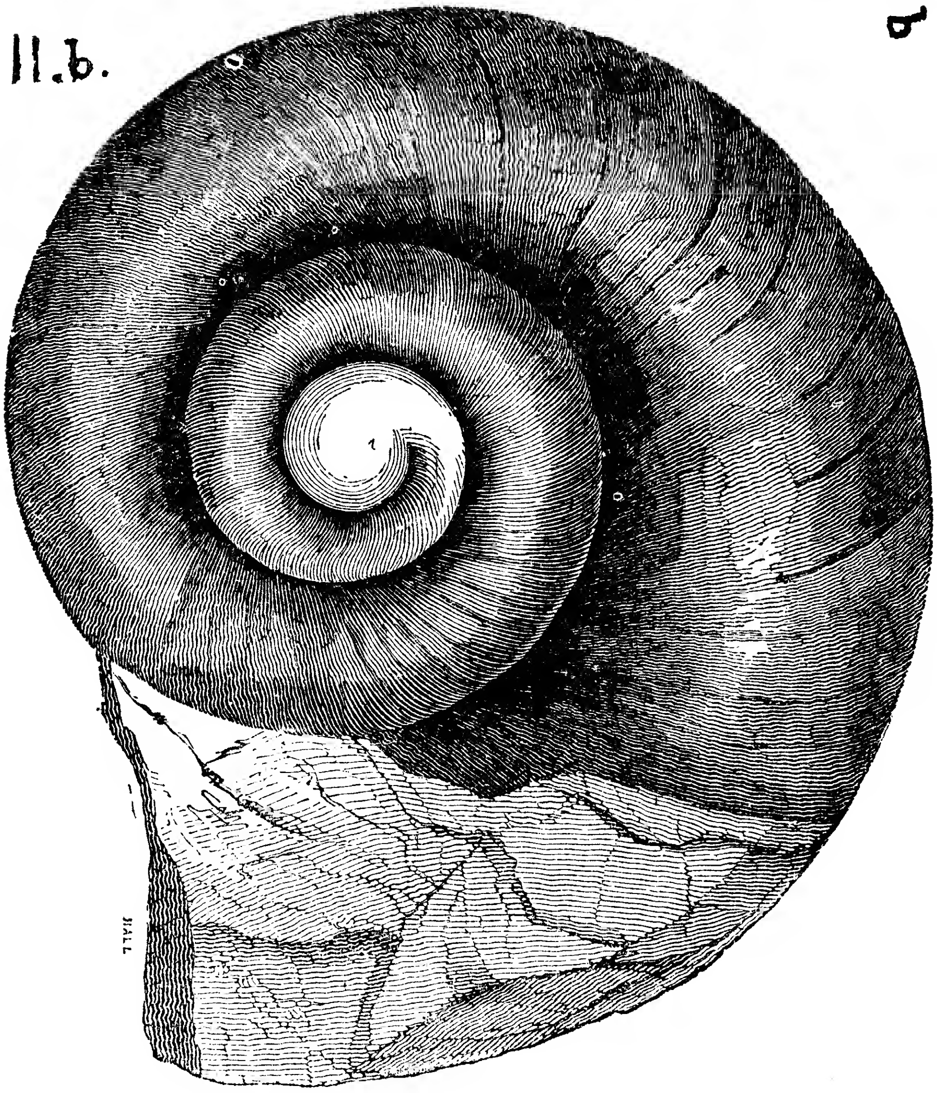
Eumicrotus hawni. (Meek & Hayden, Illinois Rt., Vol. 2, 1866, plate 27), Collett's Indiana Rt., 1883, page 142, plate 30, fig. 10, *natural size*, outside of left valve.—Coal Measures of Kansas and Upper coals of Illinois.—Doubtfully identified among specimens in Cabinet of Wyoming Hist. Soc., Wilkes-Barre, from upper *anthracite* (*Mill Creek limestone*, 1000′ feet above conglomerate) by Heilprin in An. Rt. Geol. Sur., Pa., 1885, page 455, "an obscure impression."—*XV.*

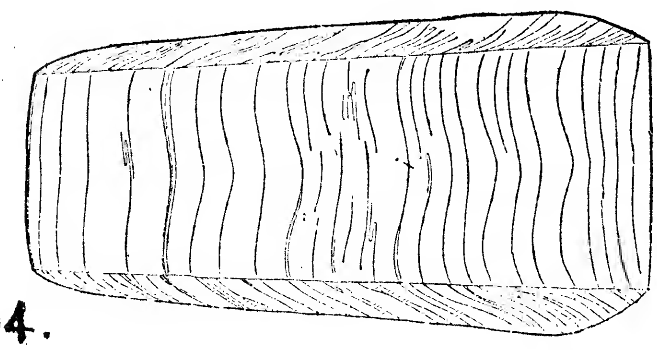


Eunicités confinis, *falcatus*, *paululus*. See **Worm teeth.**

Euomphalus catilloides. (*Inachus undatus.*) Emmons ☛ Geology of the Second District of New York, 1843, page 394, fig. 104 1. *Trenton formation*. (Conrad, Jour. Acad. Nat. Sci., Phila., 1842, Vol. VIII.—See De Koninck's use of the name in 1841.—Emmons says it is rare, found in the Watertown *black limestone;* casts are sometimes seen which are smooth —*IIc.*

11.b.





E. 104. P. 394.

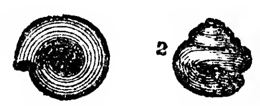
Euomphalus clymineoides (*Straparollus clymineoides*) Hall, 15th An. Rt., N. Y., 1862, named from its resemblance to the genus *Clymenia; Schoharie grit, VII.*—Specimen 883–37 (OO, p. 238) from Nichols, Tioga Co., N. Y., in Sherwood's collections of *Chemung fossils*, submitted to Prof. James Hall's inspection, Dec. 1888.—*VII* and *VIII g. See Appendix.*

Euomphalus depressus. See **Euomphalus hecale.** *VIII g.*

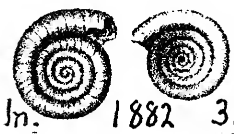
Euomphalus hecale, (*depressus.*) .Hall, page 291, fig. 139, 1. (Name changed by Hall, Illust. Dev. Foss., 1876.—*E. serpens?* of Phillips' Pal. Foss. pl. 36, p. 172.) *Chemung* formation.—Abundant in the Panama conglomerate of W. New York (Carll's I, 107; III, p. 70); seen among the characteristic forms of the Third Oil Sand, at Howard's and many other quarries in Erie, Co. (I. C. White's Rt. QQQQ, p. 249.)—*VIIIg.*

Euomphalus hemisphericus. See **Platystoma hemisphericum.**) *V b.*

Euomphalus pervetustus. (*Cyclostoma pervetusta*; also *Pleurotomaria pervetusta*, Conrad.) Hall, Geol. 4th Dist. N. Y., 1843, page 48, fig. 6, 1, 2. *Medina* formation. (Conrad, An. Rt. N. Y., pages 48, 69, 1839.)—*IV b.*



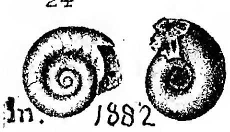
Euomphalus planispira. (Hall, Trans. Alb. Inst. Vol. 4, 1856. *Straparollus planispira*, S. A. Miller's Cat. Am. Pal. Foss., 1877.—Whitfield, Bull. 3, Am. Mus. N. H., 1882, plate 8, figs. 22, 23.) Collett's Indiana Rt., 1882, page 351, plate 31, figs. 22, 23, upper and lower views of two specimens from Bloomington, Ind.—*XI.*



Euomphalus planorbis. Belgium. Compare **Euomphalus spergenensis.** *XI.*

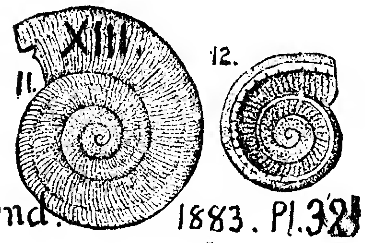
Euomphalus profundus. See **Bucania profunda.** *VI.*

Euomphalus quadrivolvis. (Hall, Trans. Alb. Inst., 1856. Whitfield, Bull. 3, Am. Mus. Nat. Hist., 1882, pl. 8, figs. 24, 25.) Collett's Indiana Rt., 1882, page 349, plate 31, fig. 24, 25.—Spergen Hill and Bloomington, Ind.—*XI.*



Euomphalus rotundus. **Pleurotomaria rotunda.** *VIII a.*

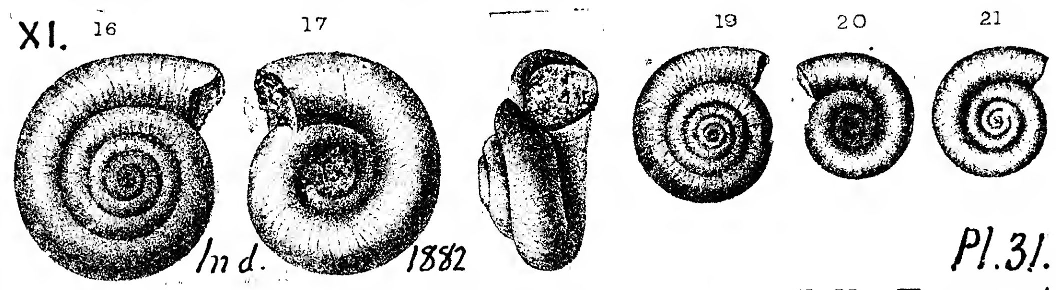
Euomphalus rugosus. Hall. (*Straparollus rugosus*, *S. A.* Miller's Cat., 1877, omitted.) Collett's Indiana Rt., plate 32, figs. 11, 12.—Stevenson finds it in the shales under the Mahoning SS. at Morgantown, and in the *Crinoidal liwestone*, 300′ higher, (L, 37) *XIII, XIV.*— Beaver, Lawrence and



Mercer Cos., Pa., in Ferriferous limestone (Q. 62, 200; Q2, 46, 106; Q3, 25; V. 147)—*XIII.*

Euomphalus serpens. See **Eu. hecale**, *VIII g.*

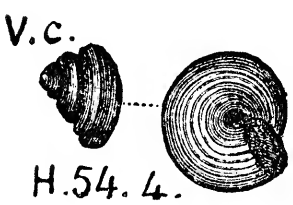
Euomphalus spergenensis; and its variety—**Euom-**



phalus planorbiformis (figs. 20, 21.)—(Hall, Trans. Alb. Inst., 1856; Whitfield, Bull. 3, Am. Mus. Nat. Hist., 1882, plate 8, figs. 16 to 21.) Collett's Indiana Rt., 1882, pp. 350 351, plate 31, figs. 16 to 21.—Subcarboniferous limestone of Spergen Hill, etc., Ind., *XI.*—Note. Like *Euomphalus lævis* of Europe, Trans. Geol. Soc. Lond., Vol. 6, plate 33. Also *Euomphalus planorbis* of De Koninck's Foss., Belgium, plate 25. It exhibits a great variety of form, from a flat whorl to a spire. Collett.

Euomphalus subrugosus. Meek and Worthen. In Fayette and Westmoreland Cos., Pa., in Crinoidal limestone, 250′ below Pitts. Coal; and in Ferriferous limestone on the Ohio river below Raccoon Cr., Beaver Co. (K, 346; K3, 310; H4, p. 78.)—*XIII, XIV.* *See Appendix.*

Euomphalus sulcatus. Hall, Geology of the Fourth District, N. Y., 1843, page 137, fig. 54, 4, from two different shells, the larger one showing its base; the lines and furrows of equal size readily distinguish this species. It resembles the English *Euomphalus sculptus*, but is smaller, and has four whorls. Abundant at Newark, Wayne Co., N. Y., in the *Salina.* *V c.*



Euomphalus ungulatus. See **Ophileta uniangulatus.** H. D. Rogers, Geol. Pa., Vol. 2, 1858, p. 817.—*Black river, II c.*

Euomphalus ——— ? Lehigh Co., Pa., Prime's Rt. (D2, p. 21, D3, p. 161, 183) and *Euomphalus* or *Maclurea* of Chazy aspect, found in Lehigh Co., Pa., by Mr. Clark, in P. Nero's farm quarry, 2 m.. E. of Ballietsville (D2, p. 21.)—*II b?*

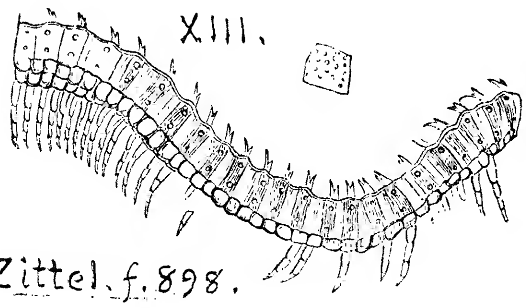
Euomphalus (or **Maclurea**) poorly preserved in J. Dech's farm quarry, Northampton Co., Pa., $1\frac{1}{4}$ m. S. W. of Bath, near

Jacksonville road, (D3, 161)—*II b?*—Also in cross road south of Bath and W. of R. R., rather abundant in quarry, of probably Calciferous age (D3, 183)—*II a?*—Similar forms were obtained from the same great limestone formation in Canoe Valley, Blair Co. (C. E. Hall's Rt. Proc. A. P. S., Jan. 5, 1876.—*II a? II b?*

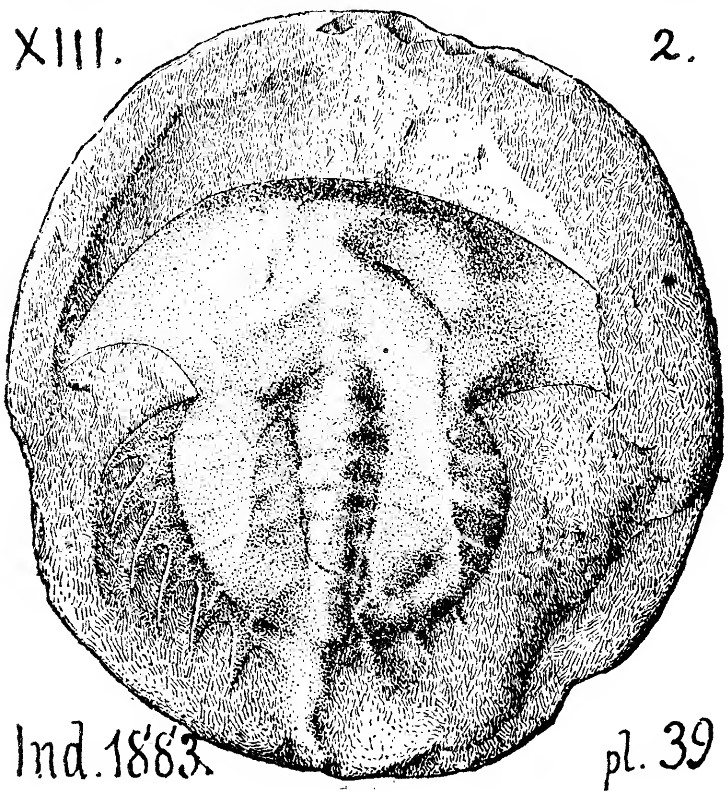
Euomphalus, Chemung forms in lower 500′ of Randall's Warren Section (I, p. 54.)—*VIII g.*

Euomphalus, very minute, silicified in vast numbers, (with *Bellerophons* and *Bryozoa*) in many outcrops of the Washington Middle (No. 4) limestone of the Upper Barren Coal Measures of S. W. Pa., especially near Washington, Pa. (K, p. 49, 242; K3, 306.)—*XVI.*

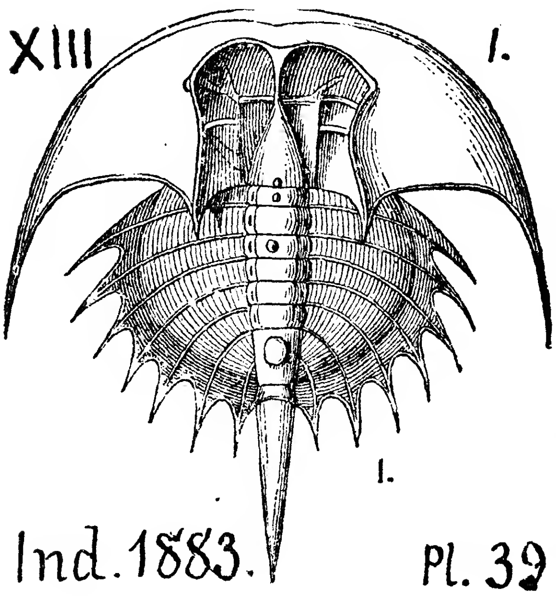
Euphoberia armigera. Meek and Worthen. A centepede of the Coal age, found in a Mazon creek nodule, Illinois. Zittel's Handbuch der Pal., 1885, Vol. 2, p. 729, fig. 898. *Natural size.* See **Acantherpestes,** and **Amynilispes,** belonging to the same family of *Euphoberidæ.*—*XIII.*



Euproops colletti. White. Collett's Indiana Report of 1883, page 172, plate 39, fig. 2, *natural size.* This specimen (imperfect) of a crustacean differing from *Euproöps Danæ*, was found by Mr. Josephus Collett on the split surface of an ironstone ball in the Coal measures at Darkee's ferry, Vigo Co., Ind.—*XIII?*—This is wider and less spiny than *Euproops danæ*, but may be of the same species.



Euproops danæ. (*Bellinurus danæ*, Meek and Worthen, Proc. Acad. Nat. Sci. Phila., 1865; Illinois Rt., Vol. 2, 1866, p. 395, and Vol. 3, 1868, p. 547.) Collett's Indiana Rt., 1883, page 170, plate 39, fig. 1, *natural size*, partly restored. The first specimens of this aboriginal horse-shoe crab of the Coal Age, looked like *Bellinurus;* but those afterwards found differed enough to make a new genus *Euproöps.*—Mazon Creek, Grundy Co., Ill.—Dr. A. S. Packard, Proc. Nat. Acad. Sci., 1888, rejects *Euproöps* for *Prestwichia danæ*, and *Prestwichia longispina.*—*XIII.*



Eurylepis tuberculatus. (Newberry, Pal. Ohio, Vol. 1, p. 350, pl. 38, figs. 2, *a*, *b*, 3, a.) Zittel, Vol. 3, 194, fig. 204.—*XIII.*

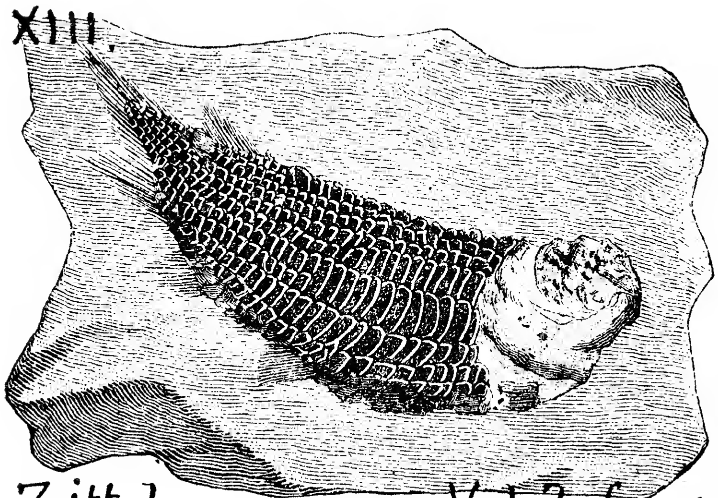
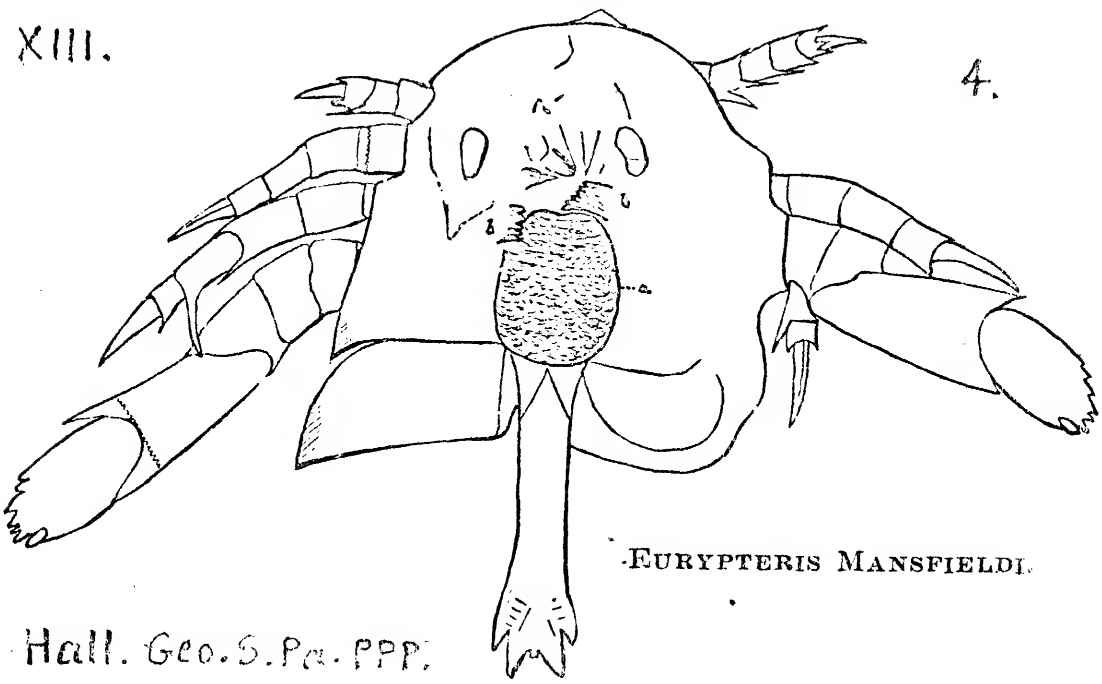


Fig. 204.

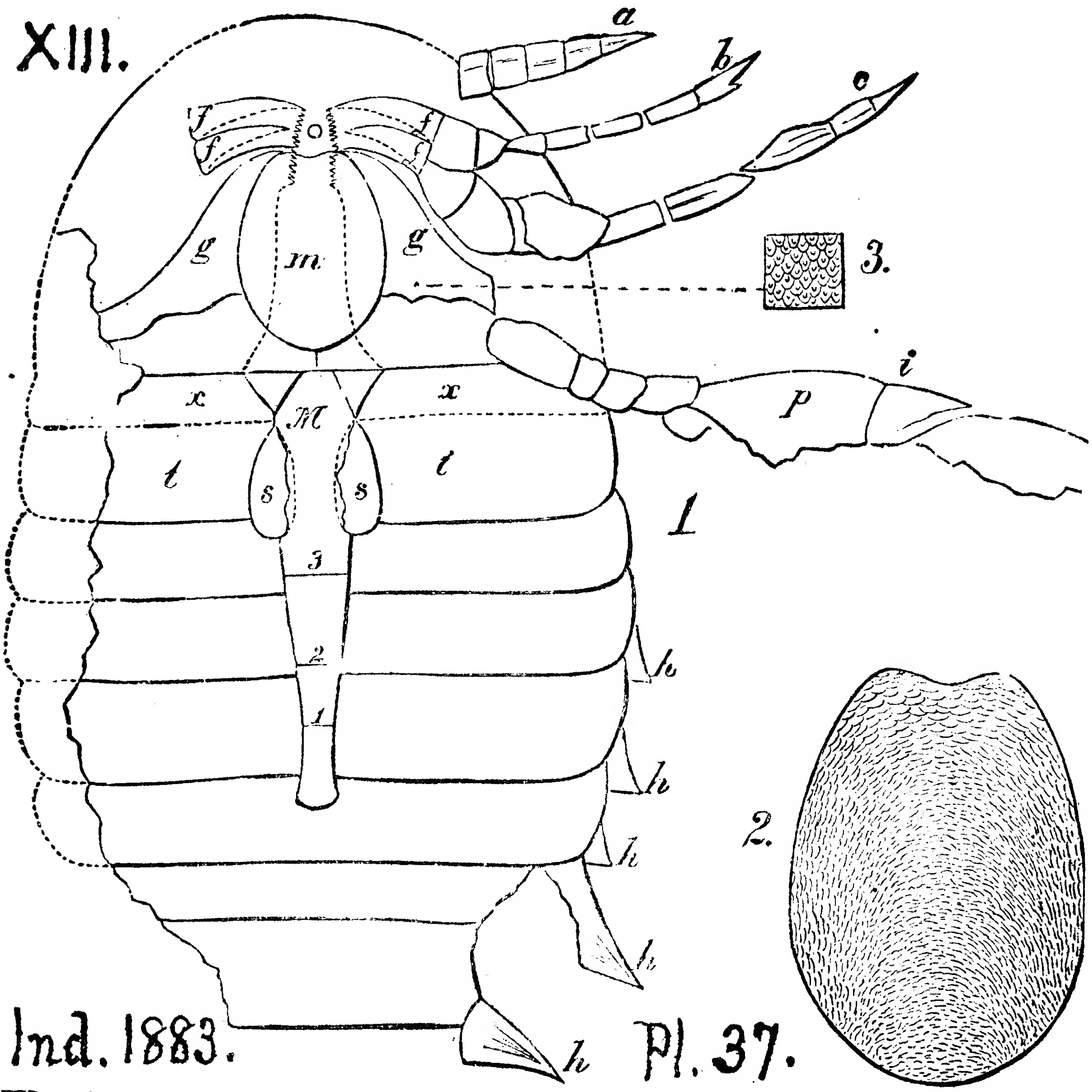
Eurypterus mansfieldi. (*Dolichopterus mansfieldi*, C.



EURYPTERIS MANSFIELDI.

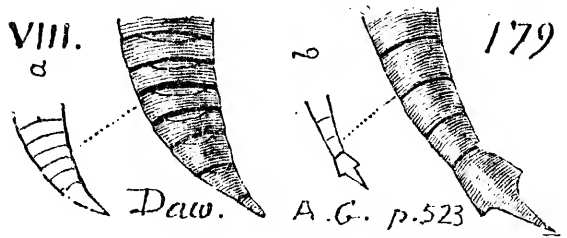
E. Hall, Proceedings of American Philosophical Society, Philadelphia. Found by Mr. Mansfield in his Kittanning (Darlington) coal bed roof shales. (Q, 56, 72.) *XIII.*

Eurypterus (*Anthraconectes*) **mazonensis.** (Meek and

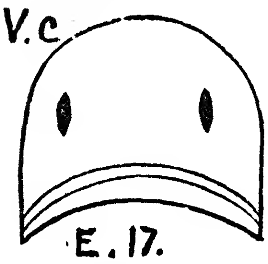


Worthen. Amer. Jour. Science, Vol. 46, 1868, page 21; Illinois Reports, Vol. 3, 1868, page 544.) Collett's Indiana Rt., 1882, page 168, plate 37, fig. 1, *natural size*, outline (indistinct); *a, b, c*, crushed and broken legs; *hh*, impressions of the angular ends of the back half of the body segments; *m*, hypostoma (under lip) in place; *p*, an imperfect paddle (natural joint at *i?*); *gg*, basal segments of paddles; M, mesial appendage of operculum; 1, 2, 3 its apparent joints; *x*, *x*, *tt*, its side wings; *o*, place of the mouth. Fig. 2, the hypostoma enlarged. Fig. 3, part of paddle enlarged to show how its surface is sculptured. —This unique little crustacean had larger cousins in the Coal era; but their time was nearly past; for the real age of these creatures was at the close of Silurian times, when the Waterlime deposits were made.—Mazon creek nodule, Ill. *XIII.*

Eurypterus pulicaris, Salter. Dawson's Acadian Geology, 1868, page 523, fig. 179, a sort of schrimp, found in the Devonian plant beds at St. John, N. Brunswick. In the same beds are many wings of ephemeral flies (Neuropterid insects.)— *VIII, IX.*

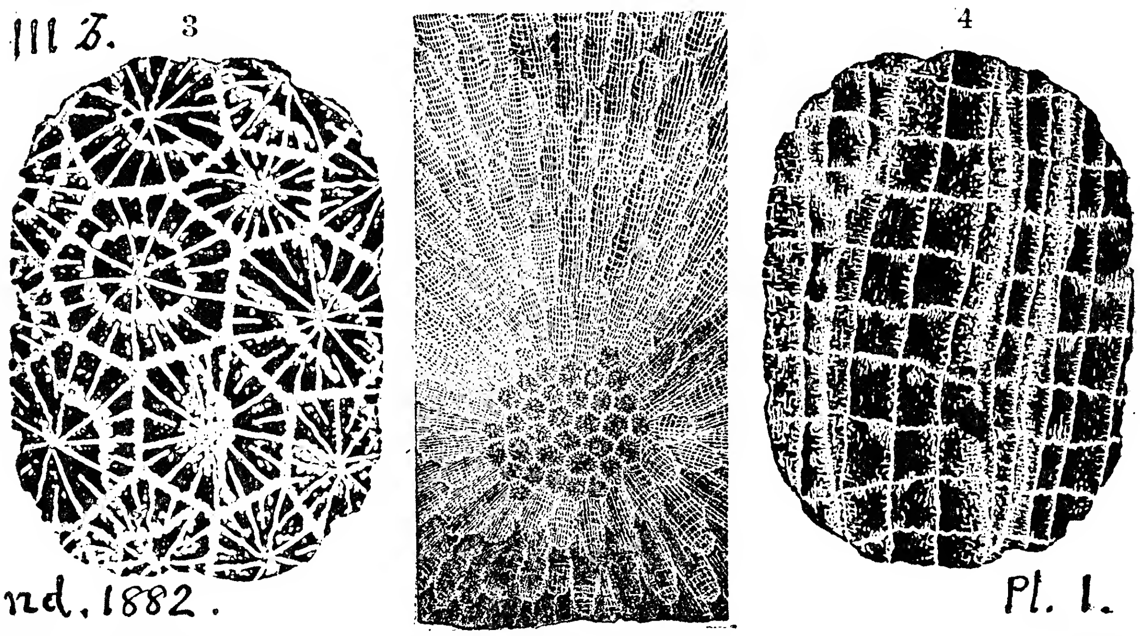


Eurypterus remipes. Vanuxem. Report on the Geology of the Third, or Middle District of New York, 1844, page 100, fig. 17. (See Hall's numerous and elaborate figures in Pal. N. Y., Vol. 3, plates 30 to 84.)—Salina (or Onondaga) formation, *V c.—For figures see Appendix.*

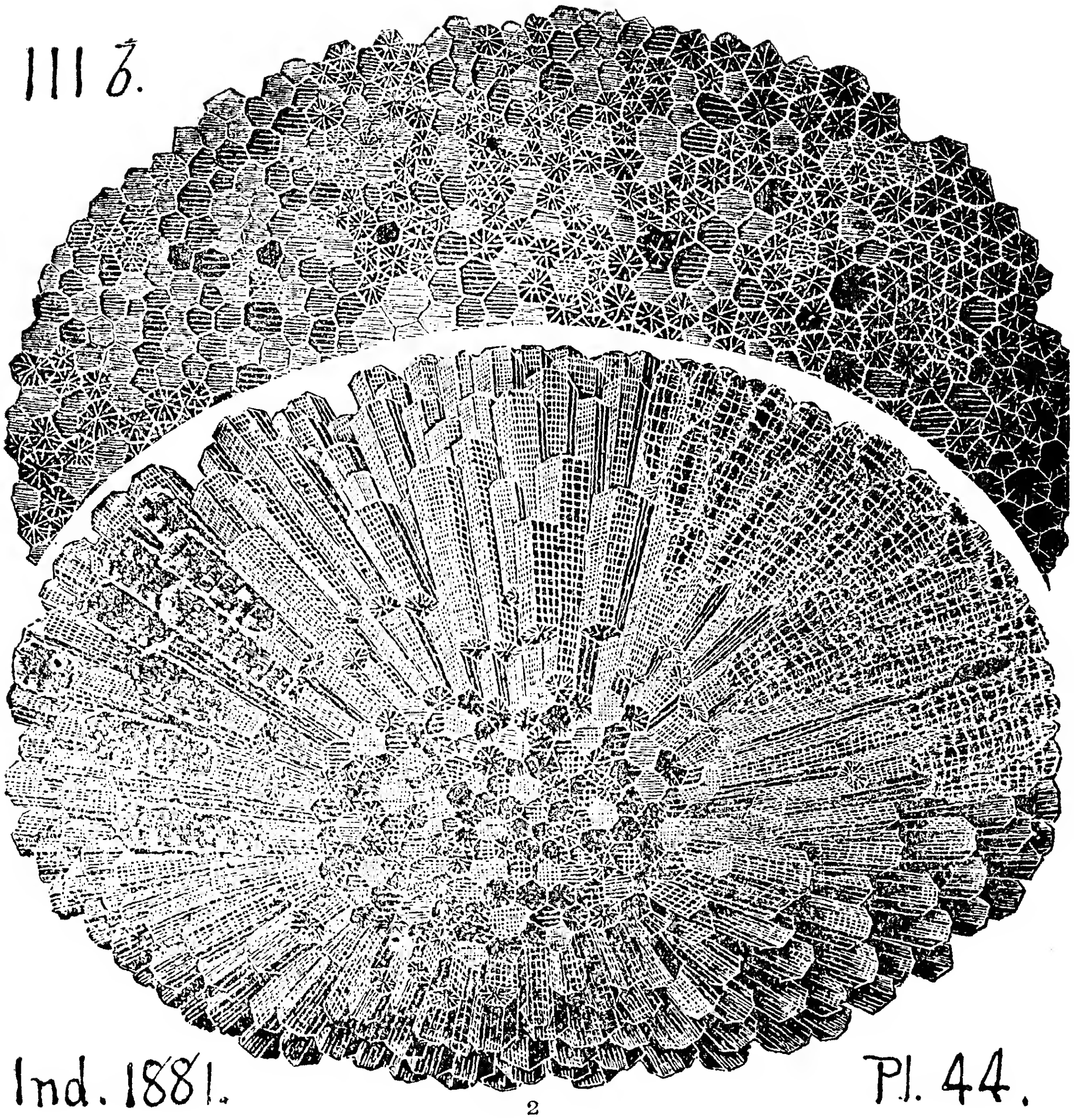


Eurypterus remipes? Conjectured by I. C. White to be in the Olean (Garland, bottom of Pottsville) Conglomerate, in Venango Co., Pa. (Q, p. 72.)—*XII.*

Favistella stellata. (Hall, Pal. N. Y., 1847, Vol. 1. Hudson

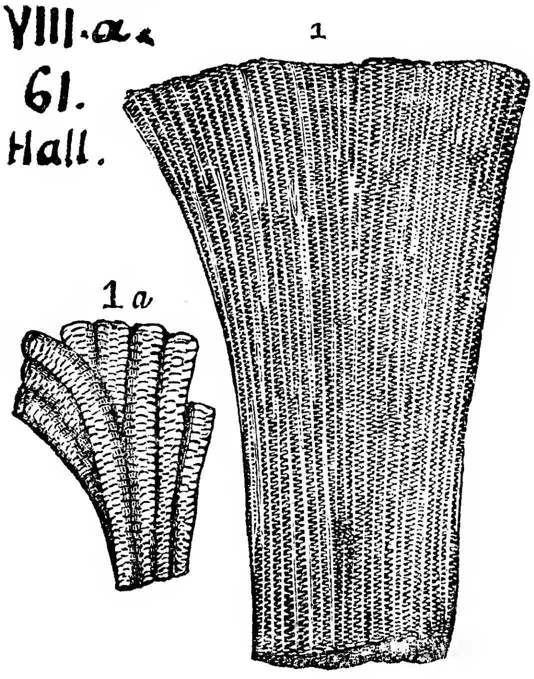


river formation.) Collett's Indiana Rt. of 1881, page 378, plate 44, figs. 1, 2 (drawn by Van Cleve), top and bottom views of a colony of coral tubes. See Collett's Ind. Rt. of 1882, page 247, plate 1, fig. 2, the lower side of a corallum deprived of its skin (decorticated). Fig. 3, cross section, *enlarged*, showing the internal constitution of the several coral tubes. Fig. 4, section lengthwise.—Lorraine (*Hudson river*) shale, *III b.*



2

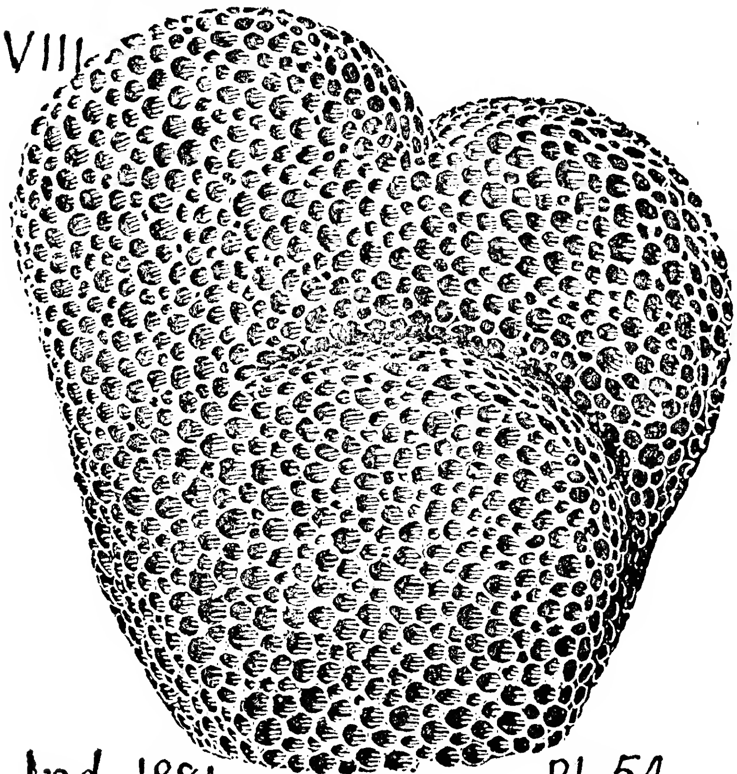
Favosites alveolaris. Hall, Geol. of the Fourth or Western District of N. Y. 1843, page 157, fig. 61, 1, which has a honeycomb structure; transverse septa interrupted; no visible pores. Fig. 1*a*, a specimen with larger columns, shows pores on the angles. Williamsville, Erie Co.; Leroy, Genesee Co.; Caledonia, Livingston Co., N. Y. All in *Upper Helderberg* (*Onondaga*) *limestone.* (DeBlainville, Manual d'Actinologie, 1834.—For synonyms see Murchison's Sil. Res. p. 682.—*VIII a.*



Favosites arbusculus. Hall, Ill. Dev. Foss. 1876, Hamilton. Collected by Claypole at north end Dorran's narrows, Mr. Tuomy's, Centre t., Perry Co., Pa., *Hamilton upper shale* (Spec. 118–14, three).—*VIII c.* *See Appendix.*

Favosites basalticus. (*Calamopora basaltica*, Goldfuss, 1826.) Billings in Collett's Indiana Report of 1881, page 394, plate 54, fig. 1. Side view of a portion of a corallum.—*Devonian rocks* in Canada.—*VIII ?*

VIII



Ind. 1881. 1 Pl. 54

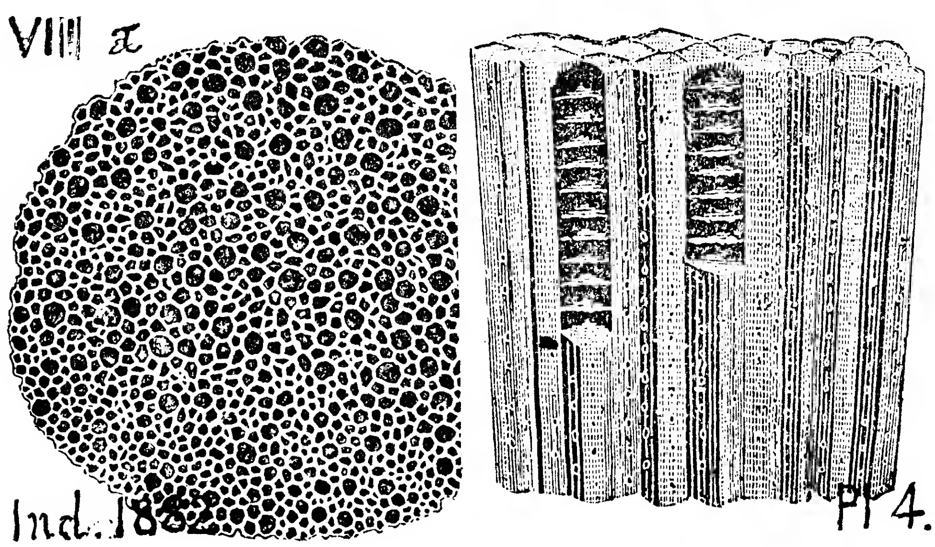
Favosites canadensis ? Doubtfully recognized in specimen 601–26 of Hale and Hall's Orbisonia collections, 1875, (OO, p. 235) from *Lower Helderberg rocks*, *VI.*

Favosites conicus. Hall, 26th An. Rt. 1874, Lower Helderberg. Collected by Dr. Barrett from White's L. H. *Stormville shales*, Pike Co., Pa., Port Jervis, N. Y. (G6, p. 132)—VI.

Note. Other *favosites* occur in the still lower *Stormville limestone* (p. 133).—*VI.* *See Appendix.*

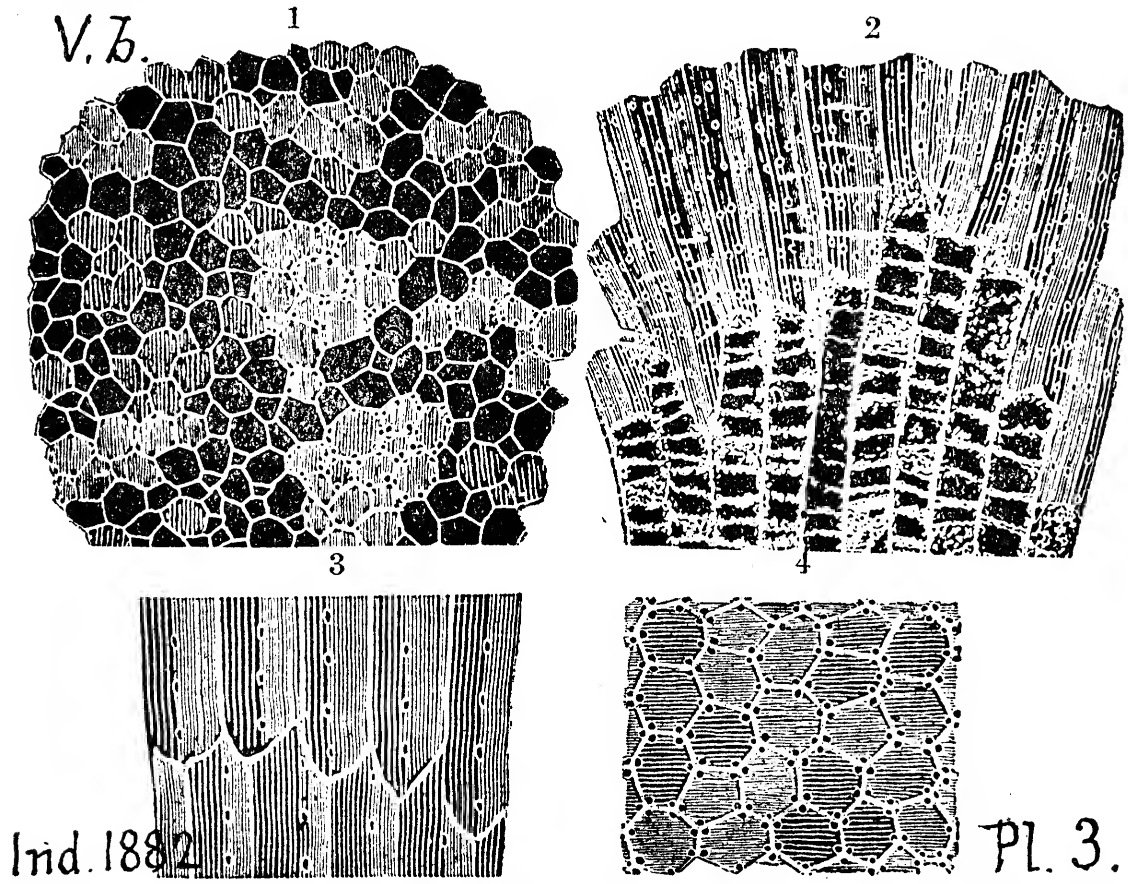
Favosites emmonsi. (Rominger, Foss. Corals, 1876, page 27). *Favosites emmonsi.*—(Hall Illu. Devon. fossils, 1876, plate 9). *Emmonsia hemispherica.* Edwards & Haime.

VIII x

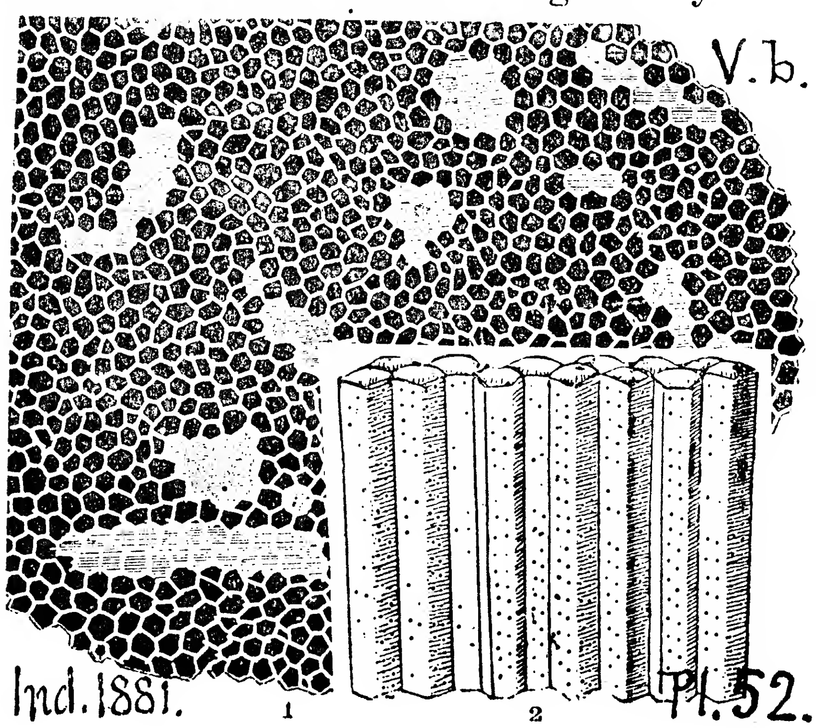


Ind. 1882 Pl 4.

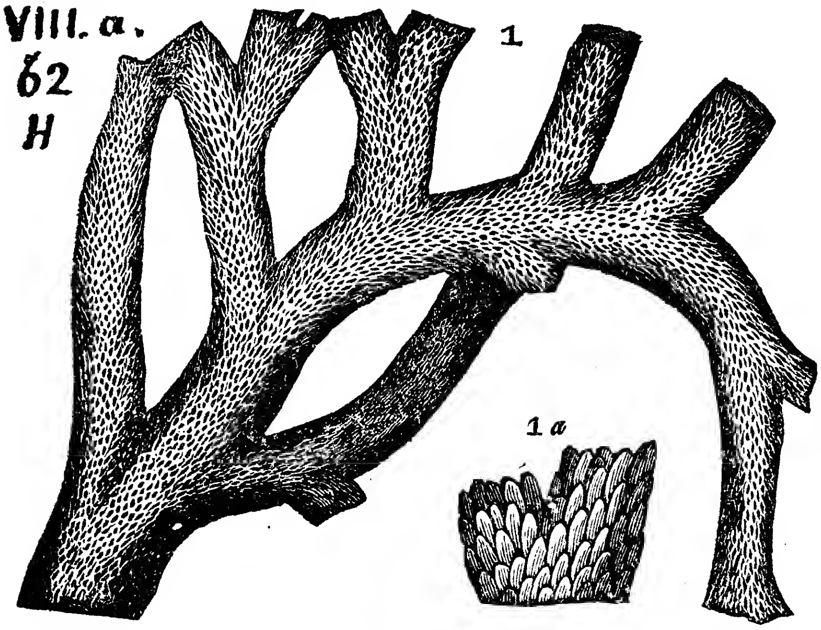
Favosites favosus. (*Calamopora favosa*, Petref. Germ.



1826). Collett's Indiana Report of 1882, page 253, plate 3, fig. 1 (Van Cleve) top view; fig. 2, side view; fig. 3, side view, *enlarged*, to show pores; fig. 4, cross section, *enlarged*, showing number and position of pores.—Characteristic and common coral of Niagara formation in Europe and America.—Note. Another illustration is given by Collett in Indiana Report of 1881, page 383, plate 52, fig. 1, 2.—And another in A. Winchell's Geol. Studies, 1886, p. 220, figure 149.—In Pennsylvania found in Lycoming Co., in 65′ limestone, say 500′ above Clinton Ore ss. (T, p. 43), i. e. in. *Salina*, *Vc.*

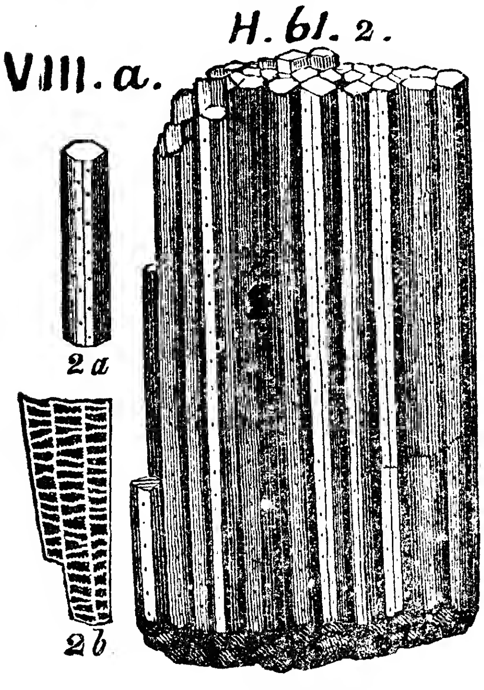


Favosites fibrosus. Hall, Geology of the Fourth District, N. Y. 1843, page 159, figs. 62, 1 and 2 *magnified.* This fossil, with its varieties, ranges from the *Clinton* up to the *Hamilton.* The figure is from abundant specimens seen on the surfaces of the *Onondaga limestone.* (*Upper Helderberg*) at Clarence, Erie Co., N. Y. It appears to be Goldfuss's *Calamopora fibrosa.* See Phillips, Sil. Res. p. 683, pl. 15 *bis*, fig. 6.—*VIII a.*



Favosites forbesi, *var.* **occidentalis.** *See Appendix.*

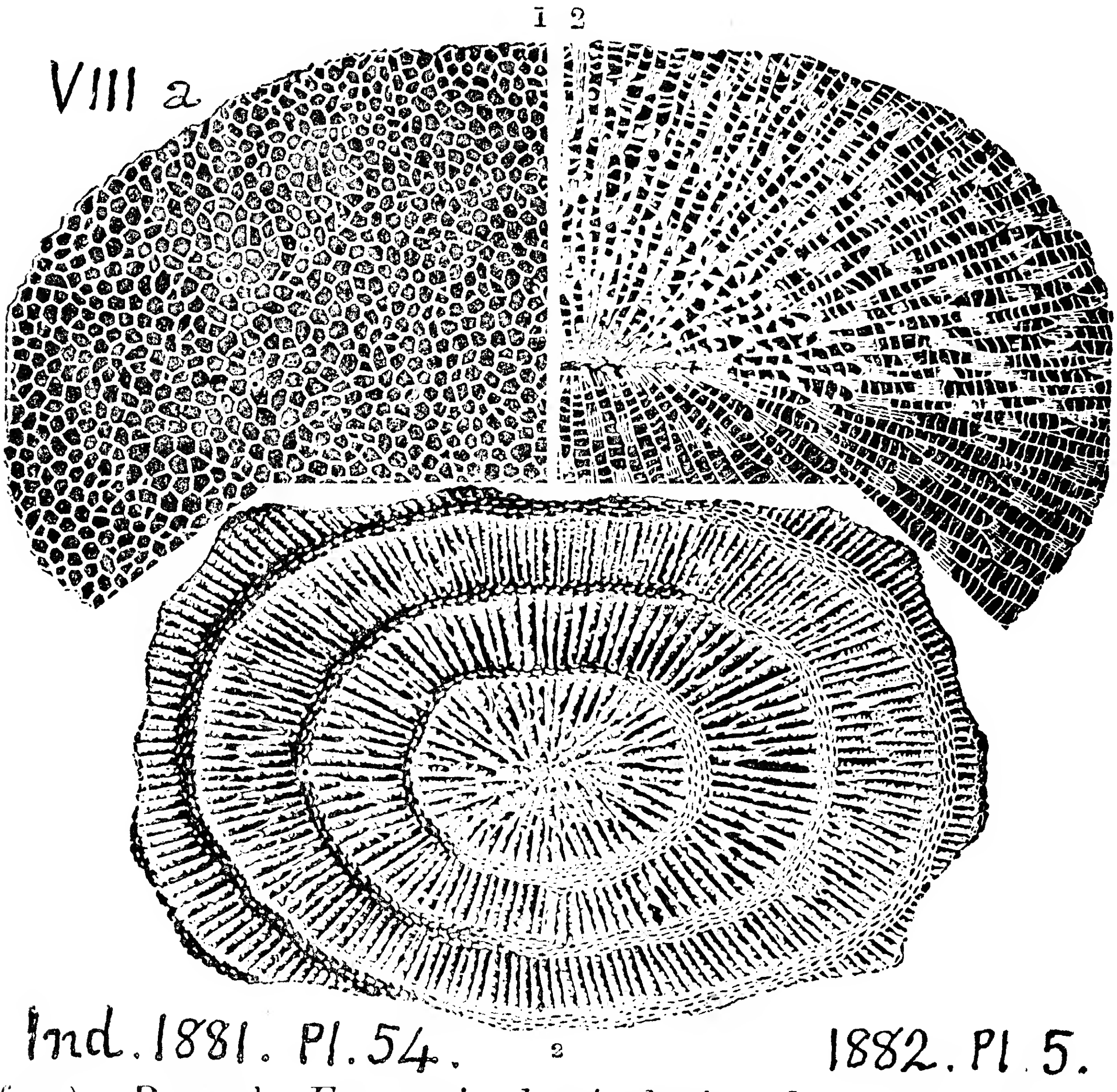
Favosites gothlandicus. Hall, Report on Fourth district of New York, 1843, page 157, figs. 61, 2, 2a, 26. Upper Helderberg formation. (2a, one tube magnified twice; 2b, a fragment, showing the cross lamellæ of the interior).—(Lamarck, Histoire des Animaux sans vertêbre, 1816).—*VIII a.*



The fossil is a mass of solid columns showing the pores on the sides of the tubes. Specimens verify Lonsdale's observation that a single and a double row of pores exist together even on one and the same column.

Favosites helderbergiæ. Hall, 26th An. Rt. 1874, Lower Helderberg.—Collected by Dr. Barrett, at Port Jervis, from White's *Stormville limestone* (G6, p. 134).—Collected by White in the same, in the Montour region (G7, p. 89, 101), at Esk's (247), Lime ridge (261), Appleman's (300, 348), Derr's (311) quarries; and in the L. H. *Stromatopora bed*, Low. Mah. t., Northumberland Co. (376).—A large mass of it, weathered out of its matrix, at McConnelltown cliffs, Huntingdon Co. (T3, 201); and among *Stromatopora* in Juniata Sand Co.'s quarry cliff on Mill cr. (p. 269.)—In Bedford Co., abundant in transition lime-sand beds of L. Held. into Oriskany, Hyndman sect. (T2, 86); chert beds 150′ below top of Oriskany (p. 104), Pine ridge, King t. (p. 134); Mann's quarry, Monroe t. (p. 187). —VI–VII.—Specimens in the cabinet (OO, p. 234) 601–2, 3, 28, and 601–33 (eight specimens, mostly conical or spherical) from $1\frac{1}{2}$ m. S. of Rockhill furnace, Orbisonia, Hunt. Co.—606–1, 4 (seven specimens), and 608–4 from Walpack bend, Monroe Co. All from *Lower Helderberg, VI.—See Appendix.*

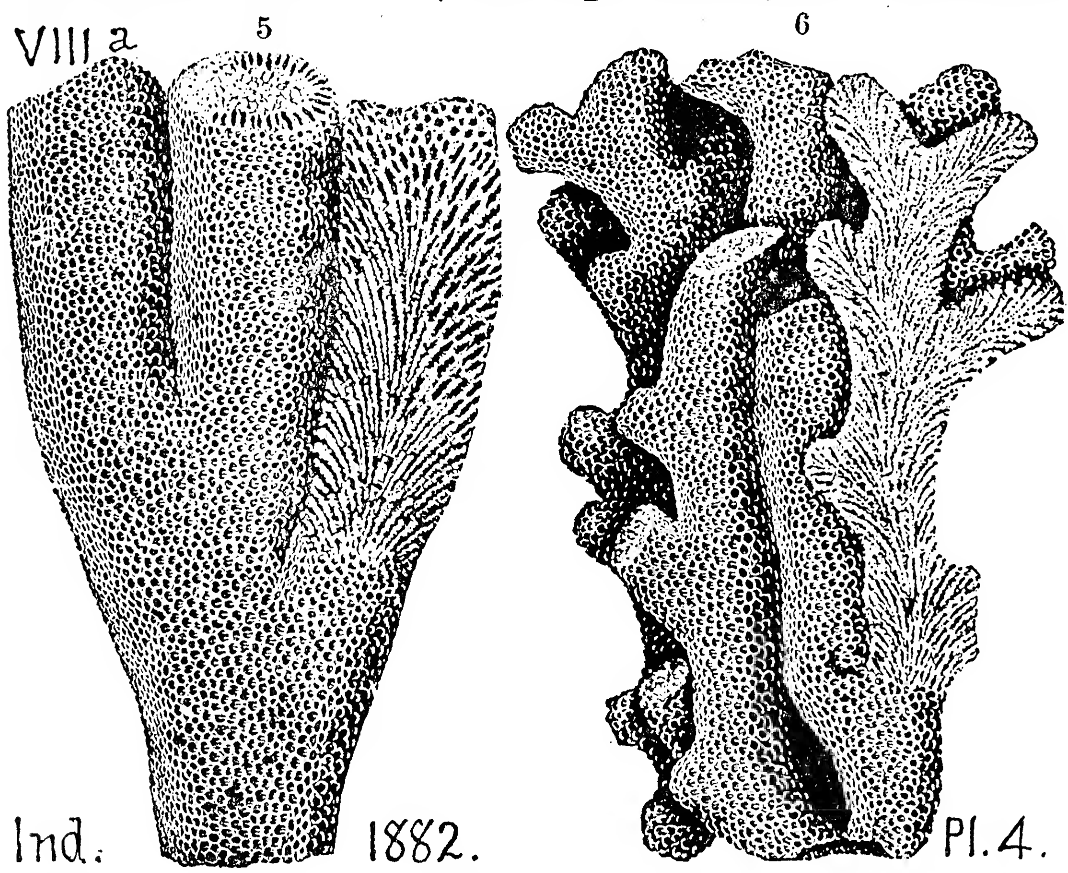
Favosites hemisphericus. (*Calamopora alveolaris*, Gold-



fuss).—Properly *Emmonsia hemispherica*, described first by Troost, 1840, at the Falls of the Ohio, 5th Geol. Report of Tennessee; then by Yandell and Shumard, 1847, Contributions to Geol. Ky.; then by Rominger, 1876; Hall, Ill. Dev. Foss. 1876. —*Favosites turbinatus* (Billings, 1859); *not* the *F. hemispheri-*

cus described by Edwards and Haime in 1851. (Collett).—Collett's Indiana Report of 1881, page 396, plate 54, fig. 2, under view of a corallum. Indiana Report of 1882, page 257, plate 5, fig. 1, [half of the] upper side of a corallum to show size and form of corallites. Fig. 2, [half of the] lower surface, skin (epitheca) dissolved away, showing the tubes and their partitions (septa).—In the U. S. and Canada common in Upper Helderberg (*Corniferous*) limestone.—*VIII a.*

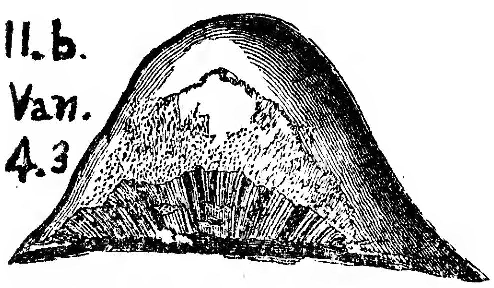
Favosites limitaris. (*Calamopora spongites.* Goldfuss.)—



(Rominger, 1876. Foss. Corals, Corniferous.) So called because lying next to *Cladopora.* Collett's Indiana Rt. of 1882, page 256, plate 4, fig. 5; specimen with large branches. Fig. 6, more slender, and frequently branching.—In Canada, Michigan, Indiana and Kentucky, *Corniferous*, *VIII a.*

Favosites lycoperdon. See **Monticulipora lycoperdon.**

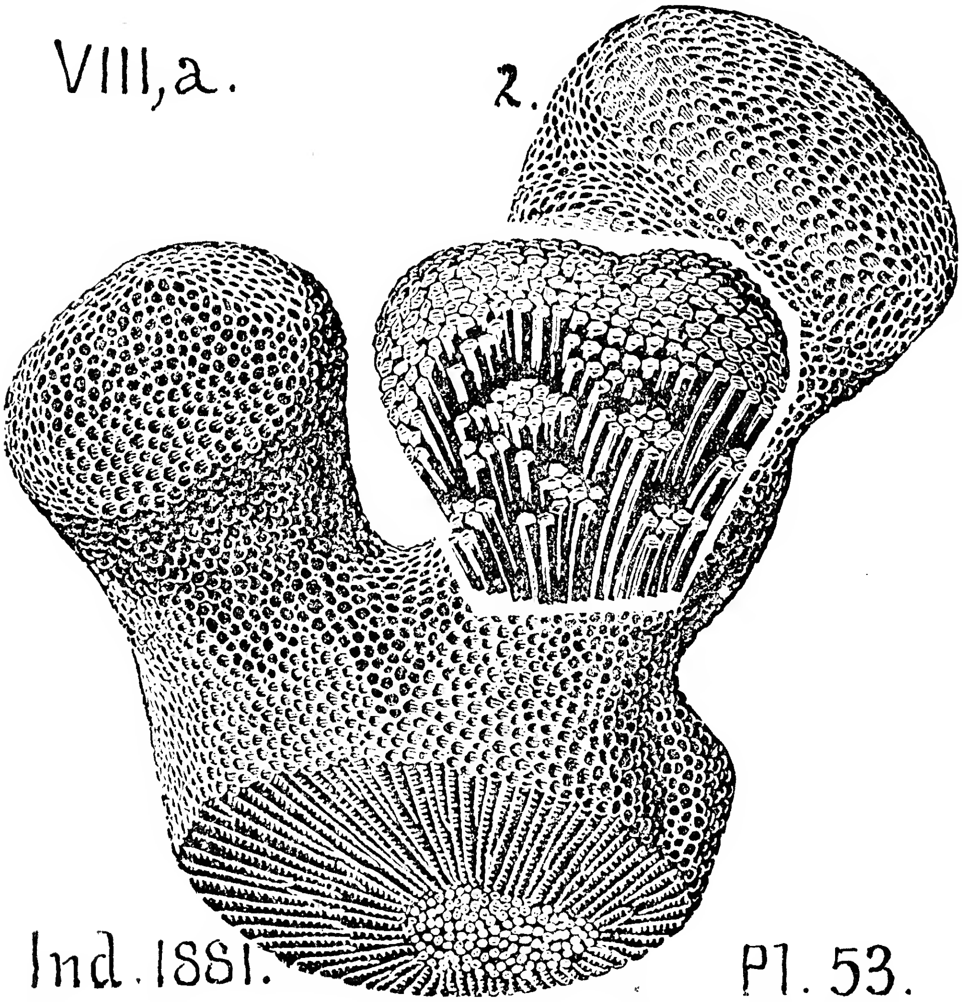
Favosites lycopodites. Vanuxem. Third District, 1844, page 46, fig. 4, 3. Emmons' Second District, 1843, page 389, fig. 99, 3.



This puff-ball favosite, a mass of small angular cells, side by side, characterises abundantly the *Trenton* and dies out in the *lower Utica.* At Frankford, Ky. called *Trianisites cliffordii*, (Van.)—*II c.*

Favosites niagarensis. (See *Appendix.*)

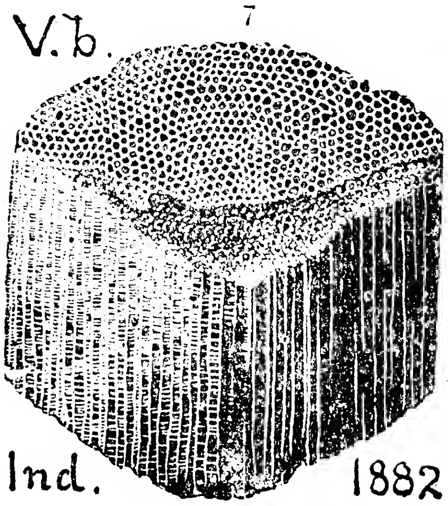
Favosites polymorpha. (Goldfuss.) Collett's Indiana Report of 1881, page 395, plates 50, fig. 1; and 53, figs. 1, 2, 3, (of which I select a large specimen, and a fragment, showing the sides of a bundle of corallites. — This coral grew in a great variety of shapes in the *Corniferous limestone* age. *VIIIb.*



Favosites spinigerus. *See Appendix.*

Favosites venustus. (*Astrocerium venustum.* Hall, Pal. N. Y., Vol. 2. Niagara.) Collett's Indiana Report of 1882, page 253, plate 2, fig. 7, oblique view of specimen with upper surface removed, to show form of cell tubes; and vertical section showing transverse diaphrams. Fig. 8. upper surface of slightly weathered specimen.—*Niagara formation. V b.*

7



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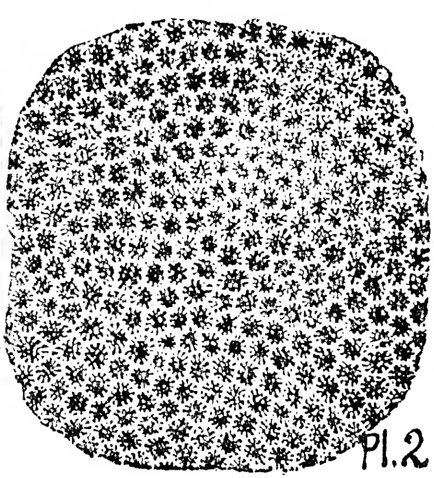


Favosites —— ? in coral beds, 30′ feet below top of L. Held. limestone, Powell's quarry, Cove station, Hunt. Co., Pa. (T3, 123).—Also on weathered surfaces of Cherty limestone near New Paris, Napier, Bedford Co. (T2, 121).—Abound in a limestone 260′ under Oriskany, in Weaver's run section, Hopewell, Hunt. Co. (T3, 156.) *VI.*

Favosites —— ? well preserved in *Clinton fossil ore bed*, Jac. Walters' mine, Bedford Co. (T2, 153), *Va.*

Favosite specimen in *Hamilton strata*, in Fellows' coll., 1876 (OO, p. 235), Dingman's Ferry, Pike Co.—*VIIIc.*

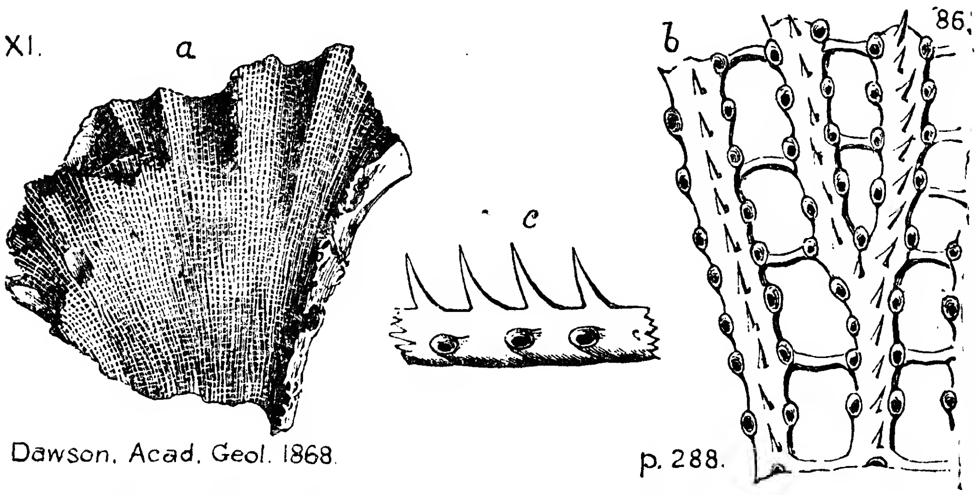
Favosite specimen in *Drift* on Pine creek, Venango Co., Pa. (O, 3056).

Felis. Two hand bones of a species of Jaguar; and a tooth as large as a tiger's; found in the cave at Port Kennedy, Chester Co., Pa. *Postpleiocene. See Appendix.*

Fenestella acmea. *See Appendin.*

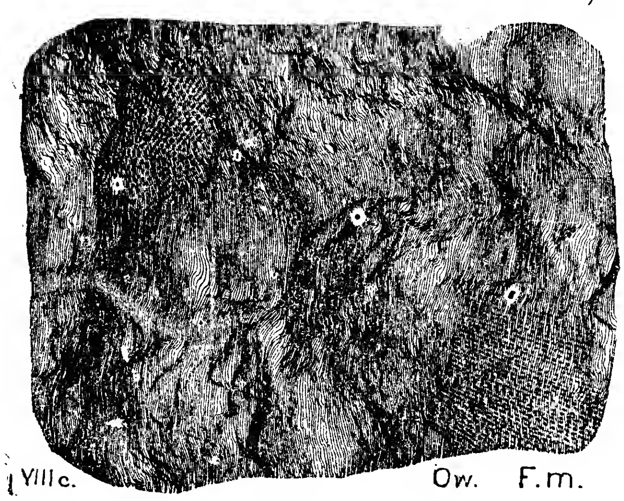
Fenestella ambigua. *See Appendix.*

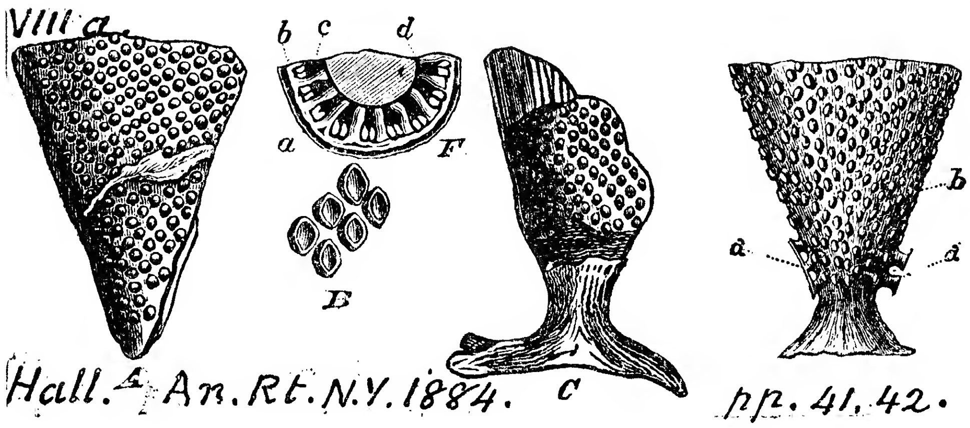
Fenestella lyelli, Dawson. Acadian Geol., 1868, p. 288, f. 86; a beautiful polyzoon characteristic of one of the carboniferous lime-



stone beds of Windsor series, Nova Scotia.—*XI.*

Fenestella milleri ? Owen, Geol. Wis. Iowa and Minn. 1852, plate 3 A, fig. 21, from limestone supposed to be of the age of the Hamilton group of New York; given here as a good representation of the look of these beautiful fossils as they lie scattered in fragments through the mass of the limestone rock.—*VIII c.*





Fenestella moulds. (*Cryptopora mirabilis*, Davidson.) Hall, An. Rt. 1884, Albany, 1885, p. 41, figs. A, C; p. 42, fig. A. The little windows of the coral animal have been filled with mineral matter, and then the animal structure has been dissolved away from around and between the window-moulds. *Corniferous.—VIII a.*

Fenestella planiramata. Spec. 805–13, from Bell's Mills, Blair Co.—Also 805–3, 16, 19, 21, 22, casts and fragments undetermined from the same locality; all from *Hamilton shale, VIII c.—See Appendix.*

Fenestella parvulipora. *See Appendix.*

Fenestella punctistriata. *See Appendix.*

Fenestella, collected by C. E. Hall, at Marshall's creek Monroe Co., Pa., 1875.—Collected by Claypole in Perry Co., at Barnett's Mills, Hamilton upper shales (Spec. 5–2, 20, with *Rhynchonella horsfordi*), *VIII c.*—Also 1 m. E. of Pine Grove, Miller t., Perry Co., in Chemung (Spec. 151–4) *VIII g.*—From a very foss. bed, S. bank Juniata below Huntingdon, 250′ under Chemung Lower (Allegrippus) Conglomerate, and —Stony Brook beds of Montour region. (T3, 193.) *VIII g.*—In Bedford, Mason's quarry, (T2, 187.) *VI.*—Spec. in Carll and Randall's collections at Warren. *VIII–IX.*

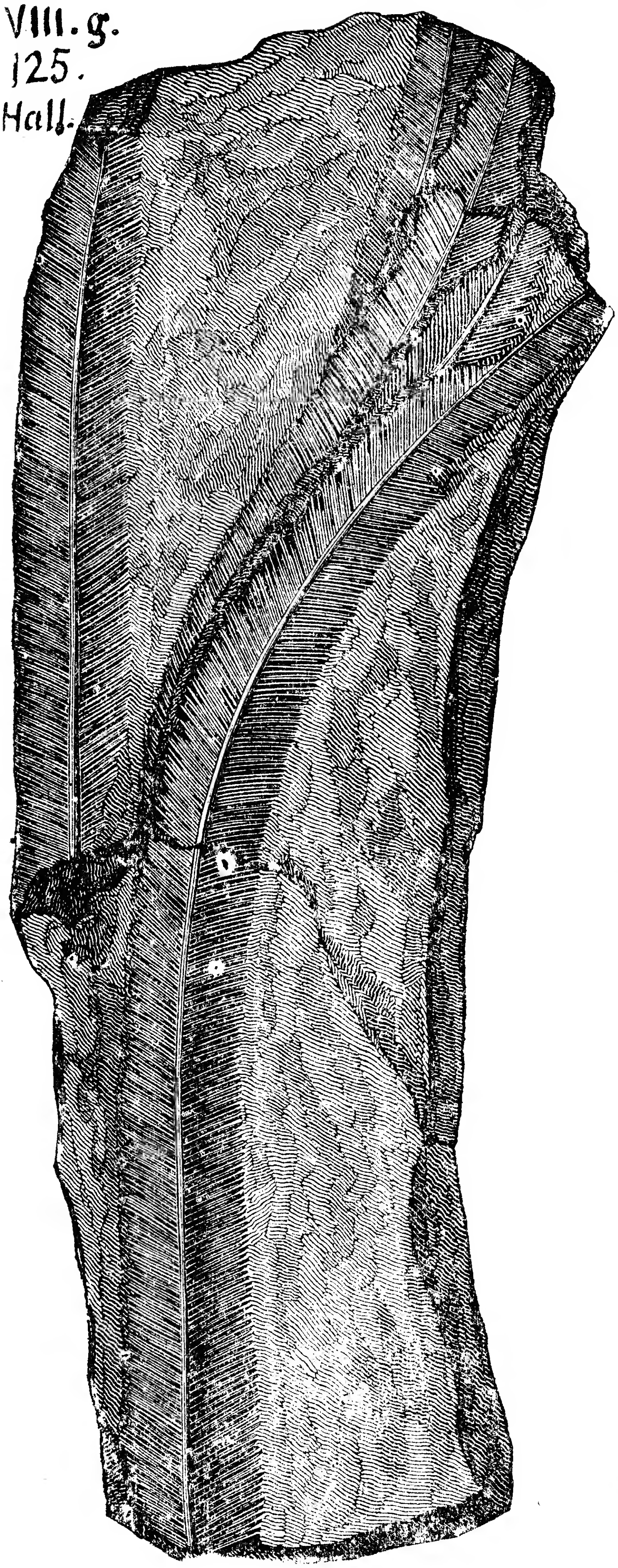
Fenestella ——— ? Specimens, 801–12, 14, 15, Marshall's Creek, Monroe Co. *VIII c.*

Fenestella ——— ? *New species* (G. B. Simpson) specimen 801–13 (impressions of cell, and non-calcareous face) from Marshall's Creek, Monroe Co., *Hamilton, VIII c.*

Fenestella ——— ? Thirteen specimens, nearly all one species, impressions, but in such a condition as not to be specifically identified (G. B. S., 1888), marked 804–61, from Marshall's Creek.—Also from the same locality 804–32, 44, 45, 71, 85, impressions too obscure. *VIII c.*

Filicites ——— ? Hall, Geology of the Fourth District of New York, 1843, page 273, fig. 125. It is found in considerable numbers at Ithaca, Hector and Enfield in Tompkins Co., N. Y., in *Chemung* strata. At first sight it appears like a plant, some species of *Filicites;* but its uniform size, the regular angle at which the leaves are given off from the stipe, and the absence of carbonaceous matter, suggest a stronger resemblance to the tentaculated fingers of a crinoid (or coralline) animal; or perhaps that it is allied to the *Sertularia.* (Hall. 1843). Compare Shumard's polyp *Plumalina.* Compare also certain tracks in the mud made by insects or small crustacean animals. *VIII g.*

VIII. g.
125.
Hall.



Fenestella ———. Rogers, page 827, fig. 656, Hamilton formation. — With an unnamed **Fenestella** in Owens' Report on the Geology of the northwest, 1852, plate 3 A, fig. 16, from Iowa limestones probably of Hamilton age, added for comparison.— *VIII c.*

Fenestella, *not named,* (G. B. S. 1888) on Specs. 807–3 (two casts of fragments); 807–15 (casts of frond); 807–12 (non cell face); all from Kintner's farm, Monroe Co., Pa. (OO, p. 235) from *Hamilton strata, VIII c.*

Ferns of many kinds in the roof shales and partings of coal beds. See **Alethopteris, Neuropteris,** etc., etc.

Fern in *Clinton strata,* near Orbisonia, Huntingdon Co., Pa. (OO, p. 233), specimen 508–22.— *V a.*

Ficoides and *Ficoidites.* See **Stigmaria.**

Filicites osmundiformis and *vesicularis.* European. See **Odontopteris schlotheimii.** *XIII.*

Fish spines. See **Ichthyodorulite; Onchus; Ctenacanthus,** etc.—*Fish teeth.* See **Hydodus; Petalodus,** etc.— *Fish scales* and buckler plates. See **Holoptychius; Eurylepis,** etc.—*Fish dung.* See *Coprolites.*

Fish remains are abundant in the Pennsylvania formations from the Clinton, *Va,* up to the Coal Measures; and would be found in great numbers, no doubt, in the New Red (Trias, etc.) if search were made for them.—S. A. Miller's indispensable Catalogue of Palæozoic fossils, published by the author in Cincinnati, O., No. 8, West 3d street, 1877 (revised and enlarged, 1883) gives the following list of *American genera of fish:* (1) of the order of Gar-pike (*ganoid*), (2) Shark (*Selachian.*)

GANOIDEI.—Acanthaspis, Acantholepis, Acrolepis, Amblypterus, Anaclitacanthus, Aspidichthys, Asterosteus, Catopterus, Cephalaspis, Coccosteus, Cœlacanthus, Conchodus, Ctenodus, Cyrtacanthus, Dinichthys, Dipterus, Eurylepis, Heliodus, Holoptychius, Liognathus, Macropetalichthys, Mecolepsis, Onychodus, Palæoniscus, Peplorhina, Platysomus, Pterichthys, Pygopterus, Rhizodus, Rhynchodus.

ORDER SELACHII.—Acondylacanthus, Agassizodus, Amacanthus, Antliodus, Apedodus, Aspidodus, Asteroptychius, Batacanthus, Bathycheilodus, Bythiacanthus, Calopodus, Carcharopsis, Cheirodus, Cholodus, Chomatodus, Cladodus, Climaxodus, Cochliodus, Compsacanthus, Ctenacanthus, Ctenopetalus, Ctenoptychius, Cymatodus, Dactylodus, Deltodus, Desmiodus, Diplodus, Drepanacanthus, Edestes, Erismacanthus, Fissodus, Gampsacanthus, Geisacanthus, Glymmatacanthus, Gyracanthus, Harpacodus, Helodus, Hybacladodus, Lambdodus, Lecracanthus, Leiodus, Leptophractus, Lisgodus, Listracanthus, Machæracanthus, Marracanthus, Mesodmodus, Oracanthus, Orodus, Orthacanthus, Peltodus, Periplectrodus, Peripristis, Petalodus, Petalorhynchus, Petrodus, Phœbodus, Physonemus, Platyodus, Pleuracanthus, Pnigeacanthus, Pœcilodus, Polyrhizodus, Pristicladodus, Pristodus, Psammodus, Psephodus, Ptyctodus, Sandalodus, Steumatodus, Stenacanthus, Tanaodus, Thrinacodus, Trigonodus, Venustodus, Xystracanthus, Xystrodus.—Also the more recently formed genera:

Chitonodus, Copodus, Deltodopsis, Deltoptychius, Ectosteorachis, Eunemacanthus, Janassa, Orthopleurodus, Palæobatis, Ptyonodus, Rhadininichthys, Stenopterodus, Tæneodus, Tomodus, Vaticinodus.

Of this long list we owe most of our knowledge to Dr. Newberry, State Geologist of Ohio, and his numerous figures in the Palæontological Volumes of that Survey; much to St. John and Worthen, of the Illinois survey; much to Dr. Leidy and Prof. Cope. Very few genera and species have been accurately determined from Pennsylvania; the numerous specimens collected are still to be studied and distributed to their places in the lists.

The oldest *fish spine* known was found in Perry Co., Pa., by Prof. Claypole, in the *Clinton Iron Sandstone*, with fragments of scales and plates and small pellets (apparently *coprolites*). See **Onchus clintoni** (F2, xii, and Spec. 50*a*–7, four.)→ *Va.*

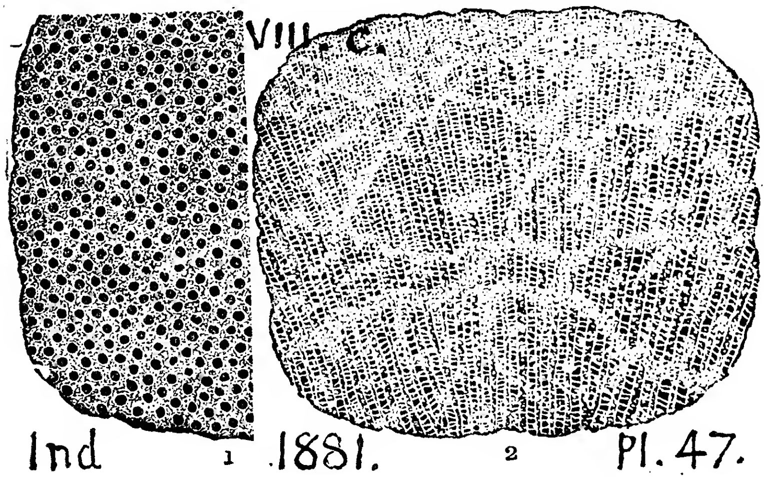
The next oldest he found in Perry Co., spines and plates in the *Bloomfield sandstone* at the top of the *Salina*. See **Onchus pennsylvanicus**; **Palæaspis americana**; **Palæaspis bitruncata.** (F2, xii.)— *Vc.*

The fossil fish beds of Pennsylvania, co-extensive with the

State, are in the Chemung-Catskill passage beds, and in the Catskill formation (VIII–IX.) It was supposed that they all belonged to the Catskill; but Claypole in Perry Co., and White in the North Branch, Susquehanna region, have found an abundance of Chemung fossils in the many hundred feet of red shales and sandstones overlying the lowest great Fish bed. (F2, xv; G7.) In Potter Co. several distinct fish horizons are well marked; and throughout the northern tier of counties the special local horizons of fish do not correspond in different districts; so that the Upper Devonian age must have had a populous sea from first to last; and in the north-western counties the remains of fish are abundant in Subcarboniferous and Carboniferous deposits (Pocono *X*, Mauch Chunk *XI*, Conglomerate *XII*, Lower Coal Measures *XII*.) See **Holoptychius.**

Fish remains. Specimens in the cabinet (OO. p. 236), spec. 804–103 (fish scale) in Fellows and Genth's coll. on Marshall's creek, Monroe Co. *Hamilton VIII c.*—852–8, Sherwood's col. at Covington, 860–19; 860–20; near Mansfield, Tioga Co., Pa. All in *Upper Chemung VIII g.*—Spec. 873–2, in Sherwood's coll. at Meshoppen, Wyoming Co., Pa , in *Chemung* (*Catskill*) *VIII g–IX.*—889–4 (fish scale) in Sherwood's collections at Roulette, Potter Co., in *Chemung VIII g.*—890–5 (plate), 890–6 (end of clavicle), Sherwood, E. Liberty, Bradford Co. *VIII g.*—893–7–8 (bone),–9 (head plate),–10 (tooth), Sherwood, Logan Station, Lycoming Co. in Hays' *iron ore bed*, *Upper Chemung*, *VIII g.*—900–1 (six specimens of fish scales, all apparently of one species, part of the surface covered with concentric lines, remainder of surface marked with strong, sinuous, parallel ridges), 900–2 (seven scales, with concentric lines, and dotted surface), 900–3 (four slabs, with fish scales, like the preceding), 900–4 (a slab with several scales), 900–5 (a scale and a spine), 900–6 six (scale and pine), 900 (specimens of scales), 900–7 (a spine), 900–8 (a tooth, and scales), all the above in Sherwood's collections on Seeley branch of Timber creek, 5 m. N. E. of Mansfield, Tioga Co., Pa. from *Catskill strata*, *IX.*—901–2 (eleven various fish plates), 901–3 (two fish plates), 901–4 (plates), 901–5 (head plates), 901–6 (plates), all in Sherwood's coll. from Sellard's *iron ore bed*, Tioga Co., Pa. *Upper Chemung*, *VIII g*—902–1 (twenty-seven specimens of fish scales), 902–2 (eight, remains), 902–3–4 (plate), 902–5 (tooth), 902–9 (plates), all in Sherwood's coll. 4 m. N. W. of Mansfield, Tioga Co. *IX.*—904-1 (twenty-nine specimens of fish scales), 904-2 (*large* fish plates), from 1 m. S. of Auburn Center, Susq. Co. *VIII–IX.*—1000-4 (obscure remains), 1000-6 (spine), 1000-7 (very obscure), 1000-8 (small fish spine ?), 1000-13 (tooth), 1000-14 (spine and plate), 1000-15 (scale ?), 1000-19 (obscure fish and plant remains), all in I. C. White's coll. at Brookfield Coal Co. tunnel, Trumbull Co., O., 2 m. S. W. of Sharon, Pa., from *Cuyahoga shales. IX? X?* —C2-9*b* (fish tooth) in C. E. Hall's coll. Harvey's Five Points, Westmoreland Co., Pa., from *Carboniferous limestone, XIII.* —C6-6 (seven hand specimens with many small fish scales) in I. C. White's coll. near J. Hoge's, Centretown, 1½ m. from Oak Forest, Greene Co. from *Upper coal measures, XV.*

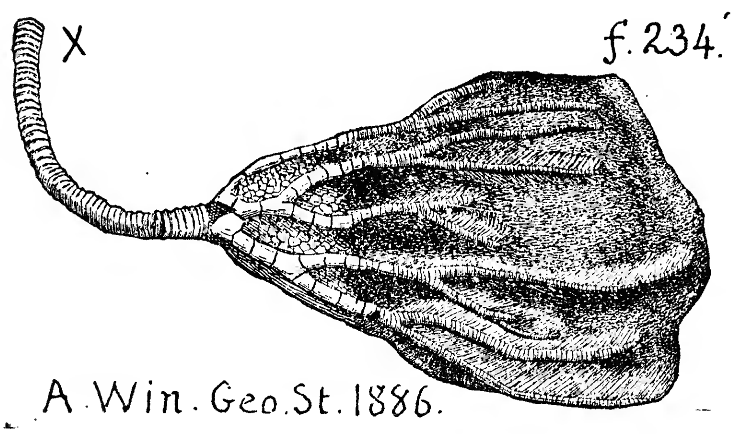
Fistulipora canadensis. (Billings, 1859, Can. Nat. and Geol., Vol. 4, p. 98, Devonian). Collett's Indiana Report of 1881, page 396, plate 47, fig. 1, upper side; fig. 2, section of walls and tabulæ of corallites; but secondary tabulæ of parenchyman not well shown.



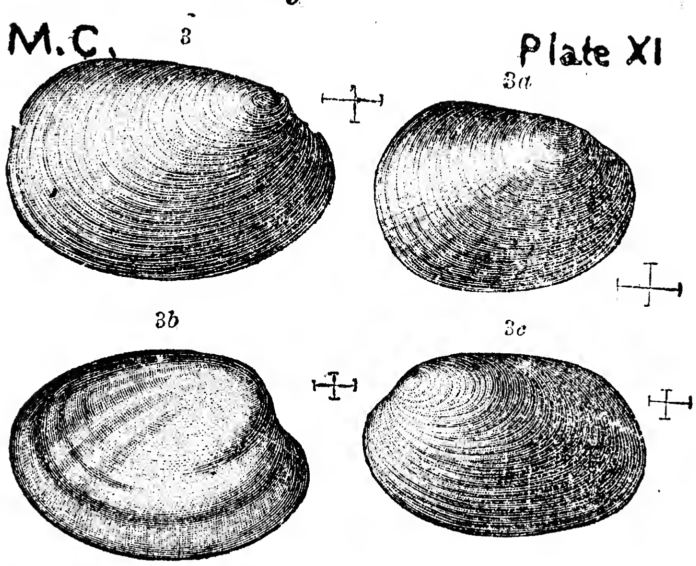
Hamilton formation; frequent in New York and Canada; abundant in Indiana.—Spec. 804-46 (OO, 235, F. & G.'s coll. on Marshall Creek, Monroe Co., Pa., 1875, from *Hamilton strata* (too poor to identify species, G. B. S., 1888), *VIII c.*

Footprints. See **Ornithichnites** (bird tracks).

Forbesiocrinus communis. (Hall, Crinoids of the Waverly sandstone, Ohio.—*Taxocrinus communis* suggested by S. A. Miller's Cat. Amer. Pal. Fossils, 1877, page 288). A. Winchell's Geol. Studies, 1886, page 326, fig. 234.—*X.*



Fordilla troyensis. Barrande. Walcott, Bulletin U. S. G. S. No. 30, page 125, plate XI, fig. 3, right valve *enlarged five times;* fig. 3*a*, another; fig. 3*b*, interior cast of a right valve, showing the muscular marks; fig. 3*c*, left valve, *enlarged five times.* (See Barrande's Etudes loc. et comp. Acéphalés, 8°, plate 361). Near Troy, and Shodack landing, N. Y. *Lower Cambrian, L. C.*



Fucoides. See **Sea weeds.**

Fucoides bilobata. See **Rusophycus bilobatus.** *V a.*

Fucoides caudagalli. See **Spirophyton caudagalli.** *VII.*

Fucoides demissus. See **Phytopsis tubulosa.** *II b.*

Fucoides gracilis. See **Buthotrephis gracilis.** V a.

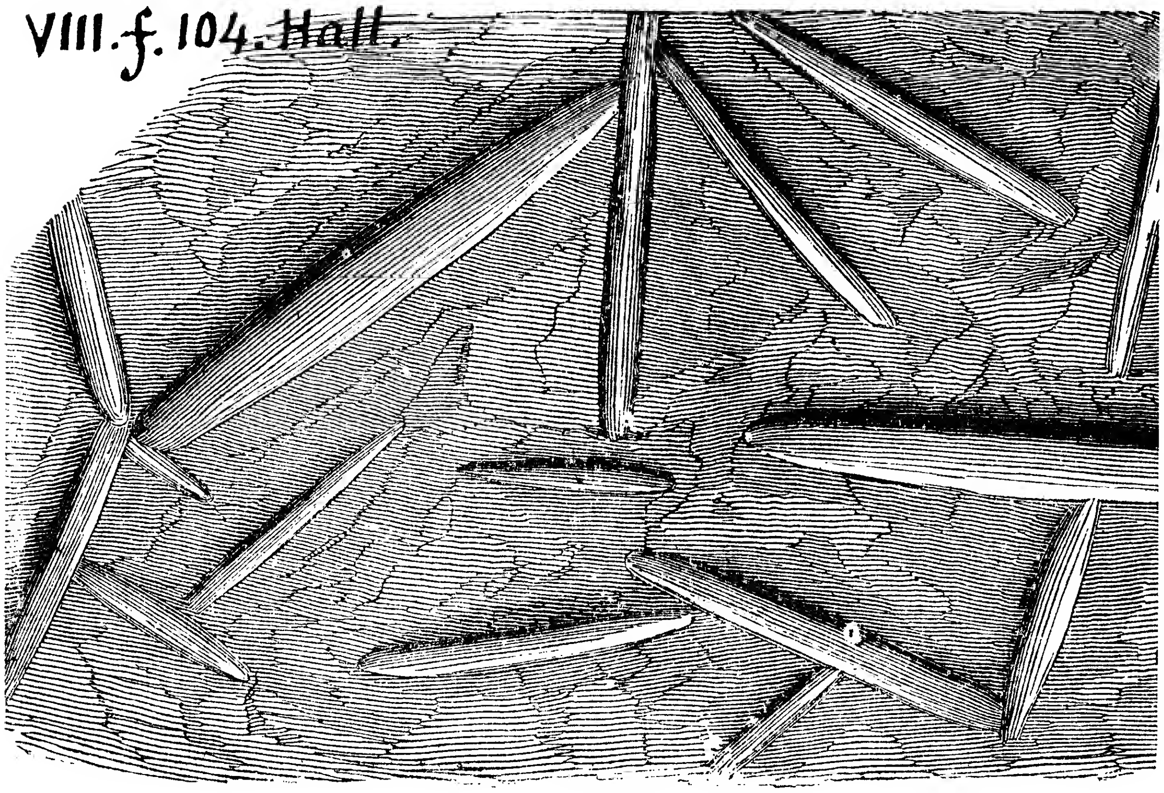
Fucoides allegheniensis. See **Harlania halli.** *IV.*

Fucoides brongniarti. See **Harlania halli.** *IV.*

Fucoides filiformis. See **Rhacophyllum filiforme.** *XIII.*

Fucoides graphica. Hall, page 241, fig. 104. Vanuxem,

VIII. f. 104. Hall.



page 172, fig. 43. *Portage formation*, *VIII f.*—In the Pa. R. R. cut below Huntingdon on the Juniata, beds No. 63 of White's section (T3, 265) are covered with *Mudflow casts* (See **Mudflow** below), and hold also *fucoides graphica.* This wears a significant resemblance to the phenomenon in Western New York. It casts doubt on supposed *volcanic mudflows.*

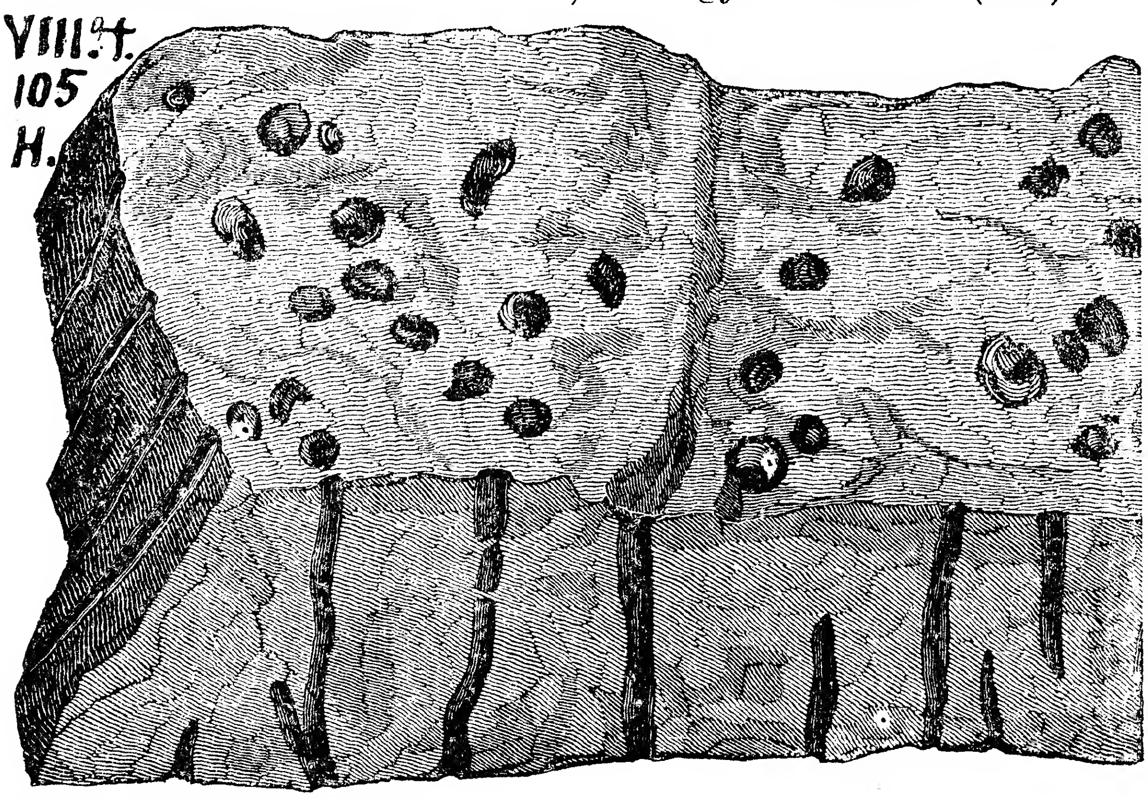
Fucoides harlani. See **Arthrophycus harlani.** *IV.*

Fucoides radians. **Rhacophyllum adnascens.** *XIII.*

Fucoides secalinus. See **Diplograptus simplex.** *M. C.*

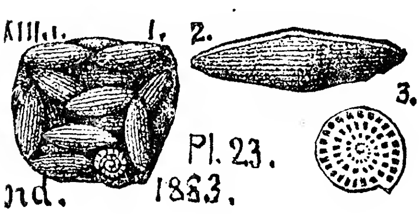
Fucoides simplex. See **Diplograptus simplex.** *M. C.*

Focoides verticalis. Hall, Geology of Western (4th) District, N. Y., 1843, page 242, fig. 105. Portage, *VIII f.*



Fucoidal markings by D. D. Owen. See *Appendix.*

Fusulina cylindrica. (Fischer, Oryct. du gouvernement de Moscou.) Collett's Indiana Rt. 1883, page 116, plate 23, fig. 1, a group, *natural size*; 2, a long one, *enlarged*; fig. 3, cross section *still more enlarged.* Common size and shape, that of a grain of wheat; often much smaller; in Indiana rarely more than half as large; sometimes slenderer, sometimes rounder.—Coal Measures, everywhere, all over Europe and America. In Indiana especially at Lodi, in limestone roof of Coal K, Collett.



—A variety of *F. cylindrica ventricosa* is described by Meek and Hayden in Proc. Acad. N. S. Phila. Vol. 10, 1859.—Another species *F. ventricosa* by M. & H. in Pal. Up. Missouri, 1864.—*F. elongata*, by Shumard, in Trans. Acad. Sc. St. Louis, 1858, from the highest Coal Measures (Permian.)—*F. gracilis*, by Meek Pal. California, 1864; also *F. robusta*. S. A. Miller's Cat. 1877.—Coal Measures, *XIII?*

Fusulina elongata. See **cylindrica.** *XIII.*

Fusulina gracilis. See **cylindrica.** *XIII.*

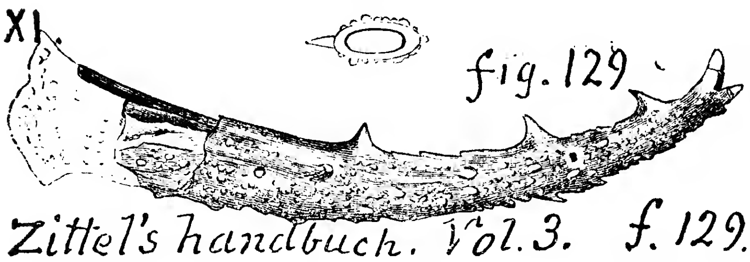
Fusulina robusta. See **cylindrica.** *XIII.*

Fusulina ventricosa. See **cylindrica** *XIII.*

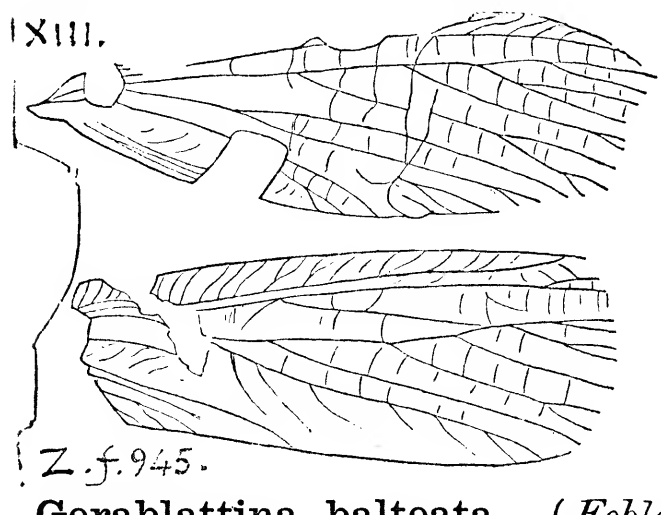
Fytolithus verrucosus. See **Stigmaria ficoides.** *XIII.*

Gallium sphenophyllum. See **Annularia sphenophylloides.** *XIII.*

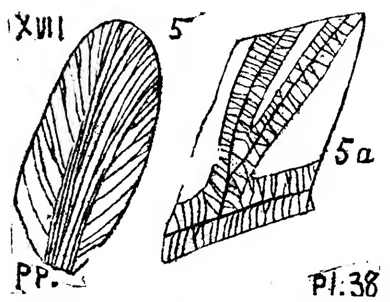
Gampsacanthus typus. (St. John and Worthen, in Illinois reports.) Zittel's Handbuch, Vol. 3, page 118, fig. 129. — Subcarboniferous (*St. Louis*) limestone formation, *XI.*



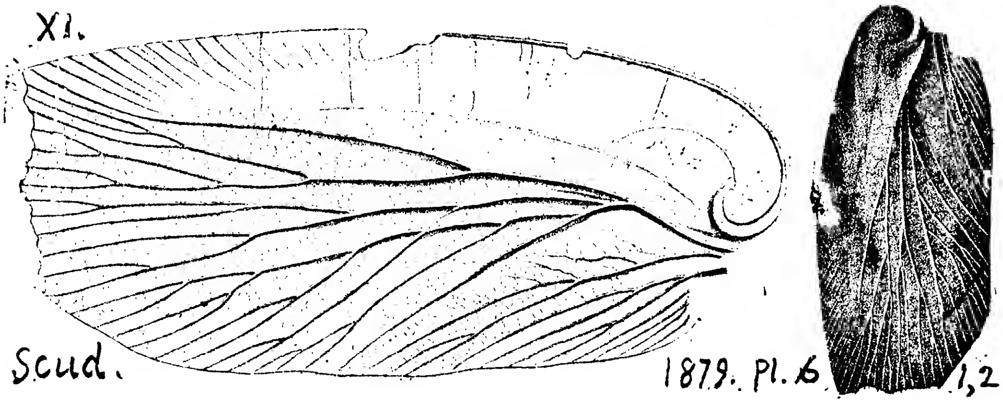
Genentomum validum. Scudder. Two wings of a neuropterid insect found in coal measure nodules on Mazon creek, Illinois. Zittel's Handbuch der Pal. Vol. 2, 1885, page 759, fig. 947, *natural size.* —*XIII.*



Gerablattina balteata. (*Eoblattina?*) S. H. Scudder in Fontaine and White's Rt. PP, to Geol. Sur. Pa. 1880, page 104, plate 38, fig. 5, one wing of a *cockroach* of the Coal age; and an enlargement, to show the nervation. (See Scudder's Memoir on Fossil Cockroaches in Proc. Bost. Nat. Hist. Soc. 1880.) Found in roof shales of the Waynesburg Coal at Cassville, W. Va. Upper Coal. *XV.*



Gerablattina fascigera. Scudder. Mem. Boston S. N. H,



1879, p. 113, pl. 6, figs. 1, 2, an insect found by Lacoe in the shales beneath the Conglomerate XII, Campbell's Ledge, in the gap above Pittston, Luzerne Co., Pa. (G7, 41.)—*XI.*

Ginkgo digitata, Europe. Near **Whittleseya elegans.** *XIII.*

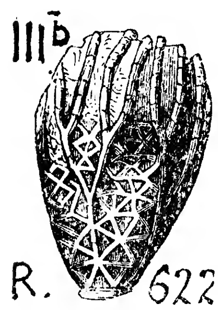
Gleichenites neuropteroides. **Neuropteris loschii.** *XIII.*

Glyptaster inornatus. *See Appendix. Vb*

Glyptaster occidentalis. *See Appendix. Vb.*

Glyptocrinus carleyi. *See Appendix. Vb.*

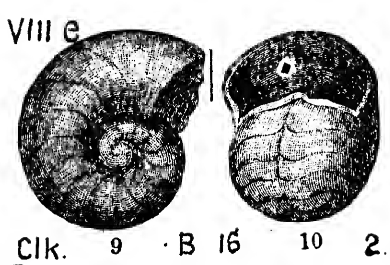
Glyptocrinus decadactylus. Rogers, page 821, fig. 622,



IIIb. Lorraine (Hudson river) formation. (Hall, Pal. N. Y. Vol. 1, 1847.)—In Blair Co., Pa., found by C. E. Hall. (Collections of 1875)—*III a, b.* —In Centre Co., Pa. found by Ewing, in Lorraine shales (T4, p. 427)—III*b*.—See specimens in cabinet 304–2 (very poor impression of stem); 304–3 (ditto); 304–6 (seven impressions of stems); 1½ m. S. W. of Henrietta station, Blair Co. on *Hudson river* (*Lorraine*) *shale* terrace of Tussey mtn.—*III b.*

Glyptodesma erectum. Conrad. Collected by Claypole in Perry Co., Pa. at Jenkin's farm, 5 m. east of N. Bloomfield, in *Chemung-Catskill* bed (Spec. 56–5; and with *Leiopteris dekayi* in Spec. 233, four.)—*VIII–IX.* *See Appendix.*

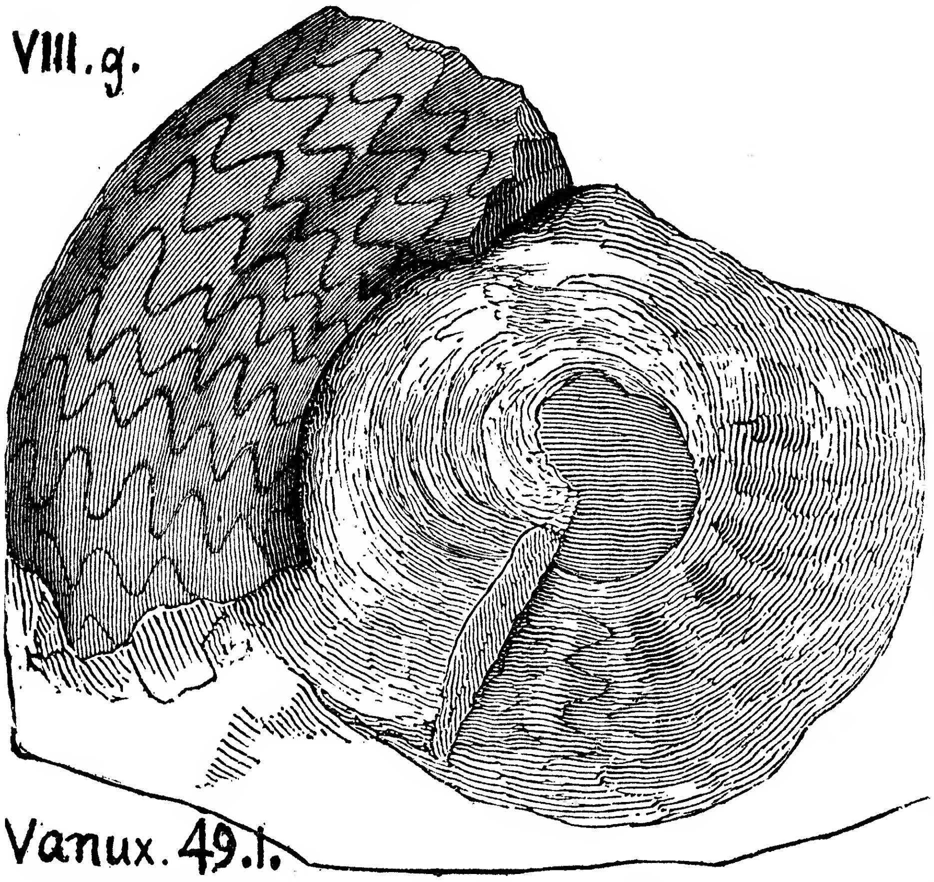
Goniatites astarte. Clarke, Bull. 16, U. S. G. S., 1885,



page 29, pl. 2, fig. 9, side and 10 front view, *both natural size*, very rotund, and very thick shell; hence peculiar in Devonian; abundant in the pyrites nodules in the *Genesee* black shale at Bristol, Ontario Co., N. Y.—*VIII e.*

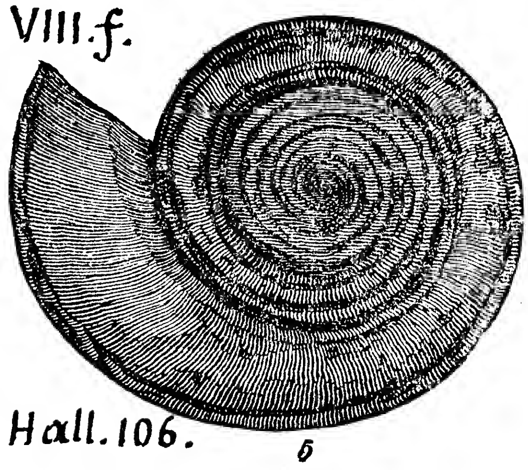
Goniatites bicostatus. Hall, Geology of the Fourth or Western District of New York, 1843, page 245, fig. 107, 8; marked by an elevated line on each side of the back; the arched striæ, rising from the umbilicus, meet this line at an acute forward angle, and recede from it at a still acuter angle, to ride over the back. Shore of Lake Erie, Chatauqua Co., N. Y., in *Portage strata*, *VIII f.*

Goniatites chemungensis. Vanuxem, Geology of the Third or Middle District of New York, 1842, page 182, fig. 49, 1. Chemung formation. *VIII g.*



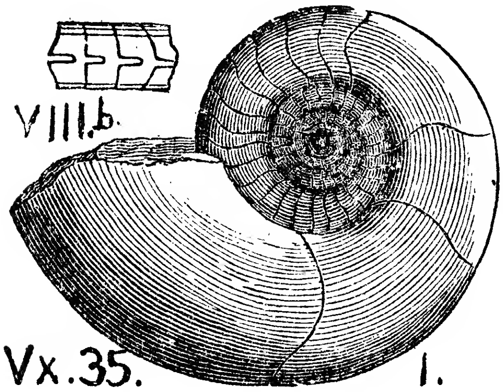
This is a large shell rarely seen in middle New York, and never except in this formation. (Van).

Goniatites complanatus. (*Clymenia complanata.*) Hall, page 243, fig. 106, 5. *VIII g.* Chemung formation.—In Huntingdon Co., Pa., it fills the black *Genesee* slates, at Cove station, Hopewell, at big bend of road 125 rods south of station. (T3, 158); collected from top of Genesee in Piney ridge, McConnellstown (p. 108, 199; Claypole's spec. 193–1, 6); abounds, with *Avicula speciosa*, in bed 18 of Patterson section (p. 184.)— *VIII e, g.*



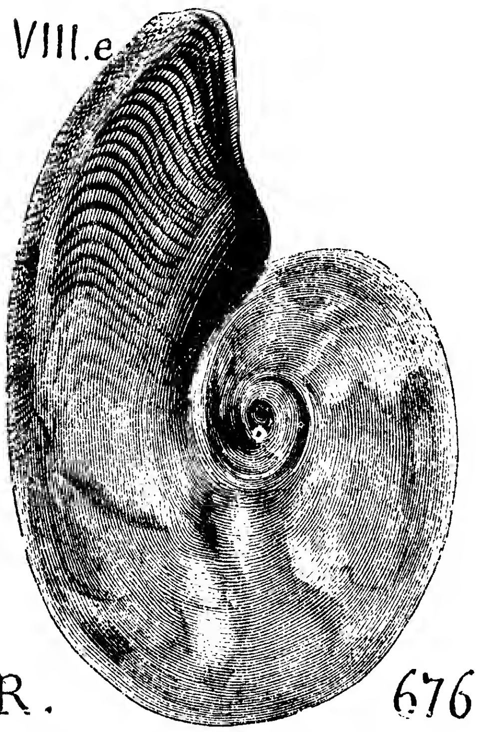
Goniatites discoidens. *See Appendix.*

Goniatites expansus. Vanuxem, Geology of the Third or Middle District of New York, 1842, page 146, fig. 35, 1. *Marcellus* formation. *VIII b.*—This is one of the few fossils found in the upper (calcareous) division of the formation, all of them peculiar to it in Middle N. Y. See *Nautilus marcellensis*, *Orthis limitaris*, *Lunulicardium marcellense* &c. (Van).



Vx. 35. 1.

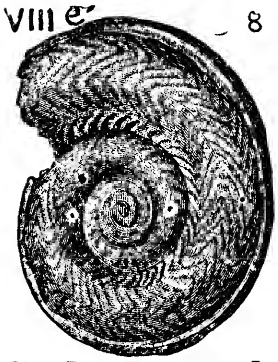
Goniatites interruptus ? Rogers' Geology of Pennsylvania, 1858, page 829, fig. 676. *Genesee* formation. *VIII e.*



R. 676.

Goniatites lutheri. Clarke, Bull. 16, U. S. G. S., 1885, page 50, plate 2, fig. 8, *natural size;* 38 septa in the last whorl; type of *Gon. intumescens*, but differing from many other species; nearer to European *Gon. forcipifer* of Sandberger; specimens few, from concretionary limestone, Parrish gulley, Honeoye lake, N. Y. *Naples* (*Upper Genesee*) slate.—*VIII e'.*

VIII e'. 8

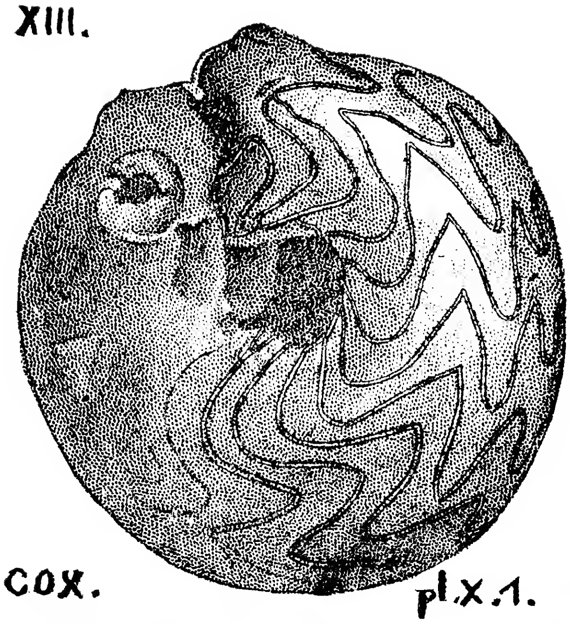


Clk. B. 16. 2.

Goniatites marcellensis. See **Nautilus marcellensis.** *VIII b.*

Goniatites patersoni. *See Appendix.*

XIII.



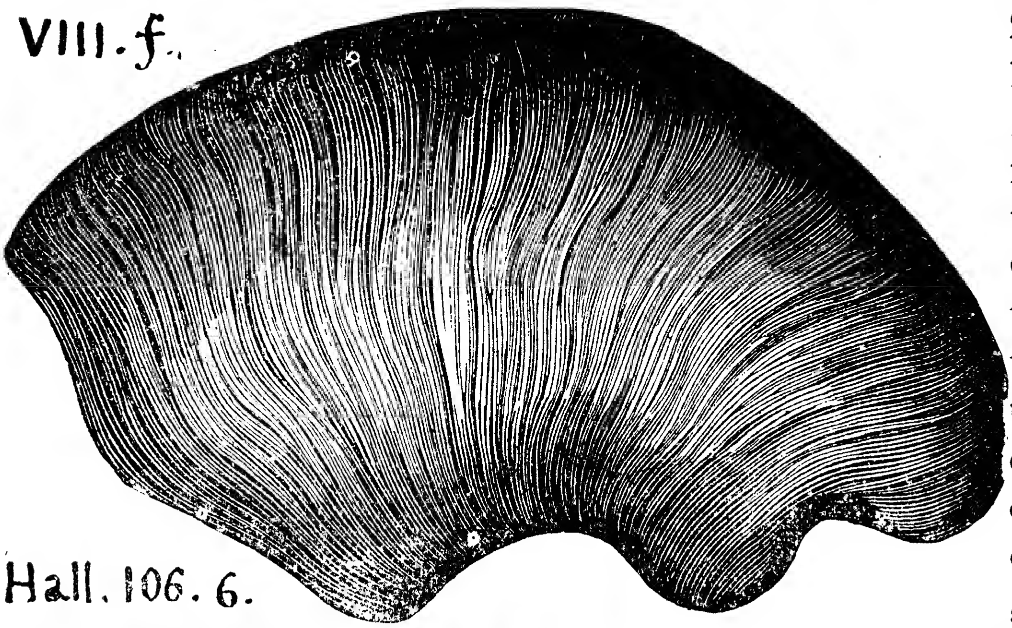
COX. pl.X.1.

Goniatites nolinensis. (Rogers, p. 833. Cox, Ky. Geo. III, 574, pl. x, fig. 1a, 1b. Coal formation. (Closely related to the English *Goniatites crenestria* of Phillips.—Named from Nolin Iron Works, E. Kentucky, in the ore of which it is found, together with *Nautilus ferzatus*, and *Nautilus canaliculatus* of Cox.)—*XIII.*

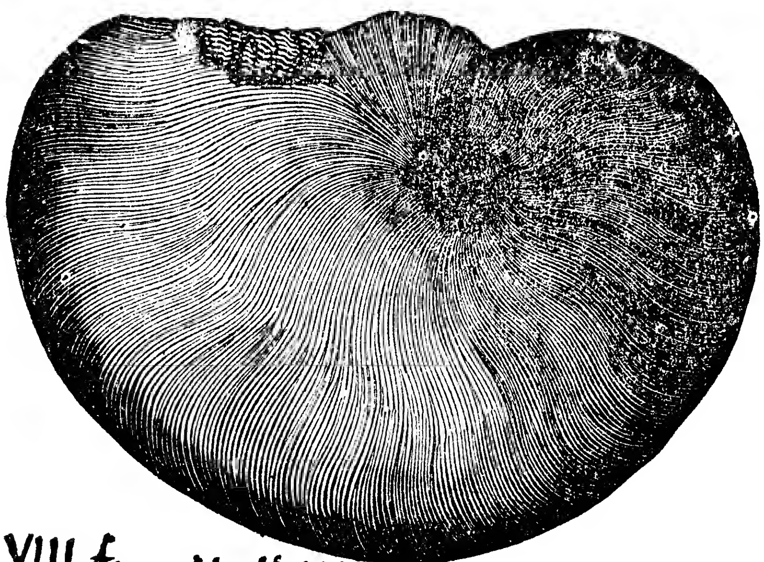
G. patersoni. *See last page, 256.*

Goniatites sinuosus. Hall, page 243, fig. 106, 6, and page 245, fig. 107, 9, *Portage* formation.—Goniatites of undetermined species occur in great numbers (with other shells) in the top 45′ of Genesee shale at Cove Station, Huntingdon Co. (T3, 107); crowd the limestone parting beds of *Genesee* No. 2 of Mapleton Section (T3. 273); occur in *Hamilton* lower shales on Coffee run, R. R. quarry

VIII.f.



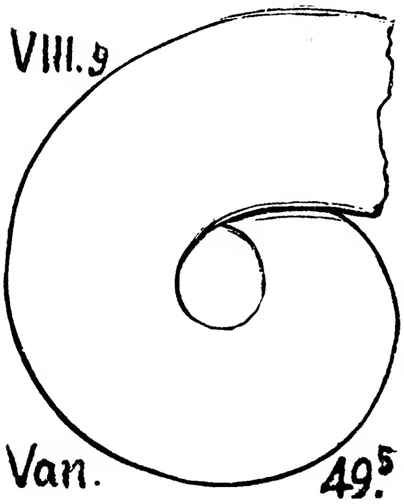
Hall. 106. 6.



VIII.f. Hall. 107. 9

(F3, 112); were collected by Claypole from *Hamilton* upper shales, 2 m. E. of Little Germany, Perry Co. (Spec. 166–3); and from Centre Mill, Madison t., from *Marcellus* shale (Spec. 223–8.) [All these are to be identified.]— *VIII b, c, f.*

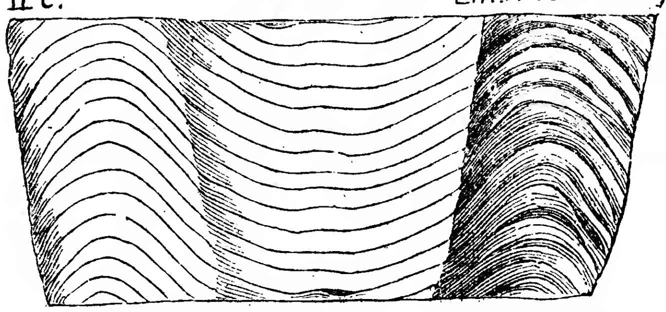
Goniatites ——? (*Clymenia?*) Vanuxem, Geology of the Third or Middle District of New York, 1842, page 182, fig. 49, 5. *Chemung* formation.—An undetermined species of *Goniatites* occurs in the lower (*Chemung* or *Chemung-Catskill*) 500′ of Randall's section at Warren, Pa. (I, 54.)— *VIII g.* —Vanuxem says (page 183) that he gives his figure of an imperfect specimen to direct search for the fossil *Clymenia*, a number of species of which genus occur in the Devonian strata of England.



Gonioceras anceps. *See Appendix.*

Gonioceras halli. D'Orbigny. Emmons' American Geol., Vol. 1, part 2, 1855, page 152, fig. 31; septa numerous, wavy and double; siphon nearly central, with interceptal swellings.— *Birdseye limestone* formation. *IIc.*

IIc. Fig. 31. Em.A.G. 1855.



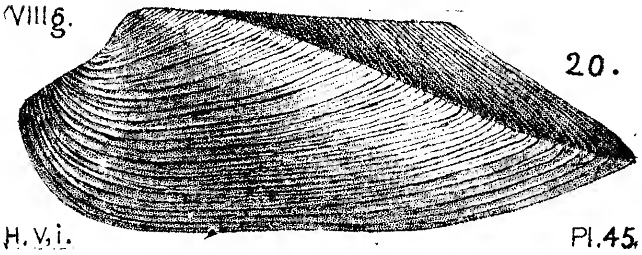
Gonioceras ——? Collected by C. E. Hall, in 1876, from Marcellus and Genesee. Ms. Rt., Dec. 30, 1876.— *VIII b, e.*

Goniophora acuta. *See Appendix.*

Goniophora carinata. Hall, Pal. N. Y., Vol. 5, part 1, page 301, pl. 42, fig. 11 and pl. 44, figs. 6 to 8. (*Cypricardites carinata*, Conrad, An. Rt. N. Y., 1841, fig. 21; also *Sanguinolites carinatus*, Conrad, Hall's Prelim. Not. Lam. 1870; compare *Cypricardites chemungensis*, Vanuxem, 1842, from which it differs by the beaks being further back, and the umbonal ridge curved instead of straight. It goes with *Paracyclas lirata*, *Chonetes scitula*, *Spirifera mucronata* and *Hyolithes aclis*, at Oneonta, N. Y., Hall).—In Pennsylvania it has not been reported. Specimen 883–16 (OO, p. 238) is from Nichols, Tioga Co., N. Y., from *Chemung*, *VIII g.*—*See Appendix.*

Goniophora chemungensis. (*Cypricardites chem.*, Vanuxem, 1842.—Hall, Pal. N. Y., Vol. V, part 1, plate 45, fig. 20. Chemung.) Claypole's collections in Perry county, Pa. (F2, page xv). *Chemung-Catskill* beds. (Spec. 50–13, two; 51–27; 104–39, two). Linton's hill; King's mill; Shermansdale mill, all in *King's mill sandstone*, *VIII-IX*.—Spec. 872–32, and 33, in Howell's coll. at Nichols, Tioga Co., N. Y. *Chemung* 886–3. Sherwood's Middletown collections in Tioga Co., Pa.—*VIII g.*

VIII g. 20.



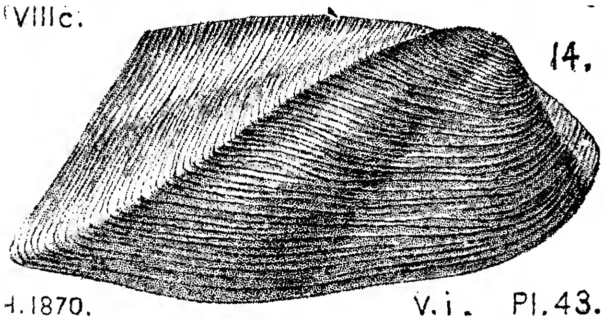
H. V. i. Pl. 45.

Goniophora curvata. *New species. See Appendix.*

Goniophora glabra. *See Appendix.*

Goniophora hamiltonensis. (*Sanguinolites hamiltonensis.* Hall, 1870, Prelim. Notice Lamellibranch shells; also, Pal. N. Y., Vol. V, pt. 1, plate 43, fig. 14. Hamilton). Claypole (F2, xiv), Hamilton formation. (Spec. 5–55, from Barnett's mill, near New Bloomfield, Perry Co., Pa.), *VIII c.*—Spec. 805–12 (OO, p. 235) Hall's coll. at Bell's Mills, Blair Co., in *Hamilton shales*, *VIII c.* Both valves vertically compressed); 801–3, Dingman's Ferry, Pike Co. *VIII c.*

VIII c. 14.



H. 1870. V. i. Pl. 43.

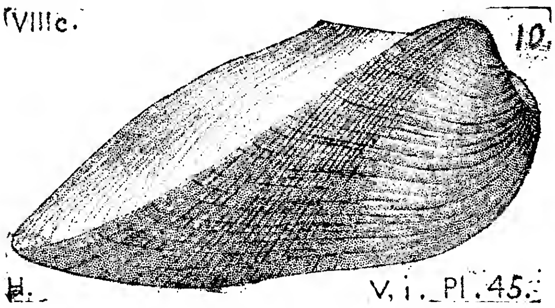
Goniophora plicata. See **Sanguinolites plicata.** *XI.*

Goniophora rigida. Abundant and characteristic in the LeBoeuf conglomerate quarries, Erie Co., Pa. Upper Chemung (Q4, p. 110, 249).—*VIII g.—See Appendix.*

Goniophora speciosa. *See Appendix.*

Goniophora truncata. (Hall, Pal. N. Y., Vol. 5, 1883, part 1, plate 44, fig. 10, Hamilton). Claypole. List of Perry Co., Pa., fossils, F2, p. xiv. *Hamilton* formation.—*VIII c.* —Hall says (p. 299) that this species is closely allied to *Goniophora perangulata*, of the *Schoharie grit. VII.*

VIII c. 10.



H. V. i. Pl. 45.

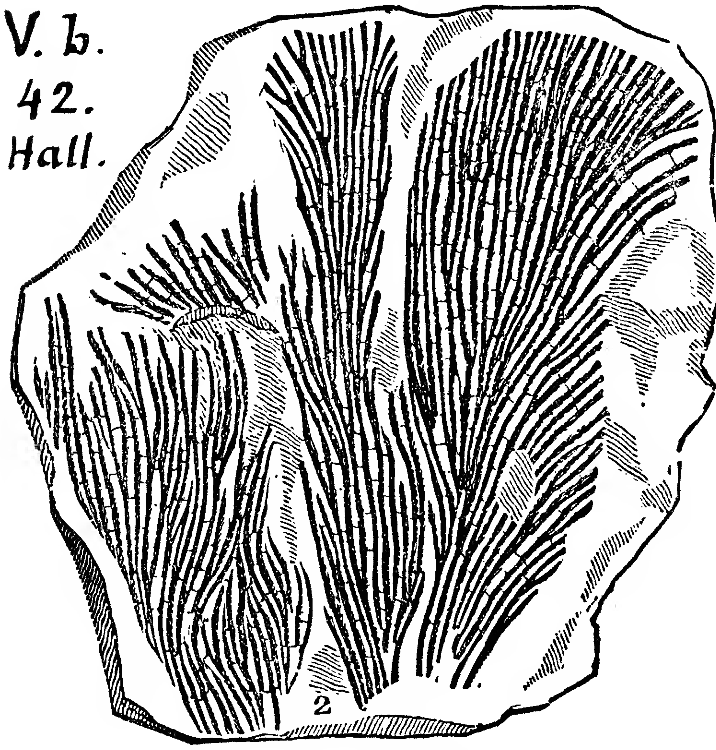
Goniophora undata. Collected by Claypole at Barnett's mill, near New Bloomfield, Perry Co., Pa., in *Hamilton* upper shales. (Specimen 5–172).—*VIII c.*—*See Appendix.*

Goniophora ——— ? Spec. 850–18 Tioga Co. *VIII g.*

Goniopteris ——— ? See **Pecopteris newberryana.** Stevenson, over Waynesburg coal (K, p. 59).—*XVI.*

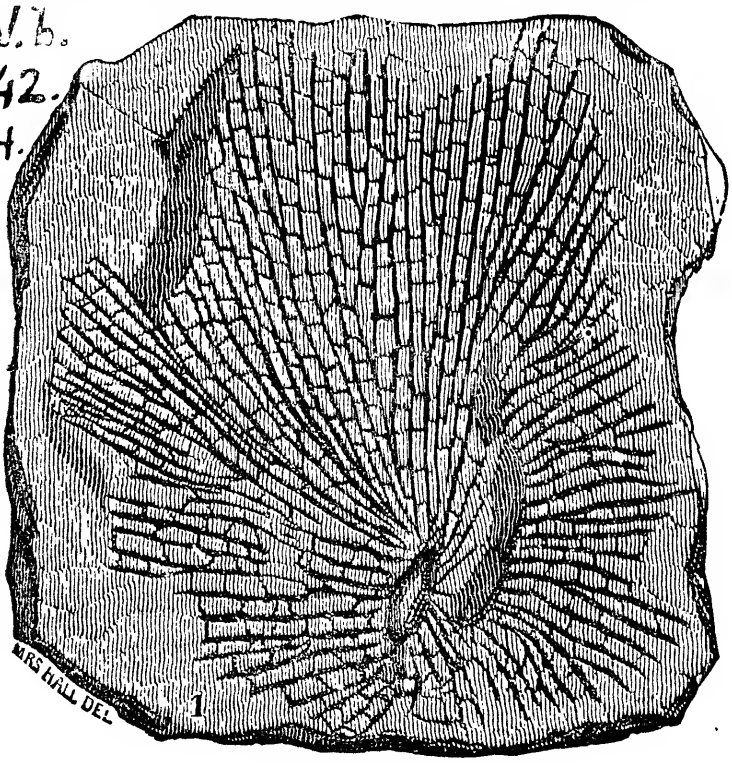
Gorgonia ? Hall, Geology of Western District of New York, 1843, page 115, fig. 42, 2. *Niagara* formation. (See *Fenestella* and *Retepora*). — *V b.* — The perfect form of this fossil is not known. Its delicate and beautiful expansion often extends over several inches, its forking and slightly diverging branches united by slender filaments. No pores and nothing but a thin film of coaly matter. (Hall).

V. b.
42.
Hall.

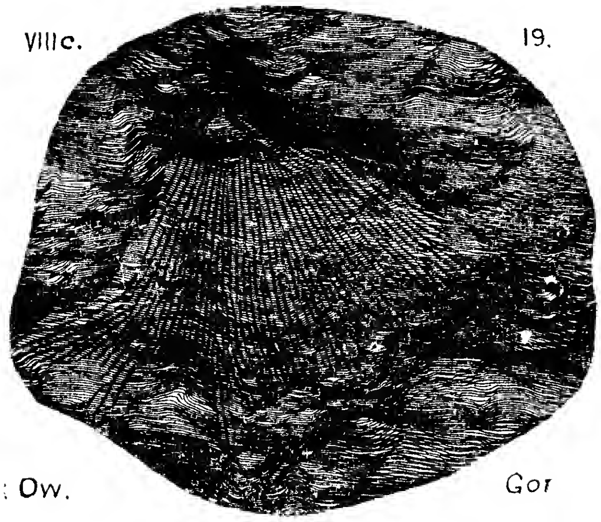


Gorgonia ? reteformis. Geology of Western District of New York, 1843, page 115, fig. 42, 1. *Niagara* formation (in the shale). *V b.*—In general appearances it closely resembles *Gorgania assimilis* of England (Sil. Research. pl. 15, f. 27); but it has no solid axis the coral growing out in all directions from a central point, as a wrinkled and flattened net-work of branches, indistinctly striated, but with no pores visible. (Hall). *V b.*

V. b.
42.
H.



Gorgonia ———. Allied to *Repisteria.* Owen, Geol. Wisc., Iowa and Minn. 1852, pl. 3A, f. 19, found in limestone (*Hamilton* age?) near Rockingham.— *VIII c.*



Grallator cuneatus. *See Appendix.*

Grallator cursorius. *See Appendix.*

Grallator formosus. *See Appendix.*

Grallator gracilis. *See Appendix.*

Grallator parallelus. *See Appendix*, for figures of these five kinds of *Triassic footprints.*

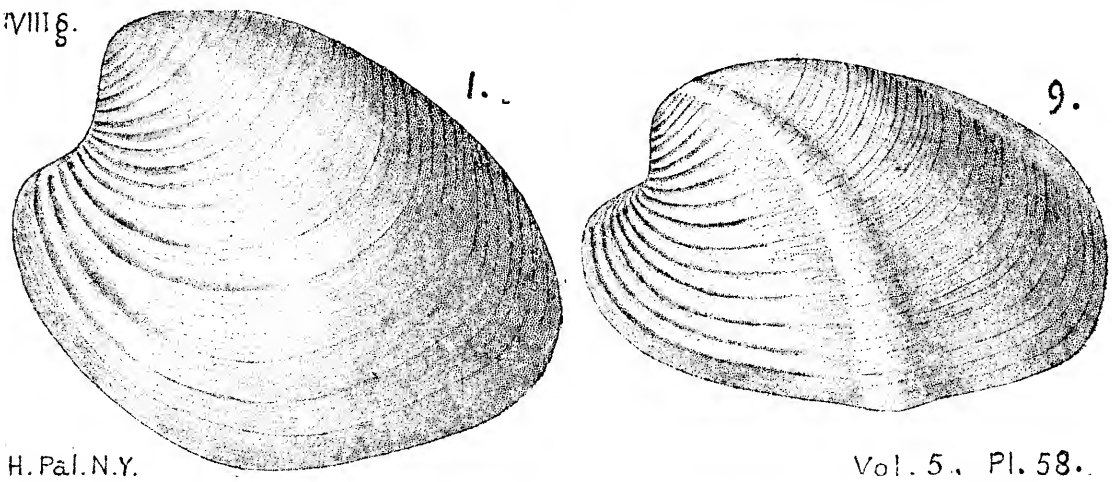
Grammysia bellatula. *See Appendix.*

Grammysia bisulcata. *See Appendix.*

Grammysia communis. Recognized by Simpson and J. Hall in spec. 9607, 9608, of Randall's coll. at Warren, Pa., from *Upper Chemung, VIII–IX.—See Appendix.*

Grammysia cuneata. *Sphenomya cuneata.* Specimens in cabinet, 804–6 (OO, p. 235), Fellows' & Genth's Coll., 1875, on Marshall's Creek, Monroe Co., Pa., from *Hamilton strata.* (G. B. S., 1888.)— *VIII c.—See Appendix.*

Grammysia elliptica. (Hall, 1870. Prelim, Not. Lamell.



shells; Pal. N. Y., Vol. 5, pl. 58, figs. 1 and 9 selected because of medium size; many much larger; one shows the characteristic groove (sinus), and the other does not. Collected by White from *Chemung*, bed 30, Rupert Section (bed 59, Catawissa, Bloomsburg Section, G7, p. 69, 286), and from *Catskill* rocks, bed 23, Sect. 9; bed 13 Catawissa Section (G7, p. 57, 238) 700′ above the bottom Fish bed=1700′ above top of Chemung proper (G7, pp. 65, 67, 240.)—*VIII*, *IX*.—In Perry Co., from *Chemung* at various places (Spec. 36; 50–20, two; 51–4, 5, 6, nine; 57–40; 69 D-1; 93–8, 9, two.)—*VIIIg*.—In Huntingdon Co., well preserved specimens from bed 22, Patterson Section, near middle of *Hamilton* upper shales (T3, 186)—*VIIIc*.—With *Rhynchonella*, in Spec. (Q,3401) from Oil group at Bradford bridge, McKean Co.—*VIII-IX*.—Specimens in Cabinet (OO, p. 236) 852–1 (good; a little above medium size);–2 (two; poor); from Covington, Tioga Co.—Spec. 855–3 (large; nearly smooth); 4 (three, fair to good, each a little imperfect, medium size); 6 (a little large, somewhat crushed, smooth); 8 (fair condition, lower rear end gone); 20 (two, good); 56 (large) all from Sullivan t., Tioga Co. Spec. 859–1 (two, one large and vertical); 2 (crushed); 3 (three of the form shown in Hall, Vol. 5, pt. 1, pl. 58, figs. 10, 11, 13); 4 (five, crushed both valves); 5 (two both valves); 6 (very small); 7 (six of the usual form); 13 (three on a large slab); 12 (large right valve, margin broken, showing hinge line); all from the Narrows 1 m. E. of Franklindale, Bradford ford Co., Pa. Sherwood's *Upper Chemung* (White's *Chemung-Catskill passage beds*) *VIII-IX*.—Spec. 860–47; 75; from same strata, near Mansfield, Tioga Co.—Spec. 861–4; 18; 35; from same strata in Sullivan t., Tioga Co., Pa., 872–28, in R. Howell's Coll. at Nichols, Tioga Co., N. Y. *Chemung*, *VIIIg*. 883–70 (hind part), 883–78 (fore part), in Howell's collections at Nichols, Tioga Co., N. Y., from *Chemung*, *VIIIg*.

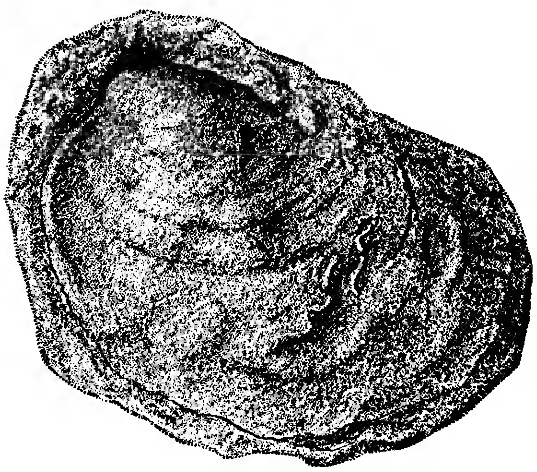
Grammysia hannibalensis. (*Allorisma hannibalensis* Shumards Geo. Sur. of Missouri, 1855; in Subcarboniferous (*Kinderhook*) limestone. *XI*.)—*Doubtfully* identified by Heilprin among the specimens in the collection of the Wyoming Historical Society at Wilkesbarre. (Ann. Report Geol. Sur. Pa., 1885, p. 451.)—*XIII*.—Multitutes in the top layers of the *LeBoeuf conglomerate* at Doolittle's quarry, Amity, Erie Co., Pa. (Q. 4, p. 110, 249, 272.)—*VIII-IX ?*—*See Appendix.*

Grammysia —— ? in vast numbers in spots in the *Oriskany* Sand Ridge at Mapleton, Huntingdon Co. and elsewhere. (T3, p. 119, 274.)—*VII.*

Grammysia —— ? numerous in *Hamilton middle* sandstone, in Huntingdon Co. (T, p. 32), and *Hamilton upper* sandstone at the end of Jack's mountain, (T3, 111); and also in Pike and Monroe Cos. (G6, 230) as at Marshall's falls.—*VIII c.*

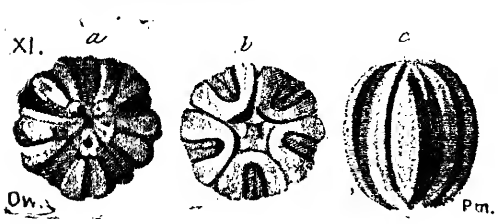
Grammysia —— ? in the middle layers of the *Trough Creek limestone*, Huntingdon Co., Pa., at top of Pocono sandstone, and bottom of red shale (T3, 77.)—*X-XI.*

Grammysia *of unknown species*, from black slate in anthracite measures, near Wilkes-Barre, in collection of the Wyoming Historical Society; Heilprin's list in An. Rt. Geol. Survey of Penna., 1885, page 451; figured on page plate 442, fig. 8.—*XIII*, Coal measures.—Also impressions found by Heilprin among *Mill Creek limestone* fossils, Wyoming Hist. Soc., Wilkes-Barre, Pa., Geo. Sur. An. Rt., 1885.—1000′ above Pottsville Conglomerate. *XIV-XV.*

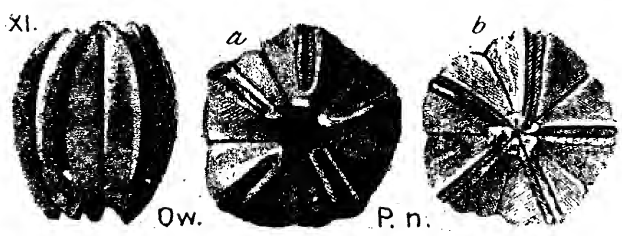


Grammysia —— ? Spec. 804-5, Marshall's creek, Monroe county, *Hamilton*, *VIII c.*

Granatocrinus melo. (*Pentremites melo.* Owen's Geolog. Wis., Iowa, Minn., 1852, p. 593, pl. 5A, fig. 14, *a b c.* *Burlington* (Subcarboniferous) *limestone* (abundant) but nowhere else.—*XI.*



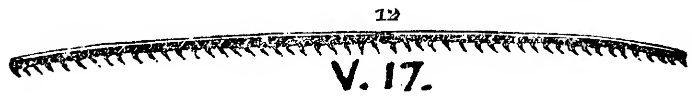
Granatocrinus norwoodii. (*Pentremites norwoodii.* Owen, Wis. 1, and Minn., 1852, p. 590, pl. 5A, fig. 13, *a*, *b*, *c.* Subcarboniferous *Burlington limestone*, at various places in Iowa and Illinois. —*XI.*



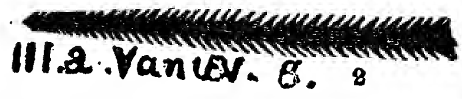
Graptolithus angustifolius. See **Diplograptus ang.** *III b.*

Graptolithus annectans. Walcott, 1879. *Utica slate*, *IIIa*.

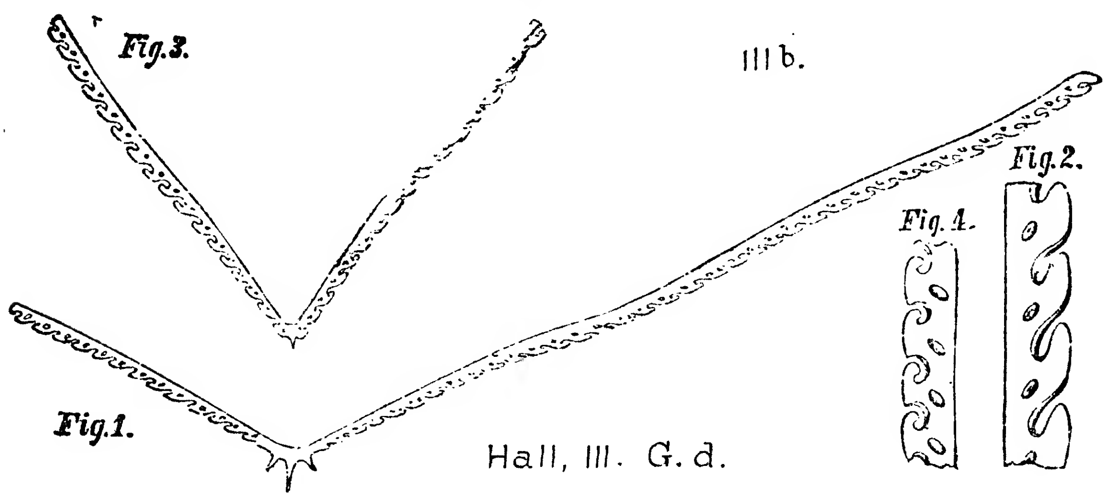
Graptolithus clintonensis. Hall, Geology of the Western District of New York, 1843, page 72, fig. 17, 12. *Clinton*. *Va*.



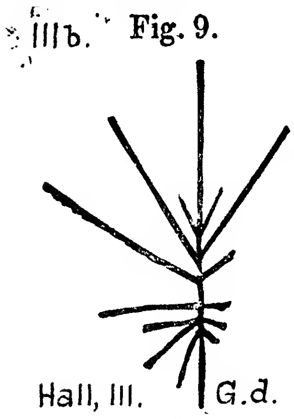
Graptolithus dentatus. Emmons, page 279, fig. 74, 2. Vanuxem, page 57, fig. 8, 2, Utica formation. (Perhaps the *Fucoides dentatus* of Brongniart. S. A. Miller.) —In Pennsylvania, a few *graphtolites* have been seen in Bedford Co., in outcrops of *Utica slate* (T2, p. 93). *IIIa*.—In Lehigh Co. only one specimen of *graptolite* (and never any other fossil) was seen by Prime in his survey of Lehigh and Northampton Cos.; and this was in a small loose piece of slate near the Ironton Iron mine, on the edge of the *Utica slate* belt, (D2, p. 74), *IIIa*.



Graptolithus divaricatus. Hall, Pal. N. Y., Vol. III, p 514, wood cut figs. 1, 2, 3, 4, *Hudson river shales*.—*IIIb*.

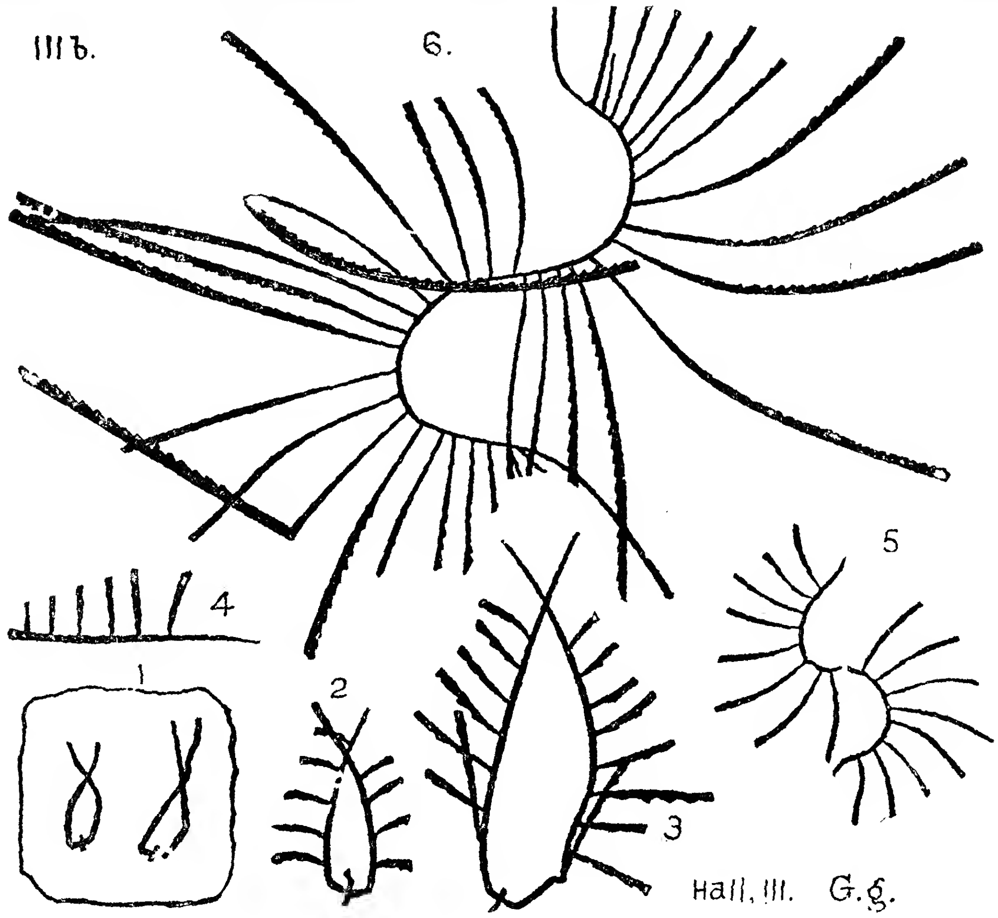


Graptolithus divergens. Hall, Pal., N. Y., Vol. 3, p. 509, wood cut fig. 9. *Hudson River* upper beds.—C. E. Hall found *graptolites* in the slate belt (*IIIa*, *b*), of Canoe Valley, Blair Co., Pa. species not given —*III*.



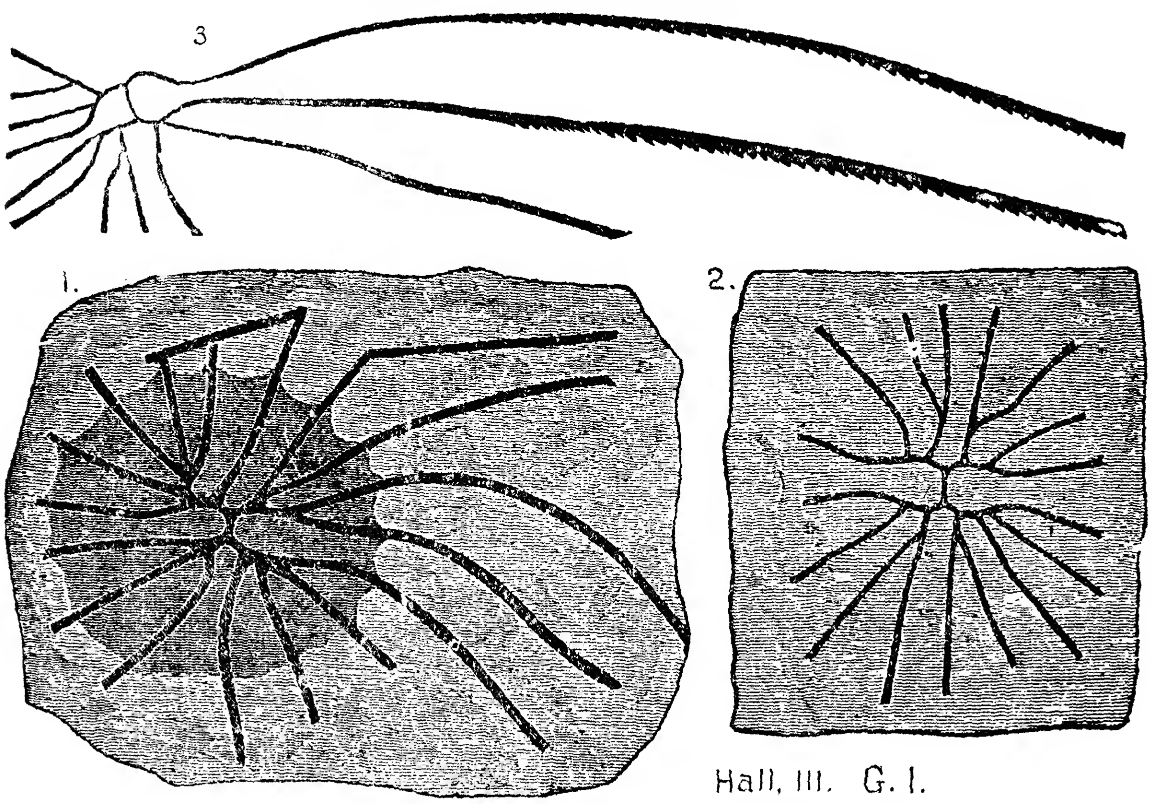
One branch of this specimen presents the remarkable appearance of forking near its junction with the central stem. The branches are of unequal length (some very long) and slenderly toothed only on one edge. (Hall).

Graptolithus gracilis. Hall, Pal. N. Y., Vol. III, p. 510,



511, 512, 513, wood cuts 1, 2, 3, 4, 5, 6, 7. *Hudson river—IIIb* — Perhaps to this species belongs also *Rastrites barrandi.*

Graptolithus logani. Hall, Canada Rt., 1858, Pal., N. Y.,



Vol. 3, p. 502, wood cuts 1, 2, 3. Point Levy rocks. Quebec.

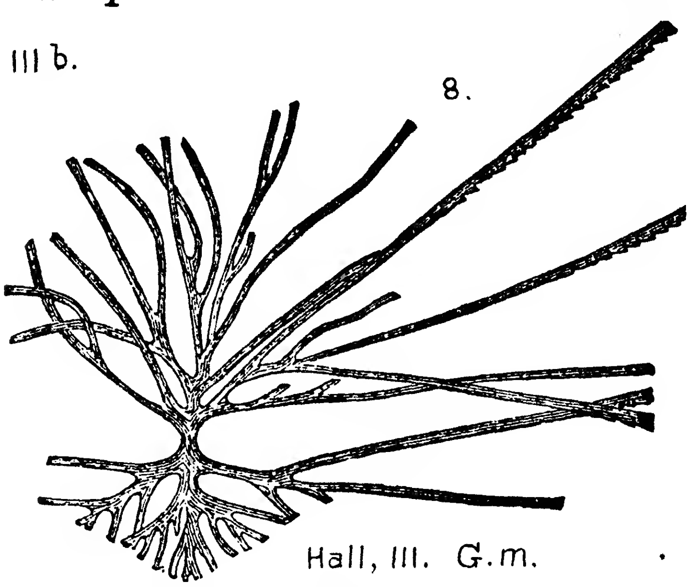
Graptolithus marcidus. See **Diplograpsus marcidus.** *III b.*

Graptolithus milesi. Walcott, Bull. 30, page 92. Uncertain origin of the specimen figured in Canada Organic Remains, decade 2, p. 53. Hall, Geol. Vt., I, 372, 1861.

Graptolithus mucronatus ? Spec. 306–11 (OO, p. 233), Sanders' Coll. at Henrietta No. 1, Blair Co., Pa., from *Lorraine (Hudson river) shale. III b.*—Other specimens from same locality 306–4, 5, 7 and 12 (three) indistinct.—*See Appendix.*

Graptolithus multifasciculatus. Hall, Pal., N. Y., Vol. 3, p. 509, wood cut, fig. 8, natural size. *Hudson river formation. III b.*

III b.



The specimen shows the lower non-serrated surface; but several of the longer branches are turned over so as to show the toothed side tolerably well. The branches fork irregularly.—(Hall.)

Graptolithus pristis. **Diplograptus pristis.** *III b. (L. C.?)*

Graptolothus secalinus. **Diplograptus simplex.** *L. C.*

Graptolithus spinulosus. **Diplograptus spinulosus.** *III b.*

Graptolithus whitfieldi. **Diplograptus whitfieldi.** *III b.*

Graptolithus. See **Phyllograptus typus.**

Graptolithus. See **Rastrites barrandi.**

Graptolithus. See **Reograptus geinitzianus.**

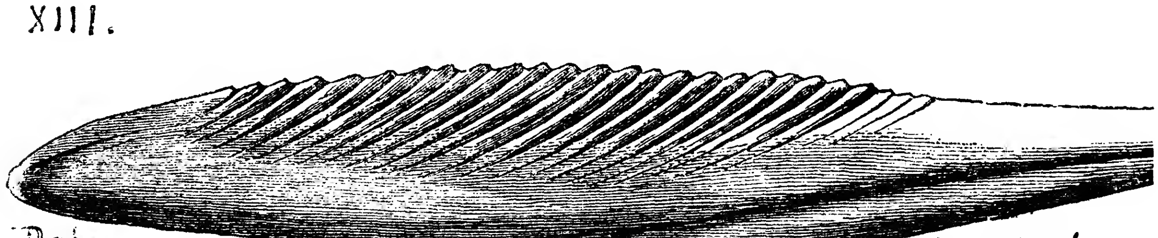
Graptolithus. See **Thamnograptus typus.**

Graptolithus. See **Thamnograptus capillaris.**

Griffithoides ? See **Phillipsia sangamonensis.** *XIII.*

Gyracanthus duplicatus, Dawson, Acad. Geol., 1868, p.

XIII.



210, f. 55, *fish spine* in Nova Scotia Coal Measures.—*XIII.*

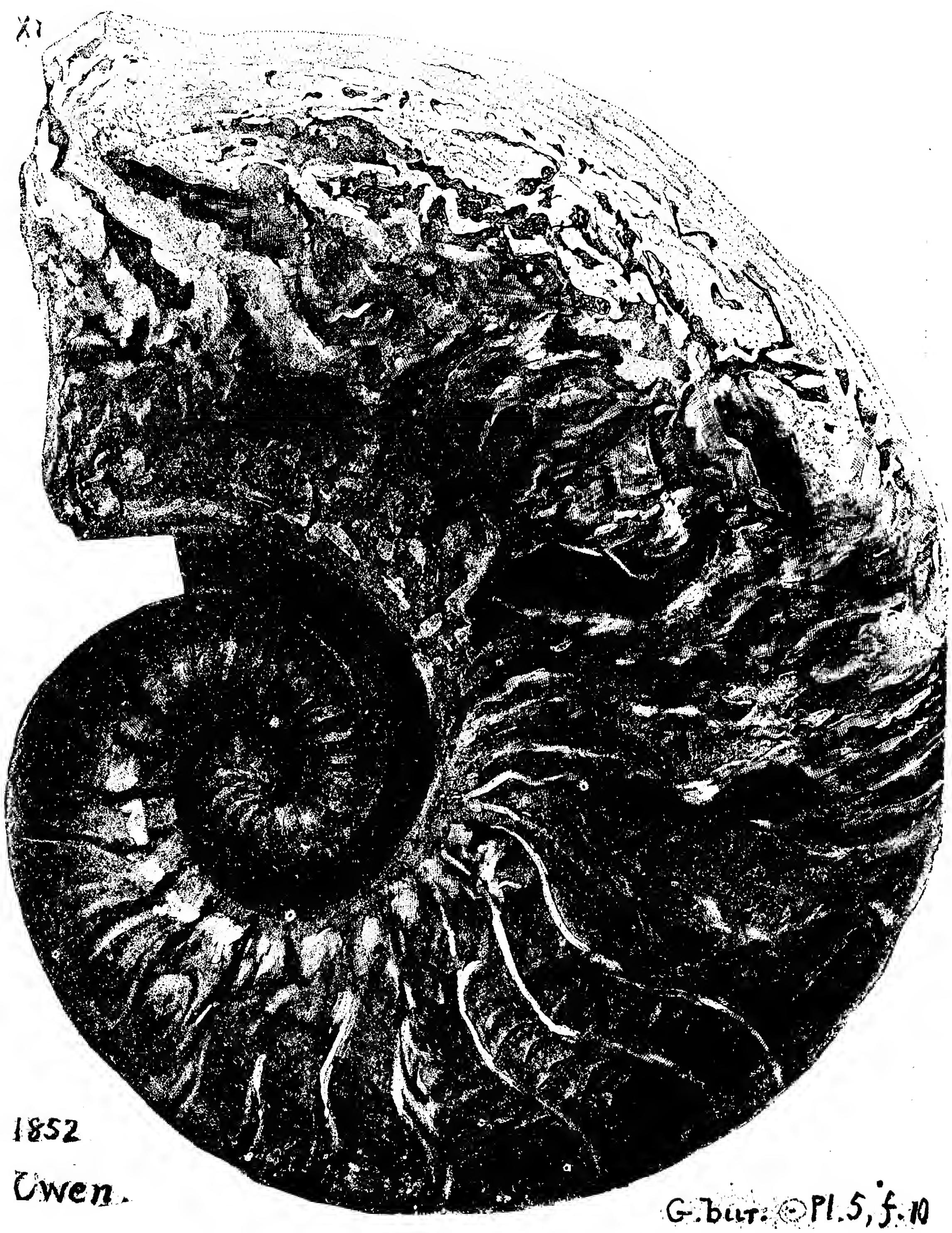
Gyracanthus magnificus, Dawson, Acad. Geol., 1868, p. 310, fig. 55 *a;* a magnificent fish spine, twenty-two (22) inches long, (fig. *reduced* to $\frac{1}{7}$) found by Mr. Barnes, in the Cape Breton (Sydney) Coal Measures.—*XIII.*

XIII Fig. 55*a.*—*Spine—Gyracanthus magnificus, N.S., reduced.*

Daws n. Acad. Geol. 1868. 110

Gyroceras burlingtonensis. Owen, Geol. Wis., 1852, pl.

XI



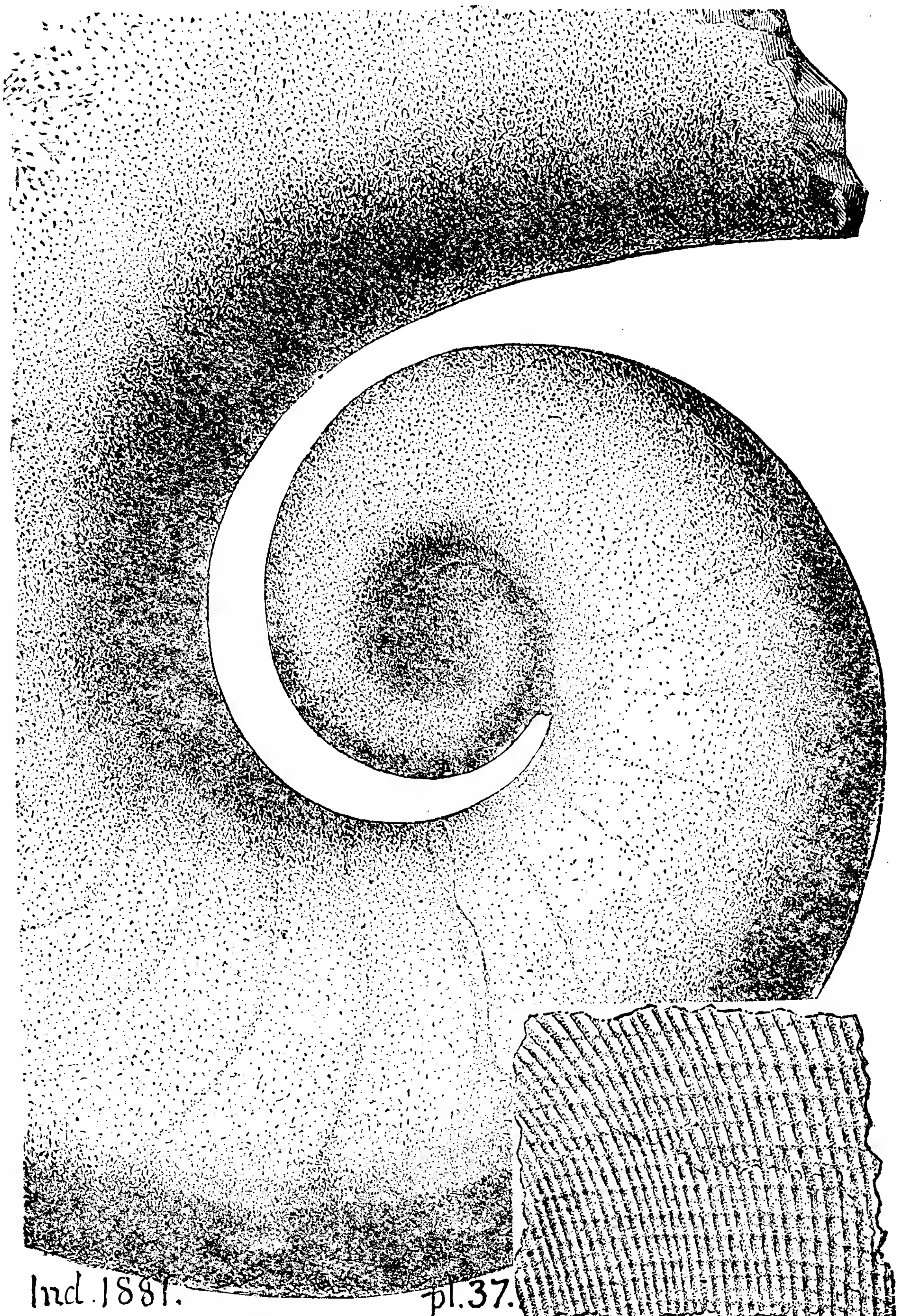
1852

Owen.

G. bur. © Pl. 5, f. 10

5, fig. 10, from top (oolite) bed of *Burlington* (Subcarboniferous) limestone at Burlington, Iowa.—*XI.*

Gyroceras elrodi. Meyer. Collett's Indiana Report of

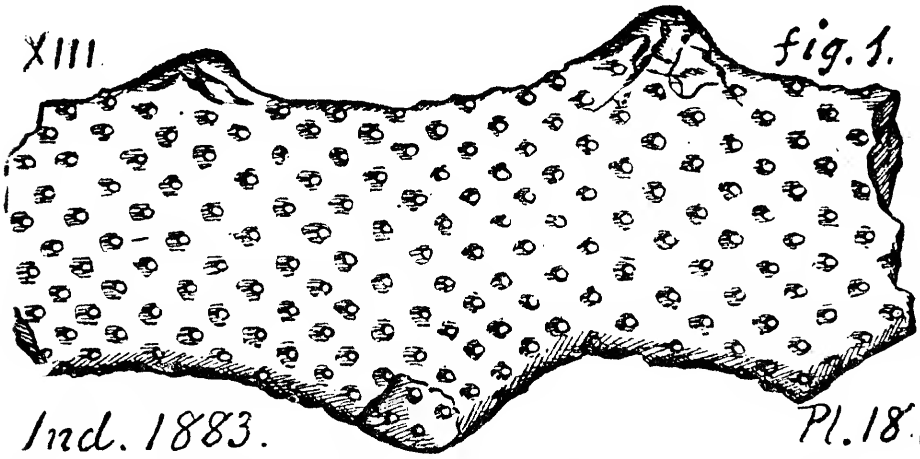


From Pen Drawings by J. C. McConnell. 38. 4

1881, page 356, plates 37, 38, figs. 1, (a portion of the fine figure by J. C. McConnell of Washington); fig. 2, 3, omitted; 4, portion of surface showing revolving and cross lines.—In the *Niagara limestone*, Hartville, Ind.—*V b*.

Gyroceras undulatum. See **Cyrtoceras undulatum**. *VII*.

Halonia flexuosa. (*Ulodendron flexuosum*, Goldfuss, Flor. Sarr. Vol. 2, plate 2, fig. 10.—Lesq. Coal Flora, page 416, plate 61, fig. 3, from Lacoe's collection at Pittston,



Pa.) Collett's Indiana Rt. 1883, plate 18, fig. 1.—*XIII?*

Halonia regularis. See **H. tuberculata**. *XIII*.

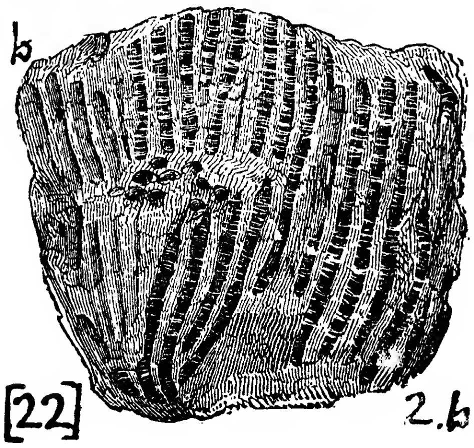
Halonia tortuosa is *not* **H. tuberculata**. *XIII*.

Halonia tuberculata. (Brongniart, Histoire des végétales fossiles, 1828) Collett's Indiana Rt. of 1883, page 87, plate 18, fig. 4. [See Lesquereux's fine representation on plate 74, fig. 9, in his Coal Flora of Penn. and U. S. (bound in Vol. 1, between pages 560 and 561,) description on pp. 411, 412. This beautiful specimen in the Cabinet of the Geol. Survey of Pa. obtained in 1879, by Dr. Chance in Venango Co., Pa., 3 miles

south of Oil City, from the base of the Conglomerate (*XII*), is an impression on very soft, fine grained sandstone, of the bark with perfectly preserved leaf scars. *Halonia tortuosa* of the English is not identical with *H. tuberculata* of Brongniart, which last, like the American specimens in Illinois Rt. Vol. 4, plate 29, fig. 1, represents *Cyclocladia ornata*, Goldfuss, with its bark removed. *H. regularis* may be a different species. Lesq.—*XII*

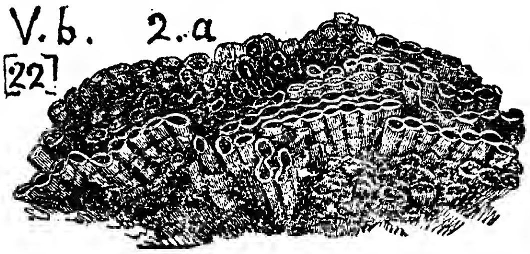
Halysites agglomeratus. (*Catenipora agglomerata*) Hall,

V. b



H[22] 2.b

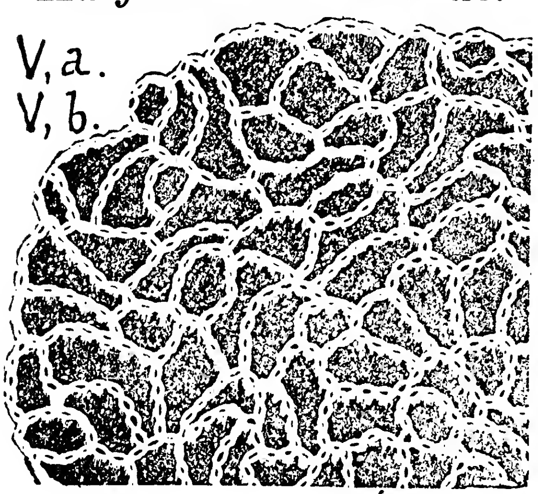
V. b. 2.a [22]



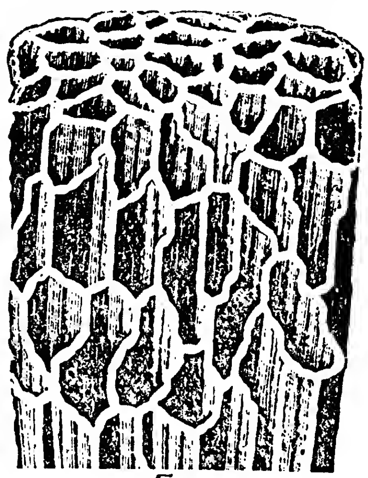
Geology of the Fourth or Western division of New York, 1843, plate fig. [22, 2] *Niagara* formation. *V b.*

Halysites catenulatus. Linnæus (1767, Syst. Nat.) Collett's Indiana Report of 1881, page 382, plate 46, figs. 4, 5, 6, 7. (Van Cleve's drawings.)—Characteristic universal fossil of *Clinton* and *Niagara* formations.—Found by Dr. Barrett of Port Jervis (with other Niagara forms) in I. C. White's *Bossardville* (Lower Held.) *limestone.*

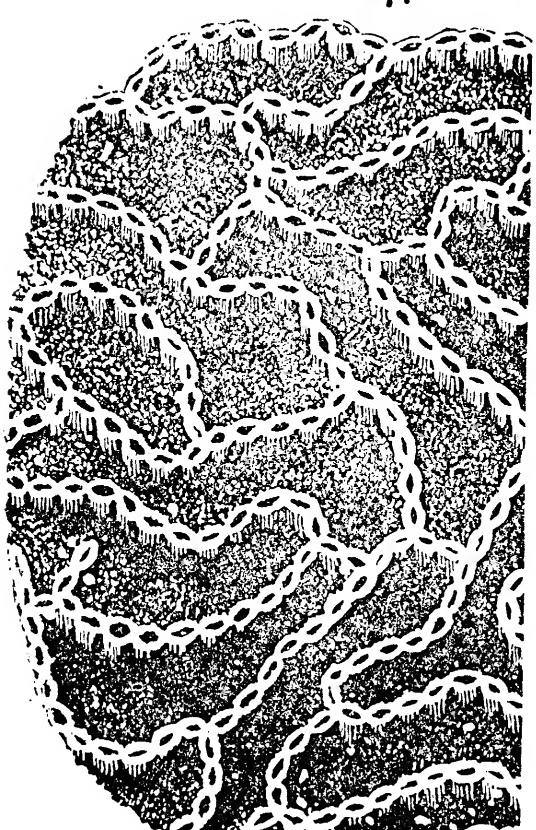
V, a.
V, b.



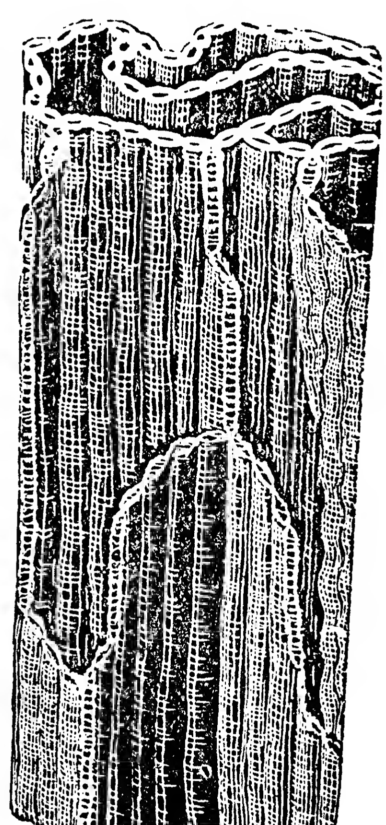
4.



5.



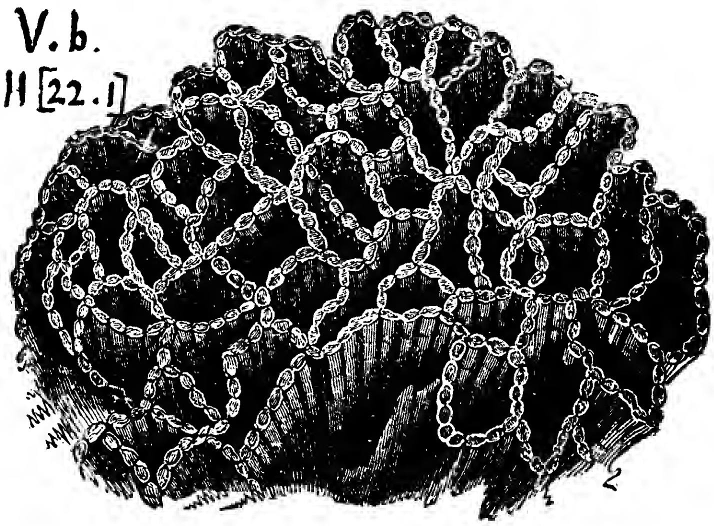
Ind. 1881. 6



7 Pl. 46.

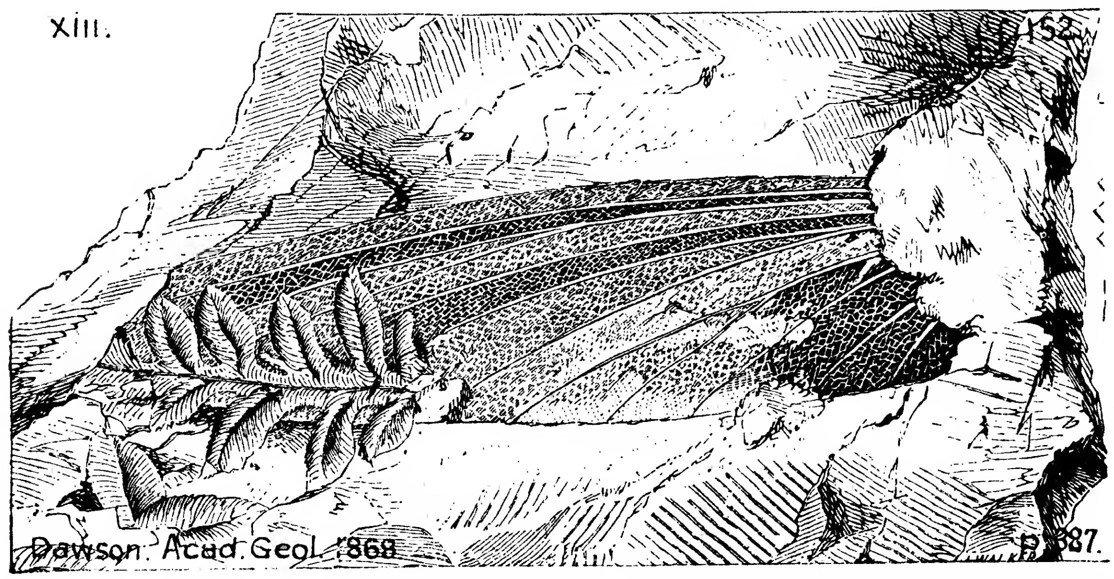
(See discussion of the question of its age in Report on Pike and Monroe Co's., Pa., G6, p. 145.)—In the North Branch Susquehanna region White finds it in Lower Helderberg strata (*Stormville limestone*) at Mauser's quarry with other *Niagara* fossils. (G7, pp. 89, 97, 101, 244, 245.)—*V b; VI.*

Halysites escharoides. (*Catenipora escharoides*). Hall, Geology of the Fourth or Western district of New York, 1843, plate fig. [22, 1]. See also the exquisite figures in Hall's Pal. N. Y., Vol. 2, 1851, plate 35. (Lamarck, Histoire des Animaux sans Vertêbres, 1816). *Niagara* formation. *V b.*



1

Haplophlebium barnesii. Scudder. Canadian Naturalist

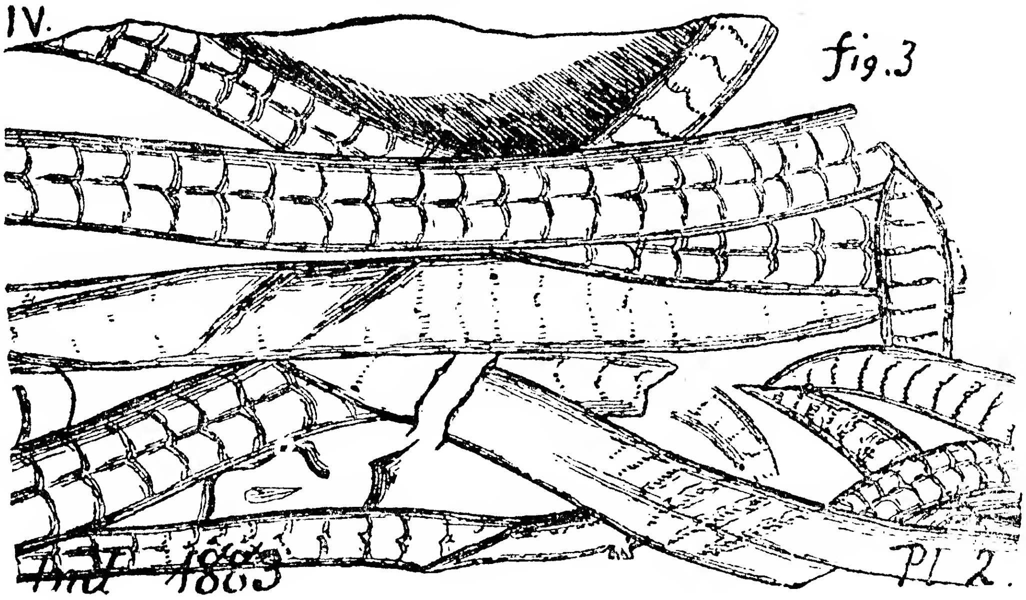


and Geol., Vol. 3, 1867. Dawson's Acad. Geol. 1868, p. 387, fig. 152, the wing of a large day-fly or shad-fly (Neuropterid) living in the swamp forests of the coal age, discovered by Mr. Barnes, of Halifax, N. S., in some Glace Bay (C. B.) coal shale, attached to a fragment of fern leaf, which proves its geological age. That such flies, with grasshoppers or crickets (orthopterids) and beetles (colepoterids), were as abundant in the coal forests and swamps, as in those of the present day, appears from the many fossil specimens of them found in Europe and America. They flitted in myriads between the reeds and fern-palms, over quiet marsh waters full of fish and reptiles. Many of them have been found in Pennsylvania coal measures. See **Mylacris,** etc.—*XIII-XV.*

Haplophlebium longipinnis. Scudder. An insect found by Mr. Lacoe under the Pottsville conglomerate, in gap above Pittston, Luzerne Co. Pa. (G7, 286).—*XI.—See Appendix.*

Harlania halli. (Goeppert, Foss. Flora des Ueberg, 1852).

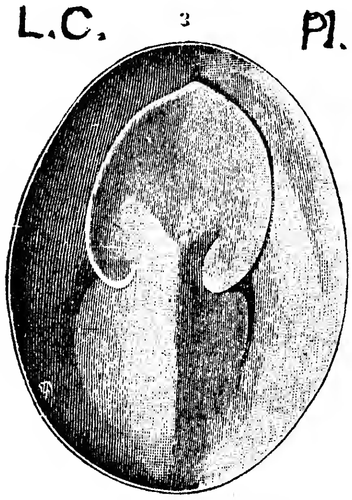
IV.



Synonyms: *Arthrophycus harlani*, Conrad; *Fucoides alleghenienisis; Fucoides brongniarti* of Hall. Collett's Indiana Rt. 1883, page 29, plate 2, fig. 3.—Some of the *Medina* sandstone beds are a net-work of fronds of this sea weed, which some have chosen to regard as tracks of worms. There is reason to think the plant stems were tubes. (Hall.) *IV b.*

Harttia matthewi. Walcott, Bulletin U. S. G. S. No. 10, page 19, plate 1, fig. 3, interior of shell, *enlarged to twelve diameters;* a unique little shell found associated with fragments of *Parodoxides* and *Ptycoparia* trilobites, in New Brunswick (*Saint John*) formation, *Middle Cambrian, M. C.*—The character of the apex is unknown, as the only representative of both genus and species is in the form of this interior cast, and around its margin the cast of the apparently smooth outer surface. (W.)

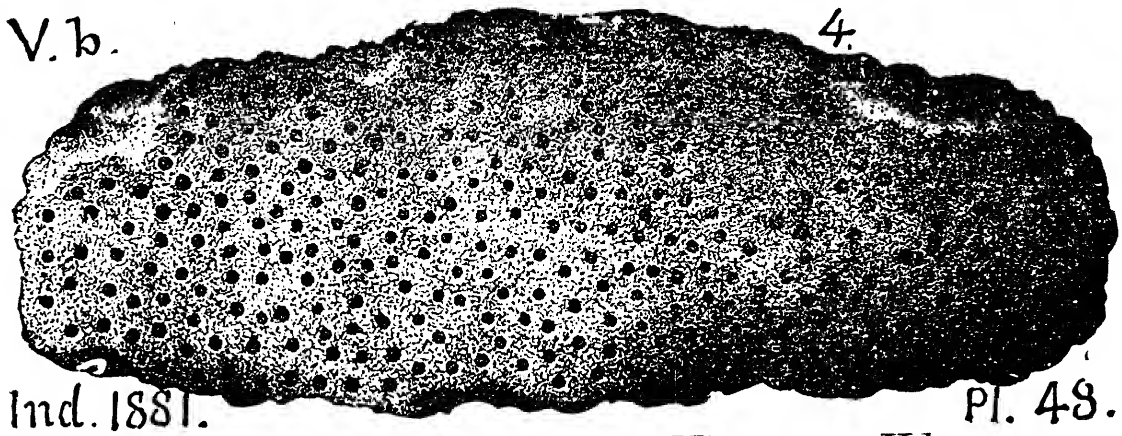
L.C. 3 Pl. 1.



I

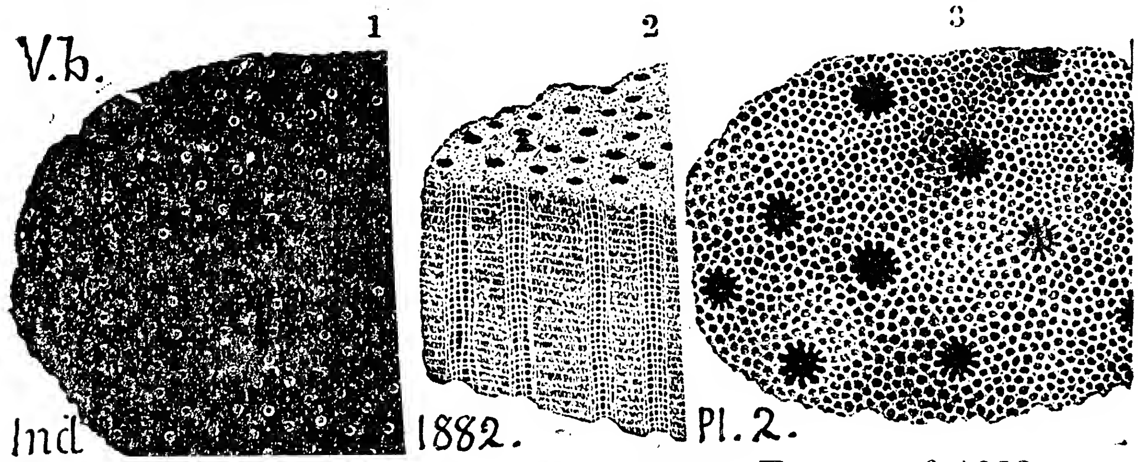
Hederella ? Specimen 901–1 (OO, p. 238), Sherwood's coll. Tioga county iron ore bed, *Upper Chemung*, *VIII g*.

Heliolites elegans ? Hall. (Pal. Vol. 2.) Collett's 1881,

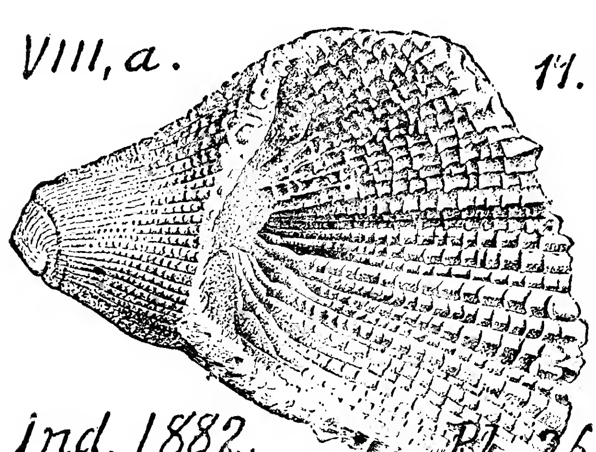


upper surface; species not certain. *Niagara.*—*V b*.

Heliolites interstinctus. (*Madrepora interstincta*, Linneus, 1767, Sys. Nat.). Collett's Indiana Report of 1882, page 252, plate 2, fig. 1, upper view (nat. size); fig. 2, top surface and vertical section; fig. 3, upper surface *enlarged*. (Van Cleve).—Common in Indiana, Kentucky, Tennessee and found in other States, always in the *Niagara strata*, *V b*.

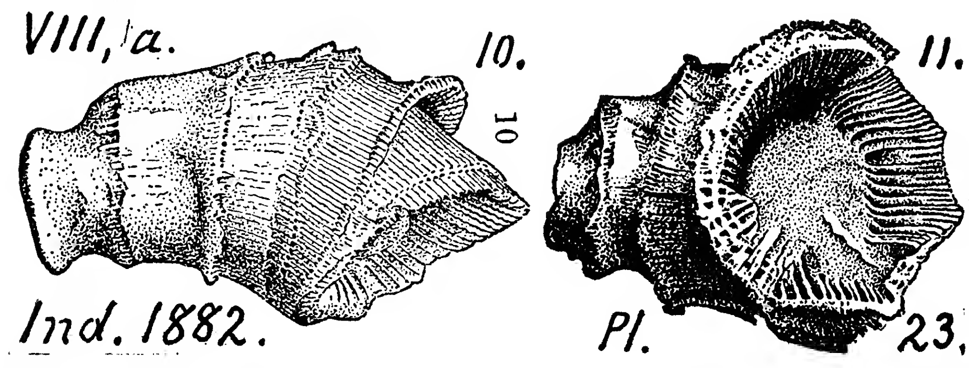


Heliophyllum acuminatum. (Hall, 35th An. Rt. N. Y. Museum, p. 450). Collett's Indiana Rt. 1882, page 310, plate 26, fig. 11.—Ontario. *Cornif. limestone*, *VIII a*.



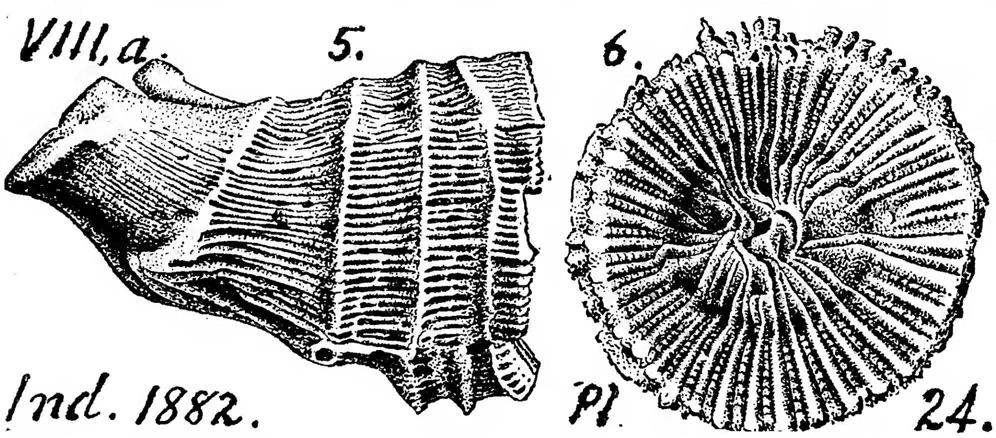
The space at the bottom of the cup is convex, and a strongly marked groove (fossette) extends from it upward to the front edge; lamellæ, 80, alternating in size, strongly toothed.

Heliophyllum æquum. (Hall, 35th Ann. Rep. N. Y. State Museum. 1882.) Collett's Indiana Rt. 1882, page 314, plate 23, fig. 10, 11.



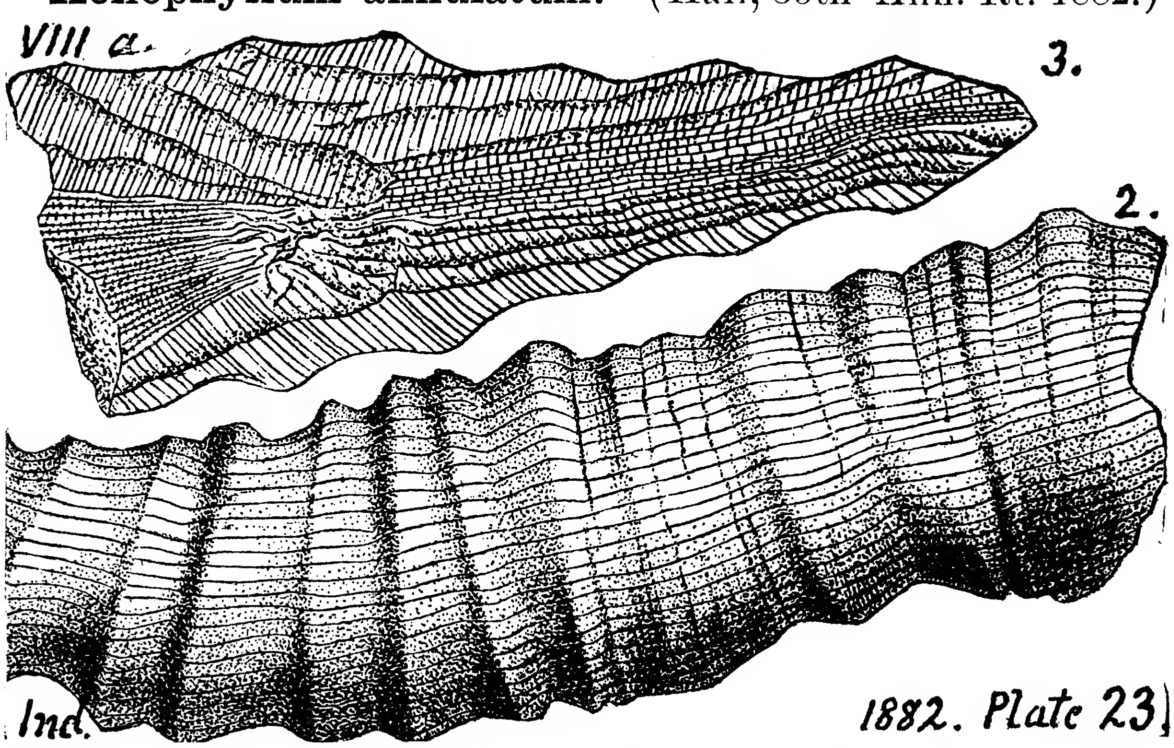
Falls of the Ohio, Ky. Corniferous limestone. *VIII a.*

Heliophyllum alternatum. (Hall, 35th Ann. Rt. 1882.) Collett's Indiana Rt. 1882, page 305, plate 24, fig. 5, 6.



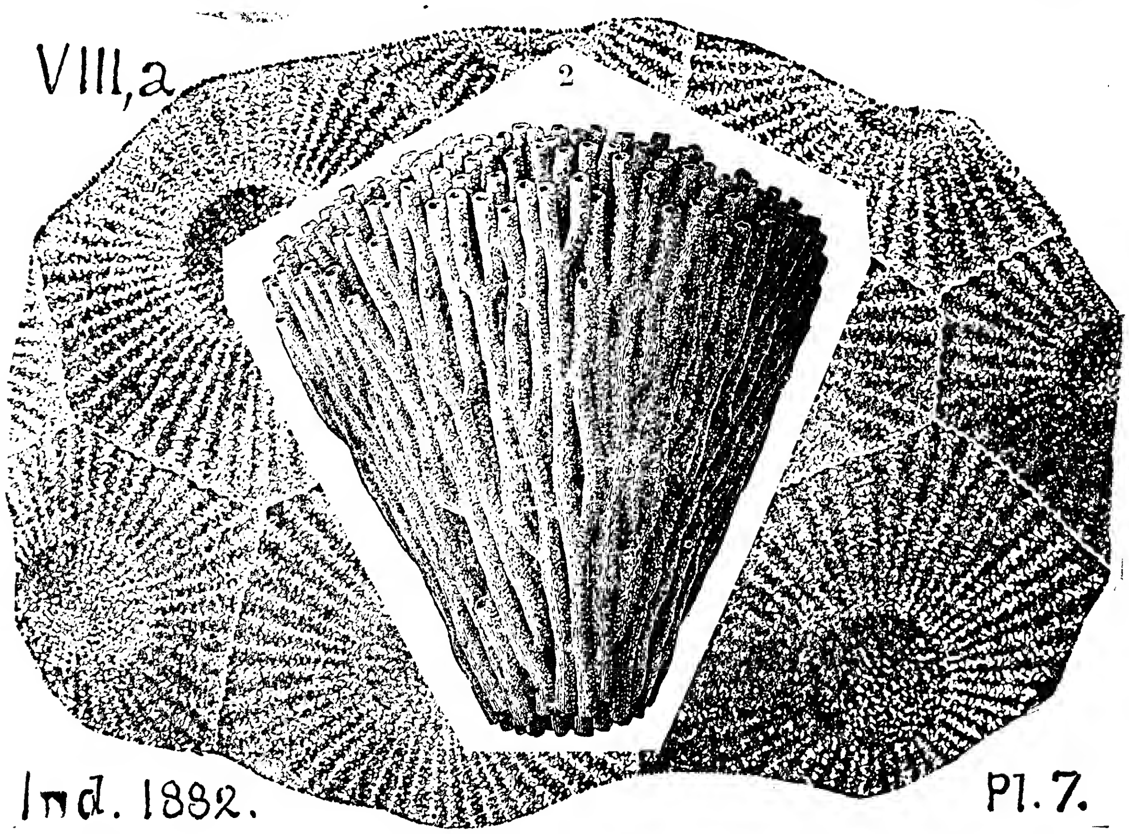
Falls of the Ohio. Corniferous limestone. *VIII a.*

Heliophyllum annulatum. (Hall, 35th Ann. Rt. 1882.)



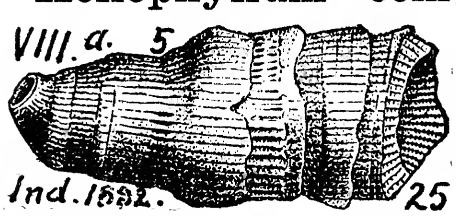
Collett's Indiana Rt. 1882, page 307, plate 23, fig. 3, a section, lengthwise, of a large straight specimen; fig. 2 [part of] a large specimen imperfect at the base. [Plate 25, fig. 12, gives another fine figure; here omitted.]—Erie Co., N. Y. and Scott and Clark counties, Ind.— *VIII a.*

Heliophyllum coalitum. Rominger. (Foss. Corals, page



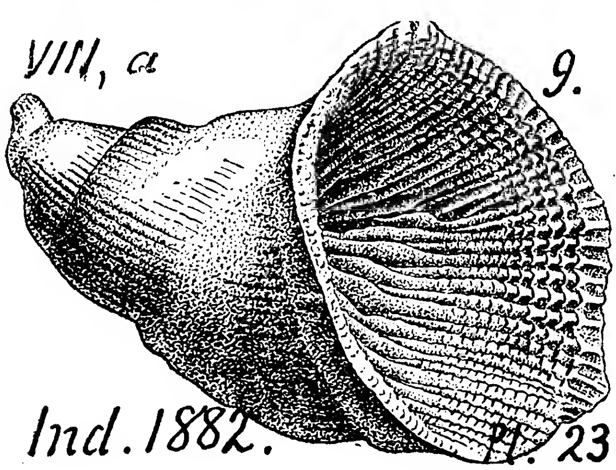
108, 1876.) Collett's Indiana Report of 1882, page 259, plate 7, fig. 2, a simple specimen; fig. 3, upper surface of a group (doubtfully identified with fig. 2).—In drift from *VIII a.*

Heliophyllum compactum. (Hall, 35 An. Rt. 1882.)



Collett's Indiana Rt. 1882, page 308, plate 25, fig. 5, back of the coral.—Falls of the Ohio, Corniferous lime-stone. *VIII a.*

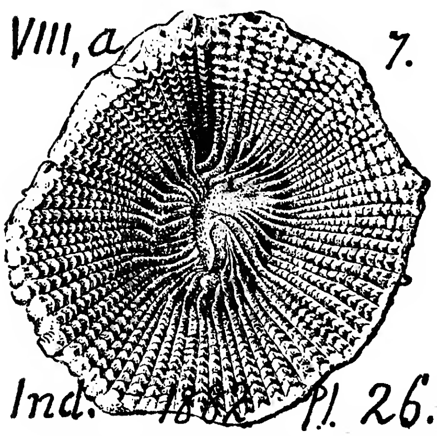
Heliophyllum corniculum. (*Caryophylla cornicula.* Lesueur, 1820.—*Zaphrentis phrygia*, Raphinesque and Clifford, 1820. — *Caninia punctata*, D'Orbigny, 1850. —*Cyathophyllum ammonis*, *delitatum*, and *conitum*, De Castelnau. — *Zaphrentis cornicula*, Ed. and Haime, Pal. Foss. plate 6, fig. 1.—*Cyathophyllum corniculum*,



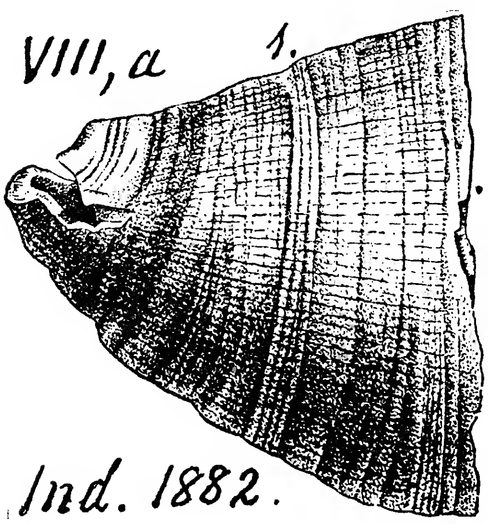
Rominger, Foss. Corals, 1876.) Collett's 1882, p. 311, pl. 23, fig. 9.—Falls of Ohio, and elsewhere. *VIII a.*

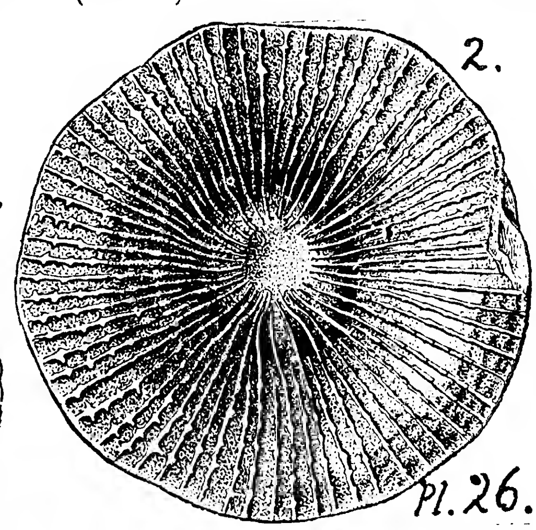
Heliophyllum cornulites ? Spec. 601–32 (OO, p. 234) seven examples collected by Hale and Hall, 1½ m. S. of Rock Hill furnace, Orbisonia, Hunt. Co., from *Low. Held.* *VI.*

Heliophyllum denticulatum. (Hall, 35th An. Rt. N. Y. State Museum, 1882.) Collett's Indiana Rt. 1882, page 313, plate 26, fig. 7, the cup (calyx) of the coral.—Corniferous limestone, Falls of the Ohio. *VIII a.*—The corallum is sometimes curved in more than one direction; surface wrinkled and finely lined; external costæ coarse and prominent; alternating lamellæ 50.



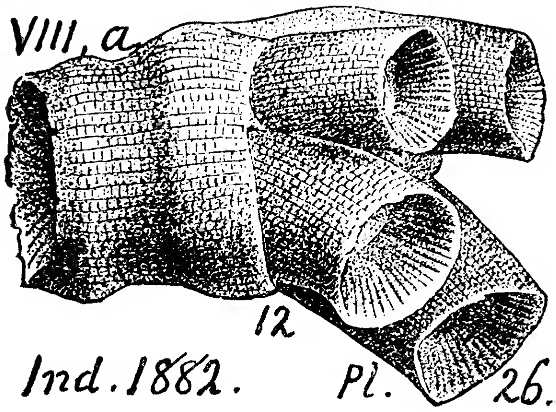
Heliophyllum distans. (Hall, 35th An. Rt. 1882) Collett's Indiana Rt. 1882, page 308, plate, 26, figs. 1, 2, side and cup.—Corniferous limestone, Falls of the Ohio. *VIII a.*





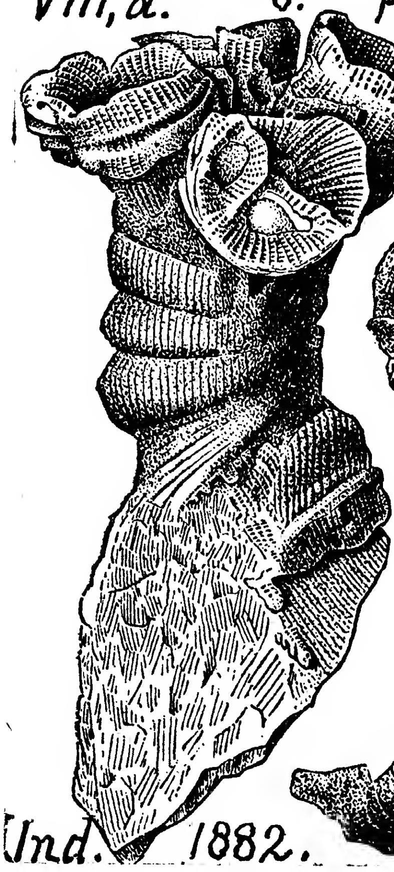
Heliophyllum fecundum.—*See page 277.*

Heliophyllum gemmatum. (Hall, 35th, An. Rt. 1882.) Collett's Indiana Rt. 1882, page 310, plate 26, fig. 12, side view, showing a young corallum budding out from the old one.—(In nearly all specimens, from 3 to 5 buds are seen growing from the parent stem. Collett.) Falls of Ohio, Corniferous limestone, *VIII a.*

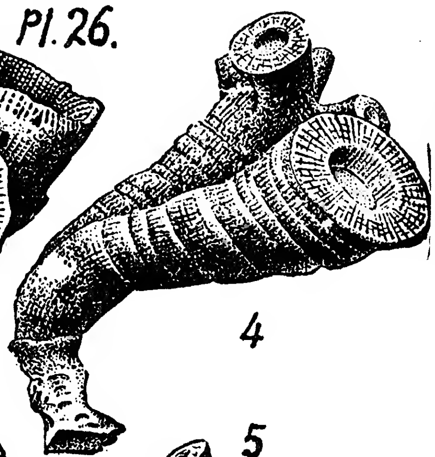


Heliophyllum fecundum. (Hall, 35th Annual Rt. N. Y. State Mus. 1882.) Collett's Indiana Rt. 1882, page 309, plate 26, fig. 6, and plate 27, figs. 4, 5. Groups of this coral, old and young, stem and buds. (Easily distinguished from *Heliophyllum gemmatum* by its smaller size and different shape of cup.) Falls of Ohio, Corniferous limestone, *VIII a.* Walls of the cup nearly flat, then abruptly descending to a flat; lamellæ 70.

VIII, a. 6. Pl. 26.

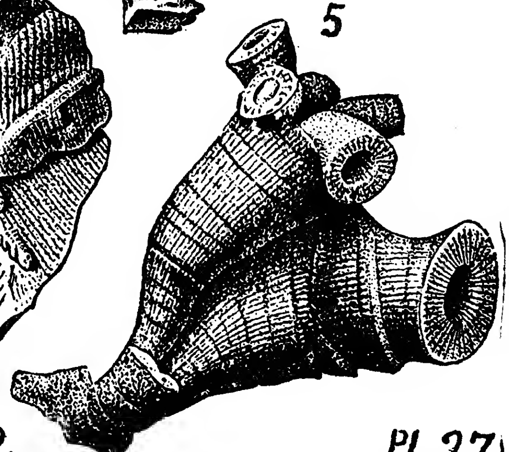


Ind. 1882.



4

5



Pl. 27.

Heliophyllum halli. Hall, Geology of 4th Dist. Plate fig. [49.1]; (*Strombodes? turbinatum?* of Goldfuss, 56, XVI, fig. 8)—Also, page 209, fig. 87, 3, Hamilton formation. (*Cyathophyllum; or Strombodes helianthoides* of Phillips, Pal. Foss. page 11, pl. v, fig. 13?)

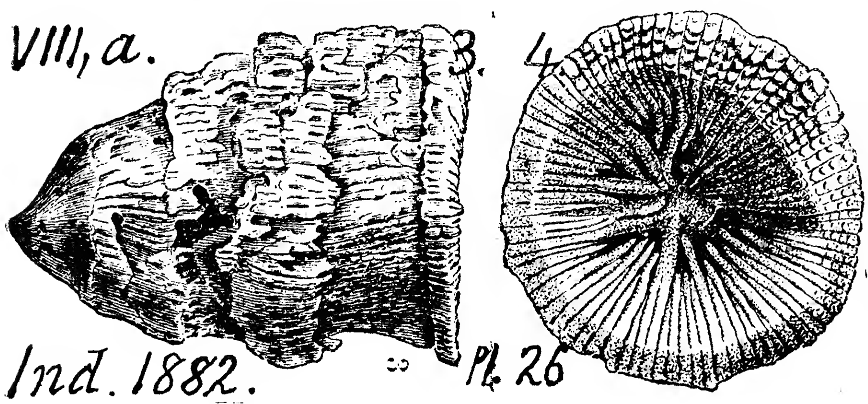
VIII. c.

H. [48] 5

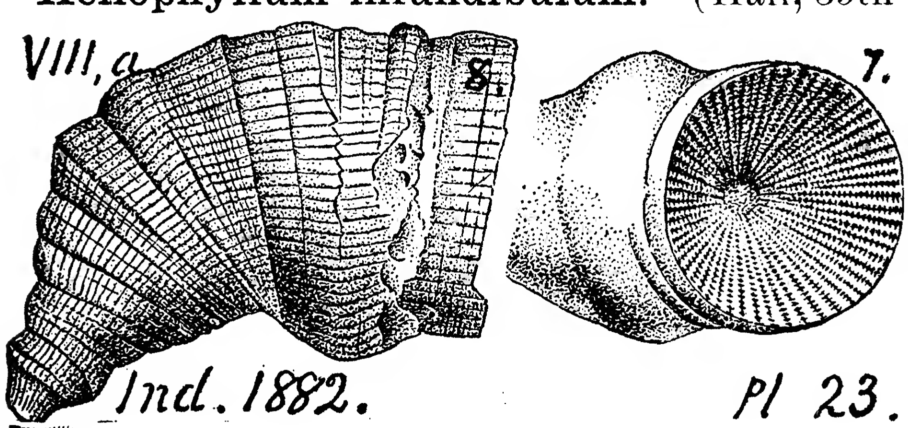
Note.—A very fine drawing of this species may be found in Collett's Indiana Report of 1882 (Van Cleve's corals) page 259, plate 6, fig. 1.—(See Edwards & Haime, 1850, Brit. Foss. corals.)—In Pennsylvania this coral belongs to the *shales above the Hamilton sandstone.* In Perry Co. N. end of Dorran's Narrows. (Claypole's spec. 118–21). In Hunt. Co., at Mapleton, in the *Genesee coral bed* No. 8, (T3, 273). At Cove Station in coral bed 120′ *beneath* the *Tully limestone* (T3, 107.) In Monroe and Pike Cos., in the *Tully limestone* at the heads of Sawkill, Raymondskill, Dingman's, Bushkill Falls, (G6, 109,) and in the *Hamilton shales* below it (p. III.)—*VIII c, d.*—Spec. 805-1 (OO, p. 235)

Bell's Mills, Blair Co.—806–3 (cast of calyx); 807–1 (ditto) Marshall's creek, Monroe Co. in *Hamilton shale*, *VIII c.*

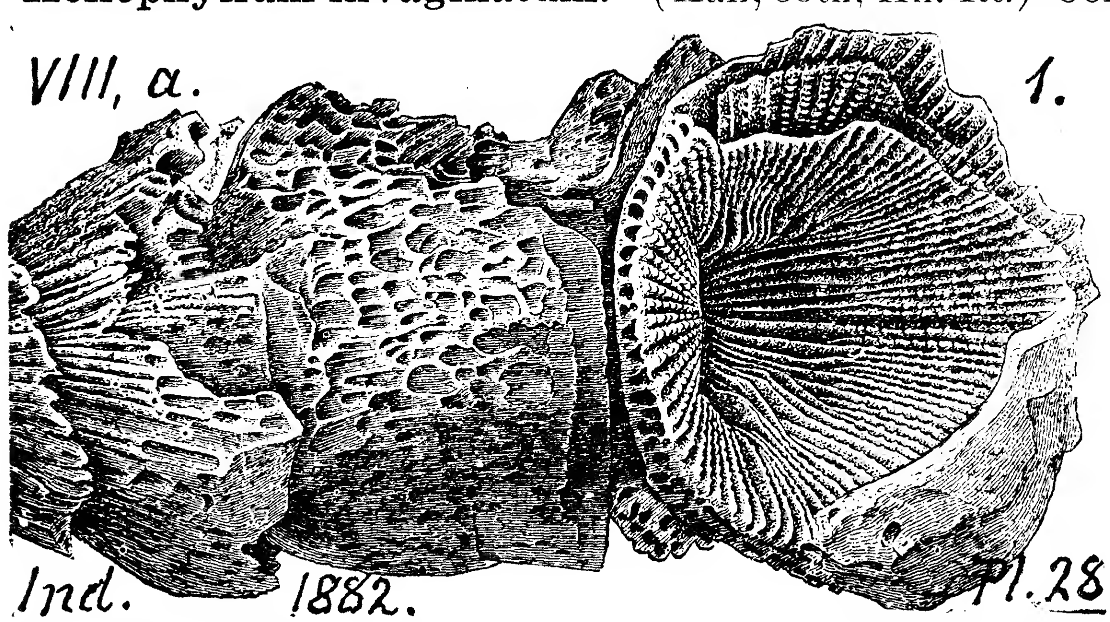
Heliophyllum incrassatum. (Hall, 35th An. Report N. Y. State Museum, 1882) Collett's Indiana report 1882, page 309, plate 26, figs. 3, 4, side and cup of a much weathered specimen.—*Corniferous limestone.* Falls of Ohio. *VIII a.*



Heliophyllum infundibulum. (Hall, 35th An. Rt. Mus. 1882.) Collett, 1882, page 305, plate 23, fig. 8, side view; plate 24, figure 7, back view, looking into the calyx.—*Corniferous limestone.* Falls of Ohio. *VIII a*



Heliophyllum invaginatum. (Hall, 35th, An. Rt.) Collett's 1882, p. 306, pl. 28, f. 1, back view, and into calyx.—*Corniferous limestone.* Falls of Ohio. *VIII a.*



Heliophyllum latericrescens. (Hall, 35th An. Rt. 1882.)

VIII, a.

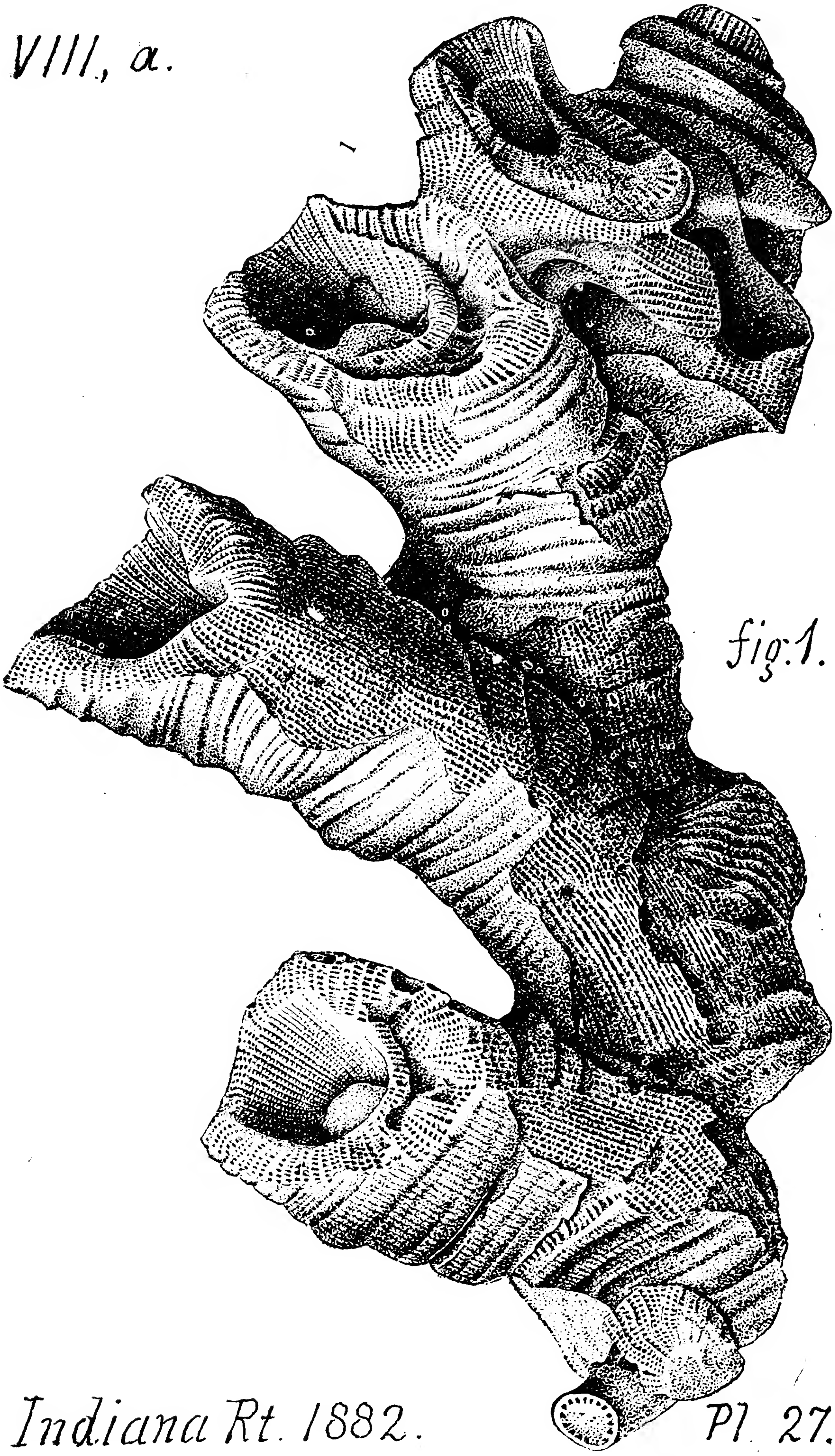


fig: 1.

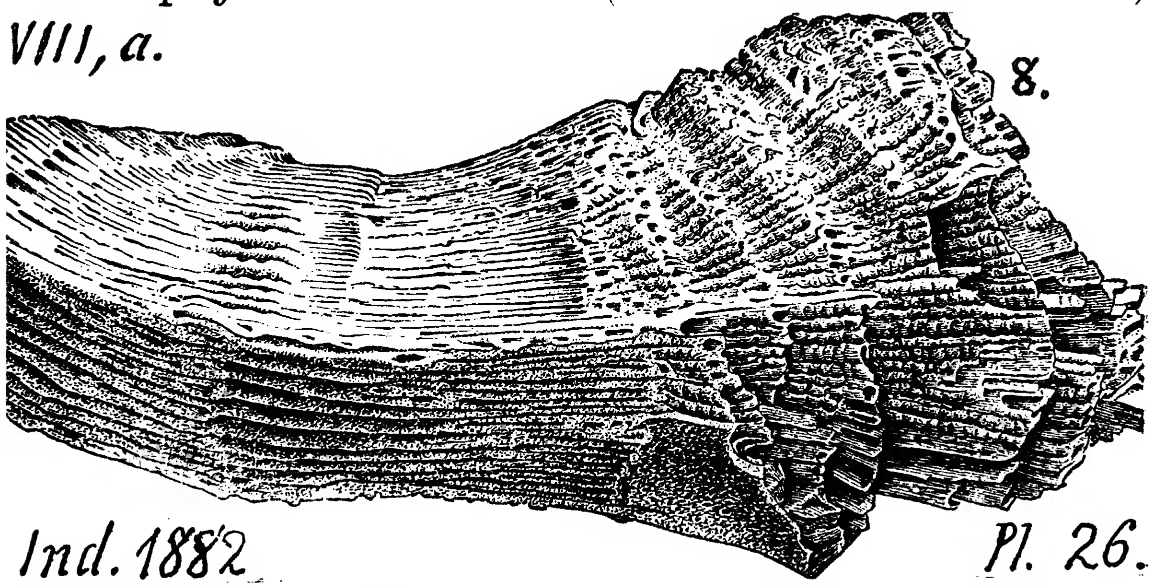
Indiana Rt. 1882.

Pl. 27.

Collett's Ind. Rt. 1882, page 314, plate 27, fig. 1, fine side view of a coral group.—*Corniferous* Ohio Falls. *VIII a.*

Heliophyllum nettelrothi. (Hall 35th Ann. Report 1882.)

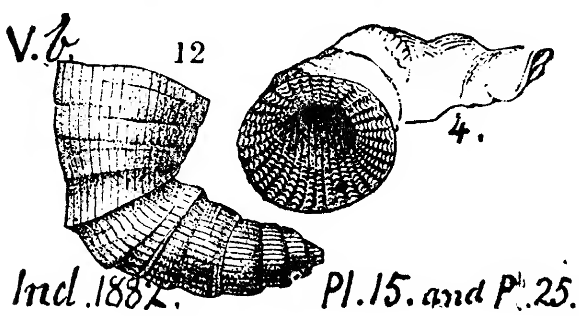
VIII, a.



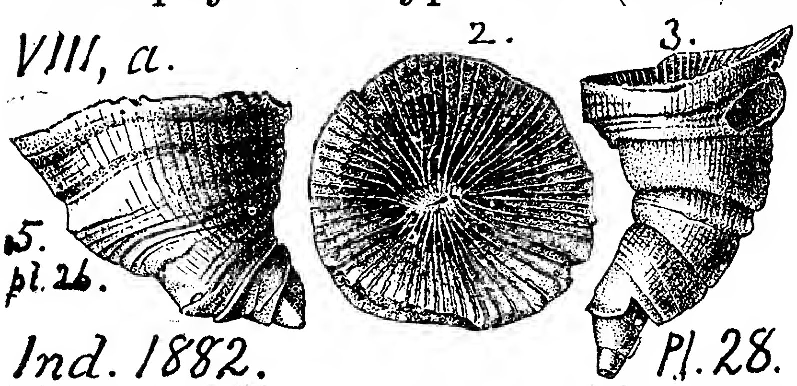
Ind. 1882 Pl. 26.

Collett's Ind. Rt. 1882, p. 312, plate 26, fig. 8, front side of a specimen from which the skin has been removed.—(All the specimens found are thus skinned. Collett.) Falls of Ohio *Corniferous limestone*, *VIII a.*

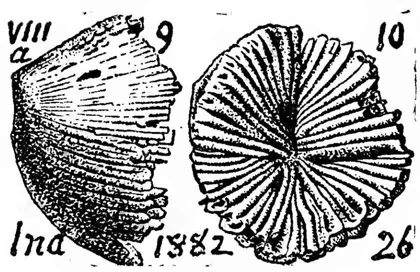
Heliophyllum pravum. (Hall, 35th Ann. Rpt. N. Y. State Museum, 1882.) Collett's Indiana Rt. 1882, page 274, plate 15, fig. 12, side view of specimen of ordinary size and form; plate 25, fig. 4, oblique view, to show the cup (calyx).—*Niagara limestone* formation at Louisville, in Kentucky. *Vb.*



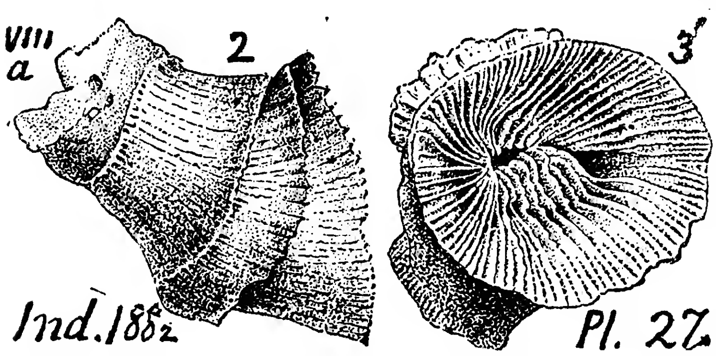
Heliophyllum scyphulus. (Hall, 35th Annual Rt. N. Y State Museum, 1882.) Collett's Indiana Report of 1882, page 306, plate 28, fig. 5, side view; plate 26, figs. 2, 3, side view and cup of coral.—(It differs from *H. halli* in the shape of its cup, and in having thinner plates and coarser toothing.) Falls of Ohio, *Corniferous limestone*, *VIII a.*



Heliophyllum sordidum. (Hall, 35th Annual Report of the N. Y. State Museum of Natural History, 1882.) Collett's Geological Report of Indiana, 1882, page 311, plate 26, figs. 9, 10, side and cup of an imperfect specimen.—*Corniferous limestone* (Upper Helderberg) formation at the Ohio Falls. *VIII a.* Numerous individuals have been observed, but in all cases the outer skin is gone, and the margins of the calyx broken away; so that the true form cannot be accurately determined.



Heliophyllum tenuimurale. (Hall, 35th An. Report of N. Y. State Museum, 1882.) Collett's Geol. Report of Indiana, 1882, page 307, plate 27, figs. 2, 3, side and cup of the coral.—*Corniferous limestone* (U. Helderberg) formation. Falls of the Ohio. *VIII a.* Number of lamellæ 90, the alternate larger ones reaching the center.



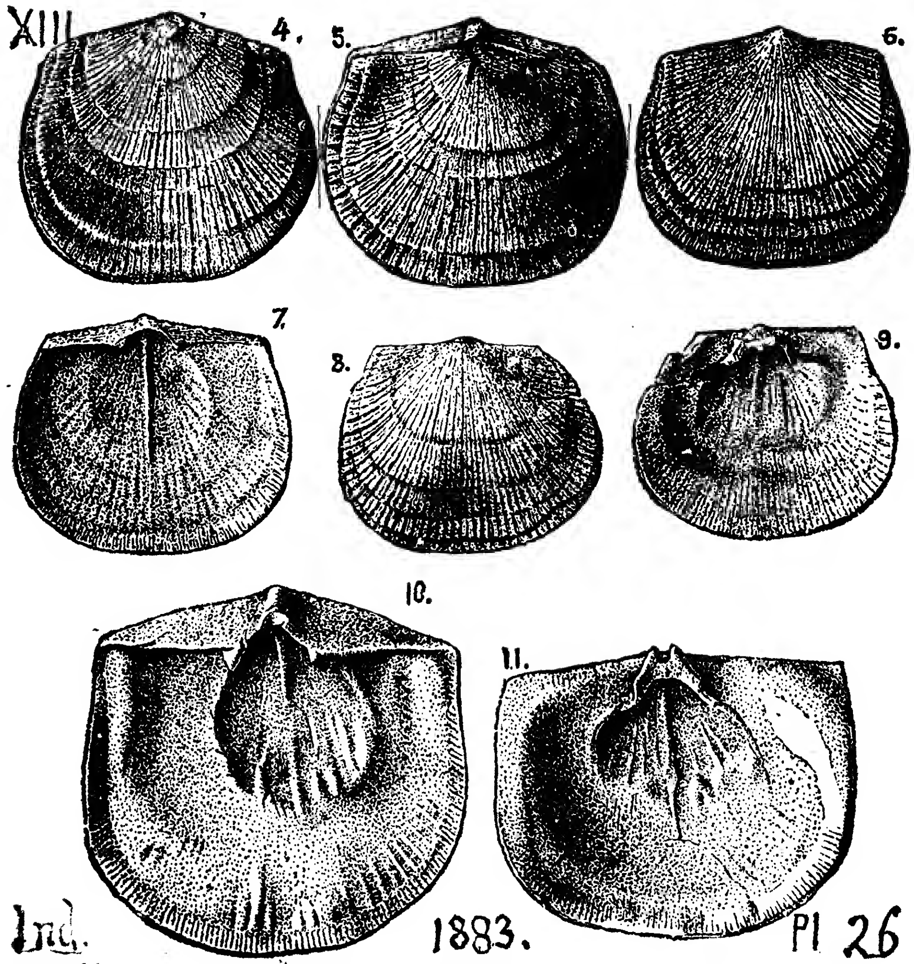
Heliophyllum turbinatum. (*Cyathophyllum turbinatum.*) Rogers, Geology of Pennsylvania, 1858, page 827, fig. 655. *Hamilton formation VIII c.* This is probably *Heliphyllum halli, which, see above, page 277.*

(*Error on page 66.*)

The figure under *Aulipora tubæformis* is that of *Heliophyllum halli*, to the front of which clings a portion of the surface of another individual of the same species; no *Aulopora* present. (J. Hall).

Hemicrypturus clintoni. (*Asaphus clintoni.*) See **Calymene clintoni.**

Hemipronites crassus. (*Orthisina crassa*, Meek & Hayden, Proc. Acad. Nat. Sci. Philada. *H. crassus* of Meek & Hayden, Pal. Upper Missouri 1864, plate 1; also U.S. Geol. Surv. of Nebraska 1872, fig. 10, plate 10, fig. 1.—Note. Pander's genus *Hemipronites* is now known as *Streptorhynchus*.—The English *Hemipronites crenistria* of Phillips is the same as this American *H. crassus*. The *Orthis robusta* of Hall's Iowa report differs from it only in being larger. Collett's Indiana Report of 1883, page 129, plate 26, figs. 4, 5, belly and back, *natural size;* figs. 6, 7, outside and inside of belly (ventral) shell; figs. 8, 9, outside and inside of back (dorsal) shell; fig. 10, 11, inside of belly and back shells of larger size.—*Coal Measures* of the West. *XIII.* Abundant in Carll's 3rd Mtn. Sand, Warren co., Pa. (IIII, p. 273) *Waverly*, *X*; and the same in the Fayette and Westmoreland Co. gaps. (K3, 311) *Low. Carb. X.*—In Beaver, Lawrence and Mercer cos., in *Ferr. Lime.* All. Series, (Q, 62, 200; QQ, 46, 106; Q3, 25; V, 147) XIII.—In W. Virginia, Morgantown, in *Deckers Cr. shale* under Mahoning SS. (L, 36) XIII.—In Fayette and West. cos., abundant in green and black *Crinoidal limestones*, Pitts. Series. (K, 80; K3, 309; L, 34) B. M. *XIV.*



Hemipronites crenistria. English. See **Hemipronites crassus** above.—*XIII, XIV.*

Hesperomys; a jaw, with teeth, of an extinct mouse found in the Port Kennedy cave-earth, Chester Co. See Cope, in Proc. A. P. S. 1871, p. 87.—*Postpleiocene*; or *glacial?*

Heterocrinus, juvenis. (Hall, Descrip. New Spec. Pal. Crinoids, p. 4, 1866; 1872, pl. 1, figs. 9, 10.) Newberry, Geology of Ohio, Palæontology, Vol. 1. page 10, plate 1, fig. 3 *a*; perhaps allied to the Cincinnati *Heterocrinus heterodactylus*, but shorter in the arms, which give off a few side armlets, so small as to be mere stout pinnules. It is curious for the excessive disproportion of head to stem. Near Lebanon, O.—*Upper Loraine* (Hud. Riv. or Cincinnati) formation.—*III b.*

III b. 3 a

Newb. Pal. O. Vol. I. Pl. I.

Heterocrinus ———, Rogers, p. 821 (no figure). *III b.*

Hipparionyx consimilis. See **Atrypa reticularis.** *V a* to *VIII g.*

Hipparionyx proximus. See **Orthis hipparionyx.** *VII.*

Holopea antiqua. (*Littorina antiqua.*) Hall, page 142, fig. 58, 4. Vanuxem, page 112, fig. 23, 4. Lower Helderberg. In Pennsylvania, Pike Co., found by Dr. Barrett in *Stormville shales* (G6, 132) and *Stormville limestone* (G6, 134.)—In Bedford Co., Piper's run, Everett, middle of the *Lower Helderberg limestone.* (T2, 88, 196.)—*VI.*

VI.

58. 4.

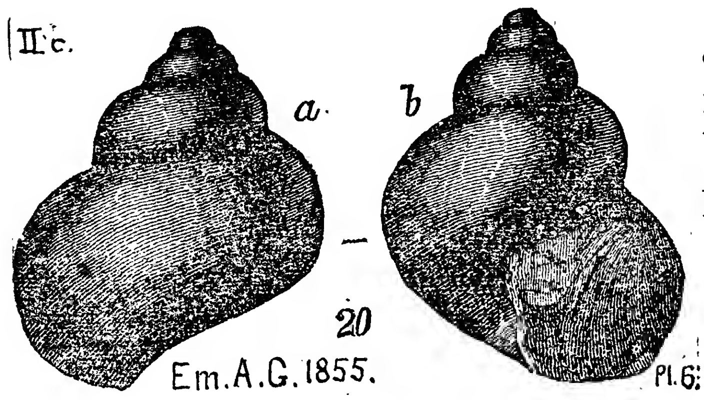
Holopea elongata. (Hall, Pal. N. Y. Vol. 3, 1859.—Found by Dr. Barrett at Port Jervis, in the *Stormville limestone* of I. C. White, Pike Co., Rt. (G6, p. 134.)—*Lower Helderberg limestone. VI.*

Holopea obliqua. (Hall, Pal. N. Y. Vol. 1, 1847, Trenton and Hudson River) *Turbo obliguus*, Emmons, American Geology, I, ii, 1855, p. 158, plate 5, figs. 18, 18 a, 18 b (alone used), surface smooth or slightly striated.—*Trenton* and *Hudson River* (Loraine) formation. *II c.*, *III b.*—Hall says that this shell has hitherto been considered a *Natica*; and that it occurs only in the upper shaly Trenton beds (page 170.)

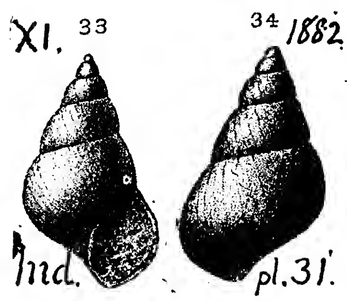
II c. & III b.

Em. A. G. 1855. 18 b Pl. 5.

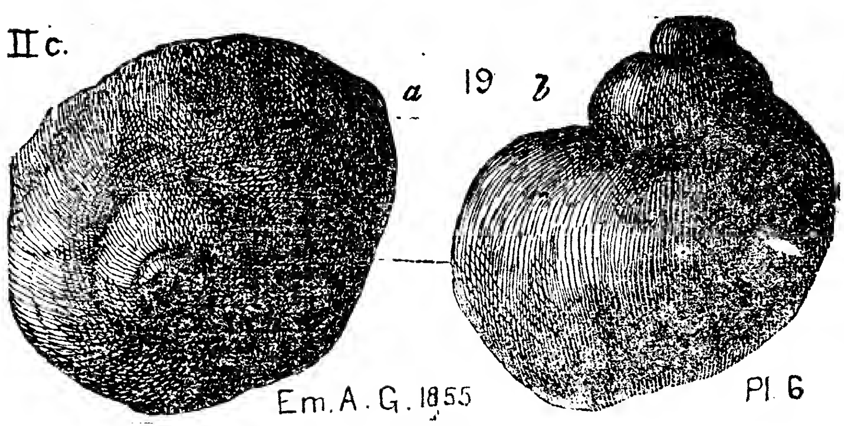
Holopea paludiniformis. (Hall, Pal. N. Y. Vol. 1, 1874, Trenton.) *Turbo americanus* d'Orbigny. Emmons Amer. Geol. 1855, Vol. 1, part 2, p. 158, plate 6, figs. 20 *a*, *b*; 4 whorls, round and full; casts smooth, as found in the New York *Trenton limestone.*— *II c.*



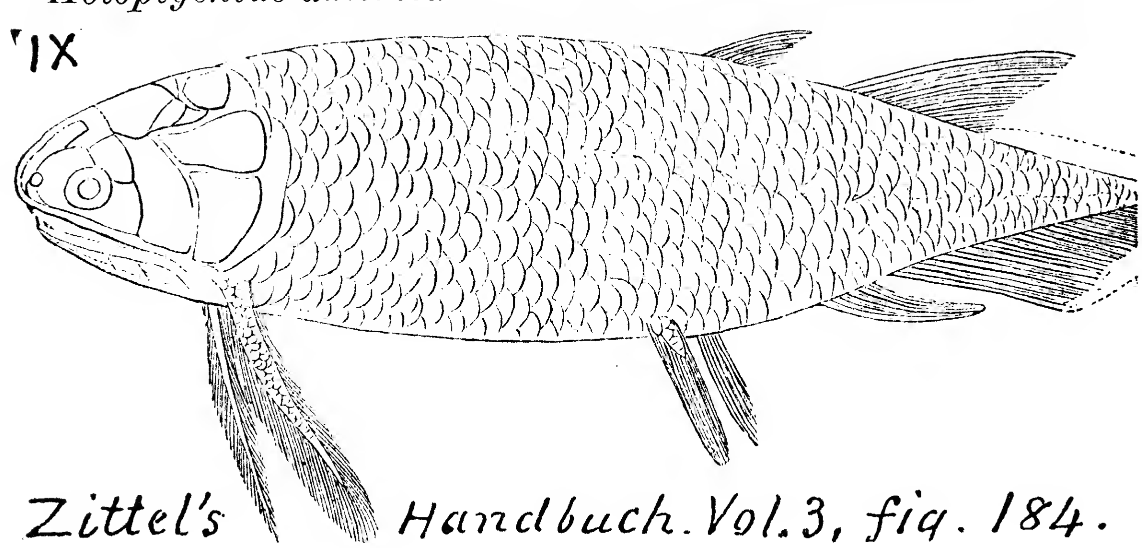
Holopea proutana. (Hall, Trans. Albany Institute, Vol. 4, 1856, Warsaw limestone. *Callonema? proutana* Whitfield, Bull. 3, Amer. Mus. Nat. Hist. 1886, p. 72, plate 8, figs. 33, 34.) Collett's Indiana Report, 1882, page 368, plate 31, figs. 33, 34, front and back views, *enlarged twice.*—Spergen Hill, *Warsaw limestone*, *XI.*



Holopea ventricosa. (Hall, Pal. N. Y. Vol. 1, 1847, Trenton) *Turbo ventricosus* of Emmons. Am. Geol. 1855, Vol. 1, part 2, p. 158, plate 6, fig. 10 *a*, *b*; 3 whorls. New York *Trenton limestone. II c.*

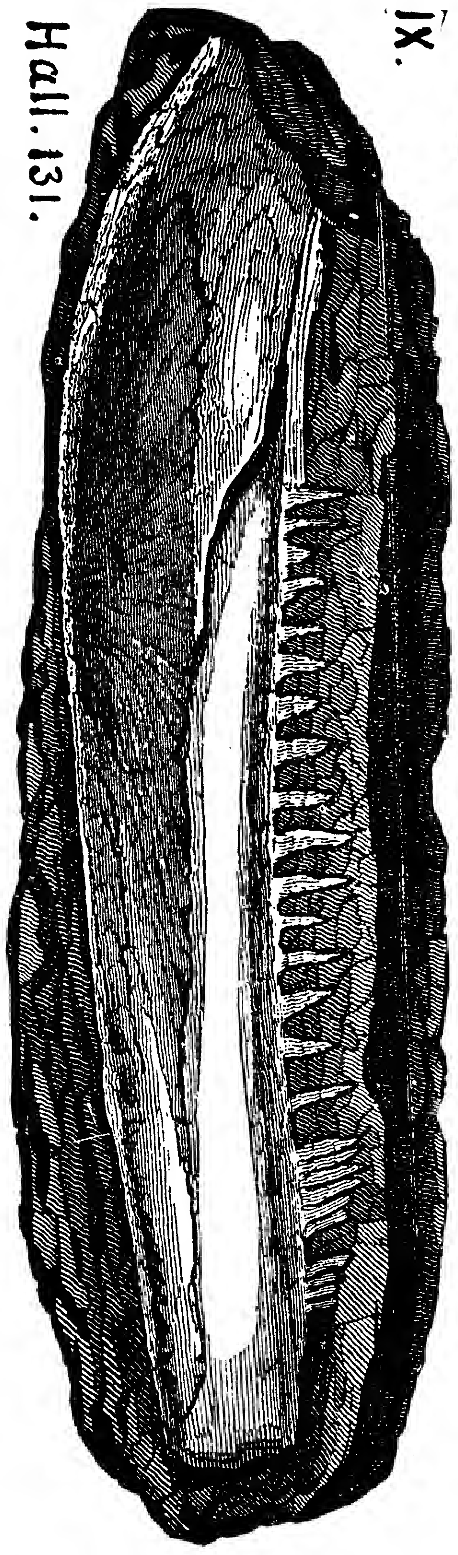


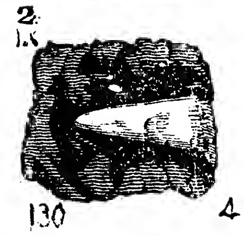
Holoptychius americanus. See **H. nobilissimus.** *IX.*



Zittel's Handbuch. Vol. 3, fig. 184.

Holoptychius nobilissimus. Agassiz (*Hol. americanus ?*)

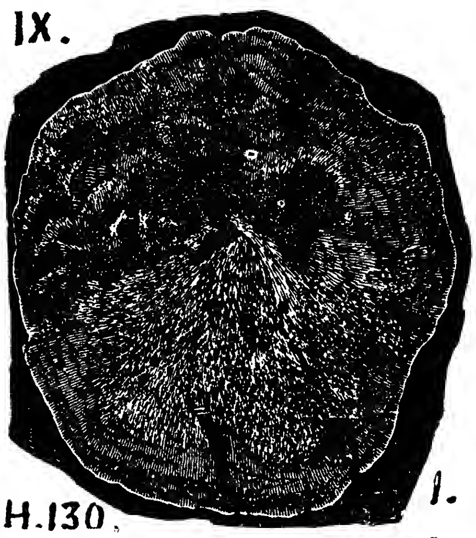




J. Hall, pages 281, 282, figs. 130, 2, 3 and 4 fig. 131. Catskill formation. *IX*. (131 is a jaw; 130, 2, 3, are scales; 130, 4 is a fragment water-worn.) (See Agassiz, Mon. Poissons fossiles. 1845.) See Hall, Geol. 4th district N. Y. plate 3.)—Claypole's list of Perry Co. fossils, preface to F2, XV.—*Chemung Catskill beds*, *VIII–IX.* I give on p. 284 a restoration of this Devonian fish by Huxley from Zittel's Handbuch, Vol. 3, page 179, fig. 184.—In Perry Co., Pa., Claypole collected it on the hill top west of Newport in *Chemung-Catskill* passage beds (Spec. 26–2); and at Linton's hill, W. of King's mill, in the same beds (Spec. 114–3, two) *VIII–IX.* White collected it in Columbia Co., Pa., N. of Bloom. and 4 m. W. of Shickshinny, in *Catskill* strata, (Spec. 98–1.) *IX.*—At Orangeville, Col. Co., 1000′ above top of Chemung (G7, 217) or lowest red bed of *VIII–IX* (p. 287); *teeth, scales, bones*, in bed 54 of Catawissa section at base of Catskill (pp. 54, 59, 60, 238)—*IX.*—In the northern tier of counties, in the red beds (above Hall's uppermost Chemung shales holding *Spiriferæ*, *Strophomenæ* and *Atrypæ*, but with no such shells,) thousands of fish bones and scales are visible as white spots on a red surface, often minutely ground up; but often perfect, and from an inch to an inch and a half in diameter; "by far the most numerous being the well-known English Old Red fish **H. nobilissimus**; the cast of the enamel surface of the scale being often the only thing preserved; teeth are often found; sometimes jaws; and occasionally a fine spine." (Hall in I, 54, 99, 101, 102; and all the northern Reports.)

Holoptychius taylori. (*Sauripteris taylori.*) Hall, Geology of the Fourth District of New York, 1843, page, 281, fig. 130, 1. A scale, or plate, from *Catskill rocks*, *IX.* Note.—This scale, with those on page 285, and the fin there given, were collected in northern Pennsylvania (see foot note to Hall's 1833, p. 281). The name *Sauripteris*, or *crocodile-fin*, was proposed by Hall at that time, without determining whether or not the scales belonged to the same animal. All these remains are now recognized as belonging to various kinds of bucklered or armoured fishes, which swarmed in the later Devonian sea.

IX.



H.130, 1.

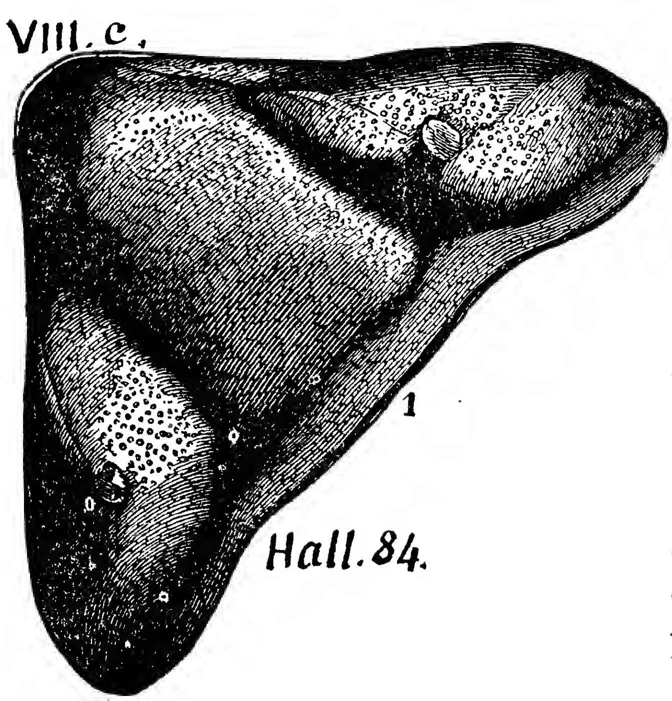
Holoptychius——? with *Coccosteus*, and a multitude of other fish remains found by Dr. Randall in the quarry near Warren, Pa., 240′ above the Allegheny river. Mr. White calculates it 375′ beneath the Olean conglomerate (the bottom of *No. XII*) and conjectures that it is the 1st Venango oil sand. (Q4, p. 102, note.) In Crawford Co., Greenwood, in the Glendale section, the *Meadville upper limestone* is a mass of *fish* and *shell* fragments; hundreds of *fish scales* on every fragment of rock; most of them belonging to *Orodus*, *Cladodus*, *Palæoniscus*; but some looking like a *small* species of **Holoptychius.** (Q4, p. 140). In Huntingdon Co. *fish scales and bones* appear in a red sandstone bed at the *base of IX*, 350′ above the *Chemung Upper* (Lackawaxen) *conglomerate* of I. C. White, (T3, 193).

Holoptychius? Bothriolepis? collected by Claypole at Kings' mills, Perry Co., Pa., from low Catskill beds (spec. 36–G–1, 2, four.) See the cast of a plate (spec. S–36).—Specimens 93–12, 13, 14, and the tooth 93–16, are all from White's collections at Rupert Narrows near Bloomsburg, Col. Co., Pa., from *low Catskill beds. VIII–IX.*

Holoptychius (scale and piece of rib) in specimen 902–3, Sherwood's coll. at Mansfield, Tioga Co., Pa., from *Upper Chemung, VIII–IX.*

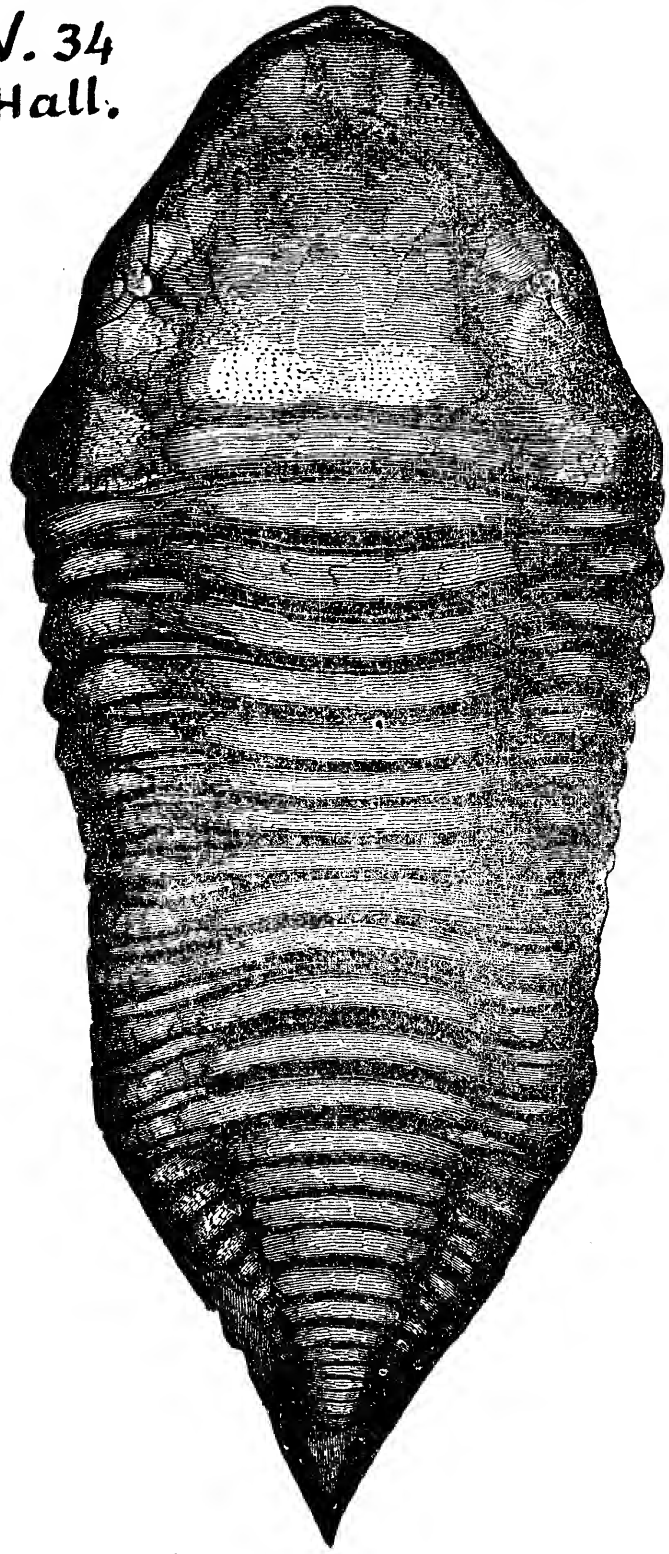
Note.—Mr. Agassiz named the *Holoptychius nobilissimus* in his Researches sur les poissons fossiles in 1843, and Hall published his identification of it in Northern Pennsylvania in the same year. But descriptions of the Scotish forms came to us in the winter of 1840–41. It was in the spring of 1841 that I happened to find perhaps the first specimen in America, as I was riding down the dug road on the north bank of the Cowanesque in Tioga county. I thought at first sight that it was a small tortoise asleep by the roadside. When I dismounted and picked it up I recognized it as one of the dorsal plates of an Old Red fish surrounded by the marginal fragments of the other plates. I sent it with other collections to Philadelphia, but the box never reached its destination. Expressage was unknown forty-eight years ago.

Homalonotus dekayi, (*Dipleura dekayi.*) Hall, page 205, fig. 84, 1. Vanuxem, page 150, fig. 36, 1. Rogers, page 828, *Marcellus* (Vanuxem); *Hamilton,* (Hall.) See Green's monograph of trilobites, 1832. *Hamilton.*—(Claypole's specimens from Barnett's mills, Perry Co., *Hamilton* upper shales (5–96, two; 5–99); Jericho school house (54–3); Crawley hill (94–3, 7, 13, 14,) from *Hamilton upper fossil ore bed.*—In Huntingdon Co., in *Hamilton* upper shales, 50′ below Tully limestone, at Cove Station (T3, 107); near Grafton (p. 109); bed 5, Mapleton section (p. 273); at Huntingdon (p. 109); Rough and Ready, in Hamilton *upper sandstone* (p. 110)—*VIII c.*



Homalonotus delphinocephalus. (*Trimerus delphinocephalus*). Hall, page 103, fig. 34. Rogers, page 828, no figure. *Clinton* and *Niagara*. (Often 7 or 8 inches long, very rarely 12 inches. See Murchison's Silurian Research. plate 7 bis, fig 1 a, b. Green's Monograph, 1832, plate 82, fig. 1.)—In Pennsylvania, Huntingdon Co., Ferguson valley, Orbisonia, in limestone layers in the 133′ of shales overlying the *Clinton fossil ore bed*. (C. E. Hall, Proc. A. P. S. Jan. 5, 1876; White's Rt. T3, p. 141.)—In Perry Co., Pa. Millerstown *fossil ore bank*. (Claypole's specimens 161–2, three; 161–13.)—*V a.*—Specimens in collections of Hall, Hale and Fellows at McKee's *fossil ore bank*, and Matilda furnace, Mifflin Co., and Orbisonia ore banks, Huntingdon Co., are as follows:—501–21 (tail, poor);—23 (body and tail, fair);—28 (frag. of head); 34 (frag. of body);—36 (two fragments of head, poor);—43.—502—1 (large tail);—8 (small head, poor);—17 (bits of heads);—18 (heads and tails, good); —19 (bit of head); —21 (head);—24 (head, large and good);— 32; 34 (head);—45 (four tails and two tails),—503–11; 13 (bit of tail).—505–5;-7;—19 (impression of tail);—23 (bit of head);

V. 34
Hall.

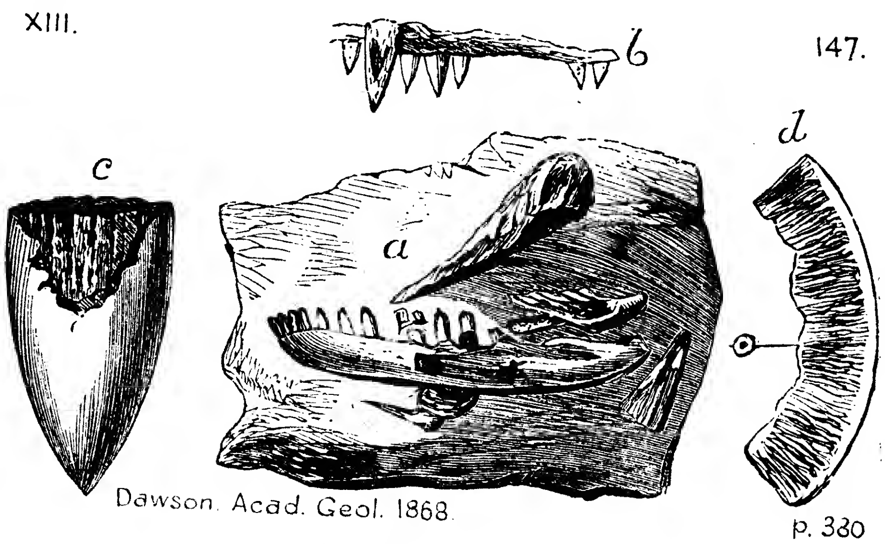


—31 (bit of medium sized tail);—33 (bit of tail).—508–9 (tail);—12 (small tail.) All the above were got in the *Clinton shales* over the fossil ore bed. *V a.—See other figures in Appendix.*

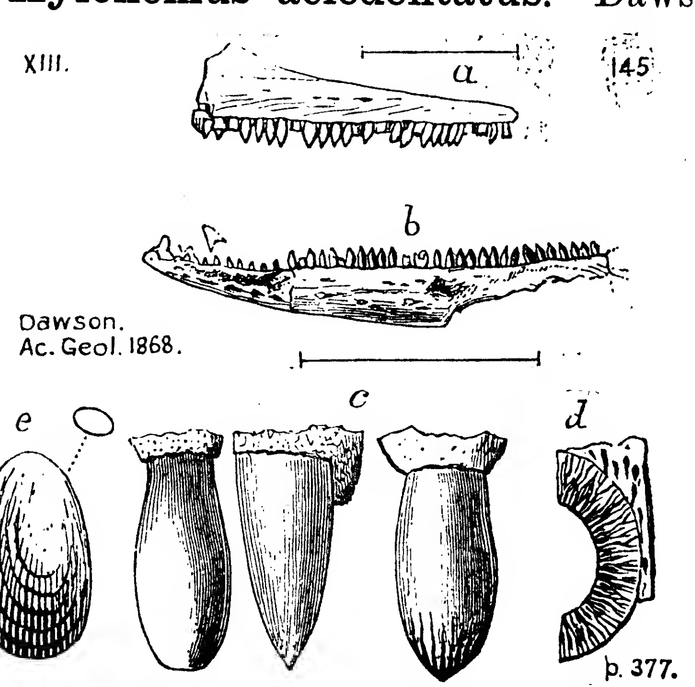
Homalonotus trentonensis, Simpson. *New species. For figures and localities, see the Appendix.*

Homalonotus vanuxemi. Hall, Pal. N. York, Vol. 3, 1859. *Lower Helderberg.*—Found by Dr. Barrett, of Port Jervis, in *Stormville shales* (G6, p. 132).—*VI. See Appendix.*

Hylerpeton dawsoni. Owen. Dawson's Acad. Geol. 1868, p. 380, f. 147, jaw and bits of scull, etc., of a fish, or more likely a reptile, found in one of the standing stone trees of the *Coal Measures*, Joggins section, N. Scotia; *a, natural size; c, enlarged; d,* section of tooth *much magnified.—XIII?*



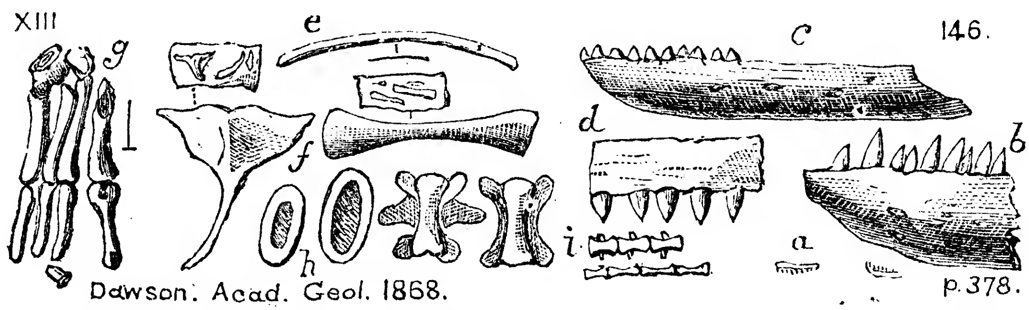
Hylonomus aciedentatus. Dawson, Acadian Geology, 1868, p. 377, f. 145, a scaled reptile, found by Dawson at the Joggins, Nova Scotia, in 1859, and described in Jour. G. S. Lond. Vol. 16; with 40 teeth on each side of the mandible and 30 on each maxillary, and other teeth on the intermaxillary bones, peculiarly *ridged* for crushing crustacea and insects, or small ganoid fishes; and with vertebræ like those of *Hylonomus lyelli.—Coal Measures, XIII?*



Hylonomus lyelli, Dawson, Acadian Geology, 1868, page

373, f. 144, a fine exhibition of what patient search in the Coal Measures may produce, in the way of an almost complete restoration of one of the little insect-feeding lizards which lived on the trees of the swamps. (*Holonomus* means forest dweller.) Lyell found the first fragments inside a decayed stump (turned to stone and standing in the cliff of the Joggins on the Bay of Funda; Dawson found others afterwards in other tree stumps (*calamites*); skull, 1 inch long; whole animal, probably six or seven inches long; vertebræ, like long hour-glasses; skin covering, bony scales; bones, so imperfectly ossified and yet so perfectly shaped as to suggest the suspicion that we are dealing with the young of some larger lizards.—Dawson *Coal Measures*, *XIII?*

Hylonomus wymani, Dawson. Acadian Geology, p. 378,



f. 146. Found by Prof. Wyman in Lyell's specimens from the Joggins' section of *Coal Measures;* a slender lizard, 4 or 5 inches long; possibly the young of *Hyl. aciedentatus*, but not of *Hyl. lyelli;* feeding on insects and grubs, in the coal swamps, and itself eaten by the larger reptiles; for, "quantities of its tiny bones occur in coprolitic masses [fossil dung] probably attributed to *Dendrerpeton*." Dawson.—*XIII?*

Hymenophyllites adnascens. See **Rhacophyllum adnascens.** *XIII.*

Hymenophyllites capillaris. Lesq. Geol. Pa. Vol. 2, p. 863,

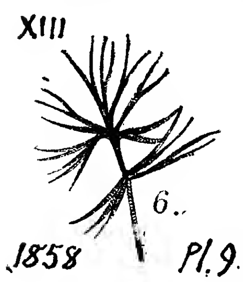
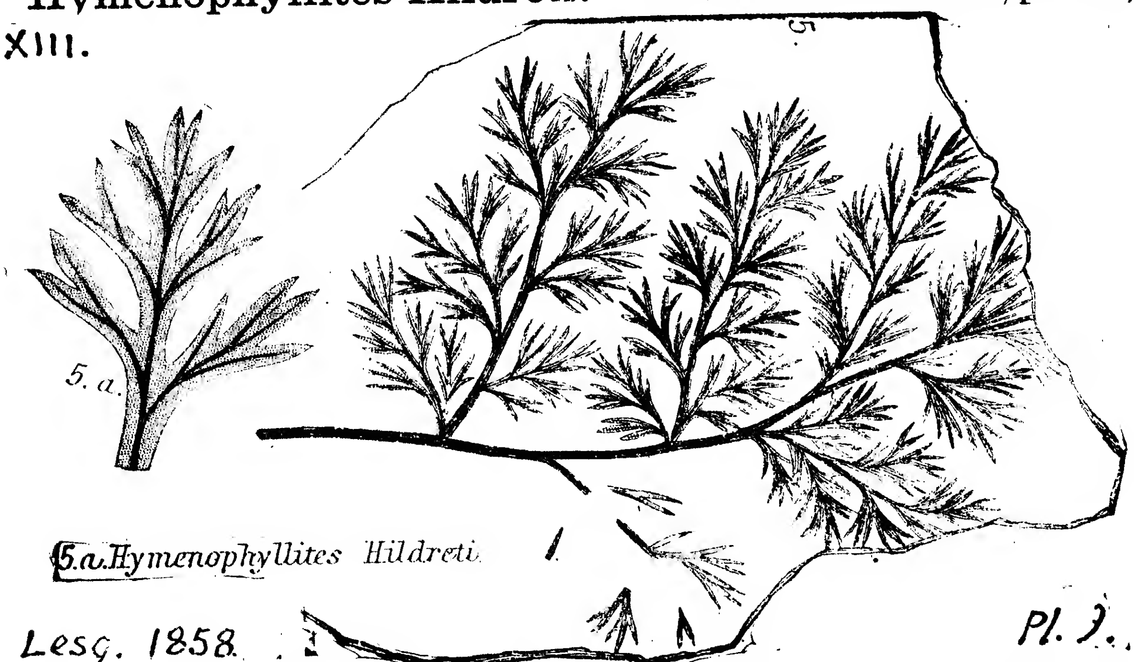


plate 9, fig. 6, looks like a *Sphenophyllum* branch, but is a true *Hymenophyllites* in nervation and outline. Perhaps only a variety of *H. Hildreti*, with which it was found at the Salines of the Kenawha river, W. Va., in the *lowest coal beds* there exposed.—*XIII.*

Hymenophyllites expansus. See **Rhacophyllum expansum,** found in Mansfield's *Kittanning coal* at Cannelton, Beaver Co., Pa. Lesq. Coal Flora.—*XIII.*

Hymenophyllites gutbierianus. See **Rhacophyllum gutbierianum,** found at Cannelton. Lesq. Coal Flora. *XIII.*

Hymenophyllites Hildreti. Lesq. Geol. Pa. 1858, p. 863, XIII.



pl. 9, f. 5, 5a; also Geol. Sur. Ky. Vol. 4; in *lowest coals* exposed at the Salines of the Kenawha, W. Va.—*XIII.*

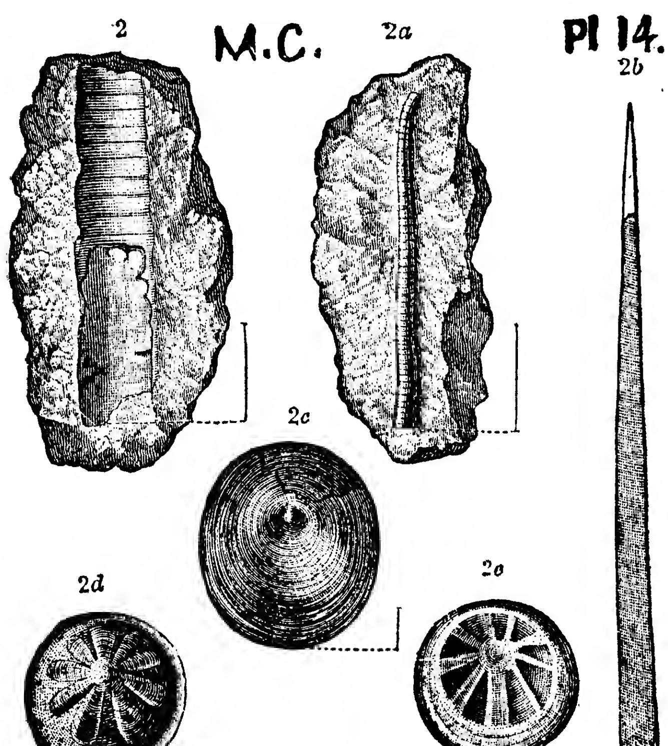
Hymenophyllites inflatum. **Rhac. inflatum.** *XIII.*

Hymenophyllites lactuca. **Rhacophyllum lactuca.** *XIII.*

Hymenophyllites pinnatifidus. **Sphen. tridactylites.** *XI.*

Hymenophyllites ——— ? *Waynesburg coal,* (K, 59.) *XV.*

Hyolithellus micans (*Hyolithes micans,* Billings, 1872, Can. Nat. [2] 6, 213, 215, figs. 3*a*, *b*.) Walcott, Bull. U. S. G. S. No. 30, page 142, plate 14, fig. 2, fragment of shell left in mold, *enlarged four times* to show rings; fig. 2*a*, end of tube *enlarged four times;* fig. 2*b*, crushed shell in shale; fig. 2*c*, outside of lid (operculum) *enlarged five times;* fig. 2*d*, inside *cast* of lid; fig. *e*, inside of lid; 2*b* was found below Shodack landing, N. Y.; 2, 2*a*, 2*c*, 2*d*, 2*e* in the



conglomerate limestone out-cropping on the ridge east of Troy, N. Y. Others have been found in similar cong. limestone beds at Bic, and St. Simon, Canada. (Larger specimens occur in the Big Cottonwood Cañon shales of Utah.) In *Georgian* (*Lower Cambrian*) slates. *L. C.—See foot-note to p. 134.*

Hyolithes (*Theca.*) Walcott, Bulletin U. S. G. S. No. 10,

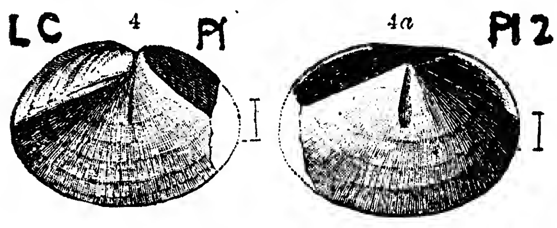
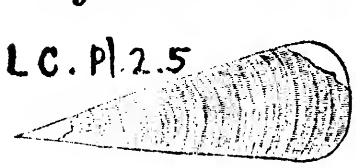


plate 2, fig. 4, *cast* of *inside* surface of a lid (operculum) of this pteropod; fig. 4*a*, *outside* surface; both *magnified four* diameters.—*M. C.*

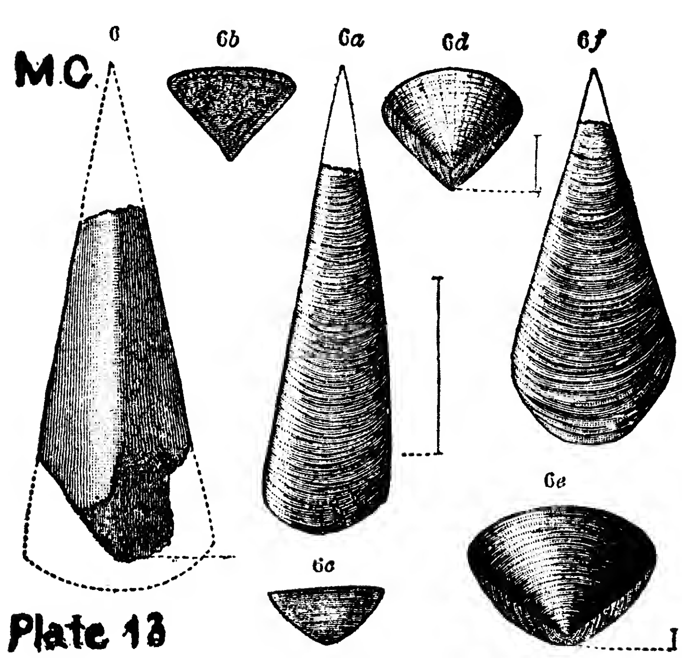
Hyolithes acadica. (*Theca acadica*, Hartt's label.) Walcott, Bulletin, U. S. G. S. No. 10, page 20, plate 2, fig. 5, ventral face of the pteropod shell, *natural size.*—New Brunswick, in *Saint John formation*, *Middle Cambrian*, *M. C.—See foot-note to page 134.*



Hyolithes aclis. (*Theca aclis.*) Hall, Palæontology of New York, V. 2, 1879, page 197, plate 32, figs. 22 to 30; plate 32 A. figs. 21 to 25.—In the semicalcareous shales of Cayuga lake, N. Y. *Hamilton.* *VIII c.*

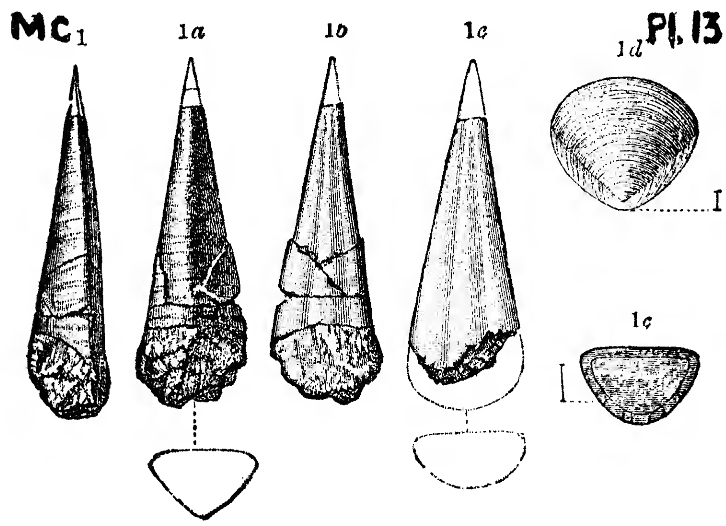
Hyolithes aculeatus. (*Theca aculeatus.*) Hall, Palæontology of New York, V, 2, 1879, page 192; described in 1860 as *Pugiunculus aculeata* from Rockford, Ind. *Lower Carboniferous goniatite beds.* *XIII?*

Hyolithes americanus. (*Theca triangularis*, Hall, 1847, Pal. N. Y. I, 313, plate 87, 1 *a* to 1 *d*.—Ford, 1871, Am. Jour. Sci. [3] II, 33.—Billings 1872, Can. Nat. [2] VI, 215, figs. 2 *a*, *b*; Am. Jour. S. [3] III, 353, figs. 2 *a*, *b*.) Walcott, Bull. U. S. G. S. No. 30, page 132, plate 13, fig. 6, ventral view, *enlarged three times*; fig. 6 *a*, dorsal view, of a narrow specimen *enlarged 2 1-2*



times; fig. 6 *b*, *c*, cross sections; 6*d*, lid (operculum) *enlarged twice;* 6 *e*, lid *enlarged five times;* fig. 6 f. small broad specimen, *enlarged five times.*—*Lower Cambrian* (*Conglomerate limestone*) formation at Troy, N. Y., and at Bic and St. Simon, Canada. *L. C.*—See *foot-note to page 134.*

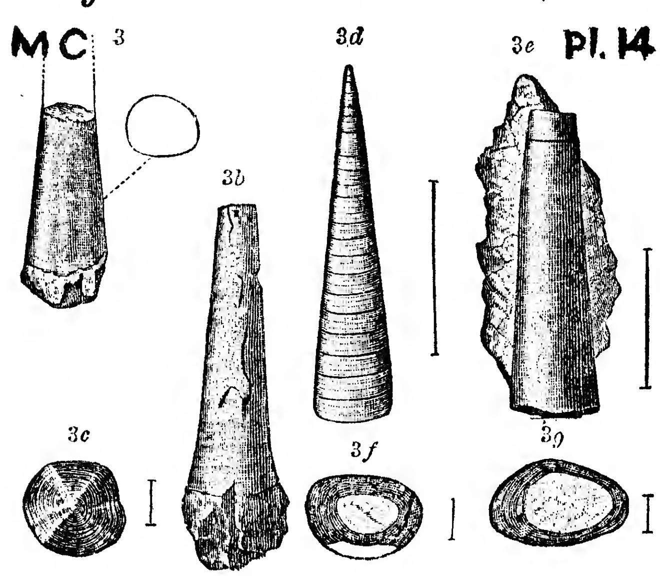
Hyolithes billingsi. (*Salterella obtusa* Billings, Geol. Vt. Pal. Foss. *Hyolithes primordialis?* White, 100th, Mer. Inv. Foss. IV, 1, figs. 5 *a—e;* but not *Theca obtusa* Salter, Mem. G. S. G. B. III. p. 352) Walcott, Bulletin U. S. G. S. No. 30, page 134, plate 13, fig. 1, side view; 1 *a* front view; 1 *b*, back view; 1*c*, section; all of specimen from Nevada; fig. 1 *d.* lid found in same bit of rock with fig. 1; fig. 1 *e*, specimen from L'Anse au Loup, Labrador. (None have yet been found in Vermont or New York; but the great range makes it probable that they will be.)—*Lower Cambrian. L. C.—See foot-note to page 134.*



Hyolithes carbonaria. Walcott. [*X*, *XI.*]

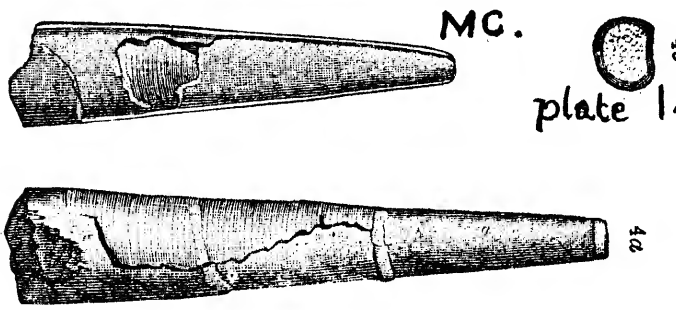
Hyolithes centennialis. Barrett, Annals of Lyceum Nat. Hist. N. Y. 1877. *Lower Helderberg*, on the Delaware river, near Port Jervis. *VI. See Appendix.*

Hyolithes communis. (Billings, Can. Nat. 1872, VI, 214, figs. 1 *a*, 1 *b*.) Walcott Bulletin U. S. G. S. No. 30, page 137, plate 14, figs. 3, back view, natural size; 3 *b*, another specimen; 3 *c*, lid (operculum;) all from Bic harbor, below Quebec, Canada. Fig. 3*d*, 3 *e* specimens from near Troy, N. Y., 3 *f*, 3 *g*, cross sections to show irregularities of thickness of shell; *magni-*

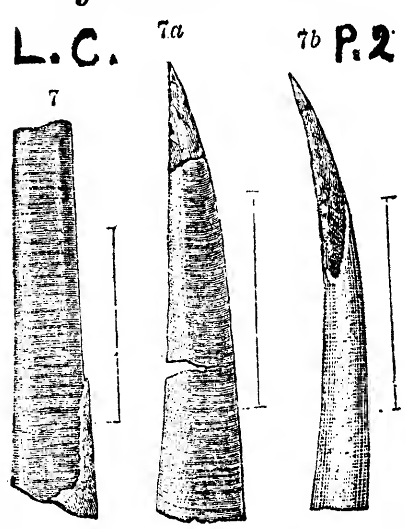


fied from three to four times.—(c. *Hyolithes impar*. Ford.)—*Lower Cambrian. L. C.—See foot-note to page 134.*

Hyolithes communis, var. **emmonsi**. (*Salterella*, Ford. Am. J. S. 1871, Vol, 2, p. 33. *Hyol. emmonsi* Ford. Am. J. S. 1873, V. 214, figs. 3 *a* to 3 *e*.) Walcott, Bull. U. S. G. S. No. 30, page 137, plate 14, fig. 4, back view, showing three layers of shell and a septum; fig. 4 *a*, front view of a specimen showing constriction at point; both *magnified three times.*—Even bedded and Conglomerate limestone, Troy, N.Y. *Lower Cambrian, L. C.*—See *foot-note to page 134.*

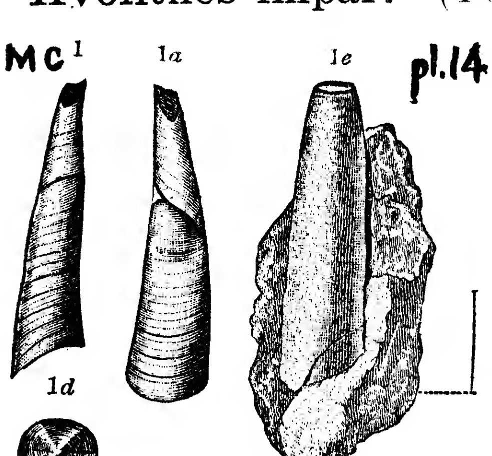


Hyolithes danianus. (*Camarotheca daniana*, Matthew, 1884, Mss.) Walcott, Bulletin U. S. G. S. No. 10, page 20, plate 2, fig. 7, back view of a portion of a shell; 7 *a*, front view; 7 *b*, side view to show the curviture; all *enlarged twice. Middle Cambrian* (*Saint John*) formation, New Brunswick, *M. C.*—A considerable range of variation in this species. In some the ventral side is not flattened, and the dorsal side has a narrow line each side of the center. Curvature varies.



Hyolithes gibbosus. (*Theca gibbosa*, Hall and Worthen.) See Hall's history of the genus in Pal. N. Y. Vol. 5, part 2, 1879, pp. 191–195, where it is placed in the *Potsdam* which Walcott calls *Upper Cambrian*, Bull 30, p. 131.—*See Appendix.*

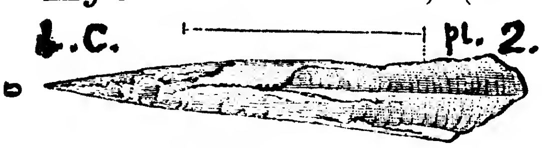
Hyolithes impar. (Ford, 1872, Am. J. Sc. [3] vol. 3, p. 419, figs. 1*a*, *b*, 2*a*, *b*.) Walcott, Bulletin U. S. G. S. No. 30, page 139, plate 14, fig. 1, side view, 1 *a* front view, of type specimen, fig. 1 *d*, lid (operculum), from Troy. Fig. 1 *e*, cast of tube, showing constriction at the septum, *enlarged twice.*—*Lower Cambrian* (*Georgian*) conglomerate and even bedded limestone, Troy, N. Y. *L. C.*



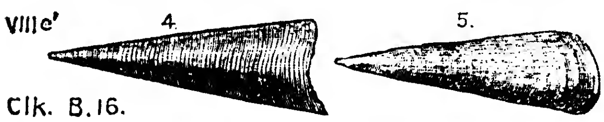
Hyolithes ligea (*Theca ligea*, Hall), *VIII a. See Appendix*

Hyolithes micans. See **Hyolithellus micans.** *L. C.*

Hyolithes micmac, (Matthew, 1884, Mss.) Walcott, Bull. U. S. G. S. No. 10, page 21, plate 2, fig. 6, type specimen, *enlarged twice.*—From *Middle Cambrian* (*Saint John*) formation, in company with *Microdiscus punctatus.* New Brunswick. *M. C.*

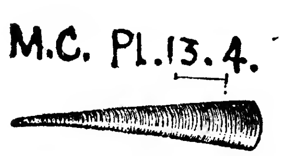


Hyolithes neapolis. Clark, Bull. 16, U. S. G. S. 1885, p. 56, pl. 3, fig. 4, back, fig 5. belly views, *natural size;* strong cross lines; no lines lengthwise; a handsome species of the *Naples* (*Up. Genesee*), differing from those of the Chemung above, and Hamilton below in its surface marking.—*VIII é*—NOTE. A dorsal and ventral valve, very small, and not sculptured, from the "upper black band," may be another species.

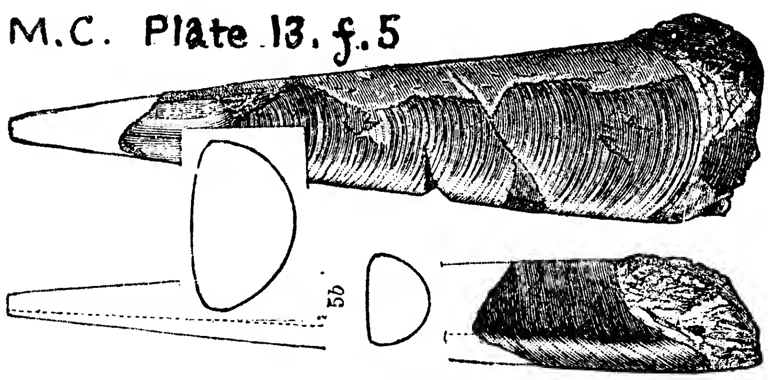


Hyolithes parviusculus. (*Theca parviuscula*, Hall, Geological Report on Wisconsin, 1862, from *Hudson River* (*Lorraine*) formation *IIIb.*—See reference in Pal. N. Y. Vol. 5, part 2, 1879, pp. 192, 193; and in Walcott's Bull, 30, U. S. S. S. 1886, p. 132.—*See Appendix for figures*, &c.

Hyolithes primordialis? (*Theca primordialis.* Hall, 1861, from Potsdam sandstone of the Mississippi Valley; probably the same as forms from the base of the Calciferous sandstone on the Escanaba river, indicated by Hall in Foster & Whitney's Report in Lake Superior district, 1851. See Hall, Pal. N. Y. V. 2, page 192.)—Walcott, in Bulletin U. S. G. S. No. 30, page 141, plate 13, fig. 4, *magnified five times*, cites a poorly preserved form, with the same apical angle (15^{c}) and a similar outline of cross section, as occurring in *Lower Cambrian* (Georgian) reddish, sandy, magnesian limestone, a mile east of Highgate Springs, Vt., in company with *Olenellus thompsoni* and *Ptychoparia adamsi.* Also in purplish sandstone above the *Olenellus bed* east of Swanton, Vt.—NOTE. For **Hyolithes primordialis=Theca gregarius** of Hall, see Walcott, Bull. 30, page 132.)—*L. C.*

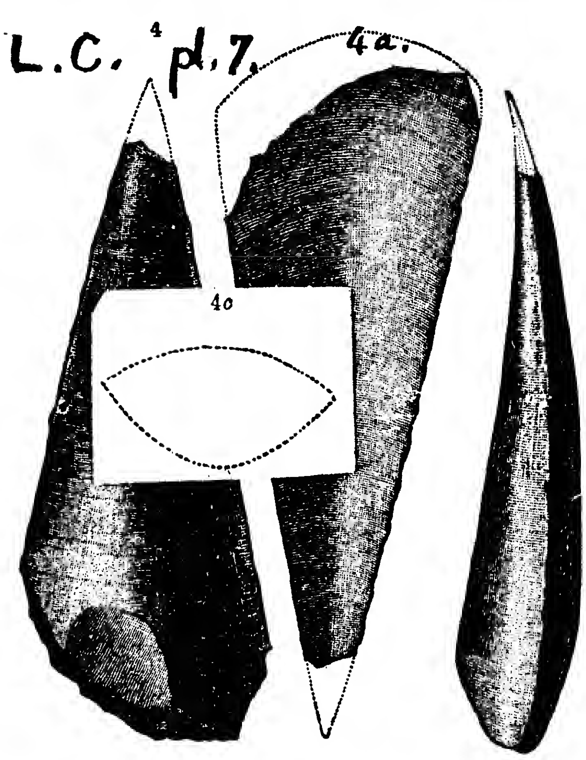


Hyolithes princeps. (Billings, 1872, Can. Nat. Vol. 6, 213, 216, figs. 4*a*, *b*) Walcott, Bull. U. S. G.S. No.30, page 135, plate 13, fig. 5, back view; 5*a* side view, *natural size;* 5*b*. cross section of a more rounded specimen.—*Lower Cambrian*, conglomerate limestone, below Quebec.—NOTE. Has been recognized on Silver Peak, Nevada. *L. C.*



Hyolithes principalis. *VIII a. See Appendix.*

Hyolithes shaleri. Walcott, Bulletin U. S. G. S. No. 10, page 44, plate 7, fig. 4, back view; 4*a*, front view; 4*b*, side view, *natural size;* 4*c*, cross section.—*Middle Cambrian* (*Paradoxides argillite*) formation, Hayward's quarry, S. Braintree, Mass. *M. C.*



The most nearly related American species of *Hyolithes* is *H. excellens*, Billings (Pal. Foss. Vol. 2, pt. 1, p. 70, fig. 39, 1874), from Smith's Sound, Trinity Bay, New Foundland; but although closely allied they seem to be distinct species. Walcott.

Hyolithes singulus. *VIII c. See Appendix.*

Hyolithes striatus. *VIII c. See Appendix.*

Hyolithes triliratus. *VIII c. See Appendix.*

Hyolithes vanuxemi. (*Theca*). Walcott, in Bull. U. S. Geol. Sur. No. 30, page 132 (table); assigned to the Lower Silurian (*Ordovician*) system, *II? III?—See Appendix.*

Hyolithes ——— ? OO, p. 235, specimen 808–5 (base of the fossil only) in Fellows' coll. at Dingman's Ferry, Pike Co., Pa., from *Hamilton*. *VIII c.*

Hypanthocrinites cœlatus. **Eucalyptocrinus cælatus.** *Vb.*

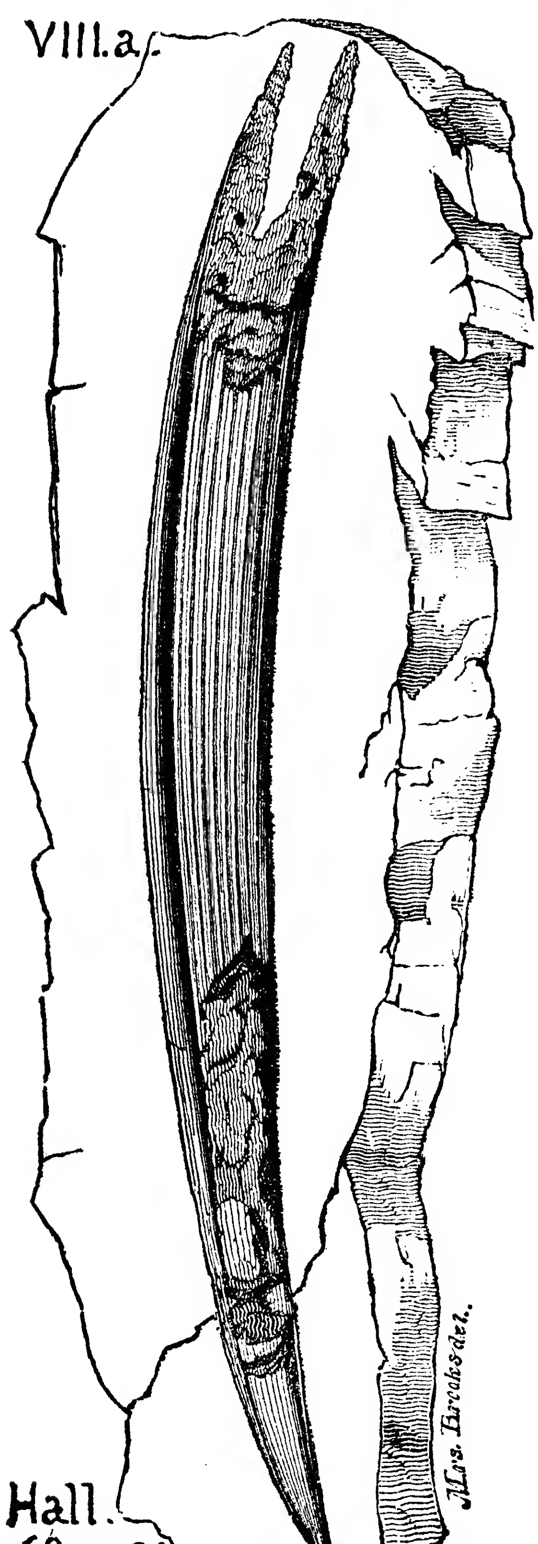
Hypanthocrinites decorus. **Eucalyptocrinus decorus.** *Vb.*

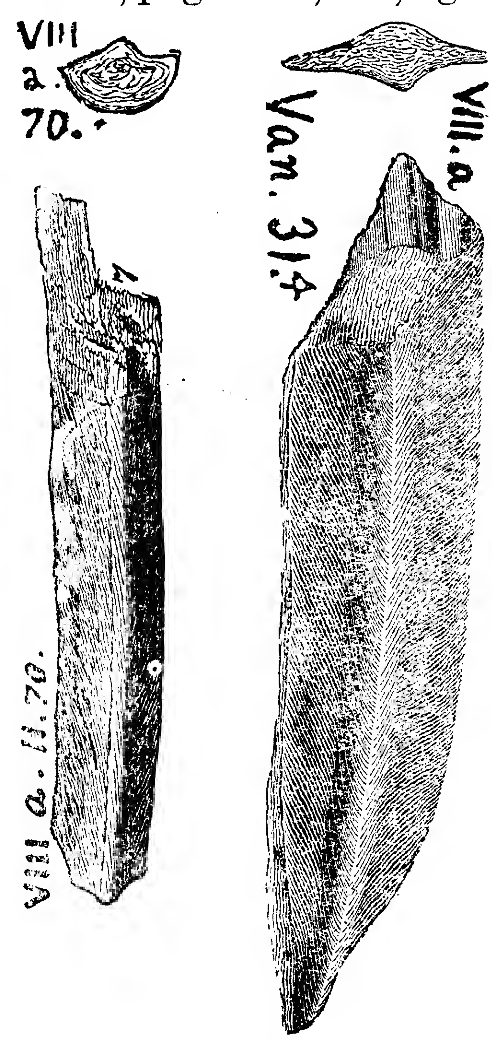
Hypurites longifolius. See **Asterophyllites equisetiformis.** *XIII.*

Ichthyocrinus lœvis. See **Cyathocrinus pyriformis.** *Vb.*

Ichthyocrinus subangularis. *See Appendix.*

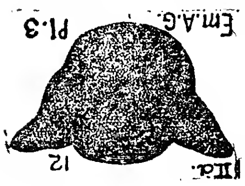
Ichthyodorulite (fish spine). Hall, pages 174, 175, figs. 69,





70, 6, 7; Vanuxem page 132, fig. 31, 4. Upper *Helderberg formation.* (Not so abundant in western as in middle New York.)—*VIII a.*—This seems to be the lowest formation in N. Y. in which vertebrate remains have been seen, viz. the *Onondaga limestone*; but such spines have been collected from the next overlying *Corniferous limestone.* (Vanuxem, 1842.)

Illænus arcturus. (Hall, Pal. N. Y. Vol. 1, 1847. *Chazy* and *Black River* groups.) Emmons, Am. Geol. I, ii, 1855, page 235, plate 3, fig. 12; distinguished by width of head lobe, at junction with throat (thorax), by the side extent of check-pieces, and by more distinct development of head lobes. Upper part of *Calciferous sandstone* formation. *II a.*

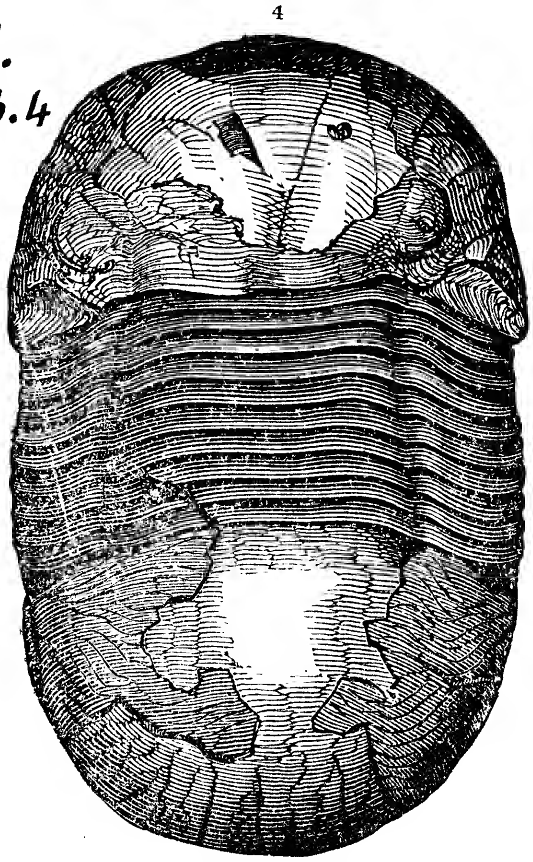


Illænus armatus. Hall, in Collett's Indiana Report of 1881, page 335, plate 34, figs. 10, and 20; and plate 33, fig. 12. *See Appendix for figure.*

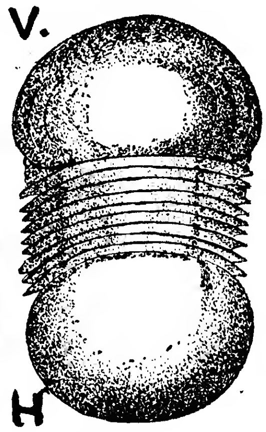
Illænus barriensis. See **Illænus ioxus.** *V a, b.*

Illænus ioxus. (*Bumastis barriensis,*) Hall, plate fig. [11, 2] natural size. Hall, 1843, page 101, fig. 33, 4, of a specimen nearly twice as large as those commonly seen, but not as large as the largest which have been found. *Niagara formation. VI.* (See Murchison's Silurian Researches, page 656, plate 7 bis, figs. 3 a, b, c, d; plate 14, figs. 7 a, b.) Also Hall, plate 19 (11?) 1843, fig. 2, (with **Lichas** (*Platynotus*) **boltoni,** and **Proetus** (*Asaphus*) **coryphæus.**—In Pennsylvania, it has been found by C. E. Hall, in the *Clinton* outcrops of Ferguson Valley, Huntingdon Co. (Proc. A. P. S. Phila. Jan. 5, 1876); and by J. J. Stevenson in shale partings of *fossil ore bed* at Wolfsburg, Bedford Co., Pa. (T2, 144.)—*V a.*—NOTE. An *Illænus* is shown on specimen 506–32, of C. E. Hall's collections 2 miles south of Bell's Mills, in *Clinton red shale*, *V a.*—*For other figures*, taken from Hall, in Collett's Indiana Report of 1881, page 335, plate 33, f. 13, 14, *see Appendix.*

V. 33.4

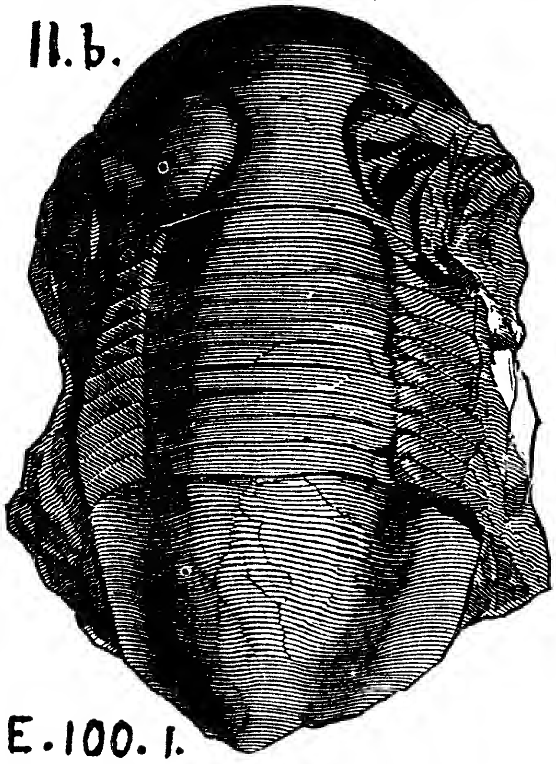


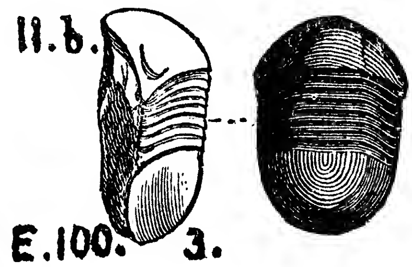
V.



H

Illænus trentonensis (*Bumastis trentonensis*). Emmons,





page 390 fig. 100, 1. *Trenton formation* (Also, Amer. Geol. 1855, Vol. 1, part 2, page 215, plate 15, fig. 13.)—A trilobite has been found in the *Calciferous sandstone* or Magnesian limestone strata in the Nittany valley, along the little Juniata river, by C. E. Hall (Proc. Am. Phil. Soc. Jan. 5, 1876), which may be this or a different species.—Spec. 210–120 (a small fragment) and 211–8 (thirty-one specimens) see OO, p. 232.—*II c.*

Inachus undatus. See **Euomphalus catilloides.** *II c.*

Inocaulis divaricata. *See Appendix for figure.*

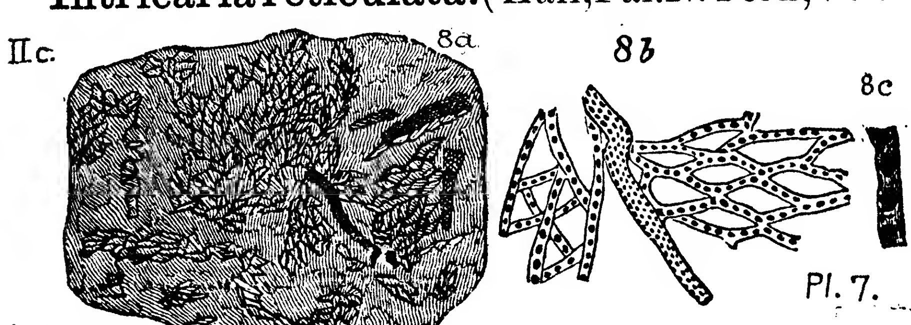
Inocaulis plumulina, Hall, is probably figured on page 148 above as a **Coral** ? (J. B. Dawson, Feb. 1889.)

Inoceramus damnoniensis. **Mytilarca dam.** *VIII g.*

Insects. *Cockroaches*, etc. See **Gerablattina, &c.** *XI.*

Intricaria clathrata. See note to **I. reticulata.** *III b.*

Intricaria reticulata. (Hall, Pal. N. York, Vol. 1. 1847, *Trenton*

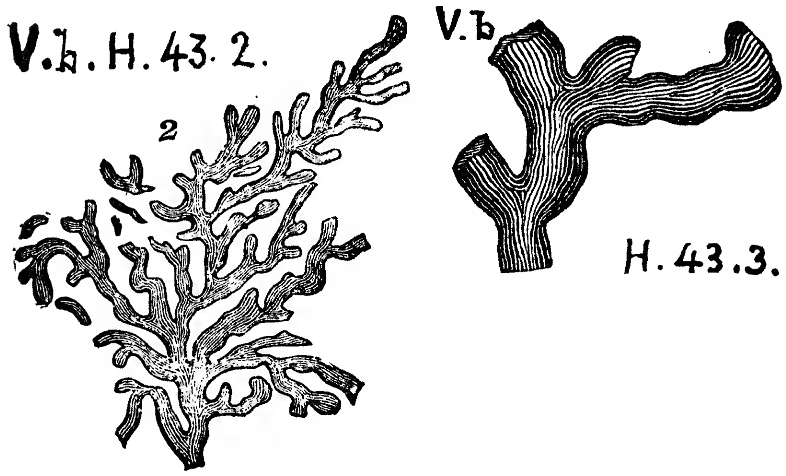


and *Cincinnati* (Hudson River groups. Emmons, Amer. Geol. Vol. 1, pt. 2, 1855, plate 7, figs. 8 *a*, 8 *b*, 8 *c*.—*Trenton limestone*, and also *Hudson River* (Loraine, or Cincinnati) *slate* formations.—NOTE. Another bryozoon of the *Hudson River* formation has been called *Intricaria clathrata*, by Miller & Dyer, contributors to Palæontology. No. 2, 1878.—*II c.*

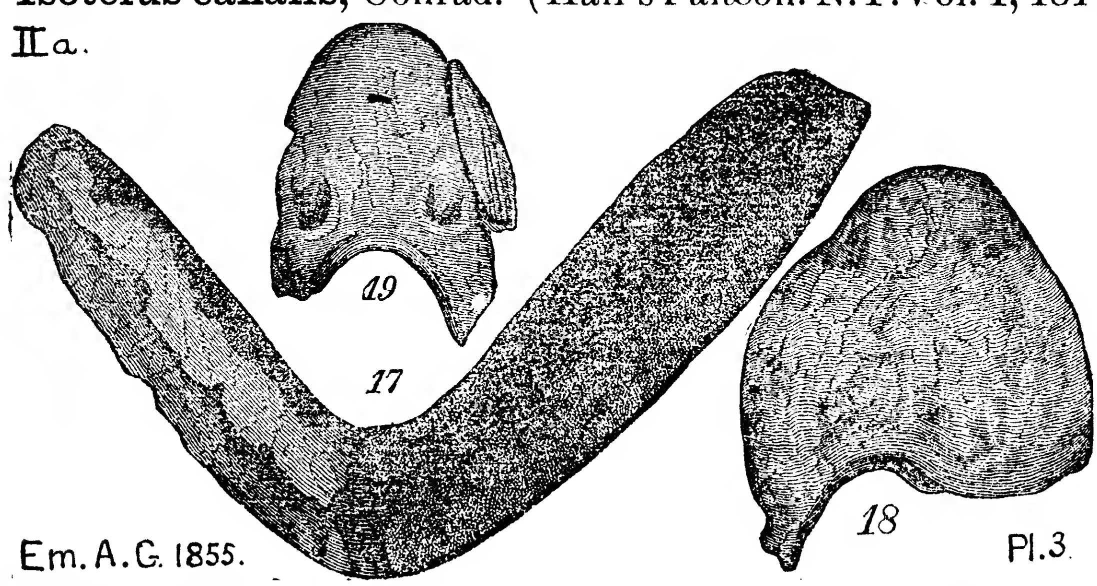
Involutina lobata, English. Comp. **Endothyra baileyi.** *XI.*

Iphidea bella. (Billings, 1872, Can. Nat. Vol. 6, 477; 1874, Pal. Foss. 2, pt. 1, p. 76,) Wolcott, Bull. U. S. G. S. No. 30, page 100, plate 7, fig. 4, copy of Billings' original figure; ventral (?) valve.—*Lower Cambrian*, in Canada below Quebec; in L'Anse au Loup limestone Belle Isle Straits, etc; not yet in Vermont, New York, or Rocky mountains. *L. C.*

Isis ? (Coral.) Hall. Plate fig. [24, 2, 3.] *V, b.*

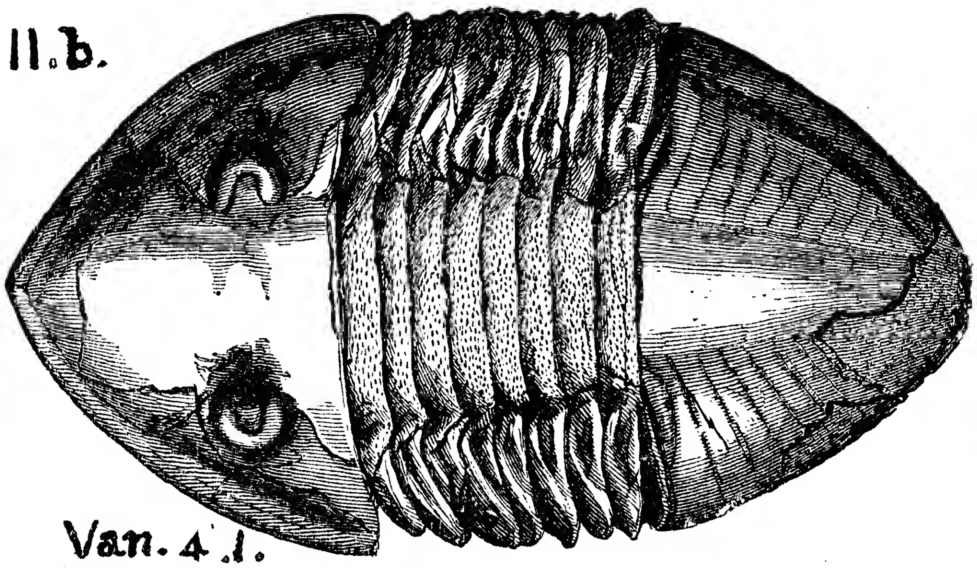


Isotelus canalis, Conrad. (Hall's Palæon. N.Y. Vol. 1, 1847, *Trenton* and *Hudson river* groups.) Emmons, Am. Geol. 1855, I, ii, 236, plate 3, figs. 17, 18, 19. The margin of the shield of this trilobite is traversed by a rather deep furrow. Figs. 17 and 19 were found by Dr. Emmons in the *Calciferous sandstone* (*II a*,) at Chazy in northern New York; in 17, only the margin has been preserved from erosion.—Reported by C. E. Hall from the *Calciferous* in Nittany Valley, Pa.; from the *Chazy* in Kishicoquillis Valley, Mifflin Co., Pa.; and from the *Trenton*, in Nittany Valley. (Proc. A. P. S, Jan., 1876.)—*II a, b, c.*



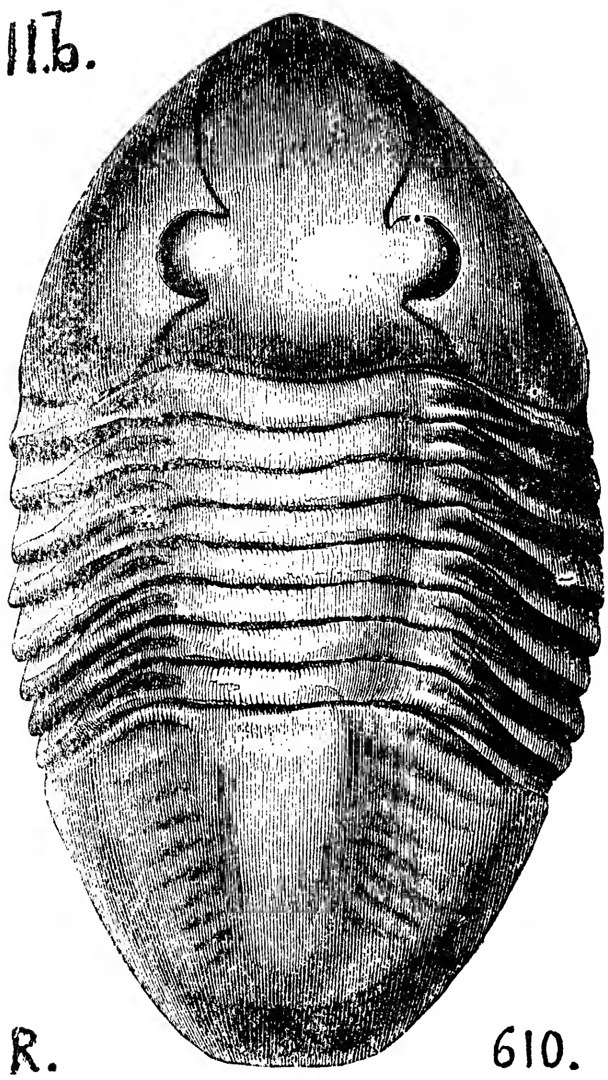
Isotelus gigas. (*Asaphus platycephalus.*) Vanuxem, page 46, fig. 4, 1. Emmons, page 389, fig. 99, 1. Rogers, p. 818, fig. 610. Salter and Woodward's chart of English fossils, fig. 70. II c. Trenton formation. (DeKay, Ann. Lyceum Nat. Hist. New York, Vol. I, 1825.) III b, Lorraine (Hudson river) formation, Rogers, page 819, no figure. He says (in Pennsylvania ?) it is rare in the great limestone formation below the Trenton, but becomes abundant in the *Trenton*. (T, 55.)—*II c.*

11.b.



Van. 4. 1.

11 b.



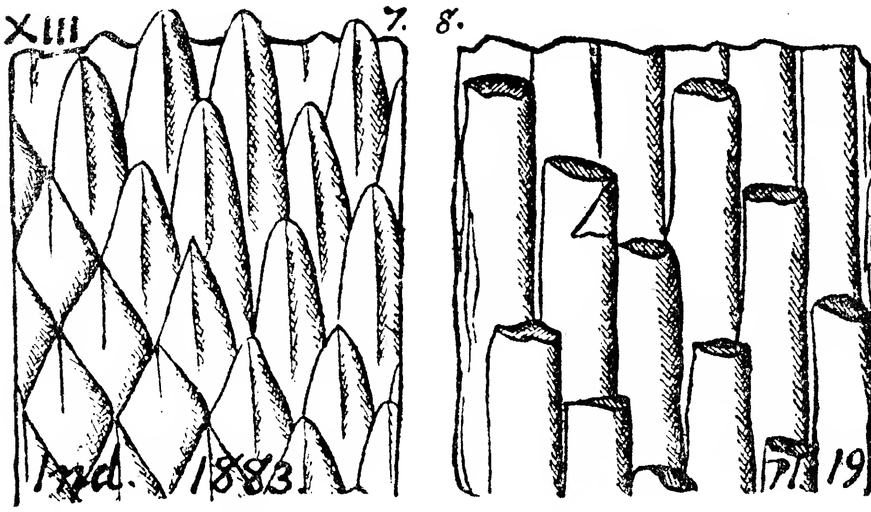
R. 610.

This *giant* trilobite is three times as large as the figure of it here given. Specimens have been found in Ohio a foot or more long. Fragments of it are numerous in all the outcrops of the *Trenton limestone* formation. Fort Plain in the Mohawk valley is an especially good collection locality. (Vanuxem, p. 47.)

Jaculus ? hudsonius, Zimm. One jaw found in the Port Kennedy cave, Chester Co., Pa., Proc. A. P. S. 1871, p. 86.—*Postpliocene ?—See Appendix.*

Knorria aciculatis. Europe. See **K. imbricata.** *XIII.*

Knorria imbricata. (*Lepidolepis imbricata*, Sternberg; *Knorria imbricata*, Göppert; *Knorria longifolia*, Göppert; *Knorria schrammiana*, Goep; *Knorria aciculatis*, Goep; *Pinites pulvinaris*, and *P. mughiformis*, Sternberg. Lesquereux's Coal Flora of Penna. Report P, 1880, page 407, plate 74, figs 14, 15.) Collett's Ind. Rt. 1882, p. 86, plate 19, figs. 7, 8. Mostly just below and just above the *Pottsville conglomerate; X–XIII.* From the *Pocono coal* in Sideling hill, East Broad Top RR. tunnel. (T3, p. 88.)—*X.*

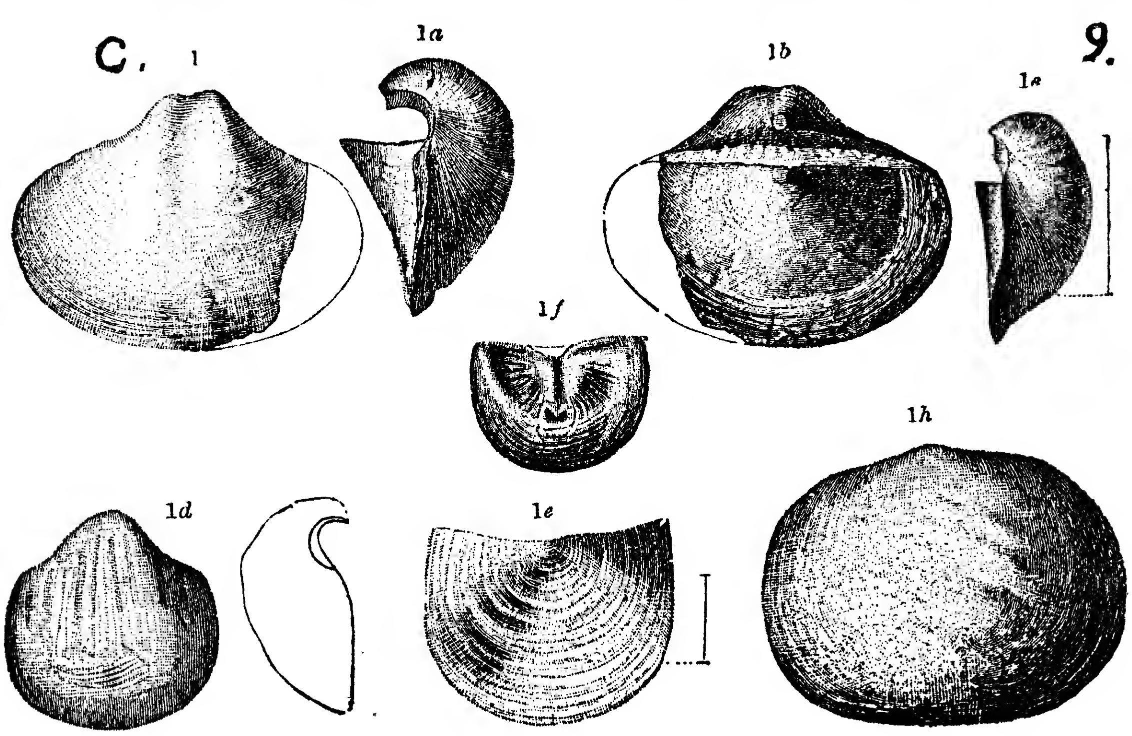


Knorria longifolia. Europe. See **K. imbricata**. *XIII.*

Knorria schrammiana. Europe. See **K. imbricata**. *XIII.*

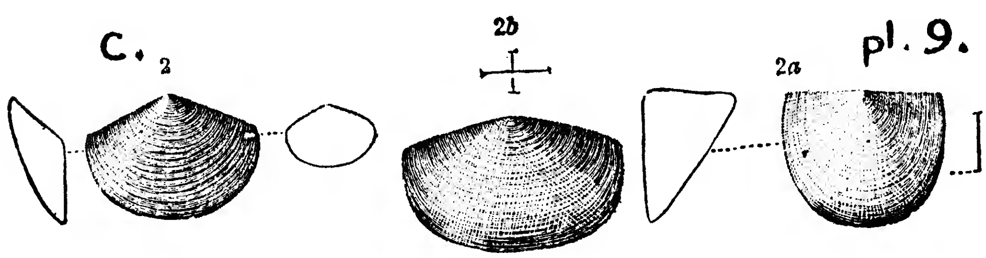
Kutorgina looks externally like *Lingula*, *Lingulella*, *Trematis*, and *Obolella*. Walcott, Bull. U. S. G. S. No. 30, p. 106.

Kutorgina cingulata. (*Obolella cingulata.* Billings,



Geol. Vt. figs. 347, 349; Geol. Can. figs. 287, *a. b.*; Pal. Foss. I figs. 8, 9.—*Obolella phillipsi*, Davidson, Mon. B. F. B. III, p. 62, pl. 4, figs. 17—19.—*Kutorgina cingulata*, var. *pusilla*, Linnarson, Brach. Par. beds Sweden, S. V. AK. Hand III, pl. 4, fig 53, 54.) Walcott, Bull. U. S. G. S. No. 30, page 102, plate 9, fig. 1, front view; 1 *a*, side view; 1 *b*, back view of large shell, mostly denuded of outer surface. Fig. 1 *c* side view of small shell, to show variation in height of dorsal valve. Fig. 1 *d*, cast of inside of dorsal valve, with muscular scars. Fig. 1 *e*, dorsal valve, *enlarged.* Fig. 1 *f*, inside of dorsal valve; (1 *g* omitted); 1 *h* flattened specimen (ventral valve?) from Parker's quarry shales.—*Lower Cambrian* (Georgian) formation of Labrador; abundant, with *Olenellus thompsoni*, in limeshales, near Swanton, Vt.; compressed casts at Parker's quarry, Vt.; identified in Wales and Sweden; and on Silver Peak, Nevada. *L. C.*—*See foot-note to page 134.*

Kutorgina labradorica. (*Obolus labradoricus*, Billings, Palæoz. Foss. I, p. 6, fig. 6.) C. D. Walcott Bull. U. S. G. S. No. 30, page 104, plate 9, fig. 2 and 2 *a*, ventral valves, *enlarged*; 2 *b*, dorsal valve, *enlarged.*—*Lower Cambrian* (*Georgian*) formation, near Swanton, and near High Gate Springs, Vt., and in Labrador.—*L. C.*



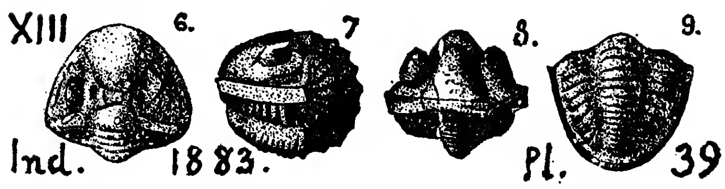
Lamellibranch shell-fish are those which have two exactly similar but lopsided valves, like the *Scallop*, and the two valves cover the right and left sides of the animal; whereas *Brachiopod shellfish* have two unlike but symmetrical valves, covering the back and belly of the animal, like the *Lampshells* of the present day.

Lambdodus *fish scales* frequent in *Meadville upper limestone*, Crawford Co., Pa., (Q4, p. 83)—*X.* *See Appendix.*

Lampterocrinus parvus. *See Appendix.*

Leaia leidyi. See figures, *natural* size and *magnified* to show sculpture under **Leperditia okeni.**

Leaia tricarinata. (Meek & Worthen, Illinois Geological Report, Vol. 3, 1868, page 541.) Collett's Indiana Geological Report of 1883, page 167, plate 39, fig. 10, right valve, *natural size;* fig. 11, another, *enlarged twice;* fig. 12, back view of another, *enlarged twice;* fig. 13, left valve, *natural size.*—This interesting little bivalve crustacean has been found at various places in the Indiana Coal Measures, usually pressed flat; shell very thin and seldom preserved. It resembles *Leaia leidyi*, a Pennsylvania species half its size. Collett.—*XIII.*



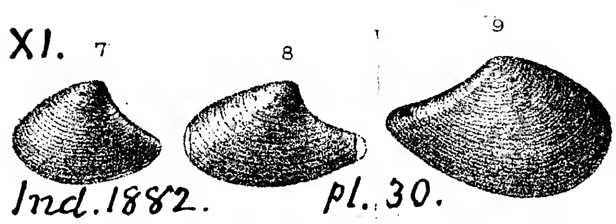
Lecanocrinus macropetalus, Hall. To this belong figs. 5, 5*a*, 5*b*, ("**Cyathocrinus**"), p. 165 above. (Whitfield.)

Lecanocrinus pusillus. *See Appendix.*

Leda bellistriata. See **Nuculana bellistriata.** *XIII.*

Leda levata. See **Tellinomya levata.** *II c*, *III b.*

Leda nasuta. (*Nucula nasuta*, Hall, Trans. Albany Institute, Vol. 4, 1856; *Nuculana nasuta*, Whitfield, Bull. 3, Am Mus. Nat. Hist. p. 57, plate 7, figs. 7, 8, 9,) in Collett's Indiana Report, 1882, page 344, plate 30, figs. 7, 8, *enlarged four times*, similar views of two specimens; fig. 9, *enlarged three times*, another from Spergen hill, Ill.—Subcarboniferous (*Warsaw limestone*) formation. *XI.*



Leda rostellata. See **Nuculana rostellana.** *VIII c.*

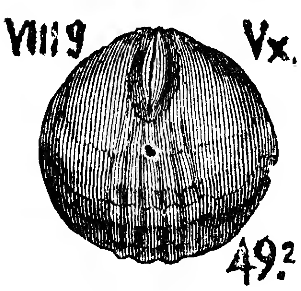
Leiopteria bigsbyi. *See Appendix.*

Leiopteria dekayi. *See Appendix.*

Leiopteria rafinesquii. *See Appendix.*

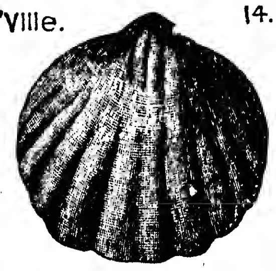
Leiopteria ——? Specimen 886–1 ,in Sherwood's coll. on Bently creek, Bradford Co., Pa., from *Chemung*, *VIII g.*

Leiorhynchus globuliformis. (*Atrypa globuliformis.*) Vanuxem Geology of the Third District of New York, 1842, page 182, fig. 49, 2. *Chemung.*—Found by White at Danville (G7, 72, 308), and by Claypole 2½ m. N. of Liverpool, Perry Co., Pa. (Spec. 37–2, 3.)—*VIII g.*



Leiorhynchus ? hecate, Clarke. Bull. 16, U. S. G. S. 1885,

VIIIe.

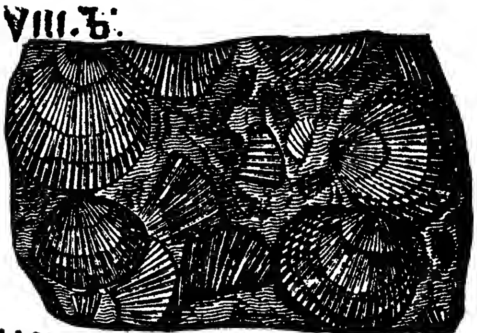


14.

page 31, plate 3, fig. 14, *magnified 10 times*, the most abundant fossil in the *Genesee* black shale of Ontario Co., N. Y. Five rounded folds on each side of the middle groove of the ventral valve; disappearing towards the beak; surface not sculptured.— *VIII e.*

Leiorhynchus limitaris. (*Atrypa limitaris*, Hall; *Orthis limitaris*, Vanuxem) Hall, page 180, fig. 71, 11. Vanuxem, page 146, fig. 35, 2. Rogers, page 826, fig. 652. *Marcellus formation.* (Supposed to characterize this formation by being found in no other in New York.)—In Perry Co. Pa. Claypole collected it from Smith's quarry, Sandy Hollow, *Marcellus limestone*, &c. (Spec. 48–1.)—At the Huntingdon car works also (T3, 115); at McConnellstown in vast numbers (Specs. 188–1, 2, 191–2); at 203rd mile post RR (T3, 113); especially abundant 10′ below top of Marcellus black shale, No. 8 of McConnellstown section (T3, 198); the most abundant of the many shells which crowd the upper 250′ of *Marcellus* in West Huntingdon (T3, 258); abundant in upper beds of *Marcellus* along Murray's run, east Oneida t. Also in Marcellus (with *Styliola fissurella*) at Selinsgrove, Northumberland Co. (G7, p. 79.) *VIII b.* — But it is found also in the *Hamilton* lower shales on Coffee run, RR. quarry, Hunt. Co. (T3, 112; and Claypole's spec. 190–2)— *VIII b, c.*

VIII.b.

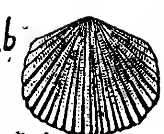


H.71.11.

VIII.b.

R. 652.

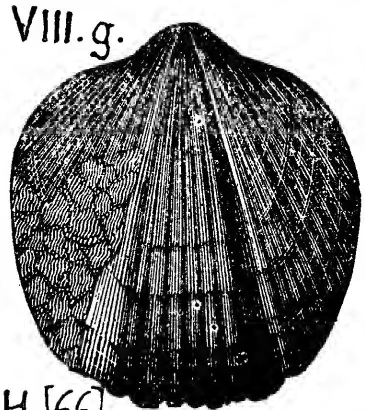
VIII.b



Vx. 35.3.

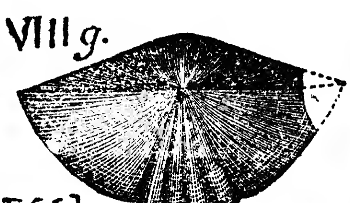
Leiorhynchus mesacostalis. (*Atrypa mesacostalis.*) Hall, G.4th D. [67, 1, a, b.] *Chemung formation.* (Casts common everywhere.)—Claypole's Perry Co. Pa. specimens are 27–6, 7 (eight) from W. of Newport, *Chemung-Catskill*

VIII.g.

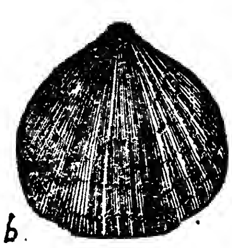


H.[66] 1

VIII g.



[66] 1a



1b

beds; 51–3, 6, 8, from *Kingsmill beds*, ditto.; 57–45, 46, 48, from Jenkins farm, 5 m. W. of N. Bloomfield, ditto.; 132–1, from Hartzlein's, S. of mouth of Locks run, Wheatfield, Perry Co., *Chemung.*—In Columbia Co., near Bloomsburg, specs. 68–3 to 8, and 21; 80–1, 2, 7, 16; 92–2. It is abundant in bed 9 of Sect. 12, and beds 30, 40, 41 of Sect. 13, at Rupert (G7, 69); at Stony Brook, in bed 37 of Sect. 63 (G7, 197); on Fishing creek, bed 30 (G7, 216, 227); at Catawissa, bed 98 (G7, 240); W. Shamokin township, North. Co. (p. 350, 356); Jackson t. (p. 365, *Upper Chemung); L.* Mah. t. (p. 367, 286, 287 *Chemung),* at Danville (p. 308); in Mifflin t., Col. Co., within 200′ of bottom of Chemung (p. 70).—In Centre Co. Ewing finds it in the *Chemung.*—In N. W. Penn., Crawford and Erie Cos., it is scattered through the Venango lower shales, between the 2d and 3rd Oil sands (Q4, p. 104); and in Ohio, Dr. Newberry finds it with *Spirifera disjuncta*, *Spirifera alta*, and *Orthis typa*, in the thinned "Erie shale." (I, p. 77.)—*VIII g–IX.*

Leiorhynchus multicostatum. *See Appendix.*

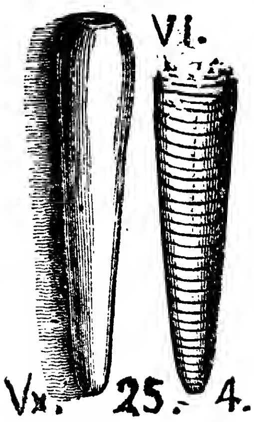
Leiorhynchus newberryi, with many other forms, in Lothrop's *3rd Oil Sand* quarry, Erie Co., Pa. (G4, p. 298). Becomes abundant from the nonfossiliferous bottom beds of the 325′ *Chemung* mass, upwards, to the top (p. 128.)—*VIII g.* —*See Appendix.*

Leiorhynchus quadricostatus, Van. Found in Perry Co., Pa. (Claypole's Cedar run, W. Center, spec. 251,) in *Salina shale.*—In Bedford Co. in beds 19 and 38 of Saxton section, 1200′ and 1500′ below *Lower* Chemung Conglomerate (2500′ and 2800′ beneath top of Chemung), T2, 80, 230.—*Portage shale.* —In Luzerne Co., Wappallopen section, bed 41, Chemung, occurs a *Leiorhynchus* which may be this. (G7, 197.)—*VIII f, g.* —*See Appendix.*

Leiorhynchus —— ? In Bedford Co. prevails throughout the Hamilton sandstone, especially in bed 58 of Saxton section. (T2, 82, 83, 232)—*VIII c.*

Leiorhynchus ——? Probably a new species. Spec. 850–15, OO, p. 236, Sherwood's collection at Lawrenceville, Tioga Co., Pa., from *Chemung*, *VIII g.*

Lepadocrinus gebhardi. (*Lepocrinites gebhardi.*) Vanuxem, page 117, fig. 25, 4. Hall, plate fig. [27, 4.] *Lower Helderberg* formation. (Stems; one coated with calcite; the other ringed.)—In Perry Co., Pa., collected by Claypole at Clark's Mills (Spec. S–6).—*VI.* Vanuxem remarks that both figures are of the lower part of the fossil; one perfect but showing nothing within; the other showing how the inside is made up of a pile of plates or discs. The upper end is drawn in, like the end of a *Echinus spine*, and was evidently movable upon the singular fossil of which it was a part.



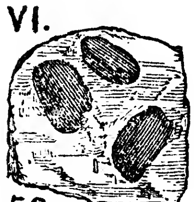
VI.

Vx. 25. 4.

Lepadocystites ——? *VI. See Appendix.*

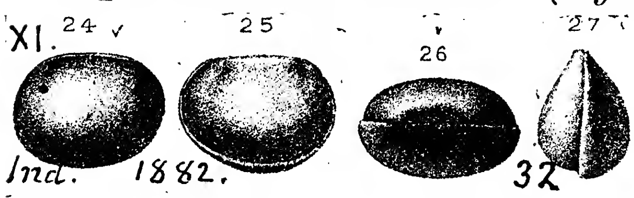
Leperditia alta. (*Cytherina alta.*) Hall, page 142, fig. 58, 6. Vanuxem, page 112, fig. 23, 6. Rogers, page 824, no figure. *Lower Helderberg* formation. (Conrad, 1843.)—Claypole found it almost the only fossil in *Salina red shale* (*V c.*); very abundant in the top layers of the variegated shales, *over the Salina red* shale; unusually large and the only abundant fossil form in the *Waterlime* division of *Lower Helderberg.* Preface to Report F2, on Perry Co., Pa. Specimens from Landisburg, Tyrone t. (183–1, four); and from near New Bloomfield (X 4) both in *Salina.* In Lycoming Co., Jersey Shore, H. D. R. reports it (*Cytherina*) from *Salina*, (Geol. Pa. p. 536.)—In Pike Co., Pa., in *Waterlime* (Decker ferry limestone, *L. Held.* Stormville limestone) G6, p. 134, 137, very abundant, their seed-like shells covering entire surfaces of *Waterlime* bed, No. 6 DeWitt's section, Monroe Co. (p. 222.)—In the Montour district, throughout *Lower Helderberg*, at the quarries (G7, 89, 95, 98, 101, 247, 260.)—Its presence in abundance, and absence of corals, distinguish the *Waterlime horizon* in middle Pa. It and the little *Beyrichia seminalis* occupy the ground (T, 41.)—In Bedford Co. it marks the *Tentaculite limestone* of New York (T2, 88, 89) middle of *Lower Helderberg;* and occurs in many of the bottom drab shales and thin bottom limestone layers of *Lower Helderberg* (pp. 137, 140, 144, 148, 155, 196.)—*VI.*

VI.



58. 6

Leperditia argenta. Walcott. *Paradoxides zone, M. C.* (Dec., 1888.)

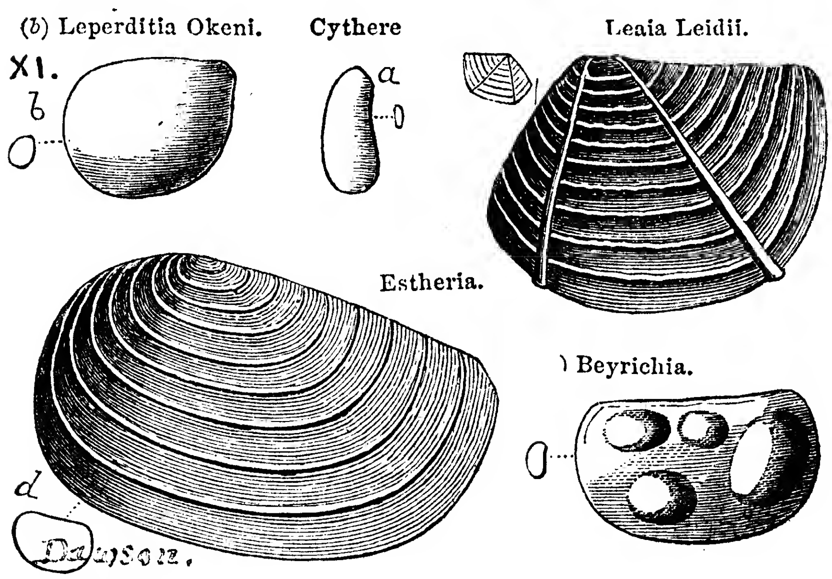


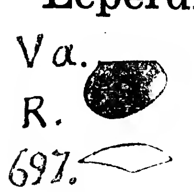
Leperditia carbonaria. (*Cythere* (*Cytherina*) *carbonaria*, Hall, Trans. Alb. Inst. Vol. 4, 1856.) Whitfield, Bull. 3, Am. Mus. Nat. Hist, 1882, p. 94, pl. 9, figs. 24 to 27 in Collett's Indiana Rt. 1882, page 375, plate 32, figs. 24, 25, 26, 27, *greatly enlarged;* exceedingly small, compare McCoy's *Cytherina pusilla.* At Spergen Hill, &c. Ind. Sub-carboniferous (*Warsaw limestone*) formation. *XI.*

Leperditia faba. *V b. See Appendix.*

Leperditia fabulites. *III b. See Appendix.*

Leperditia okeni, (78*b*), with a *Cythere* (78*a*), a *Beyrichia* (78*c*), an *Estheria* (78*d*), and *Leaia leidii* (78*e*), on page 256 of Dawson's Acadian Geology, 1868. All these little *entomostracan shells* are found in great abundance, with fish scales, fish dung, coal plants, and small reptiles, in the fossil coal forest of Lower Carboniferous age in Nova Scotia. Similar shells occur in all the *coal areas* of the United States.—*XI.*

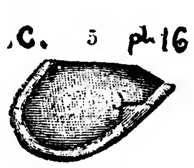




Leperditia ovata. Rogers, Geology of Pennsylvania, Volume Second, 1885, page 834, fig. 697. *Black river* formation. (Jones, Annals and Magazine of Natural History [3] Vol. I, 1858.) *II b.*

Leperditia punctulifera. *See Appendix.*

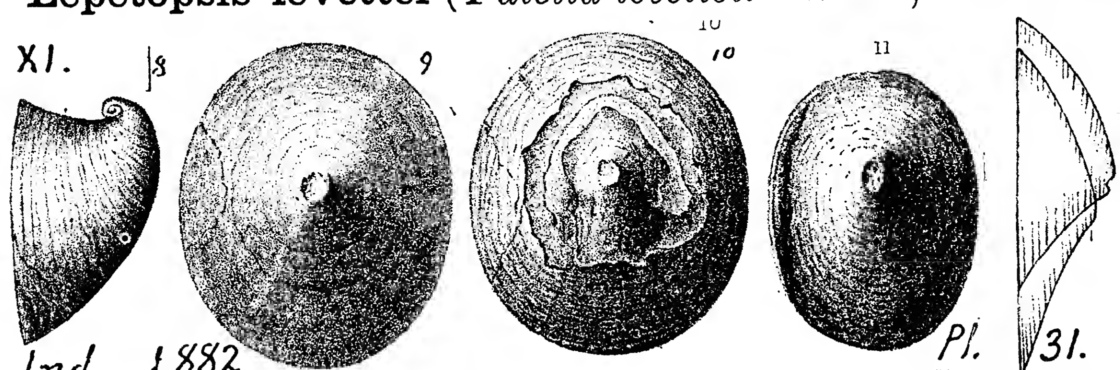
Leperditia solvensis. English. See **L. troyensis.** *M. C.*



Leperditia troyensis (Ford, = ? *solvensis*, of Jones, Ann. and Mag. N. H., [2] XVII. Feb. 1856, p. 95, from the Welsh Menevian rocks) Walcott, Bulletin U. S. G. S. No. 30, page 146, plate 16, fig. 5, sketch of type specimen, *enlarged three times*, as drawn by S. W. Ford, Amer. Jour. S. 1873, p. 138. NOTE. The only specimen found near Troy. *L. C.*

Leperditia (*Cytherina*) is occasionally found in Trenton beds (C. E. Hall, in T3, 367.)—It is found in Trenton upper beds, which are excessively fossiliferous in places in Centre county, (Ewing, T4, 423, 424.)—H. D. Rogers says that it is found in the limestones below the Trenton and disappears upward in the *Trenton*. (T, 55; Geol. Pa.)—*II b, c.*

Lepetopsis levettei (*Patella levettei.* White,—Whitfield

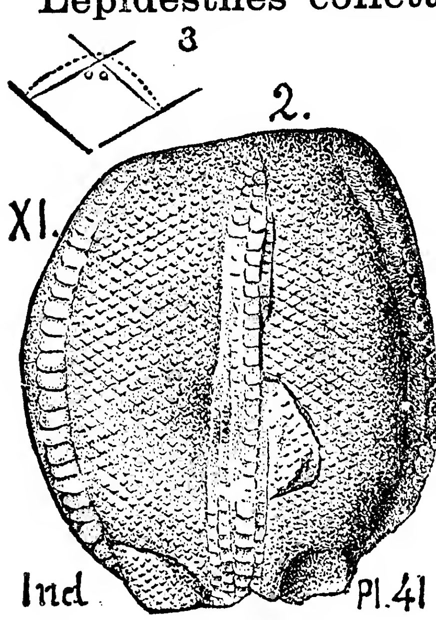


Bull. 3, Am. Mus. Nat. Hist. 1882,) Collett's Indiana Report of 1882, plate 31, fig. 8, side view of doubtful specimen, young, *enlarged four times;* 9, top view of large specimen; 10, same with shell removed to show muscular scar; 11, another specimen; 12 profiles of 10 and 11.—Spergen Hill, *XI.*

Lepidechinus, Hall. Specimen in Carll and Rundall's collections? *VIII.*

Lepidocystis bullatus, Lesq. **L. fraxiniformis**, Goepp. **L. vesicularis**, Lesq. in Lacoe collection at Pittston, from *Subconglomerate shales* (G7, p. 40). Coal Flora, p. 457, plate 69, fig. 18 to 24.—*XI.*

Lepidesthes colletti. White, (1878, Proc. Acad. Nat. S. Phil. p. 33; 1880, Am. Rt. U. S. G. Sur. Ter. for 1878, Part 1, page 163, plate 40, fig. 2.) Collett's Indiana Report of 1881, page 362, plate 41, fig. 2, type specimen; fig. 3, diagram of one of the ambulacral plates which form the head of this stone-lily coral. Only two examples, both crushed. The genus contains only two species, this one and *L. coreyi*, Meek and Worthen. *Keokuk limestone*, Washington Co., Indiana. *XI.*

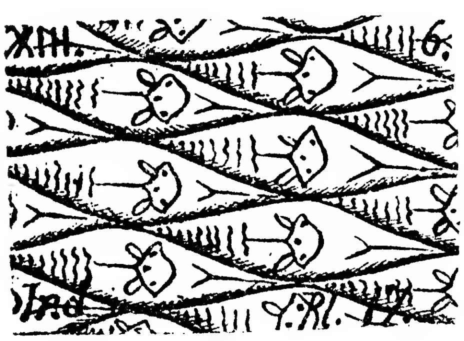


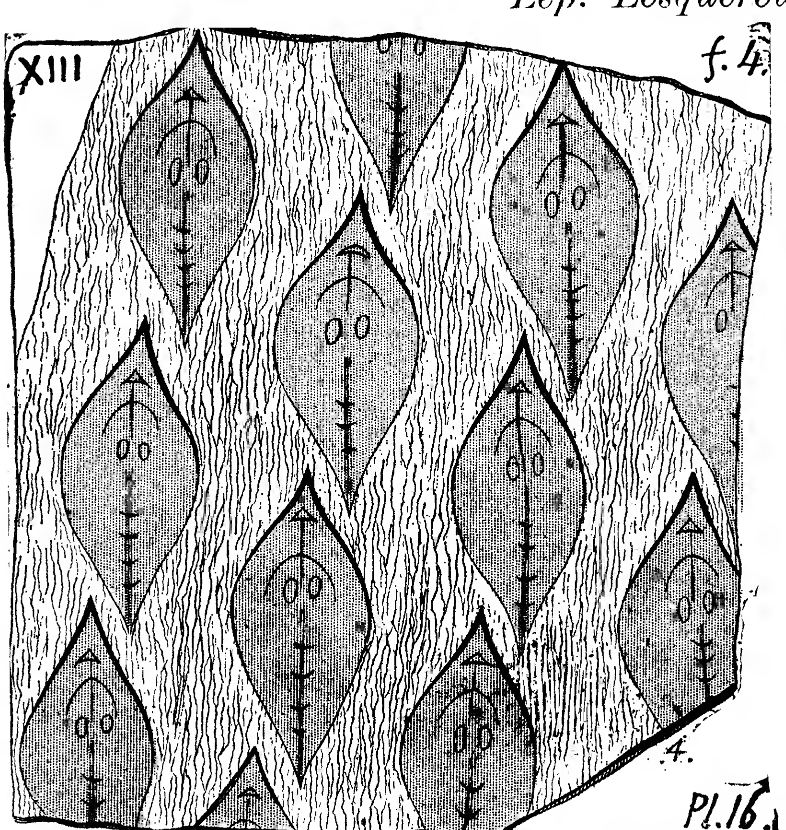
Lepidodendron. Tree-like fern stems, often of great size, 100 feet or more in length, bearing leaves on the young branches or shoots. At Ashland, in the western middle anthracite field, there was formerly a famous exposure of sandstone, not far above the Conglomerate, where scores of these trees of great length could be seen lying diagonally across each other as if a forest had been blown down. The roof of the old Clarkson coal bed at Carbondale in Lackawanna Co., Pa. is almost entirely covered with impressions of trunks, some 70 feet long and 2 feet wide, which do not taper at all at the upper end and therefore must have been much longer. A forest of them is preserved in sandstone at the Falls of the Little Beaver river in Western Pennsylvania. A few logs evidently drifted, were seen by Claypole in the *Pocono* sandstone *No. X*, in Perry Co. Pa. Lesquereux (in Geol. Pa., 1858, page 873) remarks the astonishing perfection of the fossil scars, many specimens in the magnificent old collection of W. Clarkson in Carbondale, and of Mr. Moore in Greensburg, being as distinct as though they had been carved in the stone by a good engraver.

These tree fern forests, with their stems (*Lepidodendron*) leaves (*Lepidophyllum*,) and their cones or fruit (*Lepidostrobus*) began to exist at the opening of the *Upper Devonian* age; abounded in the Lower or Sub-carboniferous ages; and died out in the Barren measure times. Commencing below and going up in the formations, we have them mixed with early Calamites, or reeds, in the top *Chemung-Catskill* shales, as in Smith's valley and Clear ridge, Huntingdon Co., Pa. (T3, 102). —Then, in the abortive coal age of the *Pocono*, as in Claypole's stem specimen (221–1) from Mt. Patrick, Buffalo, Perry Co., (and another large cast, not numbered in the collection,) showing drifted logs (only a few found, but doubtless multitudes in all;) as in the upper layers of the 730′ beneath the Shoups run red shale, Huntingdon Co., and the RR. tunnel through Sideling hill (T3, 88); and in the A, B, C, D, and E, divisions of Randall's section at Warren, Pa.—Then, in the *Pocono sandstone* under the Conglomerate, XII, in the Venango oil region hill tops, around Pleasantville, etc., from which Carll collected his specimens (O) 2790, 2798, 2804, 2928, 2938, 3072.—Then, in the *Conglomerate* itself, as in the roof-shale of the Sharon coal in Mercer Co. (Q3, 53, 123, 126, 160), and in the lowest coal

(Kidney bed) of the Blossburg coal field in Tioga Co. Pa. which is probably the equivalent of the Sharon coal, and of the famous Lykens Valley anthracite bed of Dauphin Co. (G5, 52).—Then in the middle of the E. Broad Top *Conglomerate* (T3, 71).—Then under the Tionesta sandstone at Eckert's bridge, Lawrence Co. (Q2, 85).—Then, in the first and second coal beds *above the Conglomerate* at the old Barnet mine, Broad Top, etc. (T3, 61, 315); and its leaves occasionally in the 30′ of dark shale under the Bolivar clay in Westmoreland Co. (K3, 161).—Then, in the Kittanning (Darlington) bed at Cannelton, (Q, 234).—In *Freeport upper sandstone* (Q2, 132). In *Mahoning sandstone*, as above stated. See Reports I, p. 36, 38, 53, 54, 64; III, 37, at Meadville; IIII, 306, at Warren, Randall's sect. R. 25, and R. 27.—*VIII g* up to *XIV*.

Lepidodendron aculeatum. Stern. (*Sagenaria aculeata*, Presl. in Sternsberg's Flora der Vorwelt; *Sagenaria cordata*, Sternberg; *Lep. undulatum*, Sternberg; *Aspidiaria undulata*, Sternberg; *Lep. appendiculatum*, Sternberg; *Lep. ingens*, Wood. Proc. Acad. Nat. Sc. Phil. June, 1860, plate 6, fig. 4; *Lep. Lesquereuxii*, Wood, plate 5, fig. 4; *Lep. ureum ?* Wood, Trans. Amer. Phil. Soc. Philada. Vol. 13, plate 9, fig. 5;—all these are identical with *Lep. aculeatum* according to Lesquereux, Coal Flora, page 371, plate 64, fig. 1; see Geol. Pa., 1858, page 874.) Collett's Indiana Rt. 1883, p. 80, plate 17, fig. 6.—Lesquereux, Geol. Pa., 1857, Vol. 2, p. 874, plate 16, fig. 4. A variable species common in





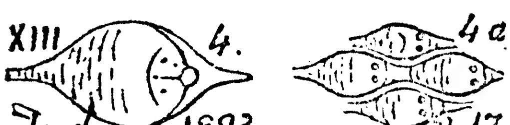
1858 4. Lepidodendron aculeatum. Lesq.

the low anthracite beds at Minersville, Lehigh Summit mine, and Carbondale, Pa.—Occurs in the Rhode Island coal measures; and at Mazon Creek, Ill.—*XIII.*

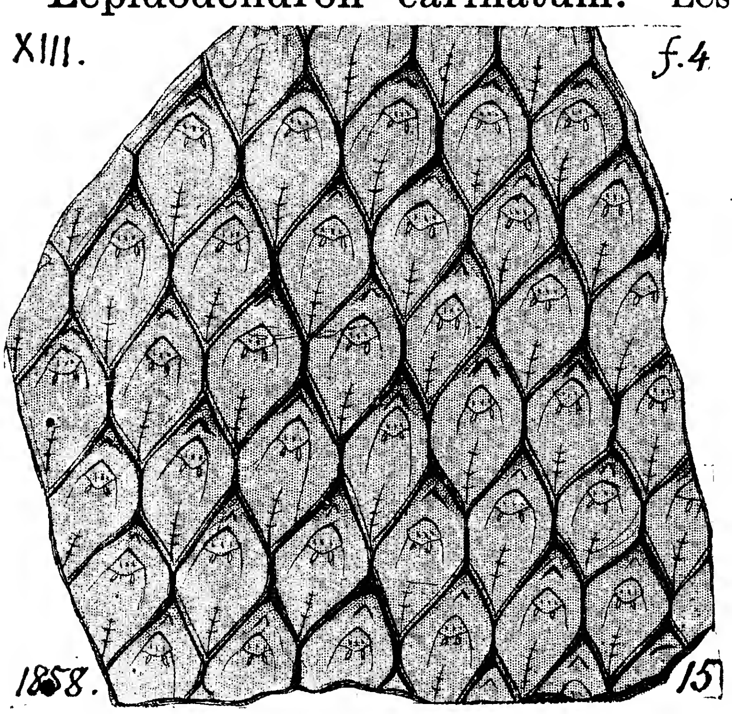
Lepidodendron appendiculatum, Europe. See **Lepidodendron aculeatum.** *XIII.*

Lepidodendron auriculatum, found with **Lepidodendron acuminatum.** *XIII.*

Lepidodendron brittsii. (Lesquereux, Pa. Geo. Sur. Rt. P. Coal Flora, page 368, plate 63, figs. 1, 2.) Collett's Indiana Report, 1882, page 80, who groups it with *L. rimosum*, *L. worthenii*, and the European *L. volkmannianum*, as confined to the *Sub-carboniferous;* his plate 17, fig. 4, 4 a, gives the form of its scars.—*Conglomerate* or *Sub-conglomerate* formation. See I. C. White's Report Q3, Q4, for its occurrences in N. W. Pennsylvania. *XII.*—The Sharon coal bed between the middle and lower divisions of the Conglomerate has roofshales which are often quite rich in fossil plants; for example at the Snyder Coal Co's shaft in Mercer Co. Here the 35 feet of shales are crowded with them; and of several species of Lepidodendra. Other excellent localities are the Morris Co's shafts; and Oakland mine No. 1.—Lesquereux says that *Lep. brittsii*, found in the Clinton coalbed of Missouri, is typically allied to *Lep. volkmannianum;* and in Pennsylvania this last is abundant in the sub-conglomerate shales.

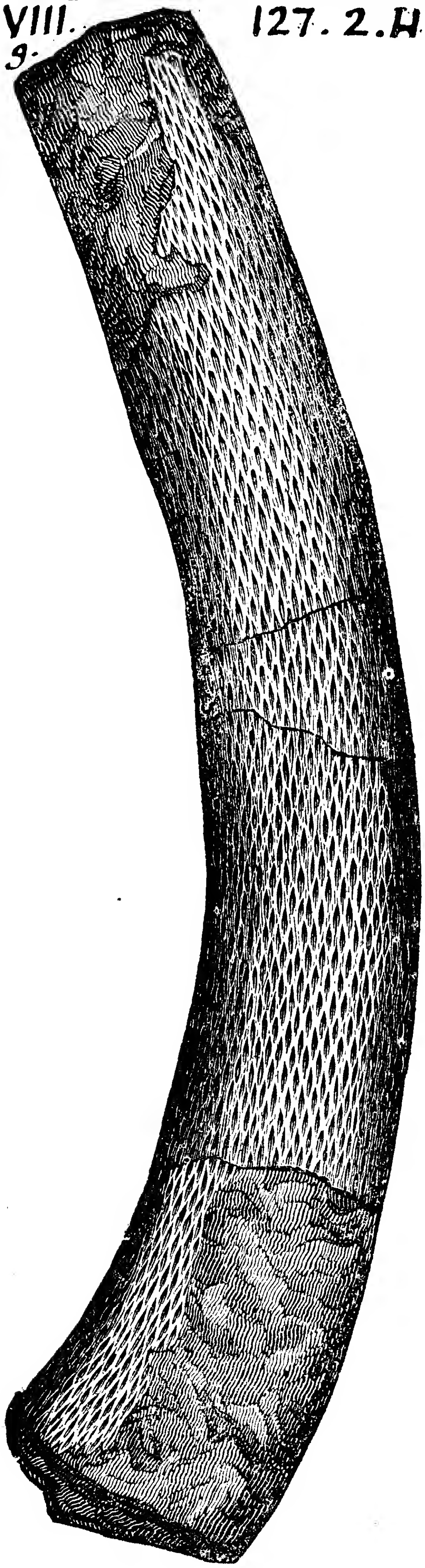


Lepidodendron carinatum. Lesq. Geol. Penn. 1858, page 875, plate 15, fig. 4; scars sharp at both ends and keeled; found in the low anthracite coal beds at Carbondale, Lackawanna Co., Pa.—Coal Flora, P. 1880, page 386. There was at that time a specimen of this species in the cabinet of Prof. Hildreth, at Marietta, Ohio, but without a label.—*XIII.*

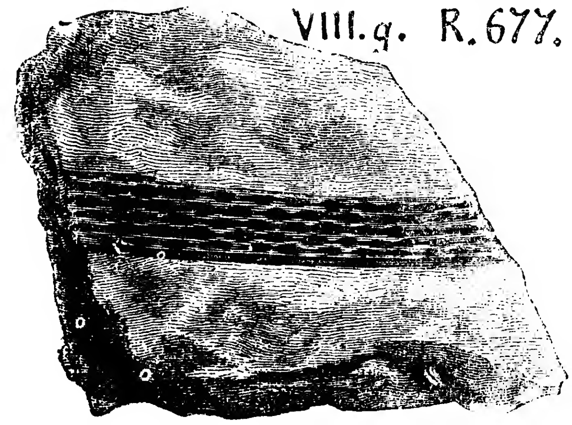


Lepidodendron chemungense. (*Sigillaria chemungensis.*)

VIII. 9. 127. 2. H



VIII. g. R. 677.

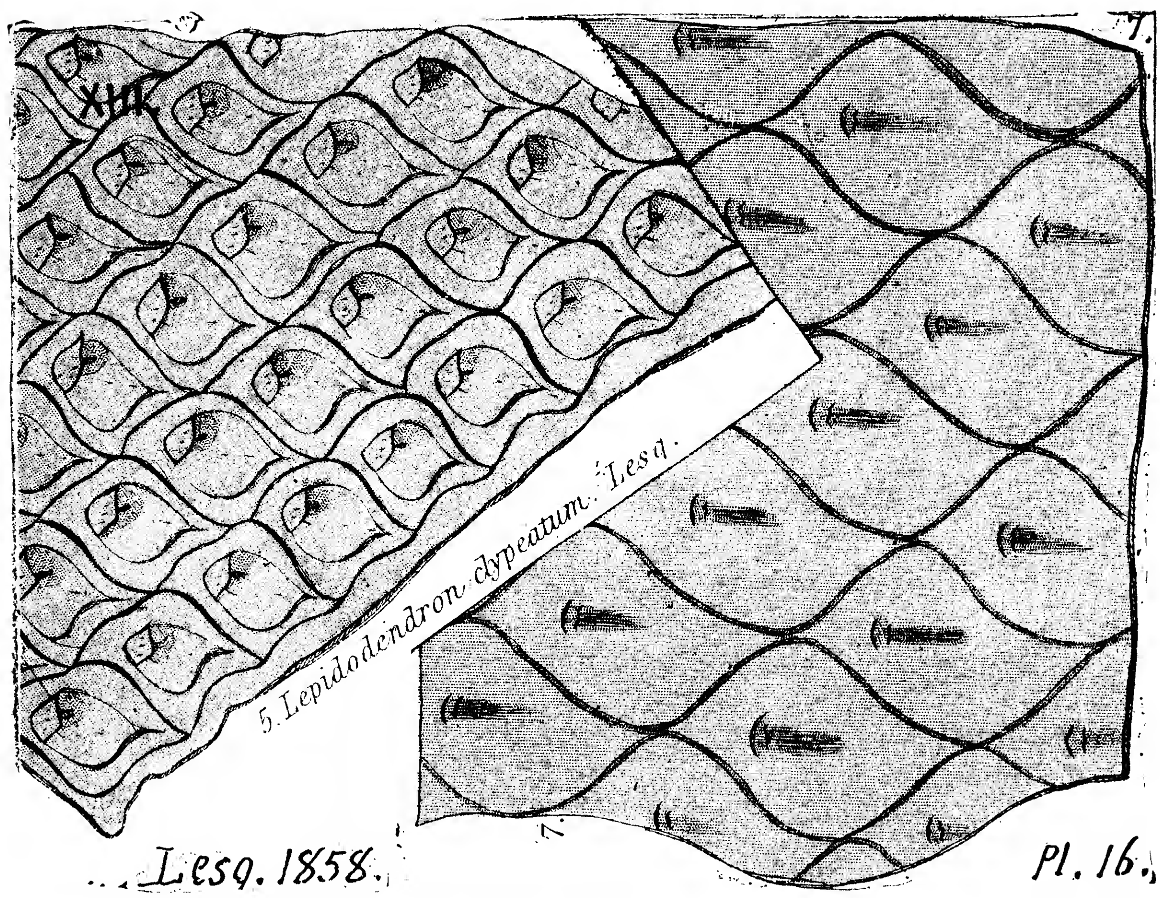


Hall page 275, fig. 127, 2 Rogers, page 829, fig. 677 *Chemung* formation. (Rogers' figure is drawn *half natural size.*)—Rogers mentions also leaves of *Lepidodendron?* in the *Marcellus shale*, Geol. Pa., page 826.—Claypole's specimen (28–4) from Penn's ridge between Newport and Millerstown, may be this species.—Also, Spec. 874–1 (2½ in. wide. 8 in. long, structure obscure), 874–2 (showing structure fairly well) in L. E. Hicks' collections on R. R. near Big Shanty, McKean Co. Pa., (OO, p. 237), species doubtful, but in *Chemung strata.*—*VIII b* and *VIII g.*—

Lesquereux says (Coal Flora, p. 374, foot note) that this species with many others (of which he only quotes the more important) had been referred to *L. veltheimeanum*, which is mostly found in the Subconglomerate measures. On p. 396 he describes Hall's specimen as a young branch with the bolsters only distinct, thought by Schimper (Pal. Veget.) to probably belong to *L. sternbergii.*—As for the small specimen figured by H. D. Rogers, Geology of Penn. 1858, p. 829, fig. 677, Lesquereux sees no reason for not referring it to *Lepidodendron chemungense.* Rogers says that it, with several fucoids, chiefly characterizes his *Vergent flags* (*Portage*, *VIII f*,) and being a confessedly terrestrial plant, is interesting as forming one of a series of steps through which we trace the gradual advent of that remarkable flora which flourished in such exuberance in the later Carboniferous or Coal period.

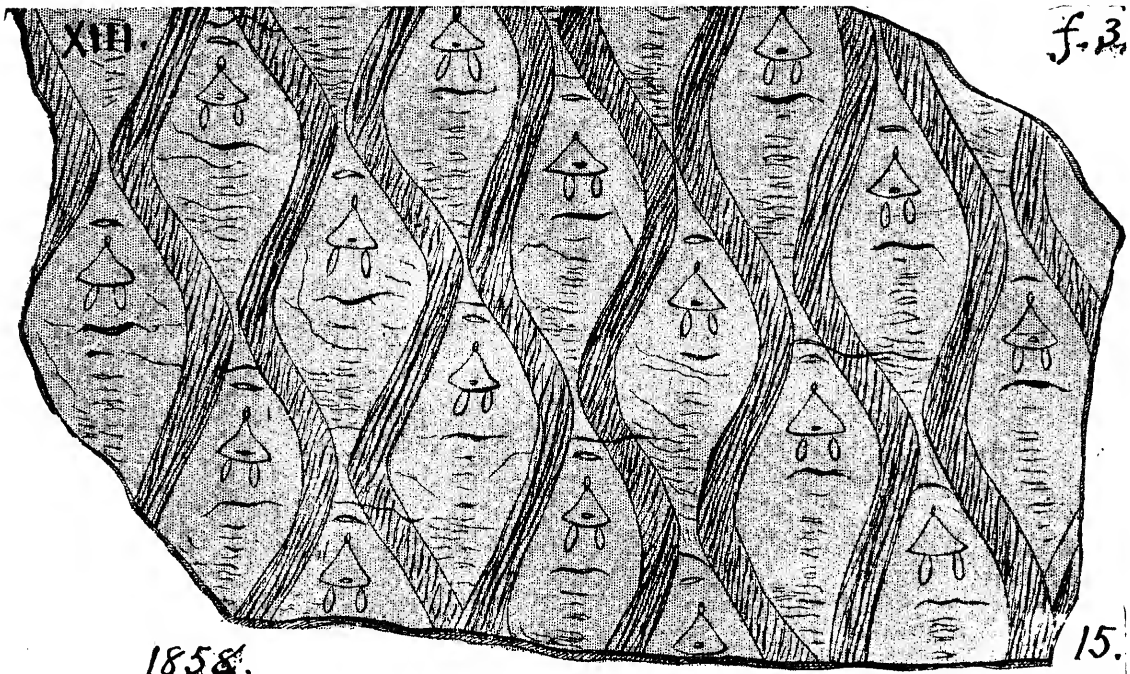
Lepidodendron cheilaleum. See **L. distans.** *XIII.*

Lepidodendron clypeatum. Lesq. Geol. Pa., 1858, Vol.



2, p. 875, plate 15, f. 5, showing the surface of the bark, and plate 16, fig. 7, showing the barked surface of the wood underneath. Common in the low anthracite coal beds at Carbondale, Pa.—See three other figures 16, 17, 18, on plate 64, of Coal Flora. P, 1880; page 380; Schimper makes it identical with *Lepidophloios irregularis*, Lesq. and *Lepidodendron lesquereuxii* (Andrews, Geol. Ohio, Pal. Vol. 2, pl. 53, f. 3); and Lesquereux does not object; but objects to its being a variety of *Lep. obovatum*, or any European tree fern. It is common in the *Sub-conglomerate* coal measures of Alabama; and in the *Coal measures* of Illinois.—*XIII.*

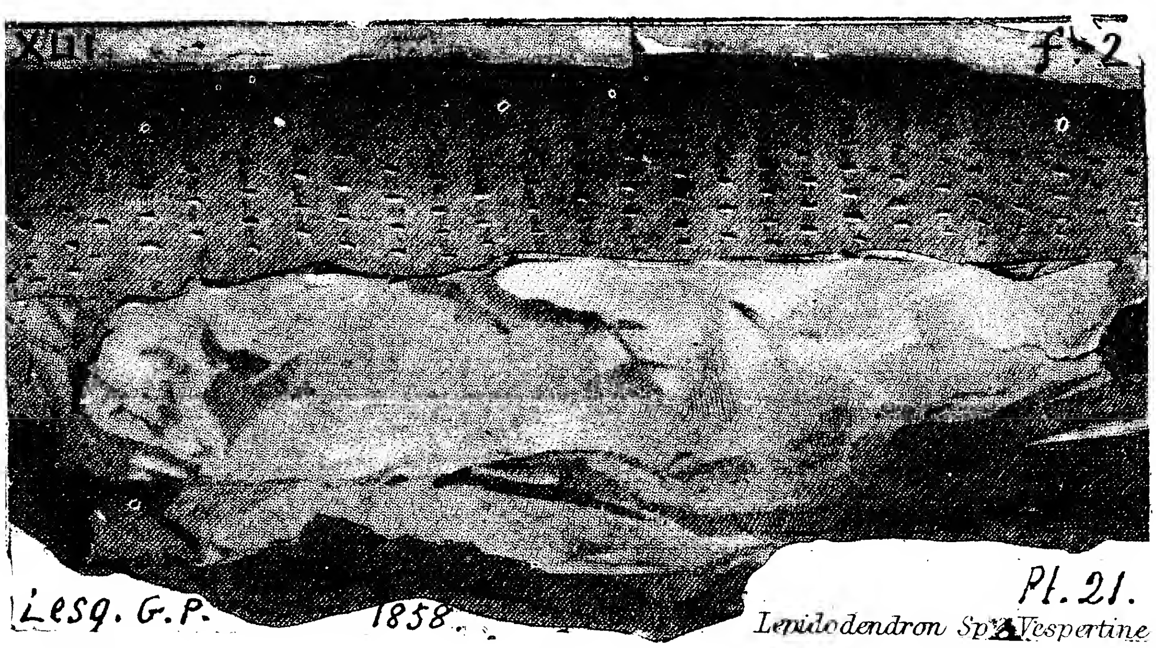
Lepidodendron conicum ? Lesq. Geol. Pa., 1858, page



3. Lepidodendron conicum

874, plate 15, fig. 3. Many specimens at Carbondale; but although well marked and distinct, they may possibly represent barked stems. In his Coal Flora, Report P, 1880, page 385, Lesquereux makes it identical with *L. modulatum ;* with *L. megiston*, of Wood (Proc. Am. Phil. S. Phila., 1860, pl. 5, f. 3); and with *L. politum* (Lesq. Geol. Sur. Kentucky, Vol. 3, pl. 7, f. 1.)—*XIII.*

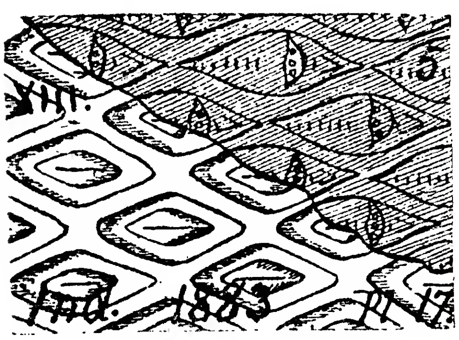
Lepidodendron corrugatum. Daws. Geol. Canada, 1873,



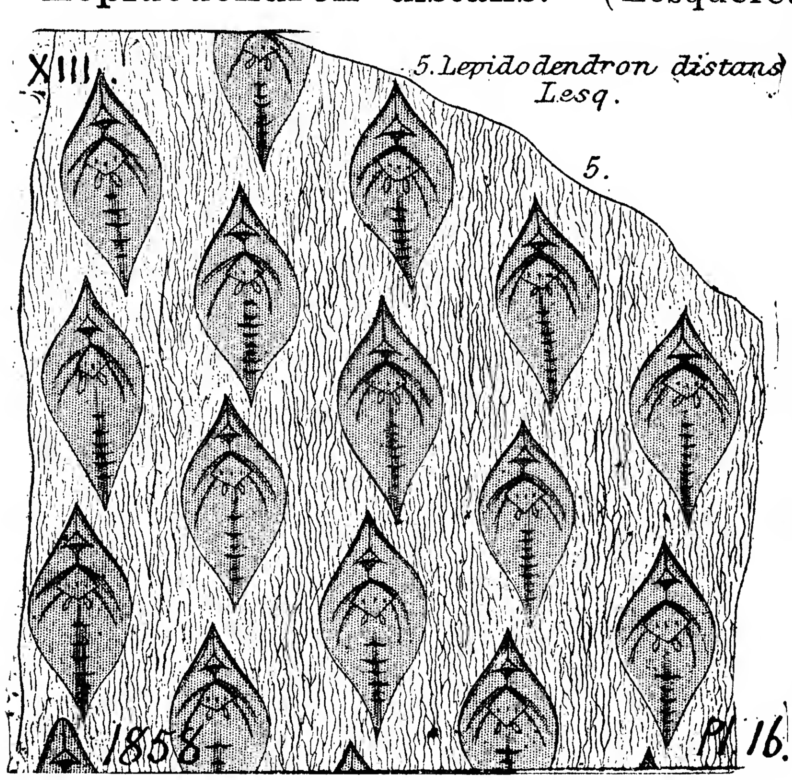
Lepidodendron Sp. Vespertine

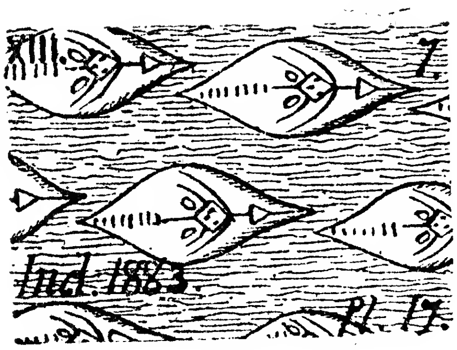
p, 19, pl. 2 to 5, f. 33 to 36 and 38. *Stigmaria minuta*, Lesq. Geol. Pa., page 830, plate 21, fig. 2. The most common air breathing plants of the *Pocono formation* are slender stems with small leaf scars. The specimen figured was found in the gap below Mauch Chunk. See Lesquereux's fig. 2, plate XVI, in same book. These plants follow No. X, through middle Penna. into Virginia. It is the *Lepidodendron scobiniforme* of Meek, Appendix Bull. Phil. Soc. Washington, 1875, p 13, pl. 1, f. 1. Dawson's figs. show the variability of the form and size of the scars. Lesqueraux's fig. above shows the *Stigmarian* stem "constantly found with it." (Coal Flora, p. 378.) Hall has specs. from VIII *c*, or *g* (Hamilton or Chemung) at Akron, N. Y. (Dawson). More probably from X (Pocono; Waverly). Specimens of various aspects, all assigned to this name, are common in *Mauch Chunk red shale* at Mt. Carbon, Pa., and Lewis Tunnel in Virginia (Meek).—Claypole's specimen (113–2) from Foose's tunnel in Cove Mtn., Perry Co., Pa.—*X*.

Lepidodendron diplotegioides. (Lesquereux, Coal Flora of Penna. Geo. Sur. Report P, page 390, 397, plate 64, fig. 2; also Arkansas Report, vol. 2, page 311, plate 4, f. 2; Illinois Report, vol. 2, page 452, plate 49, f. 2; Schimper's Pal. Veg. Vol. 2, plate 60, f. 7.) Collett's Indiana Rt. 1883, page 81, plate 17, fig. 5. Only found as yet in the *Subconglomerate coal* of Arkansas.—*XI*.



Lepidodendron distans. (Lesquereux, Jour. Soc. Nat. Hist. Boston, vol. 6, 429; Geol. Penn. 1858, page 874, plate 16, fig. 5; Schimper, Pal. Veg. vol. 2.—*Lep. oculatum*. Lesq. Geol. Pa. plate 16, fig. 4,—*Lep. cheilaleum*, Wood, Trans. A. P. S. Phil. Vol. 13, plate 9, fig. 4.) In Collett's Indiana Report, 1882, page 80, plate 17, fig. 7. Very large specimens in Mr. Clark-





son's cabinet from the Carbondale *anthracite beds.* Lesq.—*XIII.*

See Coal Flora, 1880, page 387, plote 64, fig. 10; the bolsters are very regularly placed in the same relative distance, equal to half their width, in measuring it in their spiral direction. This holds good in the three figures of specimens representing different ages, *L. oculatum*, *L. distans*, *L. cheilaleum.* (L.)

Lepidodendron dubium. See **Lep. rimosum.** *XIII.*

Lepidodendron gaspianum. *VIII. See Appendix.*

Lepidodendron gigas. See **L. veltheimianum.** *XIII.*

Lepidodendron greeni? See **L. veltheimianum.** *XIII.*

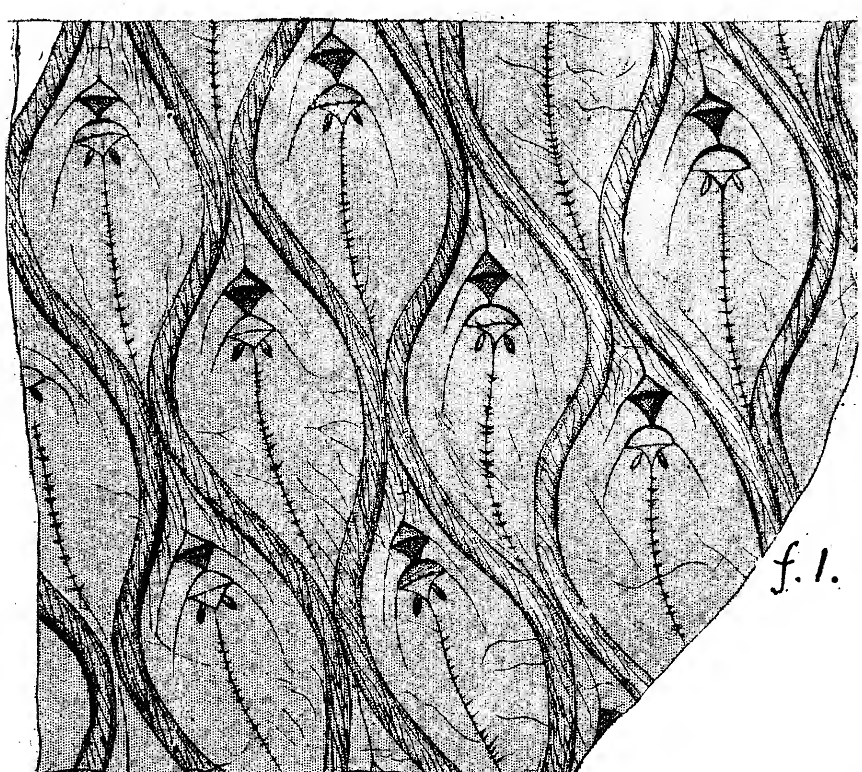
Lepidodendron ingens. See **L. aculeatum.** *XIII.*

Lepidodendron lesquereuxii. **L. aculeatum.** *XIII.*

Lepidodendron mamillatum. See **L. veltheimianum.** *XIII.*

Lepidodendron minutum. See **L. corrugatum.** *X.*

Lepidodendron modulatum. Lesq. Geol. Pa. II, 874, plate 15, fig. 1; a beautiful species preserved in the low anthracite beds at Carbondale, Pa., somewhat like *Lep.* rugosum.—Same as *L. conicum* Lesq.; and *L. mekiston* of Wood, Proc. A. N.S. Phila. 1860, pl. 5, f. 3; and *L. politum* Lesq. Geol. Kentucky, vol. 3, pl. 7, f. 1. —*Subconglom-*



1. *Lepidodendron modulatum.* Lesq. 1858., Pl. 15

erate coals of Arkansas; Mazon Creek, Ill., etc. Coal Flora, p. 386, plate 64, figs. 13, 14.—*XI*, *XIII.*

Lepidendron obovatum. Lesq. Coal Flora, p. 384, pl. 64, fig. 3; detected by White at bottom of Powelton shales, roof of Cook-Barnet Broad Top coal, Huntingdon Co., Pa., but only a few at the Reed mine, and at McHugh's, among myriads of *Alethoptoris* leaves, but in great numbers where the bed is cut by the Ocean Mine Tunnel (T3, 62, 310, 313, 319)—XIII.—In Fayette and Westmoreland Cos., Pa., huge stems are abundant and clearly impressed on the *Mahoning sandstone* beds, as on Cove run, in N. Union township. (KK, p. 75, 172.)—*XIII–XIV.*—*See Appendix.*

Lepidodendron obtusum. Lesq. Geol. Pa., 1858, p. 875

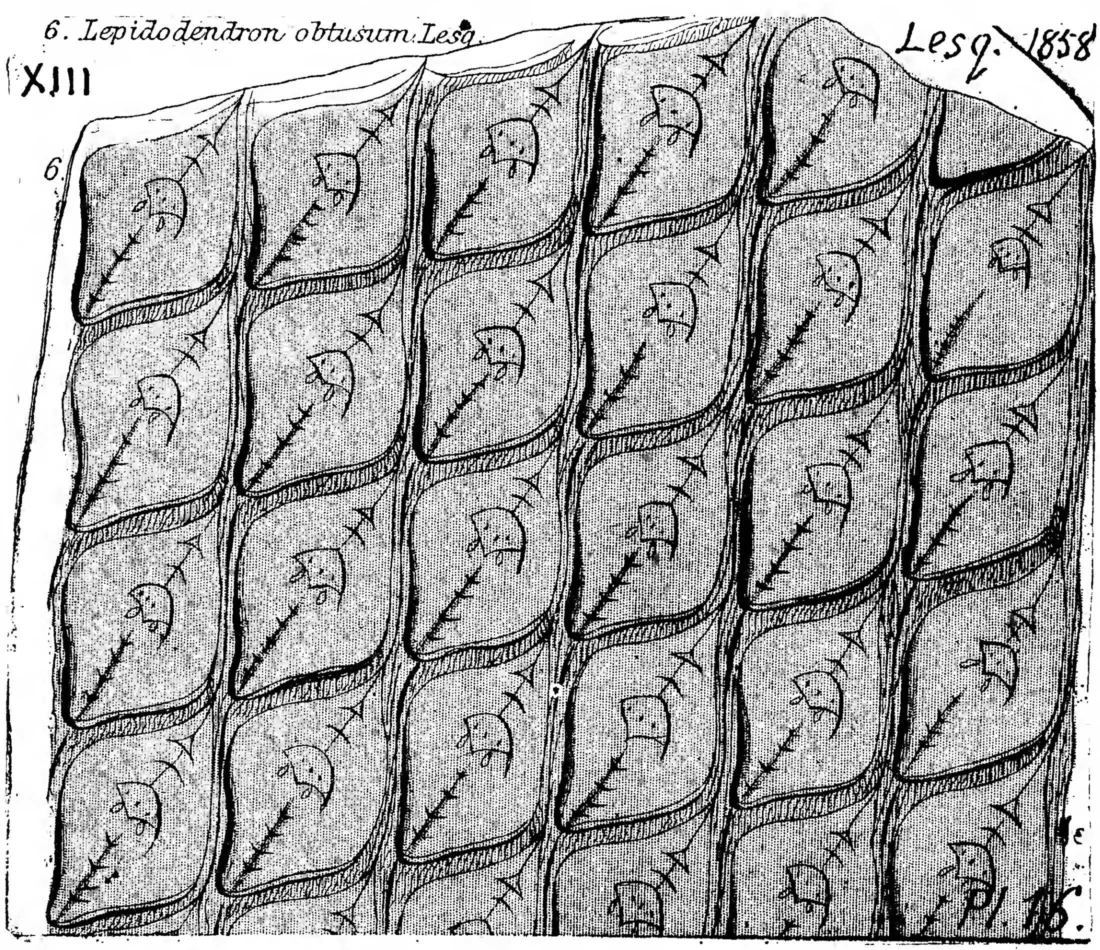
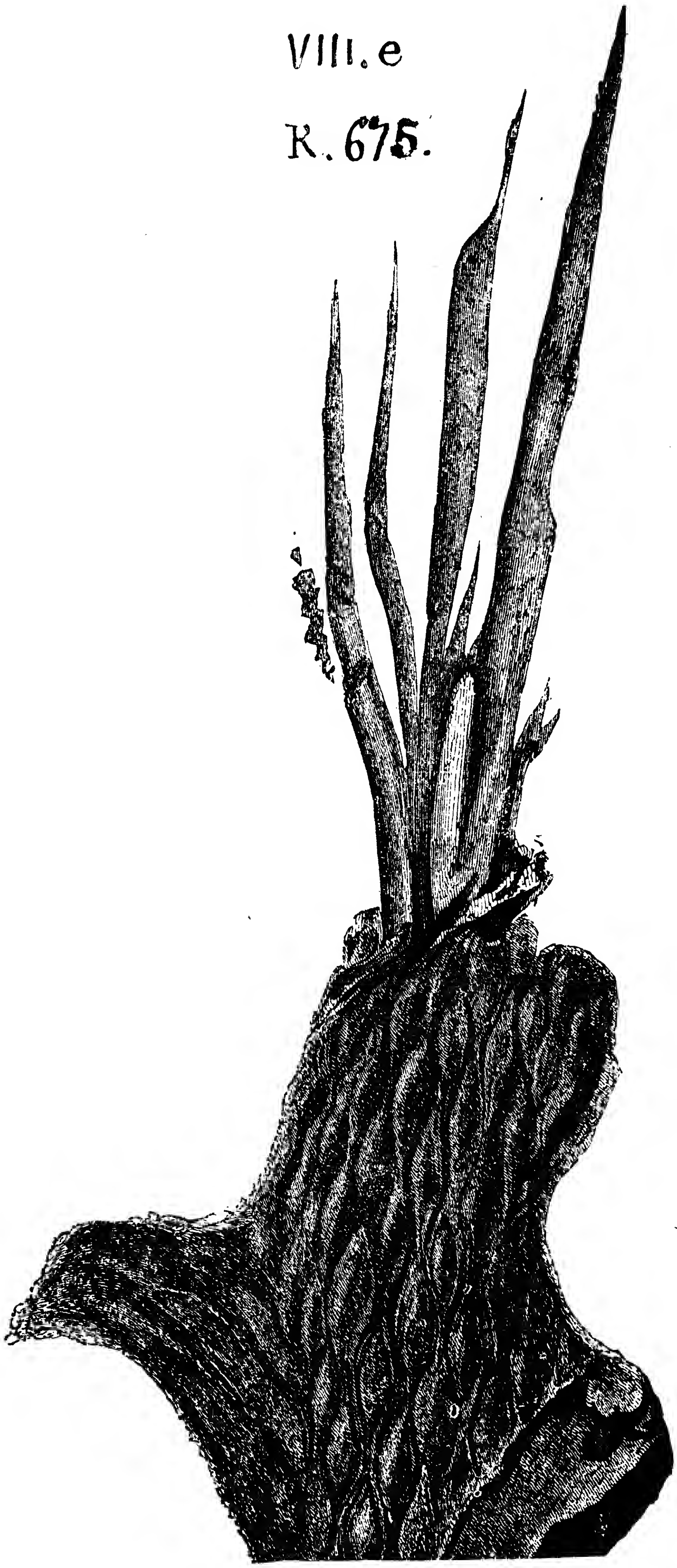


plate 16, f. b. from Carbondale, Pa. It is Wood's *L. venustum*, Trans. A. P. Soc. Phil. Vol. 8, p. 347, plate 9, f. 1, and may be compared with *L. modulatum. Low anthracite beds.*—*XIII.*

Lepidodendron oculatum. See **Lepidodendron distans.** *XIII.*

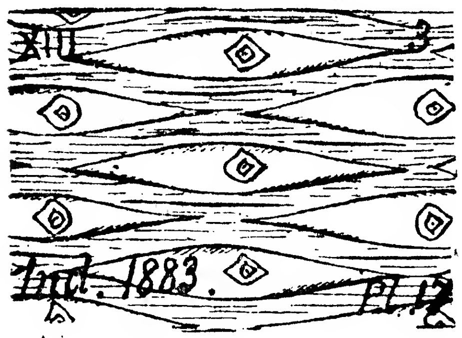
Lepidodendron ornatissimum. See **Ulodendron elongatum.** *XIII.*

Lepidodendron primævum. H. D. Rogers, Geol. Pa. 1858, page 828, fig.675.–*VIII e.* *Genesee black shale* formation in which are found "well developed specimens of an air-breathing plant, a *Lepidodendron*," the figure representing a fragment of a forked stem, ending in a bunch of grass-like leaves. Specimens, pressed flat, were collected by the First Geo. Survey from the *Genesee* outcrop at the junction of Standing Stone creek with the Juniata river, at Huntingdon, Pa.; and in the same shale lie beautiful impressions of a delicate marine or brackish water shell, *Goniatites interruptus?* an *Orbicula*, two *Lingulæ*, and an *Atrypa*. The marsh on which



this earliest tree fern grew must have been near by. Lesquereux found at the same place, *Lepidodendron leaves* of the regular kind, long, straight, channeled and nerved. Coal Flora, 1880, page 376.—*VIII e.*

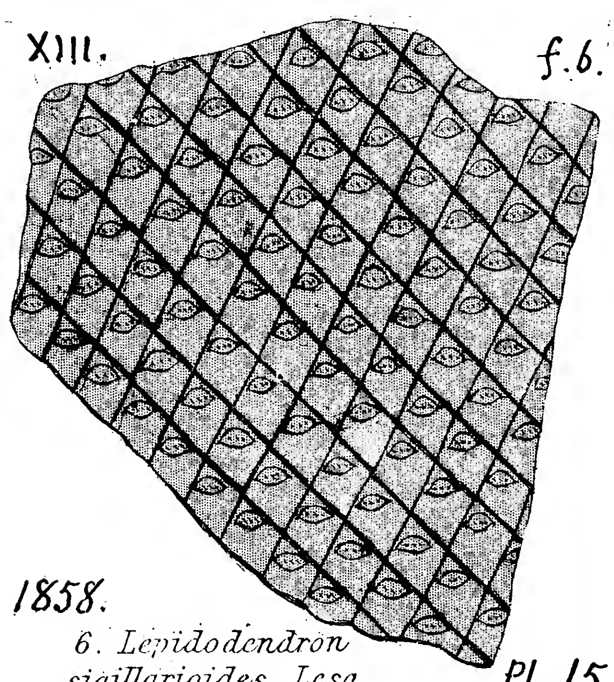
Lepidodendron rimosum. (Sternberg; Roehl; Lesquereux, Geol. Pa. 1858, plate 8, fig. 1; 10, fig. 2; Schimper, II, plate 60.—*Sagenaria rimosa*, Presl.—*Lep. rimosum*, and *Lep. dissitum*, Sauv. Veg. Fos. Belgium; *Lep. simplex*, Lesq. Illinois Report, Vol. 2, plate 45; *Lep. dubium*, Wood, Trans. Am. Phil. Soc. Phil., Vol. 13, plate 8, fig. 4.) Collett's Indiana Rt. 1882, page 80, plate 17, fig. 3.—*Above Conglomerate* at Pottsville, Pa. and in Illinois and Kentucky. The rarity of *L. simplex* and abundance of *L. rimosum* in Europe, contrasted with the rarity of *L. rimosum* and abundance of *L. simplex* in the American coal measures, points to a specific difference. Lesq.—*XIII.*



Lepidodendron rushvillense. *See Appendix.*

Lepidodendron scobiniforme. See **L. corrugatum.** *X.*

Lepidodendron sigillarioides. Lesq., Geol. Penna. 1858, p. 875, plate 15, fig. 6.—*Mammoth anthracite bed*, Lehigh Summit Mine.—NOTE. In Coal Flora, 1880, P, page 379, Lesquereux expresses the opinion that this fragment of *barked wood* may be referred to *Lepidodendron latifolium*, or to *Lepidodendron vestitum.* —*XIII.*—In the Coal Flora this species is made a synonym of *Lepidodendron vestitum*, which is rare in the Coal Measures.



6. Lepidodendron sigillarioides. Lesq.

Lepidodendrom sternbergii, Bgt. Detected by Lesquereux at the base of XII in the Northern Anthracite Field, in Lacoe's collections at Pittston. (G7, 37, 40)—*XI.*

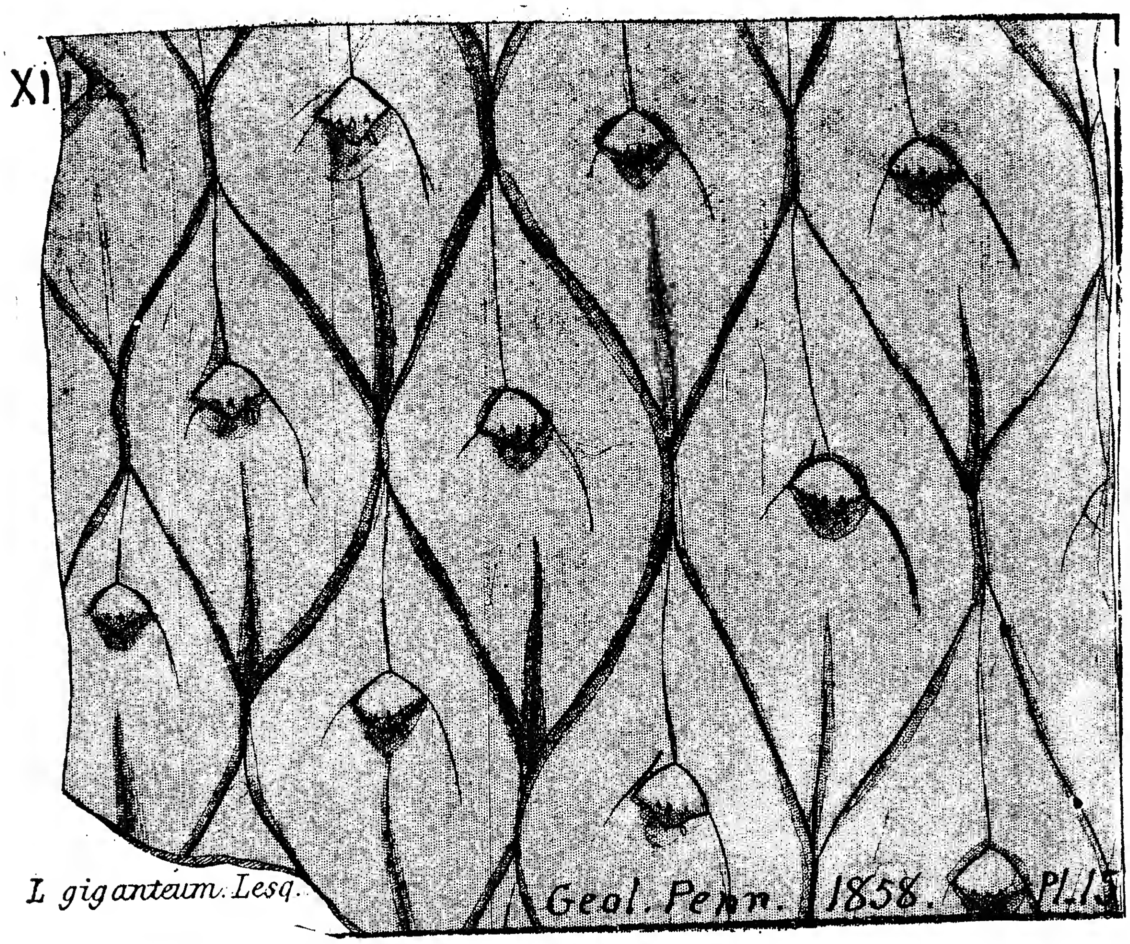
21

Lepidodendron simplex. See **L. rimosum.** *XIII.*

Lepidodendron undulatum. Europe. **L. aculeatum.** *XIII.*

Lepidodendron ureum? See **L. aculeatum.** *XIII.*

Lepidodendron veltheimianum. Sternberg. Also see

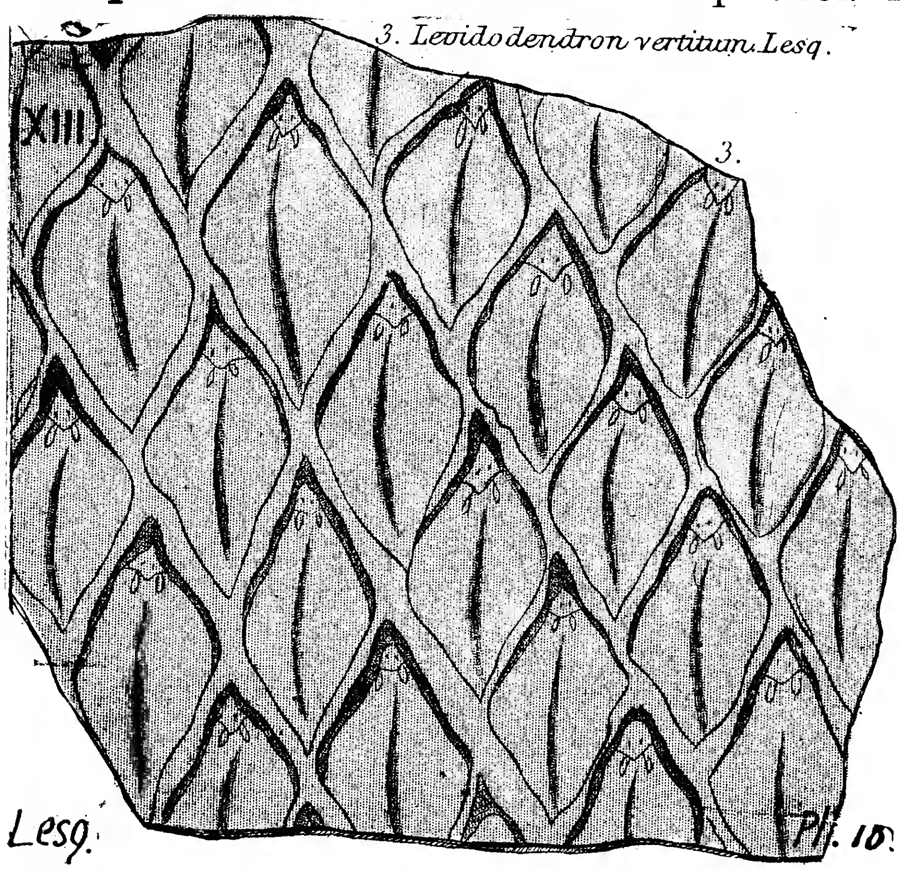


Roehl, Schimper, Stur, and Heer, all of whom give figures; also Lesquereux in Geol. Illinois, 2, 455. (*Lep. giganteum*, Lesq. Bost. N. H. S., also Geol. Pa. 1858, page 874, plate 15, fig. 2. *Lep. greenii?* Lesq. G. R. Ill. IV, pl. 27, f. 7, 8. *Lep. mamillatum*, Lesq. G. R. Ill. IV, pl. 25, f. 1. *Sagenaria veltheimiana*, Prest. in St.; Goep., Koechl, all with figures. *Sagenaria elliptica*, Goep. *Sagenaria acuminata*, Goep. *Phytholithus cancellatus*, Steinhauser, Trans. Am. Phil. Soc. Phila. Vol. 1, p. 280, plate 6, fig. 2 to 6.)—XIII.—Common in the low coals at Carbondale, *without the bark*, as *giganteum*. Lesq. 1858.—The diversity of scars is due to the age and size of the trees and the presence or absence of bark. In Lacoe's cabinet at Pittston are fine examples of fragments with the bark preserved. Lesq. Coal Flora, 1880, p. 374, plate 62, figs. 6 to 8. Its *probable* leaves are given by Lesq. as *Lycopodites asterophyllitæfolius*.

Geol. Ill. II, pl. 37, f. 3.—Mostly in the *Subconglomerate coal measures* as in Mercer Co., Ill.; Alabama coal measures; under Campbell's Ledge, Pittston, Pa.; but also Seneca and Boston *anthracite beds* at Pittston; in Jackson coal shaft, Ohio, etc.—In Lawrence and Crawford Cos. it is seen in all the exposures of the *Subolean* (Shenango) *sandstone* (= Pocono SS. No. X); and in Crawford Co., also in the overlying *Shenango shales*, *XI* (Q3, 61, 124; Q4, 78, 79).—*X*, *XI*, *XIII*.

Lepidodendron venustum. See **Lep. obtusum**. *XIII*.

Lepidodendron vestitum. Lesq. Geol. Pa. 1858, page 874, plate 16, fig. 3; a peculiar, but well marked species, found in the *anthracite* roof-shales at Wilkes-Barre, Luzerne Co., Pa. The margins of the scars are sometimes flattened so broad as to partly cover the scars, like a frame of a picture, but were easily broken and fell off, leaving the scars exposed. See also Coal Flora, 1880, p. 379, pl. 64, fig. 16; scars like but larger than those of *L. scutatum* (pl. 63, f. 6–6*c*.) When barked it presents the look of *L. sigillarioides*. —Rare, in the Archbald *anthracite B & C veins*, Wilkes-Barre; also Mazon Creek nodules, Ill. *XIII*.



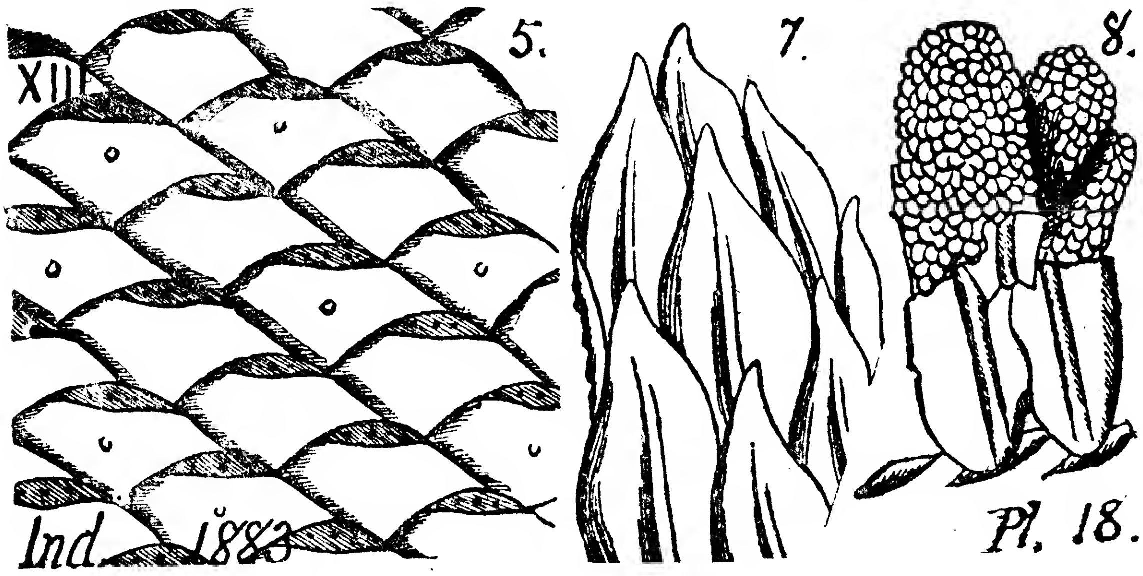
Lepidodendron ——? Specimen 883–9, (OO, p. 238) in Howell's collections, Tioga Co., N. Y. *Chemung*, *VIII g*.

Lepidolepis imbricata. See **Knorria imbricata**. *XIII*.

Lepidophloios laricinus, St. Coal Flora, p. 422, pl. 68, f. 1, *Darlington Coal* at Cannelton, Q, 55. *XIII*.

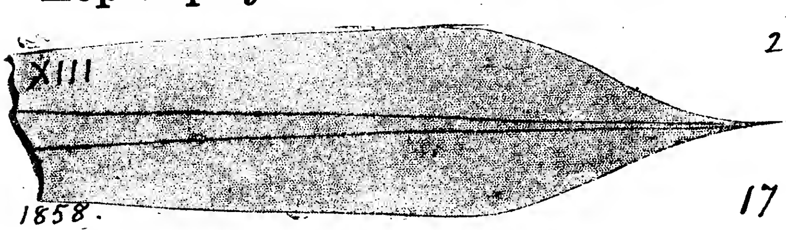
Lepidophloios ——? *Sharon* roof shales. Q, 3 p. 160. *XII.*

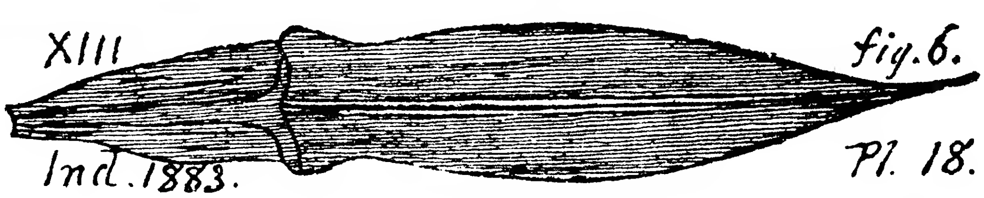
Lepidophloios macrolepidotus. Goldfuss, Flor. Sarræp.



Vol. 3, pl. 14; Schimper, Pal. Veg.; Lesquereux, Coal Flora, page 424, plate 68, fig. 2.) Collett's Indiana Report, 1883, page 90, plate 18, fig. 5, a fragment found on Grape creek. Ill. Figs. 7, 8, fruit of *Lepidophloios* discussed by Collett on page 89.—*XIII.*

Lepidophyllum acuminatum. Lesq. (Name pre-occupied by Gutbier, 1843, A. C. Miller.) Collett's Indiana Rt. of 1883, page 69, plate 18, fig. 6,



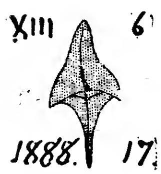


found with *Lep. auriculatus* at St. John, Ill. Geol. Pa., 1858, II, p. 875, pl. 17, f. 2; blade nearly an inch broad, 3 inches long; resembles *L. trinerve* of Ll. & Hutt. but has only two nerves.—Lowest coal, Johnstown, Cambria Co. Pa.—*XIII.*

Lepidophyllum affine. Lesquereux, Geol. Pa., 1858, Vol. 2, page 875. plate 17, fig. 5; differs form *L. lanceolatum* by its blunt blade and long pointed sporange.—Very scarce; but seen at New Philadelphia *anthracite mine*, Schuylkill Co., Pa. *XIII.*

Lepidophyllum auriculatum. Cannelton, Q, 55. *XIII.*

Lepidophyllum brevifolium. Lesq. Geol. Pa., 1858, Vol. 2. p. 876, plate 17, fig. 6. Common in the low anthracite coal at Wilkes Barre. Abundant in the *lowest coal bed* at Johnstown, Cambria Co., Pa.—*XIX.*

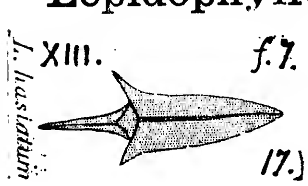


Lepidophyllum campbellianum, Lesq. Coal Flora, P, p. 786, pl. 107, figs. 6, 7, in the *Subconglomerate shale*, at Campbell's ledge, Pittston, Luzerne Co., Pa., G7, 40.—*XI.*

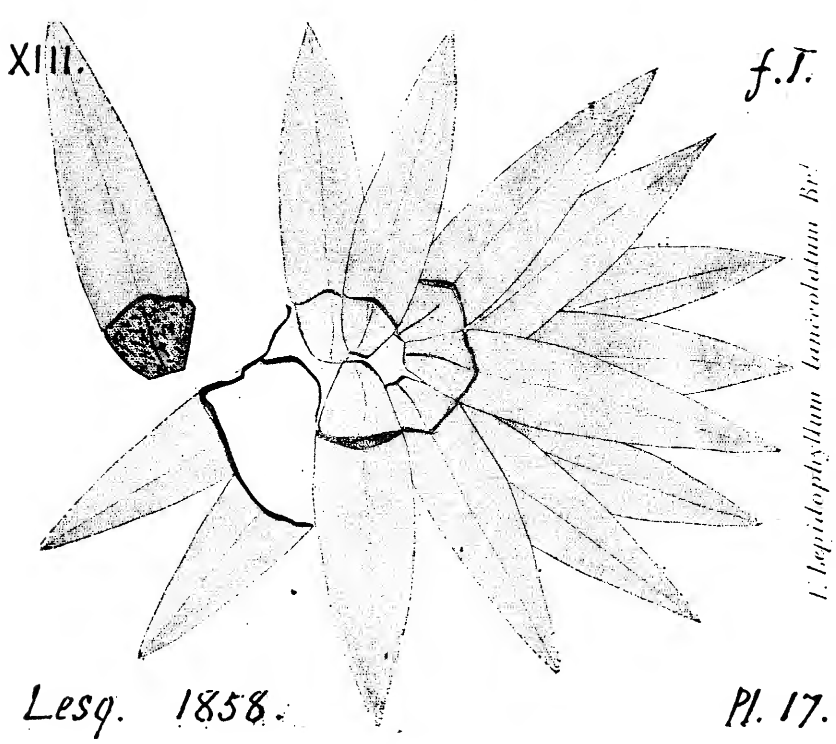
Lepidophyllum foliaceum (now *Lepidostrobus foliaceus* Lesq.) Geol. Rept. Ill. Vol. 4, p. 444, pl. 31, f. 10. Coal Flora, Pa., 1880, p. 445, pl. 69, fig. 8; found at places in Ill. and (as a sporange) in the *Darlington coal*, Cannelton. —*XIII.*

Lepidophyllum gracile. Coal Flora, P, p. 786, plate 107, fig. 8; found in *Subconglomerate shale*, Pittston.—*XI.*

Lepidophyllum hastatum, Lesquereux, Geol. Pa., 1858, p. 876, plate 17, fig. 7. Distinguished by the spreading points of the base of the blade. The specimen figured was found by the Rev. Mr. Moore "near Greensburg," Northumberland Co., Pa., possibly therefore in a coal bed of the *Barren Measures* (Pittsburgh series.)—*XIV?*

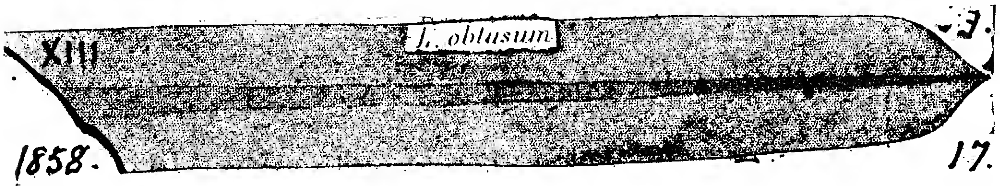


Lepidophyllum lanceolatum. Brongt. (Ll. & Hutt., Foss. Flor. I, pl. 7, fig. 3, 4.) Lesq. Geol. Pa., 1858, p. 875, plate 17, fig. 1, a beautiful specimen belonging to Mr. Chambers of Carbondale, Lackawanna Co., Pa.—XIII. Anthracite lower coal beds.—In *Subconglomerate*; Pittston. G7, 40—*XI.*



Lepidophyllum mansfieldi. Coal Flora, P, p. 449, pl. 69, fig. 34, found in *Darlington coal*, Cannelton, Pa., Q, 55.—*XIII.*

Lepidophyllum obtusum. Lesq. Geol. Pa., 1858, p. 875, pl. 17, f. 3; blade $\frac{3}{4}$ inch broad



and more than 4 in. long, traversed lengthwise by a broad swollen nerve. Broken pieces in the *lowest coal* at Johnstown, Pa., suggest a length of seven or eight inches.—*XIII.*

Lepidophyllum plicatum. Lesq. Geol. Pa. 1858, II, 876, plate 17, fig. 4. Nerve disappears at half the length of the blade (which is curved) in this unique specimen from the *Gate Vein* Pottsville, Pa. *XIII.*

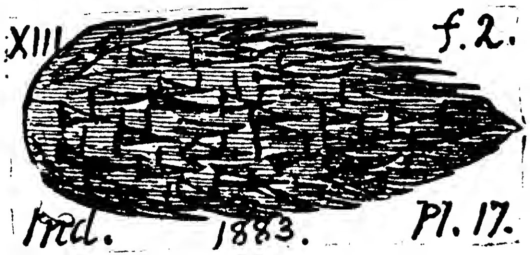
Lepidophyllum proliferum, in *Ferriferous limestone*, Lawrence Co. QQ, 47; Mercer Co. QQQ, p. 25.—*XIII.*

Lepidophyllum stantoni. Lesq. Coal Flora, p. 841; essentially differs from *L. hastatum.* Spec. 657, Lacoe's collection; Stanton *anthracite mine*, Wilkes-Barre, Pa.—*XIII.*

Lepidophyllum undulatum. Found in the *Darlington coal*, Cannelton, Beaver Co., Pa. Q, 55.—*XIII.*

Lepidostrobus butleri. New species. Lesq., Coal Flora, Additions, 1884, page 840. Closely resembles *Lep. variabilis*, Ll. & Hutt. Lacoe's specimen No. 681 came from the Butler *anthracite colliery* near Pittston, Luzerne Co.; specimen No. 681*a* from the neighboring Brown colliery.—*XIII.*

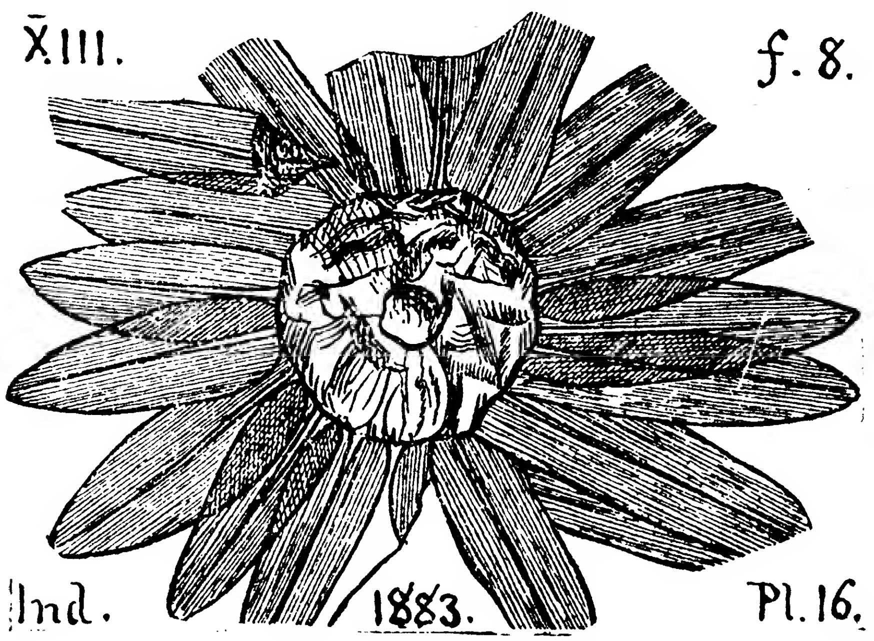
Lepidostrobus hastatus. (Lesquereux, Coal Flora, page 438, plate 69, figs. 27, 28.) Collett's Indiana Report of 1883, page 82, plate 17, fig. 2, representing the conical fruit of *Lepidodendron hastatum.* The separated blades of such a cone appear as in figs. 9, 10, 11. —Coal Measures. *XIII.* See also Lesquereux, in Geol. of Pa. 1858, Vol. 2,



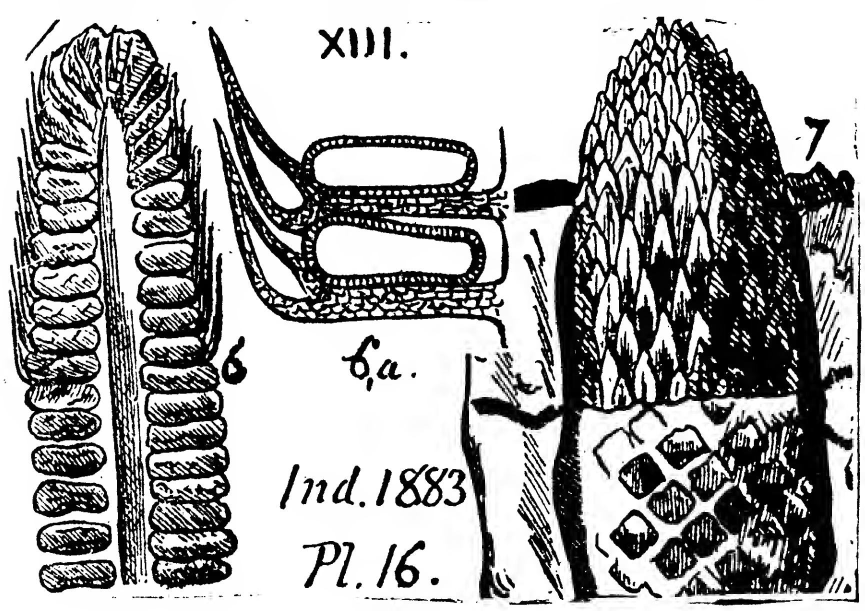
pages 456 and 876, plate 17, fig. 7; Schimper, Pal. Veg. Vol. 2, p. 65; also Lindley & Hutton, Vol. 1, plates 10 and 11, *Lep. variabilis.*—Lesquereux's figure is from *Subconglomerate shales* (XI) under Campbell's ledge, in the Pittston gap, Luzerne Co., Pa.—*XI.*—One is described from Mazon Creek, Ill.—*XIII.*

Lepidostrobus latus. New species. Lesquereux, Coal Flora, Additions, 1884, p. 841. Resembles both *L. lanceolatus* Brgt. and *L. prœlongus*, Lesq. but differs from both. No. 728 Lacoe's coll. from Olyphant *anthracite mine.*—*XIII.*

Lepidostrobus oblongifolius. Lesquereux, (Illinois Rt. Vol. 4, plate 30. Coal Flora, page 437, plate 69, fig. 29.) Collett's Indiana Report of 1883, page 83, plate 16, fig. 8. Rarely found in the Mazon creek nodules, Ill. One cross section shows the blades curved into the top of the stone (or kernal), showing thus shorter and blunter. Lesq.—*XIII.*



Lepidostrobus ornatus. Lindley & Hutton, (Fossil Flora, Vol. 1, plate 26; Vol. 3, plate 164; Hooker, Mem. Geol. Sur. England, Vol. 2, 1847, plates 7, 8; Lesquereux, Geol. of Pa. 1858, p. 876; Illinois Survey, Vol. 4, p. 448; Schimper,



Pal. Veg. Vol. 2, plate 62.) Collett's Indiana Rt. 1883, page 83, plate 16, figs. 6, 7, showing seed cases (sporanges) which when found separate have been sometimes mistaken for and described as fruit (*Carpolithes.*) Collett.—*Anthracite Coal beds* at Wilkesbarre, Pa.; small fragments in the Mazon creek nodules, Ill.; best specimens yet found are from *Kittanning Coal* bed roof shales at Cannelton, Pa. Lesq.—*XIII.*

Lepidostrobus variabilis. See **L. hastatus.** *XIII.*

Lepidostrobus, in fragments, are found mixed with the myriads of *Alethopteris pennsylvanica* leaves, which make up most of the roof shale of the *Cook bed* (bed B) at Powelton, and McHugh's mines, Broad Top, T3, p. 61, 62.—*XIII.*

Lepocrinites gebhardi. See **Lepadocrinus gebhardi.** *VI.*

Leptæna alternata. See **Stroph. alternata.** *II c, III b, V a.*

Leptæna concava. Hall, (*Orthis concava,*) Pal. N. Y. Vol. 3, 1859. *Low. Held. limestone.* Found by Dr. Barrett at Port Jervis, on the Delaware river. G6, page 134.—*Stormville limestone* (Lower Helderberg) *VI.—See Appendix.*

Leptæna deltoidea. See **Strophomena deltoidea.** *II c.*

Leptæna depressa. See **Strophomena depressa.** *V a, V b.*

Leptæna fasciata. See **Strophomena fasciata.** *II b.*

Leptæna incrassata. See **Strophomena incrassata.** *II a.*

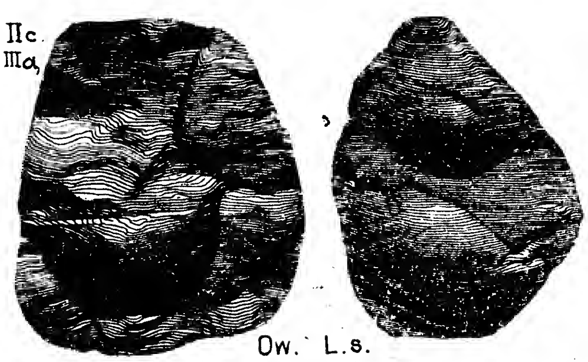
Leptæna interstrialis. See **Stroph. interstrialis.** *VIII g.*

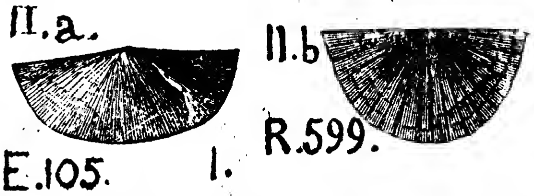
Leptæna patenta. See **Strophomena patenta.** *V a.*

Leptæna punctulifera. See **Strophodonta punct.** *VI.*

Leptæna rugosa. See **Strophomena rugosa.** *VI.*

Leptæna sericea. (*Strophomena sericea,*) Rogers, Geol.

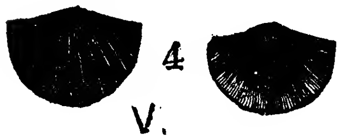




Pa., 1858, page 818, fig. 599. Emmons, page 394, fig. 105, 1. *Trenton* formation, *II c.* Rogers, page 820, *Loraine* formation.—Also in *Clinton* formation. (Sowerby, in Murchison's Sil. System, 1839.) Owen's figures from the Magnesian limestone of the Red River of the North and Great Lake Winnepeg, are added for comparison. 1852, pl. 2A, figs. 11, 12.—*II c.*—Numerous in the lower beds of *Trenton* limestone at Churchville quarry, Northampton Co., Pa. D3, p. 162. Lie in colonies in the limestone slabs in the quarries on the Delaware river at Howell's cotton mill, D3, p. 163. Very abundant in some of the *Trenton* beds on the Little Juniata, T3, p. 367; and in Centre Co. T4, page 424, in Trenton, and p. 427, in Loraine shale. In Bedford Co., Cove Creek, in *Upper Trenton* beds, T2, 164; and found by Stevenson in a block of soft red sandstone, summit of road from Friend's Creek into Morrison's Cove, Evitt's mountain, top of *Loraine shale*, T2, 170.—Specimens in Claypole's collections, 223–5 (nine specimens with *Discina*, *Strophomena*, and *Orthis testudinaria*) S–19, X–24 (two.)—Specimens (OO, p. 231) 203–8 B (one or two interiors, excellent for figuring; exteriors not so good; and with a beautiful *Stictopora acuta*, A); 203–46; both from Bellefonte,—210–1 (several ventral and dorsal valves, interior of ventral valve pretty fair; the dorsal valves form a very pretty slab); 210–6 (a mass of mostly crushed shells); 210–11 (A. fair for drawing; B. interior of ventral valve excellent); 210–30 (mostly poor interiors); 210–44 (very poor); 210–50 (small, numerous, poor); 210–61 *a* (poor); 210–76 (exterior and interior, fair to good); 210–90 (both poor); 210–93 (mostly interiors and poor); 210–103 (large slab covered with specimens); 210–110 (mostly interiors and ventral valves, some of them excellent); 210–111 (many good interiors); 210–114 (mostly interiors of ventral valve, fairly good); 210–116 (mostly interiors, fair); 270–119 (dorsal valve and interior of ventral, not good); 210–123 (many interiors, fair. The whole slab would make a good illustration). 210–126 (fair); 210–147 (two); 210–135 (two, fair); 210–141 (two); 210–146 *b*; 210–147.—*II c*, *III b*, *V a*.

Leptæna striata. Hall, Pal. N. Y. Vol. 2, 1851, page 259, plate 53, fig. 7. (For figure see *Strophomena striata*, Hall, 4th Dist. N. Y., 1843, p. 104, fig. 3.) Recognized by G. B. S. at McKee's, Mifflin Co., Pa, in specimen 501–49, from roof shale of *Clinton fossil ore*, *V a*.—*See Appendix.*

Leptæna transversalis. (*Strophomena transversalis.*) Hall, page 104, fig. 35, 4, *Niagara* formation, *V b*. (Dalman, Vet. Acad. Handlungen. *Anticosti formation* of Canada.—*V b*.



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V.

Leptœna trilobata. See **Strophomena trilobata.** *II c.*

Leptæna —— ? abundant in the Crinoidal limestone of the *Pittsburgh series* (Lower Barren Coal Measures). Stevenson in Trans. Am. Phil. Soc. Philada. Vol. 15, page 26.—*XIV.*

Leptocœlia acutiplicata, (*Atrypa acutiplicata,* Conrad, Ann. Rt. N. Y., 1841, *Upper Helderberg.*) Found by I. C. White, in the *Selinsgrove lower limestone,* (*Corniferous,* or *Marcellus*) in Northumberland Co., Pa., G7, pp. 79, 80, 360. See Claypole's 91–1; 223–5 (nine).—*VIIIa, b.*

Leptocœlia dichotoma (now **Coelospira dichotoma.**) *See Appendix.*

Leptocœlia flabellites (*Atrypa flabellites,* Conrad An. Rt. N. Y., 1841, *Oriskany.*) Found by I. C. White, in Cooper township, Montour Co., Pa., G7, pp, 86, 297. Claypole's Catalogue, Spec. 95–8. In Bedford Co., on Wills creek, bed 39 of the Hyndman section (104′ to 169′ beneath the top of *Oriskany*) is rich in it. Stevenson, T2, 104.—*VII.*

Leptocœlia hemispherica (*Atrypa hemispherica.*) Hall,

V.

17. 4.

1843, page 72, fig. 17, 4. *Clinton.* (Sowerby, p. 829, in Murchison's Silurian Researches, pl. XX, f. 7.—At Matilda furnace *fossil ore* bank, Mifflin Co., Pa., in the *Clinton* roof shales, Hale & Hall got specimens 503–1–2–7.—At Patton's limestone ore bank, near Hollidaysburg, Blair Co., Sanders got specimens 513–1, 513–8.—At Cambria Iron Co.'s slope on Frankstown *fossil ore bed,* specimen 514–2 (?)—In the roof slate of the Frankstown bed, specimens 515–2 (?) and 515–3.—*Va.*

Leptocœlia imbricata, Hall, 10th Rt. 1857. *Lower Helderberg,* crowded in a thin layer of limestone (150′ beneath the bottom of Oriskany sandstone) at Bedford station, followed by Stephenson to Bedford, and well exposed under the African church. T3, p. 149.—*VI.—See Appendix.*

Leptocœlia intermedia. *See Appendix.*

Leptocœlia —— ? in the shales enclosing the *Clinton* siliceous fossil ore bed, $1\frac{1}{2}$ miles beyond Yellow creek, Hopewell township, Bedford Co., Pa., T2, p. 198.—*Va.*

Leptocœlia —— ? *a rare form;* Specimens 810–1 and 810–4, in Fellows' collections in Hogs-back ridge, Pike Co., Pa., from *Upper Helderberg rocks, VIIIa.*

Leptodesma acanthoptera; wrongly named *Avicula acanthoptera* on p. 67 above. (R. P. W.)

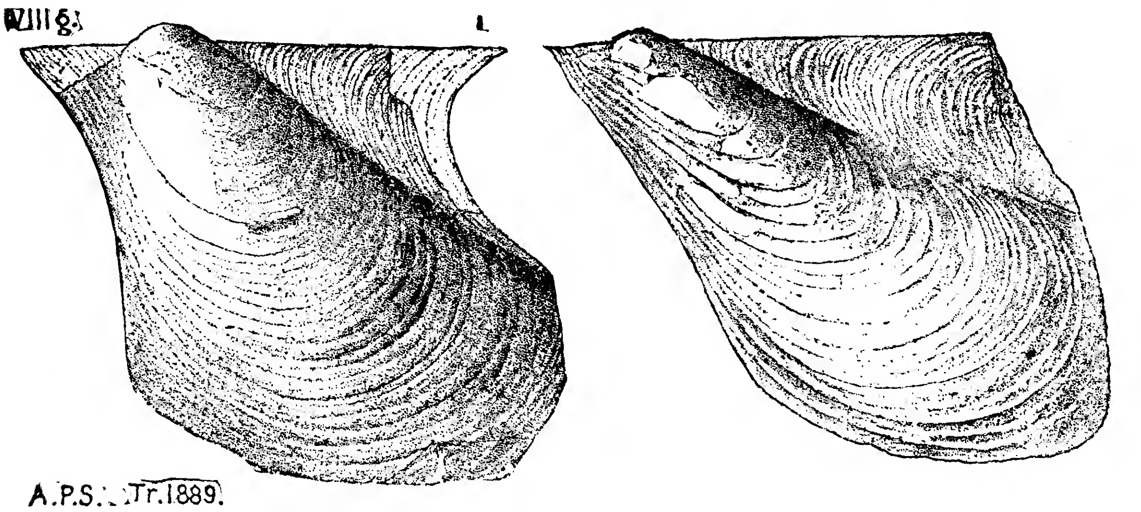
Leptodesma beckii. Hall. Specimens 238–1–4, Claypole's Cat. from mouth of Raystown branch Juniata, Hunt. Co., Pa., *Chemung*, *VIIIg.—See Appendix.*

Leptodesma demus; recognized by G. B S. in specimen 853–6, of Sherwood's collections at Tioga village, Tioga Co., Pa., from *Upper Chemung*, *VIIIg.—See Appendix.*

Leptodesma galene, specimen 9502 of Randall's collections at Warren, *Upper Chemung*, *VIII.—See Appendix.*

Leptodesma lamellatum. Recognized by G. B. Simpson in Randall's Collections at Warren, Pa. Catalogue No. 9502 B.—*See Appendix.*

Leptodesma leiopteroides, Simpson. *New Species.* Trans.



A. P. S. Phil. Dec. 21, 1888, page — pl. — fig. — founded on specimens 9495, 9554, 9555, 9556, of Randall's Collections near Warren, Pa. (wrongly labeled *Avicula.*)—*Chemung*, *VIIIg.*—For description *see Appendix.*

Leptodesma lichas? Hall, (Pal. N. Y., Vol. 4, pl. 91, fig. 19). Specimen 852–7, OO, p. 236, in Sherwood's collections near Covington, Tioga county; also 855–4 and 855–25 (Hall's plate 21, figs. 35, 36,) from Sullivan township; 858–16, one mile north of Mansfield; and 860–42 (Hall's pl. 21, f. 37) from near Mansfield; all from *Upper Chemung*, *VIII g.—See Appendix.*

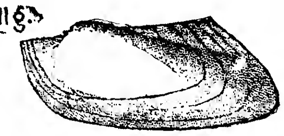
Leptodesma mortoni. Hall, Pal. N. Y., Vol. 5, pl. 21, f. 29. Specimen 862–3, (OO, p. 236) Ashburner & Fellows' collections, 1876, near DeGolier, Tuna creek, McKean county, Pa. *Chemung*, *VIII g.—See Appendix.*

Leptodesma naviforme, recognized by G. B. Simpson, in Specimen 850–18, in Sherwood's coll., at Lawrenceville, Tioga county, Pa., from *Chemung*, *VIII g.—See Appendix.*

Leptodesma phaon, recognized by G. B. Simpson, in Specimen 850–18, in Sherwood's coll., at Lawrenceville, Tioga county, Pa., from *Chemung*, *VIII g.—See Appendix.*

Leptodesma parallela. (N. S. Simpson) Trans. A. P. S. Phil. Dec. 1888, founded on specimen No. 9610 of Randall's collections, on the hill north of Warren, Pa., and wrongly labeled *Cypricardia.—Chemung*, *VIII g.*

VIII g.



A.P.S.XTr.1889.

Leptodesma potens. Hall. Specimen 59–9, Claypole's catalogue, top of Pisgah hill, Perry Co., Pa. *VIII.* OO, p. 237, specimen 856–25, in Sherwood's coll. at Mixtown, Clymer township, Tioga Co., Pa., from *Chemung upper beds*, *VIII g.* 871–6, in Ashburner's coll. 1 m. N. of Salamanca, N. Y., from strata below the *Salamanca conglomerate*, *VIII g.—See Appendix.*

Leptodesma propinquum. Hall. Pal. N. Y. Vol. 5, pt. 1, pl. 41, fig. 17, 16. Specimens in cabinet: 858–6 (two); 858–7; Sherwood's collection at Mansfield, Tioga Co., Pa. *Upper Chemung*, *VIII g.—See Appendix.*

Leptodesma protextum, recognized by G. B. Simpson in specimens 855–39, of Sherwood's coll. at Sullivan town., Tioga Co., Pa., and 9611 of Randall's collection at Warren, Pa. (wrongly labeled *Cypricardia*); both from *Upper Chemung*, *VIII g*, or *VIII–IX.—See Appendix.*

Leptodesma robustum, recognized by G. B. Simpson in specimen 809–6 (?) Hall & Fellows' coll. near Port Jervis, Pike Co., Pa., from *Hamilton strata*, *VIII c;* and 853–5, in Sherwood's coll. at Tioga village, Tioga Co., Pa., from *Chemung upper strata.* *VIII g*, *VIII–IX.—See Appendix.*

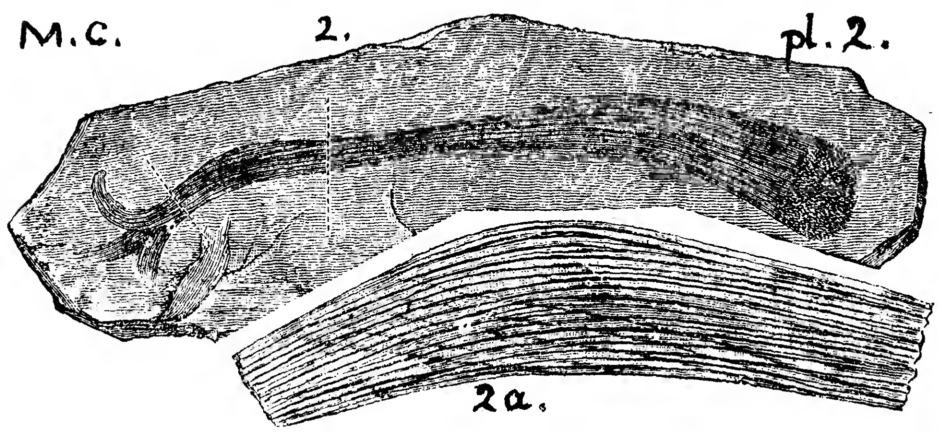
Leptodesma stephani, recognized by G. B. Simpson in specimen 852–7, in Sherwood's coll. near Covington, Tioga Co., Pa., from *Chemung upper rocks*, *VIII g.—See Appendix.*

Leptodesma ——— ? 850–19; 853–5 (two, in fair condition); 853–6 (several fragments not determinable); 855–32 (in fair condition); 855–39 *d* (margins broken); 856–25; 858–9; 858–16 (requires work to dig it out for determination);

859–10 (very poor); 859–11 (three specimens of some as yet unfigured species); 861–21 (large); all the above in Sherwood's collection from Bradford and Tioga counties. 864–1 (two specimens, different from any of Hall's figured species ?) from the Lafayette and Big Shanty road, McKean Co.—Also 883–4 (impression) Roulette, Potter Co., *Chemung*, *VIII g*.

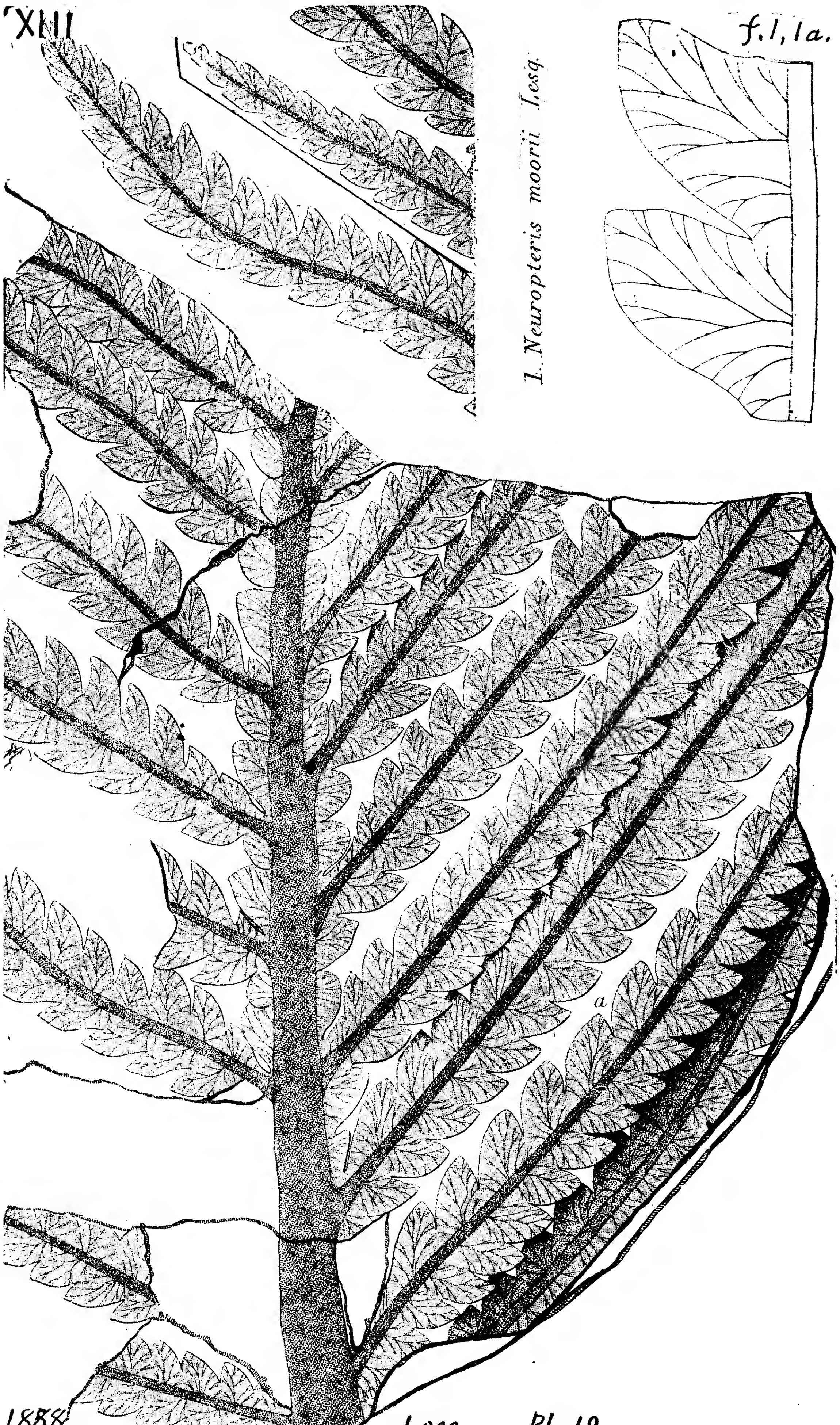
Leptodesma ——— ? not **Avicula** ——. Rogers, p. 829, f 678, as stated on page 162 above. (J. H.)

Leptomitus zitteli, Walcott, Bulletin U. S. G. S. No. 30, page 89, plate 2, fig. 2, type specimen; 2 *a* enlargement of a portion marked by dotted lines. In fine grained argillites of Parker's quarry, Georgia township, Vt. Other fragments have been found. Resembles a bundle of the long needles of *Hyalonema* (a genus of *sponges*). The resemblance to *Serpulites dissolutus* (Billings) in *Trenton limestone*, is considered deceptive by Walcott, who puts it in *Lower Cambrian*. *See foot note to p. 134 above.*



Lescuropteris adiantites. (*Neuropteris adiantites*. Lesquereux, Jour. Soc. Nat. Hist. Boston, Vol. 6, p. 419; Geol. Pa., plate 20, fig. 1. Re-named, because distinctly related to *Lescuropteris moorii*, Schimper. Supposed to have been found in clay over Pittsburgh coal bed at Irwin Station, Pa., Coal Flora, page 163, plate 26, figs. 4, 4*a*.) Collett's Ind. Rt. 1883, page 57, plate 11, fig. 6. Upper coal. Also South Salem vein, Pottsville, Pa. *XV*.

Lescuropteris moorii. *Neuropteris moori* Lesq. Geol. Pa. XIII f. 1, 1a.

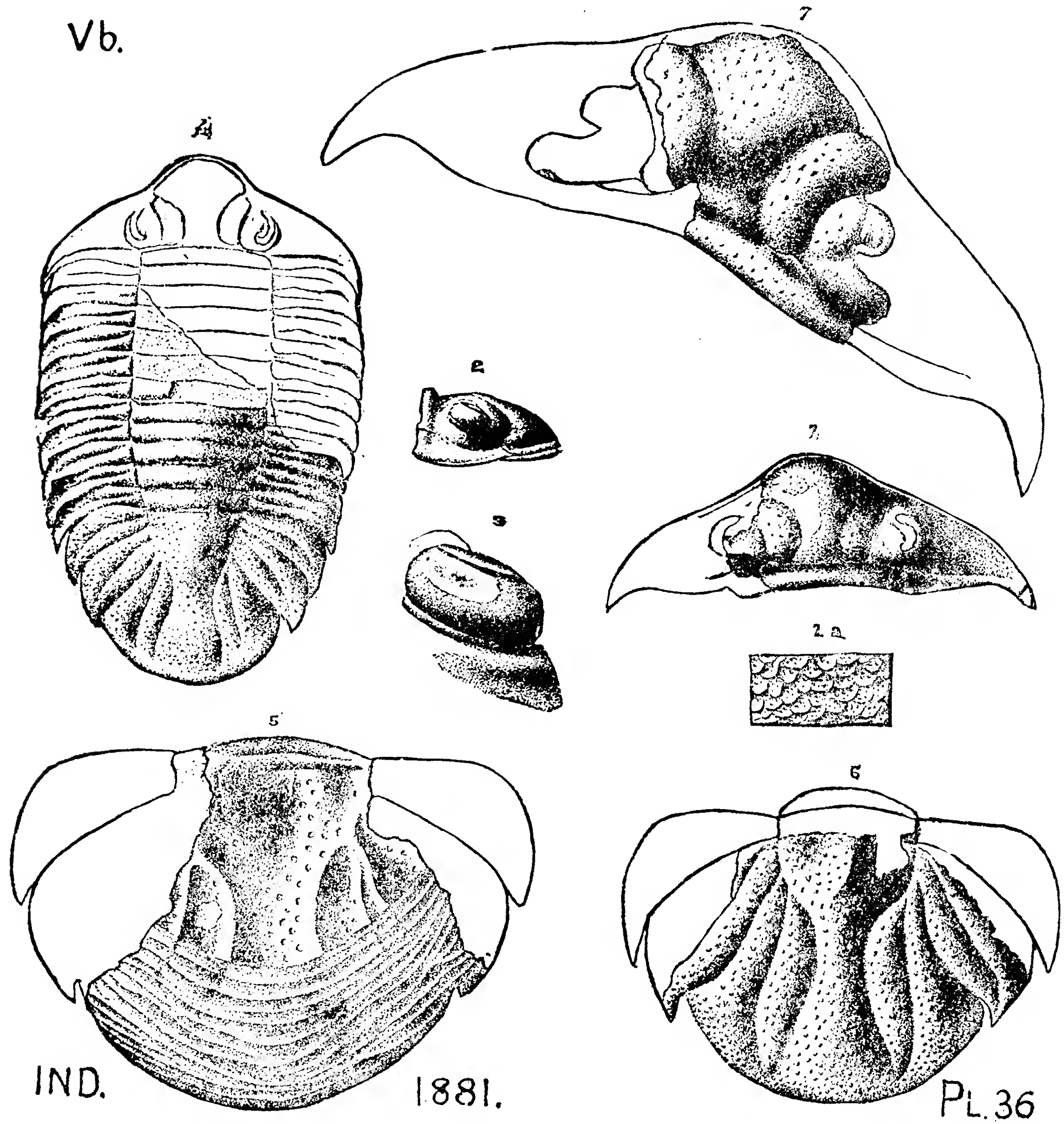


1888 Lesq. Pl. 19.

Lesleya microphylla. Lesq. Additions to Coal Flora, page 831, two leaves from Kansas in Lacoe's collections at Pittston, Pa.—*XIII.*

Libellula carbonaria, *See page 336.*

Lichas boltoni, *var.* **occidentalis,** Hall. (For citations,

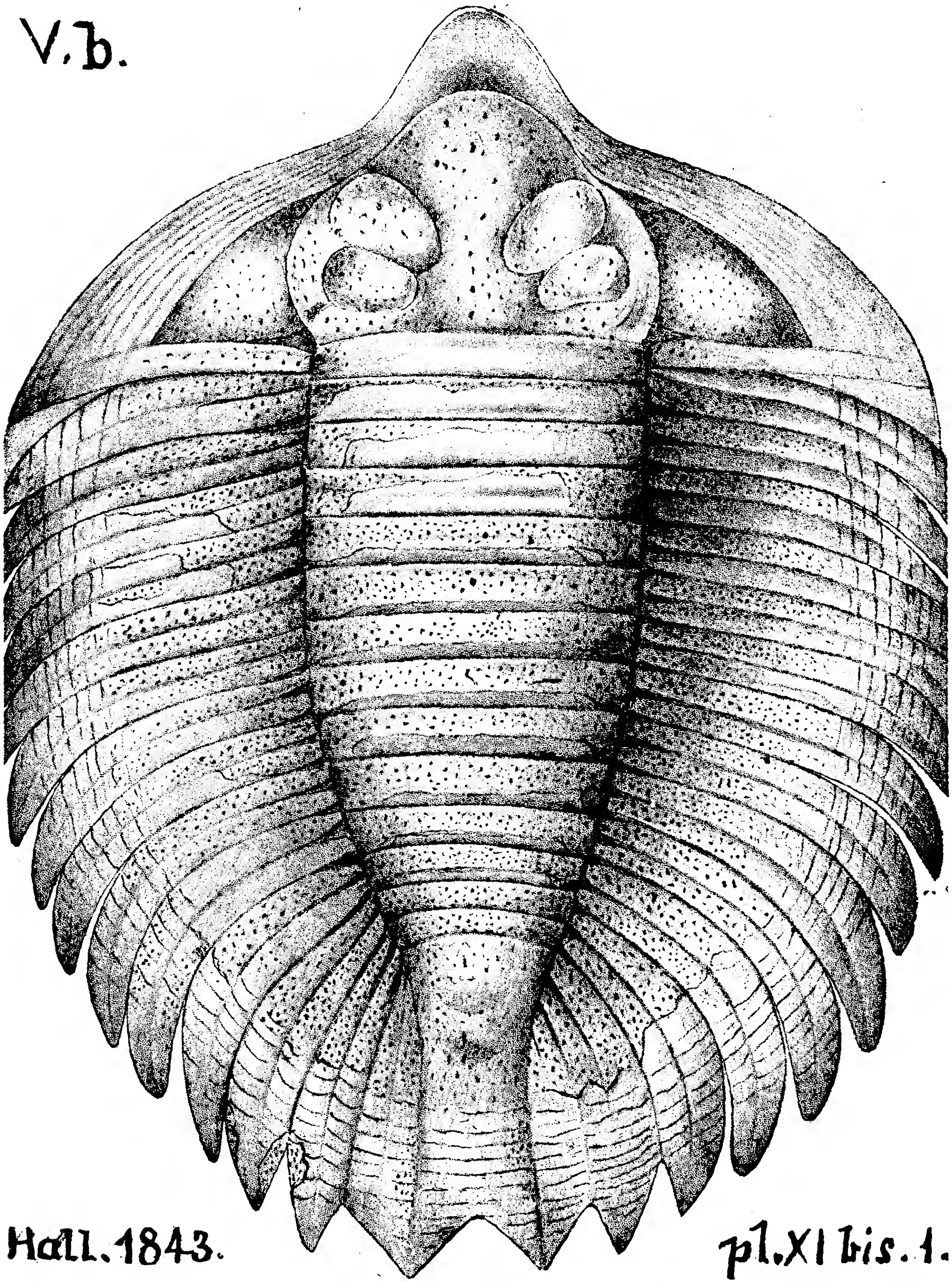


see Pal. N. Y. Vol. 2, 1852, page 311.) From Collett's Indiana report of 1881, p. 344, plate 36, fig. 8, lower side of a large perfect tail; fig. 9, upper side of smaller tail, split by pressure; fig. 10, lower side of smaller tail; fig. 11, hypostoma (chin-piece) resembling those from the *Niagara shale* of New York; fig. 12, front extension of a head of some trilobite of the *genus.* This species is known almost entirely from mostly imperfect tails, which vary in the same locality. The animal reached a large size, one fragment of body segment being found half an inch wide.—*Niagara. Vb.*

Libellula carbonaria. Scudder. Probably an arachnid (spider family) and not a cockroach of the genus *Anthracomartus*. Proc. Amer. Ass. A. S. Vol. 24, B., 1878, p. 110, f. 1. Bull. U. S. G. S. No. 31, 1886, p. 25. Zittel, p. 236. (R. D. L.)

Lichas boltoni. (*Palynotus—Paradoxides.*)—Hall, plate

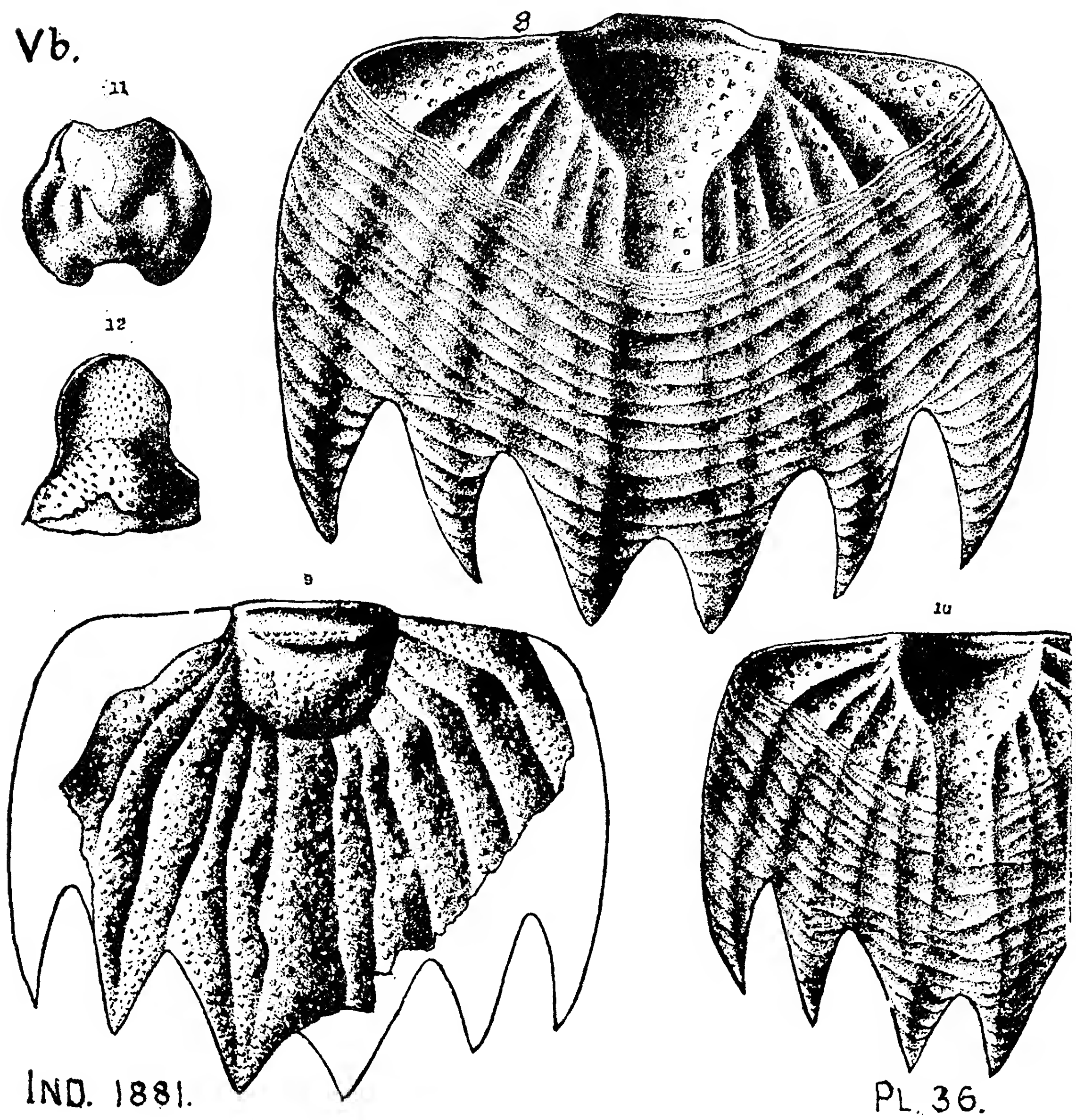
V. b.



Hall. 1843. pl. XI bis. 1.

fig. [11 bis, 1]. *Niagara formation.*—(Bigsby, 1825, Jour. Acad. Nat. Sci. Phila. Vol. IV.—Green's Monograph, p. 60. A rare trilobite (Hall).—*V b.*

Lichas breviceps, Hall. (Trans. Alb. Inst., 1863; 28th Rt.

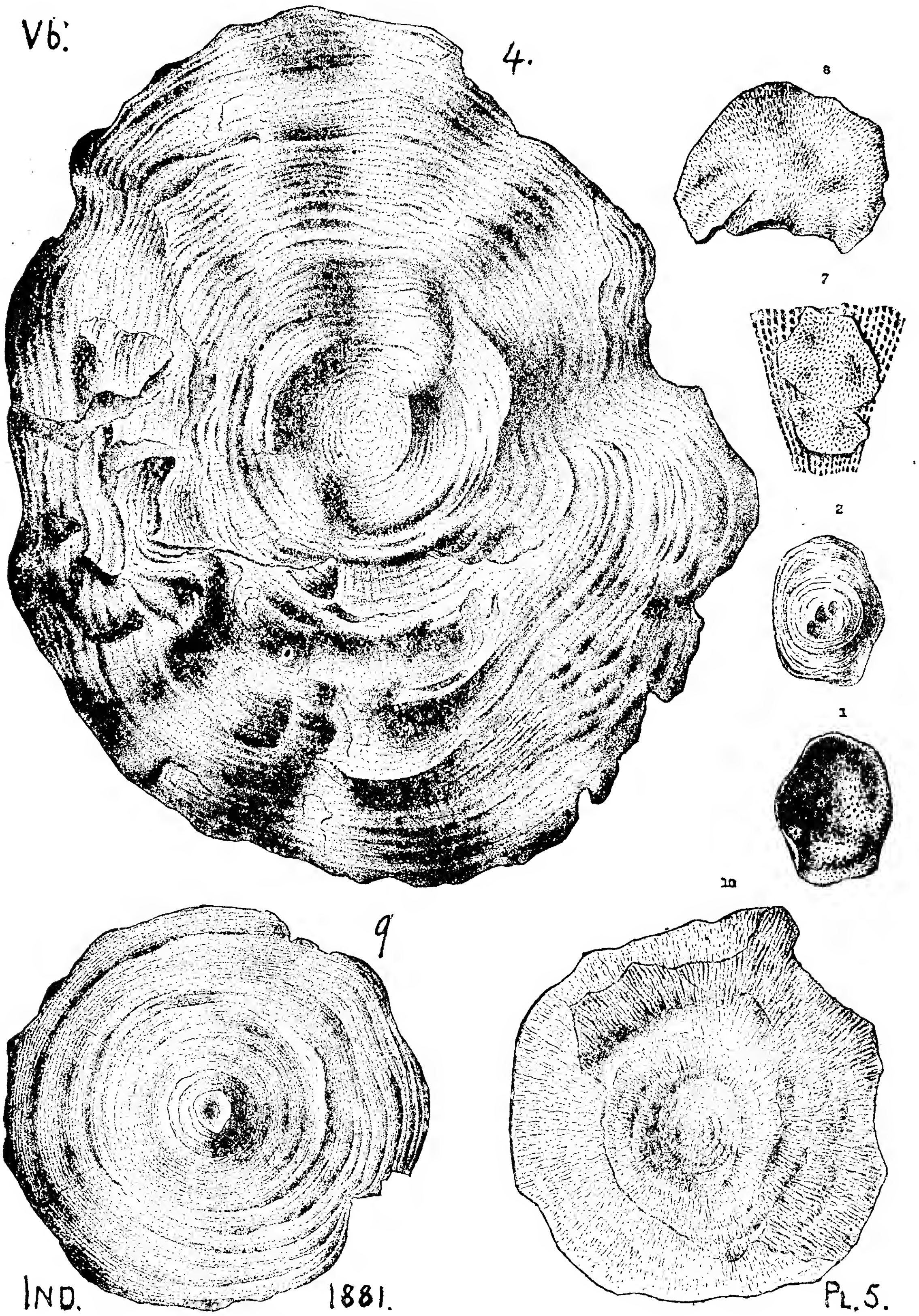


St. Mus. 1879, etc.) Figures taken from Collett's Indiana Report of 1881, p. 343, plate 34, fig. 1, upper surface of imperfect head; 1 a, *enlargement* of surface of glabella; 2, profile of same to show elevation of glabellar lobe; 3 *enlargement* of the eye; 4, imperfect body (thorax) and tail (pygidium) restored in outline; 5, under surface of large imperfect tail, showing striæ of enfolded border; 7, central portion of large glabella. Surface of animal, marked by pustules, and a few short hollow spines. Resembles the Cincinnati (Hudson river) blue shale trilobite *Lichas* (*Platynotus*) *trentonensis*, but the head is shorter and the tail broader and with straighter end border.—*Niagara*, *Vb*.

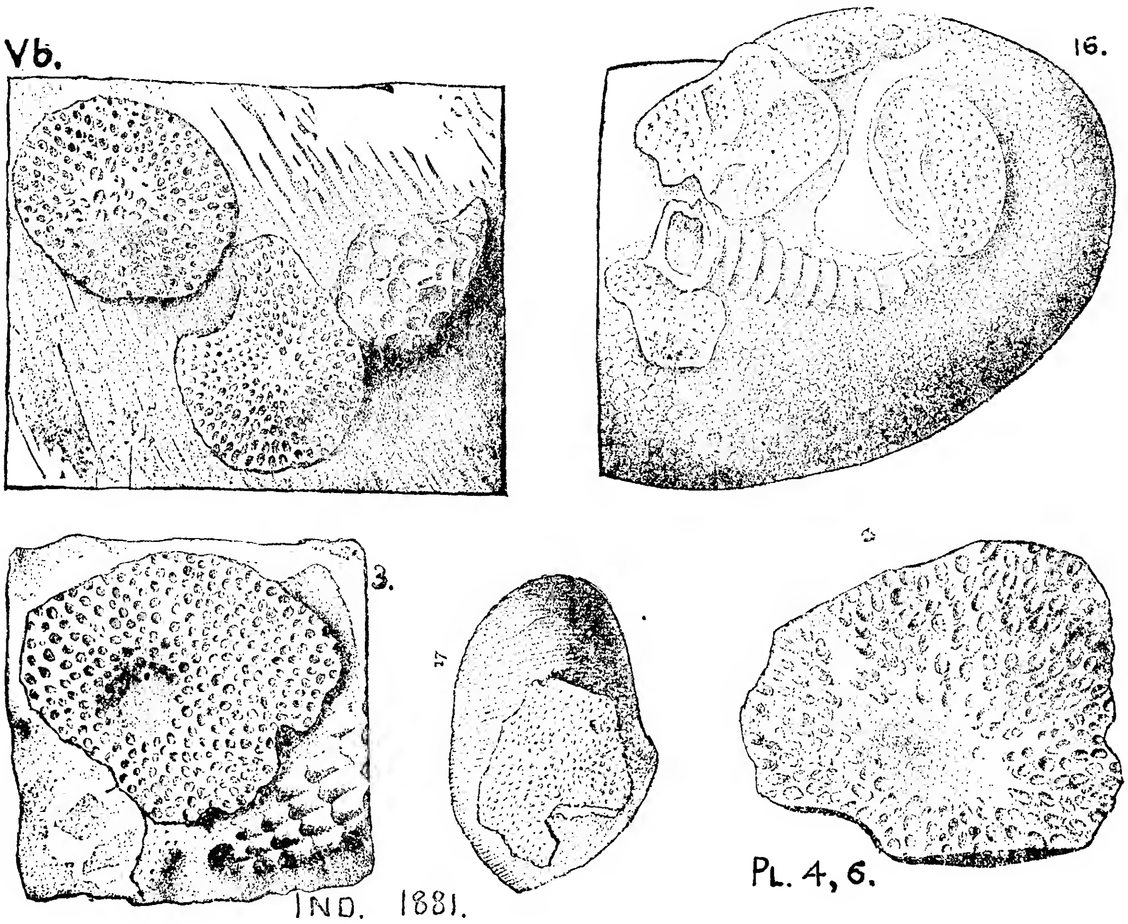
Lichas grandis. See **Terataspis grandis.**— *VII*.

Lichas pustulosus. Hall, Pal. N. Y. Vol. 3, 1859, *Lower Helderberg.* Found by Dr. Barrett, at Port Jervis, on the Delaware, I. C. White's *Stormville limestone.* G6, p. 134.— *VI. See Appendix.*

Lichenalia concentrica, Hall. (Pal. N. Y. Vol. 2, 1852;

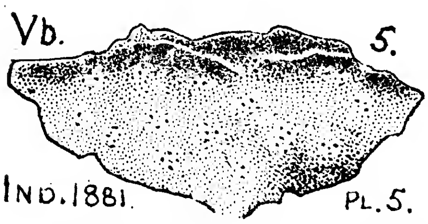


28th An. Rt. Mus. N. Hist. 1879.) From Collett's Indiana Beport of 1881, p. 240, plate 4, figs. 9 to 17; plate 5, figs. 1 to 10; plate 6, figs. 3 to 11; from which I have selected figures to



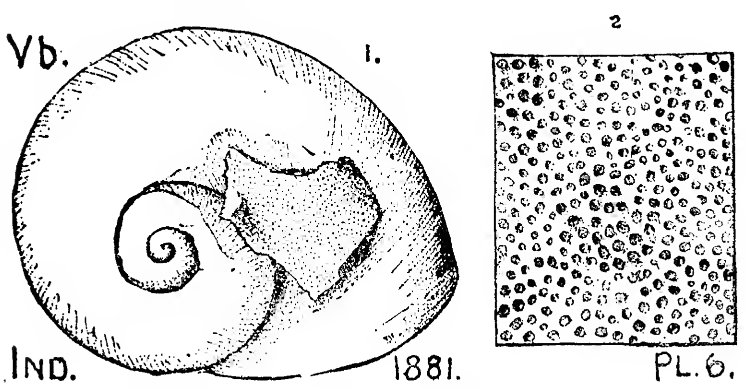
show the parasitic character of this bryozoon. (Plate 4, f. 9, a small irregular specimen; f. 10, another, the frond enrolled on itself; f. 11, section of 10 showing the great increase of length of cell in rolled part; f. 12, cell surface of encrusting specimen, showing tendency to tubular extensions and branches; f. 13 *enlargement* of cell structure of the last; f. 14 *enlargement* of 12, with some of the cell mouths angular; f. 15, another *enlargement* with large cells; f. 16, four young *Lichenalia* and the base of a *Cornulites*, growing on a *Strophostylus cyclostomus* shell, covered below with another parasite (*Paleschara*); f. 17, a young one on a *Platystoma niagarense* shell.—Plate 5, f. 1, 2, upper and lower surface of young *Lichenalia;* f. 4 under surface, irregular growth, concentric markings; f. 7 two young ones on a *Fenestella;* f. 8, lower surface of a small fragment, through which show the lengthened cell structure; f. 9, ditto showing concentric markings; f. 10, ditto, showing radiating grooves on its base, made by cells curving upward toward surface. Plate 6, f. 3, *enlarged*, young *Lichenalia* growing on an *Atrypa* shell; f. 4, 5, 7, 8, *enlarged*, specimens growing on *Fenestella;* f. 6, *enlarged four times*, a group of two young *Lichenalia*, and a young *Favosites*, on a *Strophostylus* shell; f. 9, 10, *enlarged*, lower surfaces; f. 11, *enlarged*, cross-section, showing depth of cells and thickness of skin in old individuals.

Lichenalia concentrica, *var.* **maculata,** from Collett's Indiana Report of 1881 p. 241, plate 5, fig. 5, a small irregular specimen, with unusually distinct maculæ upon the celluliferous surface. (Hall, 28th Rt. pl. 6, figs. 3, 5, 6.)—*V b.*



Lichenalia concentrica, *var* **maculata,** *Hall.* Page 241. Upper or celluliferous surface of a regularly growing specimen of medium size, showing tubercles with maculæ of larger cells. The cells are represented much larger than they really are on the specimen.

Lichenalia concentrica *var.* **parvula** (Hall Doc. Ed. 28th Rt. State Museum, N. Y. 1876, pl. 7, f. 12; Mus. Ed. 1879, p. 147.) Figures from Collett's Indiana Report of 1881, p. 241, plate 6, fig. 1, a fragment growing on a *Strophostylus* shell; fig. 2, *enlargement* of a portion, showing the cells much smaller and more distinctly circular than in the ordinary form of the species.—*Niagara*, *V b.*



Lichenalia concentrica. It is probably the under surface of this bryozoan which is figured on page 153, and erroneously named **Crania corrugata.** (R. P. Whitfield.)

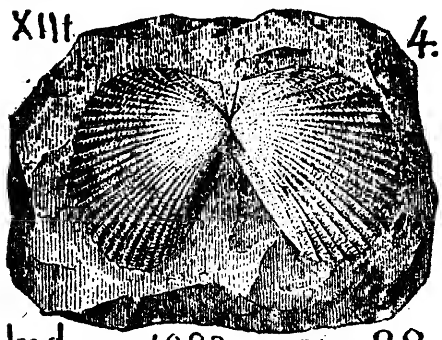
Lichenalia ? (Hall, Pal. N. Y. Vol. 1, 1847, *genus in Trenton and Hud. river.*) Found in the Millertown *Clinton* fossil ore bed, Perry Co., Pa. Claypole's specimen 46–5; and at 1 m. N. of Dilville, Perry Co., in *Chemung.* Spec. 109–9 (perhaps wrongly labeled and placed)—*V a; VIII g.—See Appendix.*

Lima glaber. See **Pernopecten glaber,** *VIII g.*

Lima obsoleta. See **Pernopecten obsoleta,** *VIII g.*

Lima rugæstriata. See **Aviculopecten rugæstriata,** *VIII g.*

Lima retifera. (Shumard, Trans. St. Louis Acad. Sci. Vol. 1, 1858.) Collett's Indiana Report of 1883, page 188, plate 28, fig. 4, a natural cast of both valves, *natural* size; a somewhat rare Coal Measure shell, of rather wide geographical range.—KK, p. 276, *Pittsburgh series* (Barren Coal Measures) 440′ below Pittsburgh coal bed.—L, 35, in Crinoidal limestone 250′± below Pitt. C. Fayette Co., Pa.—KKK, p. 310, in bed No. 23 of Coal Measure section, Stevenson.—*XIV.*



Limaria crassa. (Rominger, Fossil Corals of the Niagara formation, 1876.) A. Winchell's Geol. Studies, 1886, page 223, fig. 155, 156.—*Niagara formation, V b.*

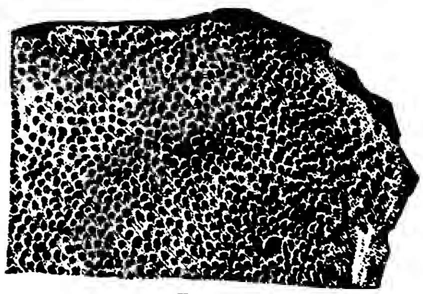


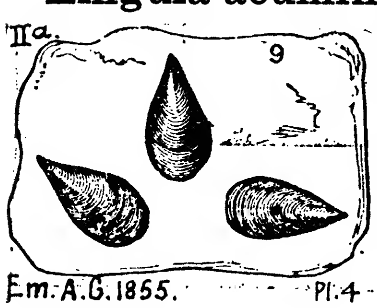
Fig. 155.
Limaria crassa, Rom.

Limoptera macroptera. (*Lima macroptera*, Conrad, An. Rt., N. Y., 1838, *Hamilton*) found by Claypole at Junkin's farm, 5 m. S. of New Bloomfield, Perry Co., Pa. Specimen 57–51 (five examples) in *Chemung-Catskill passage beds, VIII–IX.—See Appendix.*

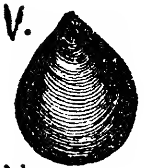
Limulurus, in shale partings in *Clinton fossil ore bed* at Wolfsburg, Bedford Co., Pa. Stevenson, T2, p. 144.—*V a.*

Lingulas and *Orbiculas* in colony. See Owens' figure under **Orbicula.**

Lingula acuminata. (Conrad; An. Rt., New York, 1839, *Potsdam* and *Calciferous.*) Emmons, Amer. Geol. 1855, Vol. 1, part 2, p. 203, plate 4, fig. 4; showing three of these long pointed shells, as they lay buried in the sand.—*Calciferous sandstone, II a.*

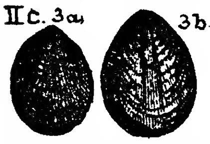


Lingula acutirostra, Hall. Report on Fourth District of



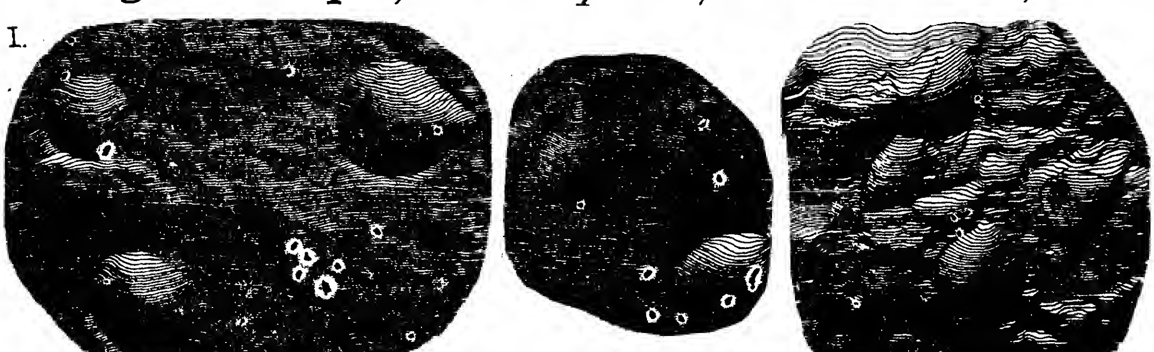
New York, 1843, page 76, fig. 18, 9; a shell of the *Clinton formation*, readily distinguishable from all other New York *lingulæ*, by its acute point; surface marked by a single series of rather course striæ; larger than *L. acuminata*, and striæ stronger.—*V a.*

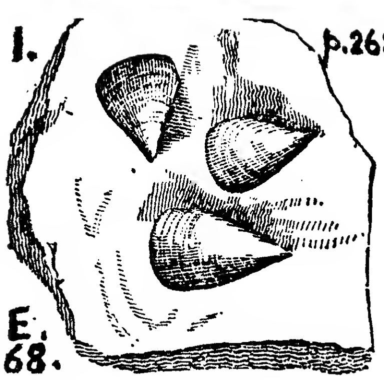
Lingula æqualis, Hall. (Pal. N. Y., Vol. 1, 1847, *Trenton.*) Emmons, Amer. Geol. Vol. 1, part 2, 1855, p. 203, plate 8, figs. 3*a*, 3*b*, closely resembling *Lingula riciniformis.*—*Trenton formation*, *II c.*



Lingula ampla, Owen. Geol. Wis., Iowa and Minnesota, 1852, plate 1B, fig. 5, 12; from the *Lingula grits*, upper Mississippi river near Mountain island, supposed to be the western extension of the *Potsdam sandstone.*—*I.*

Lingula antiqua, with *L. prima*, Owen. Geol. W., I. and





Minn. 1852, pl. 1 B, f. 2, 7, 10, from the *St Croix* (Potsdam) *sandstone* at the falls of the St. Croix river; specimens usually much larger than those of the New York Potsdam.—Emmons, page 268, fig. 68. *Potsdam* formation. (Rogers, pp. 815, 816, says that it somewhat resembles *L. curta*, *II c.*)—*I.*

Lingula centrilineata, Hall, 1859, Pal. N. Y. Vol. 3, *Low. Held.* Claypole's list (doubtful), *VI.*—*See Appendix.*

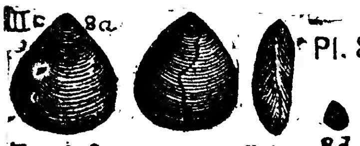
Lingula clintoni. See *Lingula oblonga.*— *V a.*

Lingula concentrica, Vanuxen, page 168, figs. 42, 4. Hall, page 223, fig. 94? 4, *Genesee formation.* (Rogers, finds in the Genesee two species of Lingula, with *Goniatites interruptus;* Geol. Pa., 829.—Conrad, 1839).— *VIII e.*

VIII. e.

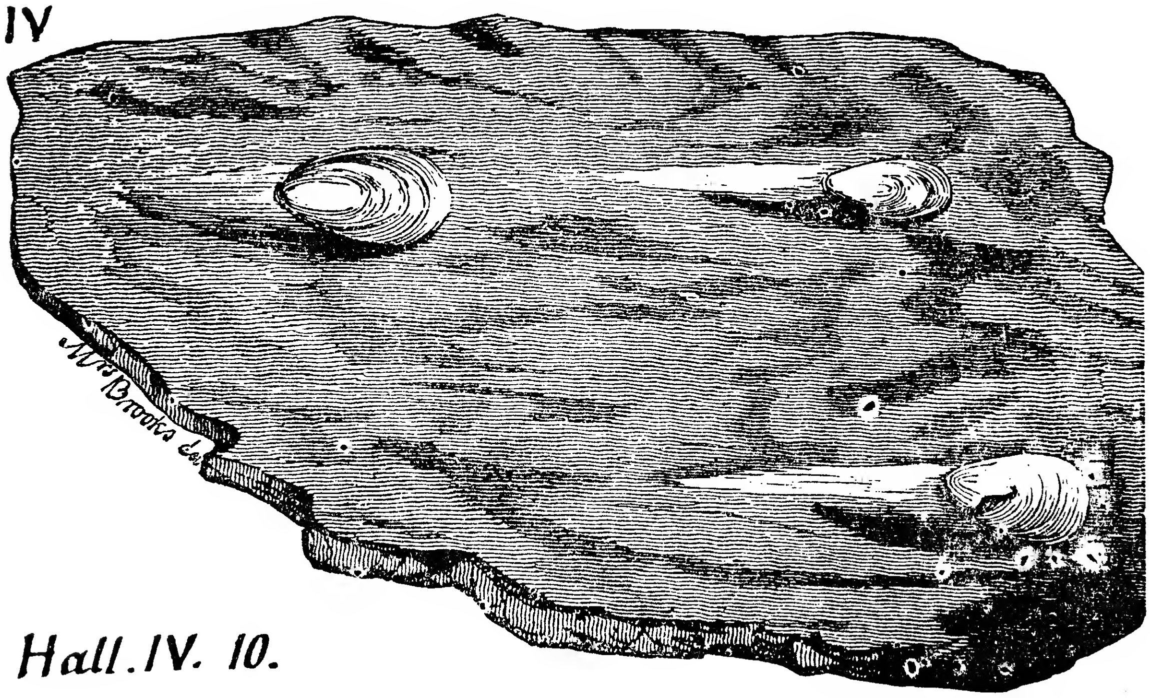
94: 4 IIIA

Lingula crassa, Hall. Pal. N. Y. Vol. 1, 1847, Trenton. Emmons, Amer. Geol. Vol. 1, pt. 2, 1855, p. 203, plate 8, figs. 8 *a*, *b*, *c*, *d;* Shell thick, etc.; but the marked difference of breadth of the upper and lower scales is a rather common feature of many other species. *Trenton* limestone formation, to which it is confined.—*II c.*



Lingula cuneata, Conrad. Hall, page 48, figs. 6, 5; page 52,

IV



Hall. IV. 10.

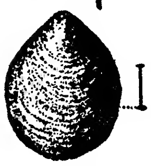
fig. 10. (Rogers, Geol. Pa., 1858, Vol. 2, page 822, no figure. Conrad, page 64) showing specimens with tails of sand formed by the current.—*Medina, IV.*

Lingula curta. Rogers, 1858, pages 818, 820, 821, fig. 604. *Trenton* formation. (Conrad, Journal Acad. Nat. Sci., Philadelphia, 1842). Occasionally found in some of the *Trenton* beds of the Nittany valley. (C. E. Hall and Ewing, T4. p. 424.)—*II c.*

II, b R. 604

Lingula ? dawsoni, Walcott. Bulletin U. S. G. S. No. 10, page 15, plate 5, fig. 8, ventral valve, *enlarged four times. Middle Cambrian* (*Saint John*) formation, New Brunswick. (Somewhat like the Welsh Menevian *Lingulella ferruginea* of Salter, Mon. Br. Foss. Davidson, Vol. 3, p. 336).—*M. C. See foot note to page 134 above.*

LC. 8 pl. 5



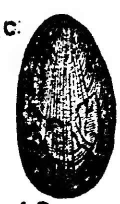
Lingula delia, Hall. 16th Reg. Rt. N., Y., 1863, *Hamilton upper beds.* Specimen in Carll & Randall's *Chemung* section at Warren, Pa. (C. E. Hall's Rt. 1875)—*VIII g.—See Appendix.*

Lingula densa, Hall. Pal. N. Y. Vol. 4, 1867, *Hamilton upper beds.* Found by I. C. White in the Montour district, Pa., 50′ to 100′ down in the *Hamilton.* G7, pp. 75, 229, 230.—*VIII c.*—Also in the *Hamilton lower shale* at the Coffee run quarries for the RR. embankment, Huntingdon Co. T3, p. 171.—*VIII c.—See Appendix.*

Lingula elliptica. See **Lingula perplexa.** *V a.*

Lingula elongata, Hall. Pal. N. Y. Vol. 1, 1847, *Trenton.* Emmons, American Geology, Vol. 1, part 2, page 202, plate 8, fig. 5; shell oval, ends somewhat equal, but hinge end narrower; concentric striæ on the surface. —*Trenton limestone. II c.*

IIc



Em. A. G. 5 Pl. 8.

Lingula gibbosa, Hall. Trans. Alb. Institute, Vol. 10, abstract, p. 13, 1879. Figure from Collett's Indiana Report of 1881, p. 284, plate 27, f. 2, ventral valve.—*Niagara limestone, V b.*—Hall, Geology Fourth district, 1843, page 284, pl. 27, fig. 2. ventral valve of a specimen of this species.

Vb. 2

IND. 1881. PL. 27.

Lingula lamellata, Hall. Report of the Fourth (Western) district of New York, page 100, fig. 38, 2, *Clinton* and *Niagara* formations. Covered with concentric, slightly wavy, raised little plates (*lamellæ*) wrinkled at the sides; beak sharp, low; perfect examples rare; no striæ; Lockport, Rochester, etc.—*V a, V b.*

V. b. 38. 2

Lingula matthewi. *See Appendix.—C.*

Lingula ligea, Hall. 13th An. Rt. 1860, *Hamilton upper beds.*—C. E. Hall found it in 1875, on Marshall's Creek, Monroe Co., in *Hamilton beds.*—I. C. White recognized it (with a query) at Cove Station, long RR cut near Bradford line, Huntingdon Co., in the bottom layers of the *Hamilton middle shale;* specimen 196–12 of Claypole's Coll. Cat.—It occurs in Carll's collections in Oil region in *Chemung upper strata* (C. E. Hall's Ms. Rt. 1876) specimen 3299 (O, p. 148,) at the Gibson well, ¼ m. N. E. of Jamestown lower quarry, Crawford Co., on a slab of Berea grit holding also *Spirifera mesostrialis?— VIII g, or X.—See Appendix.*

Lingula maida, Hall. 16th An. Rt. N. Y. 1863, *Hamilton.*—Spec. 804–47 (OO, p.) Fellows & Genth's coll., 1875, on Marshall's creek, Monroe Co. *Hamilton. VIII c—See Appendix.*

Lingula matthewi. See **Acrothele matthewi.** *M. C.*

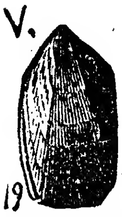
Lingula melie, Hall. Pal. N. Y. Vol. 4, 1867, *Chemung.* At the Austin flag quarries in Ohio, III, p. 436. Recognized by I. C. White in the Sharpsville sandstone, QQQ, p. 62; in the Orangeville shales, p. 63; in the Cleveland shales? p. 100; and in the Bedford shales, p. 196; all in Mercer Co., Pa.; in limestone 40′ above the *Corry sandstone* (3rd Mtn SS.) in the Riceville section, at Athens, Crawford Co., QQQQ, p. 193; in great numbers in the Orangeville shales (with fish remains) from top to bottom, most near bottom, QQQQ, p. 89; also at Schrenk's, E. Fairfield t., Crawford Co., p. 132; many specimens in the laminated bench of the *Sharon* coal bed, outlined clearly as a shining film on the dull black cannel coal (species however somewhat doubtful) QQQQ, p. 124.—*X* to *XII.—See Appendix.*

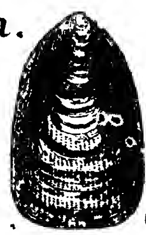
Lingula membranacea, Winchell. Proc. Acad. N. Sc. Phila. Vol. 15, 1863, *Lower Carboniferous.* Found by I. C. White in the *Orangeville shales* of Mercer Co. (Q3, p. 63) and Crawford Co. (Q4, p. 89) in great numbers, with fish, from top to bottom but most near the bottom of the formation.—*X.—See Appendix.*

Lingula newberryi, of the Ohio *Cuyahoga shale,* is found by I. C. White in the shale partings of the Sharon coal bed (near the bottom of the Conglomerate) at the old Liberty Furnace mine in Crawford Co. Q4, p. 62. *XII.—See Appendix.*

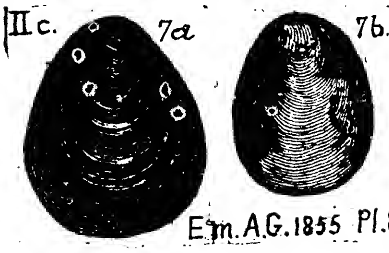
Lingula oblata, Hall. Report on Fourth district of New York, page 76, fig. 18, 8. *Clinton.* Shell wide; surface covered with concentric lines or slight folds, stronger at the margins; whole surface finely striated. These two series of lines distinguish it from the allied *Lingula perplexa.*— *V a.*

Lingula oblonga (*clintoni*). Hall, 1843, p. 77, fig. 19, 4. Vanuxem, page 79, fig. 11, 4. Rogers, p. 823, fig. 629. Hall, plate fig. 9, 4. (Conrad An. Rt., N. Y. 1839). *Clinton formation.*—Occurs in lime shales over Ore sandstone (among other Clinton forms); Claypole, specimen 60 (five) at Waggoner's mill, near Center. Perry Co. *V a.*—Note. G. B. Simpson finds what seems to be a *Lingula oblonga* (not good enough to draw) as Spec. 204–34, in Fellows' collections from the Reedsville mill-dam, Mifflin Co., Pa., in *Black River or Trenton limestone.*—*II c.*

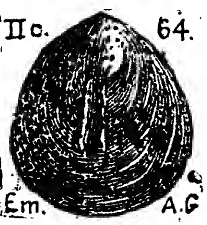




Lingula obtusa, Hall. Pal. N. Y. Vol. 1, 1847, *Trenton.* Emmons, Am. Geol. 1, ii, p. 202, plate 8, fig. 7*a*, 7*b*; shell ovate, sides rounded and curving toward a blunt beak, projecting beyond the hinge; rays and contrentric lines extremely fine.—*Trenton II c.*



Lingula papillosa, Emmons. American Geology, Vol. 1, part 2, page 202, fig 64; surface covered with fine pimples (papellæ), and striated with faint ray lines; two smooth furrows down the middle.—*Trenton limestone. II c.*

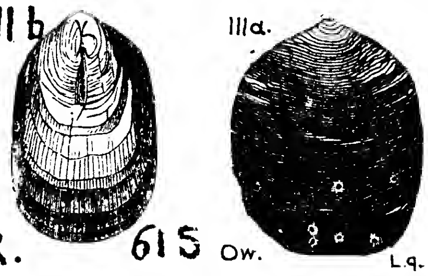


Lingula perplexa (*elliptica*). Hall, 1843, page 76, fig. 18, 7. *Clinton.* (Name preoccupied by Phillips in 1836 and changed by Hall in 1877. S. A. Miller.) The concentric lines on the shell are scarcely raised at all.—It is remarkable that *L. acutirostris*, *L. perplexa* and *L. oblata* are found together at one place (in the shales of the Wolcott ore bed in New York), the first and last in considerable numbers. The rule is that *one species of Lingula alone is found at any one place*, however numerous the individuals may be. (Hall, p. 77.)—*V a.*

Lingula pinnaformis. See **Lingulepis pinnaformis.**—*I.*

Lingula punctata, Hall, 16th An. Rt. 1863, *Hamilton.*—Doubtfully recognized by Simpson in Spec. 886–1 and 886–4 of Hick's coll. at Bradford, McKean Co., Pa., from *Chemung, VIII g.*—*See Appendix.*

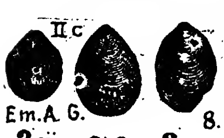
Lingula quadrata. Rogers, page 820, fig. 615. *II c.* to *V, Trenton to Clinton* formations. Eichwald, Zool. Specialis, 1829. S. A. M.) Owen, Geol. Wisc., Iowa and Minn. 1852, pl. 2 B, fig. 8, from the lead-bearing beds of U. Mag. Lime. near Dubuque, for comparison.—*III b.*



Lingula rectilateralis, Emm. Geol. Sec. Dist. N. Y., 1842 page 399, fig. 110, 6; associated with *Triarthus beckii* in the *Utica formation*, which Emmons never found in the Lorraineshales above nor in the Trenton limestone below.—*III a.*—Note what Emmons says about the constant connection of these two with *Nuculites scitula*, *N. poststriata* and *Avicula insueta*, under barren beds.

Lingula scotica, Davidson, Monog. Carbon. Brach. Ohio, *Waverly.* Rt. I, p. 70—*X.*—*See Appendix.*

Lingula riciniformis, Hall, Palæont. N. Y. Vol. 1, 1847, *Trenton.* Emmons' Amer. Geol. I, ii, 1855, p. 203, plate 8, figs. 2 *a*, *b*, *c*; oval, convex, slightly tapering to beak; smooth surface with concentric lines scarcely or not at all visible; and not more than ⅛ inch long.—*Trenton formation.*—Found in C. E. Hall's coll. 1875, in Nittany Valley, Pa.—*II c.*

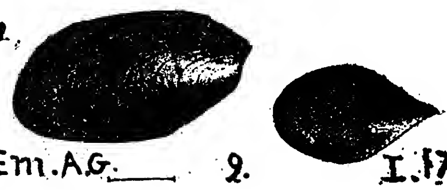


Lingula spatiosa, Hall, 1859, Palæont. N. Y., Vol. 3, Low. Held.) Claypole's list of fossils from Perry Co., Pa., in F2, preface page xiii.—Specimen 6–1, collected by Claypole at Clark's mill, 2½ miles north-west of New Bloomfield, from *Lower Helderberg upper shaly beds, VI.*—*See Appendix.*

Lingula spatulata, Hall, page 223, fig. 94, 3, 95? Vanuxem, page 168, fig. 42, 3 *Genesee, VIII e.* Claypole's specimens, S40 (three); 93–17 (two) doubtfully identified; also at car works, at Huntingdon, T3, p. 115 in *Marcellus, VIII b.*

Note. I. C. White in the Montour region, G7, p. 57, 65, 238, 240, finds it in *Catskill-Chemung transition beds*, *IX-VIII;* in beds No. 25, 35 and 54, of the Cacawissa section, Columbia county, Pa.—*IX.*

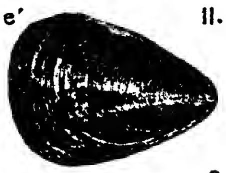
Lingula striata and another *Lingula* found by Emmons



in the light friable shales of Virginia (rocks of low uncertain age), with *Orbicula excentrica*, etc. Am. Geol. I, ii, p. 112, pl. 1, figs. 17 (and 9).—*I?*

Lingula trentonensis, Conrad. Jour. Ac. Nat. Sci. Phil. Vol. 8, 1845, *Trenton.* See Report T on Blair Co., p. 55.—*II c.* Note. This may be the Lingula (excellent specimen) 203–11 A, of C. E. Hall's coll. at Bellefonte in 1875. On the same piece is a poor head of *Trinucleus concentricus*; on the reverse side, fragments of *Chœtetes* and *Tentaculites.*—*II c.*—*See Appendix.*

Lingula triquetra. Clarke, Bull. 16, U. S. G. S. 1885, p.



62, pl. 3, fig. 11, *natural size*; somewhat resembles *Ling. lœna*, Hall and *Ling. palœformis*, Hall, of the Hamilton shales, but is shorter than the *lœna*, and narrower in front than *palœtormis*, and without ray lines.—Found in the *Naples* (*Upper Genesee*) black shales of Ontario Co., N. Y.—*VIII é.*

Lingula umbonata, Cox. Geolog. Survey of Kentucky, Vol.

3, 1857, page 576, plate 10, fig. 4. Collett's Indiana Report of 1883, page 120, plate 25, fig. 14, single valve, *natural* size.—Coal measures of Vermillion Co., Ind. Cox's specimen from the *coal measures* south of the Ohio river.—*XIII.*

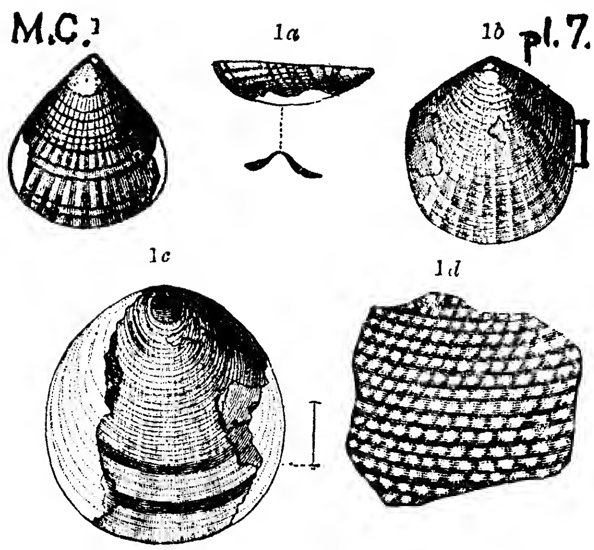
Lingula ——— ? Rogers, Geol. Pa. 1858, p. 816, 817, from the *Potsdam sandstone*, *I.*—About a dozen specimens, not identifiable, were got in 1875 from J. Schadt's quarry, ½ m. N. W. of Helfricht's spring, where the Jordan sinks, in Lehigh County, in a Lower Silurian formation below the *Trenton.* See DD, p. 22. *II.* — A *Lingula* poorly preserved, is *the only fossil* to be seen in the *Lower Salina* (*Bloomsburg red*) *shale* formation at Chulasky furnace, Northumberland Co., but is in great numbers in bed 2 of the section; G7, p. 107. 341. 342. *V c.* — A *Lingula* occurs in Dr. Barrett's list of fossils from the Delaware river *Stormville shale* (*Lower Helderberg*) at Port Jervis. G6, p. 134. —*Lingulæ* fill the limestone parting beds No. 2 of the Mapleton section in Huntingdon Co. T3, p. 273, *Genesee black shale*, *VIII e.* (This is the *Lingula* with *Goniatites interruptus*, Geol. Pa., 1858, p. 829.) — A *Lingula* occurs in Stevenson's list of Devonian fossils in the gaps of Westmoreland and Fayette counties, KKK, 311. *VIII g–IX.* — A *Lingula* in *VIII*, Report I, p. 54.—A *large lingula*, found by Mr. Hatch, 1875, among Chemung fossils in a bed 300′ below the Olean (2d Mt. SS.) conglomerate. I, p. 79. — *Large lingulæ* occur in the Ohio *Bedford* shale on the Pennsylvania State line, in Williamsfield, in a bed separating the Upper and Lower Berea grits, I, p. 74.— *Lingulæ* are numerous in Randall's section at Warren, Pa., IIII, p. 305. *VIII g–IX.* — A *Lingula*, in Berea grit? Mercer Co. Pa., QQQ, 158. *X?* — *Lingulæ*, a few only, were found by White at one or two outcrops in the *Meadville lower limestone*, usually non-fossiliferous in Crawford, but fossiliferous in Warren Co. Q4, 88. — A *Lingula* is common in the *Corry sandstone* (3d Mt. SS.) of Crawford Co. It differs from the four species of *Lingulæ* and *Discinæ* which are so abundant in the overlying *Orangeville shales*, and which were never seen by White beneath that horizon, Q 4, 89. — *Lingulæ* abundant at the top of the *Orangeville shale* on Henry run, E. Fallowfield (Q4, p. 148); near Meadville (p. 170); in Smith's ravine (p. 172); near Little Cooly, N. line of Athens t. (p. 192); in Biter's section, Richmond t. (p. 195); at Pfeiffer's, Woodcock t. (p. 199); below Hayfield the whole formation is full of them (and *Discinæ*) from top to bottom, 88 feet (p. 202); in road cut 2 m. S. E. of Conneaut, myriads (p. 207); N. W. of Venango village (p. 219,) all in Crawford Co. — Casts of *Lingula* and *Rhynchonella* from McCaslin farm, near Pleasantville, Venango Co. Cat. O, Spec. 3148, from over 2nd Mtn. SS. — See also I, p. 67, 69. *XI.* — A *Lingula* in the Coal Measures of Fayette Co., KKK, p. 309. *XIII.*

Lingula ——— ? Figured by H. D. Rogers, in Geology of Pennsylvania 1858, page 833, fig. 693, as found in the roof shale of Nelsonville Coal, Ohio; also in roof of a Mercer Co. coal, Pa.; also in roof shale of Tennessee coal, *XIII.*

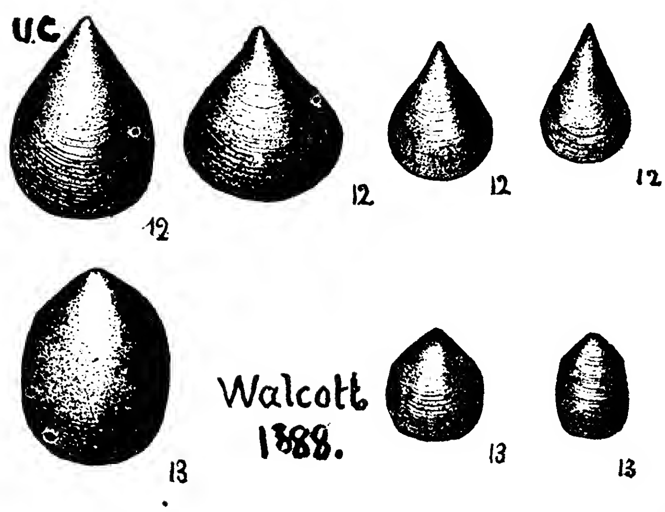
XII. R.

FIG. 693. Lingula.

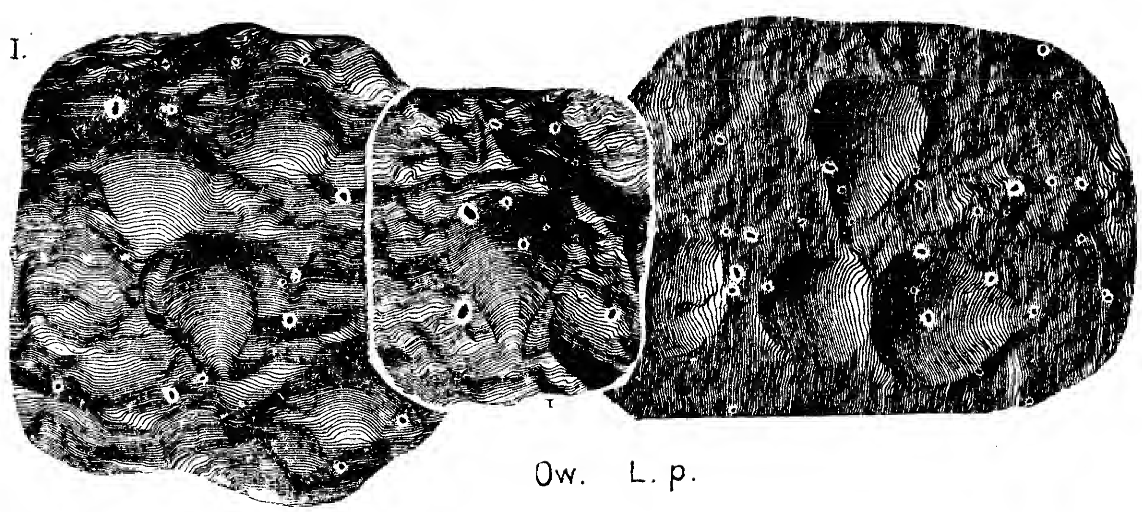
Lingulella cælata. (*Orbicula cœlata*, Hall, Pal. N. Y. 1847, pl. 79, fig. 9*a*—*c*. *Obolella* (*Lingulella*) *cœlata*, Ford. Am. Jour. S. [3] II. p. 33, XV, p. 127.) Walcott, Bull. U. S. G. S., No. 30, page 95, plate 7, fig. 1, ventral valve, *enlarged twice*, drawn by Ford; 1*a*, side view of same, with beak as seen from behind. Fig. 1*b*, small dorsal (?) valve *enlarged*. Fig. 1*c*, dorsal valve *enlarged*. 1*d*, Surface of dorsal valve *greatly enlarged.—Lower Cambrian* (*Georgian*) cong. lime. near Troy, N. Y. Also, one mile S. of Schodack Landing, Col. Co., N. Y.—*L. C. See foot note to page 134 above.*



Lingulepis acuminata, Conr. See Walcott's Potsdam formation of Saratoga County, N. Y. 1888. pl.— fig. 12. See Bull. 30, U. S. G. S. page 62.—Confined to the *Lower Cambrian* beds. In the upper line are the ventral valves; lower line, dorsal valves, —*L. C.*



Lingulepis pinnaformis. (*Lingula pinnaformis*, Owen).



Geol. W. I. and Minn. 1852, pl. 1 B, f. 4, 6, 8; from sandstone at the falls of the St. Croix.—*I.*

Lingulepis pinnaformis, Owen. A group of the smaller (dorsal) valves of this little brachiopod is figured on page 154, above, and wrongly named by Owen. *Crania prima.* (R. P. W.)

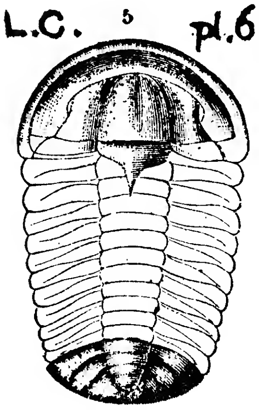
Linnæa humilis, Say, abundant in the shell marl of the glacial ponds at Harmonsburg, Crawford Co., Pa. Q4, p. 41.

Linnarsonia sagittalis. *See Appendix.*

Linnarsonia transversa. *See Appendix.*

Liostracus aculeatus. Walcott, Bull. U. S. G. S. No. 10, page 36, plate 6, fig. 5, type of the genus, copied from the Swedish of Angelin, to make comparison with Walcott's genus *Ptychoparia.* It represents the forms which have an unfurrowed head-piece (glabella) and no eye-ridges on the fixed cheeks. (See the discussion of Ptycoparia, on pp. 34, 35, 36.)—*Middle Cambrian* formation. *M. C.*

L.C. 5 pl.6



Liostracus ouanagondianus, See **Conocophalites aurora,** which Matthew considers a variety of it, and makes it *Lower Cambrian. L. C.*

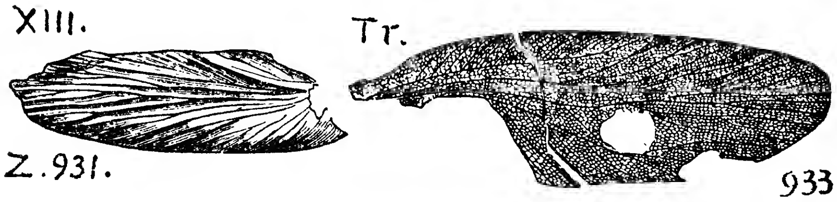
Lithentomum hartti. Scudder. A hexapod insect from the *Devonian strata* of St. John, N. B. See Conad. Nat. [2] Vol. 3, 1867, p. 206, f. 4.—*XIII? IX?*

Lithomantis carbonaria. *See Appendix.*

Lithomilacris simplox, Scudder. A cockroach from near Danville, Ill. Mem. Boston S. N. H. Vol. 3, 1879, p. 51, pl. 5, fig. 5. *Coal measures, XIII.*

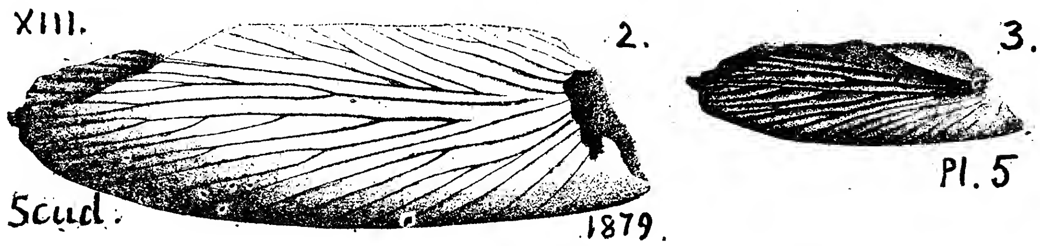
Lithomilacris angustum, Scudder. Mem. Bost. S. N. H. 1879, p. 48, pl. 5, fig. 2, 3, A cockroach wing, from

XIII. Tr.



Z.931. 933.

XIII. 2. 3.

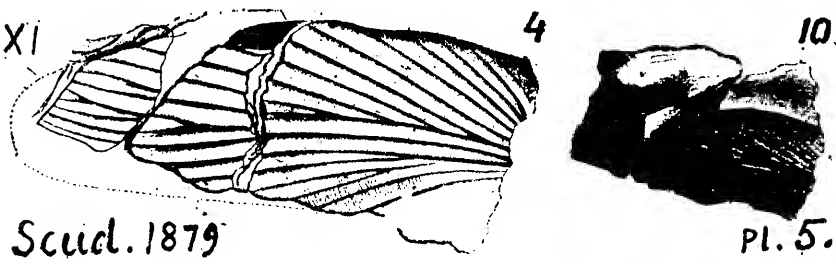


Scud. 1879. Pl. 5

Port Griffith near Pittston, Pa. in the collection of M. Lacoe. Zittel's Handbuch, 1885, Vol. 2, p. 754, fig. 931, *natural size.*—NOTE. See **Mylacris anthracophila.**—I add Zittel's fig. 933, (*enlarged 5-2*), of Scudder's *Spiloblattina gardineri*, from the *Trias* of Colorado, to show how the cockroach wing was changed in the ages following the Coal.—*XIII.*

Lithomilacris pauperatum. Scudder, Mem. B. S. N. H. from same place; in Lacoe's collection.—*XIII.*

Lithomilacris pittstonianum. Scudder Mem. Bost. S. N. H. Vol. 3, 1879, pl. 5, figs. 4, 10, another cockroach from a Port Griffith bed near Pittston, Pa. Lacoe's collection.—*XIII.*



XI 4 10

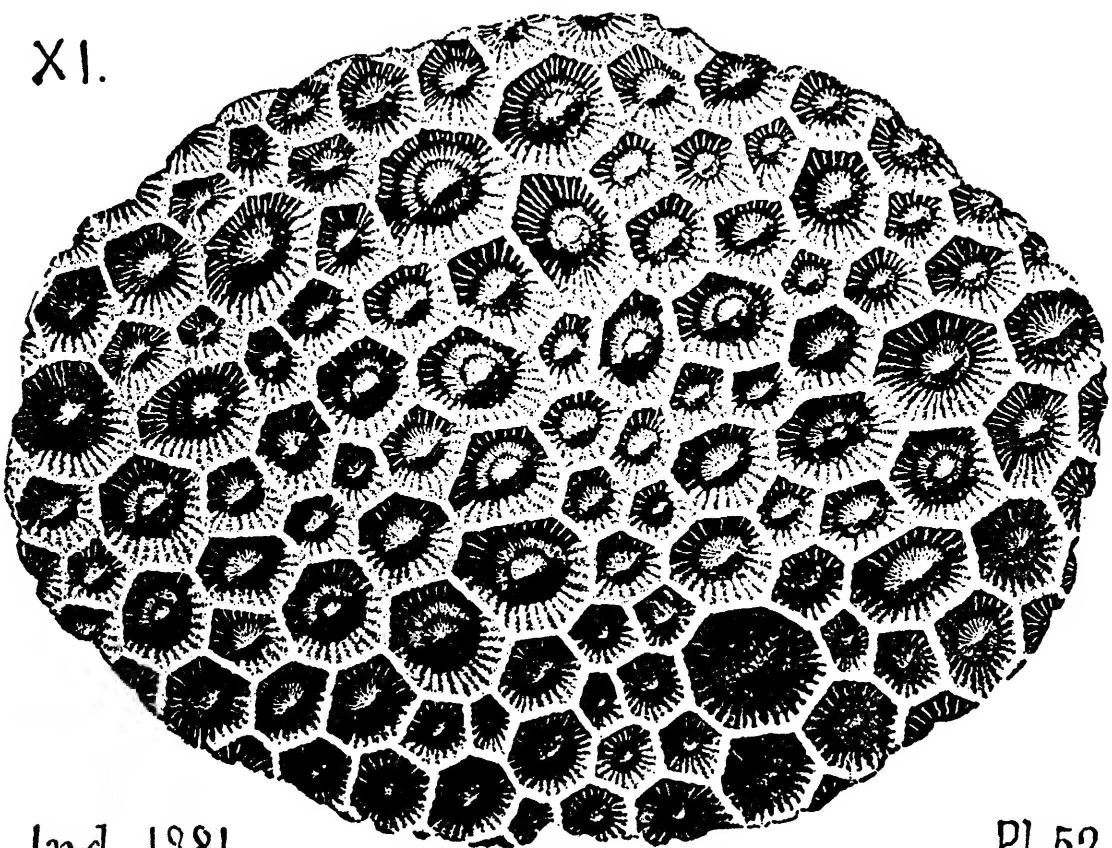
Scud. 1879 Pl. 5.

Lithomyza condita. *See Appendix.*

Lithopsis fimbricata. *See Appendix.*

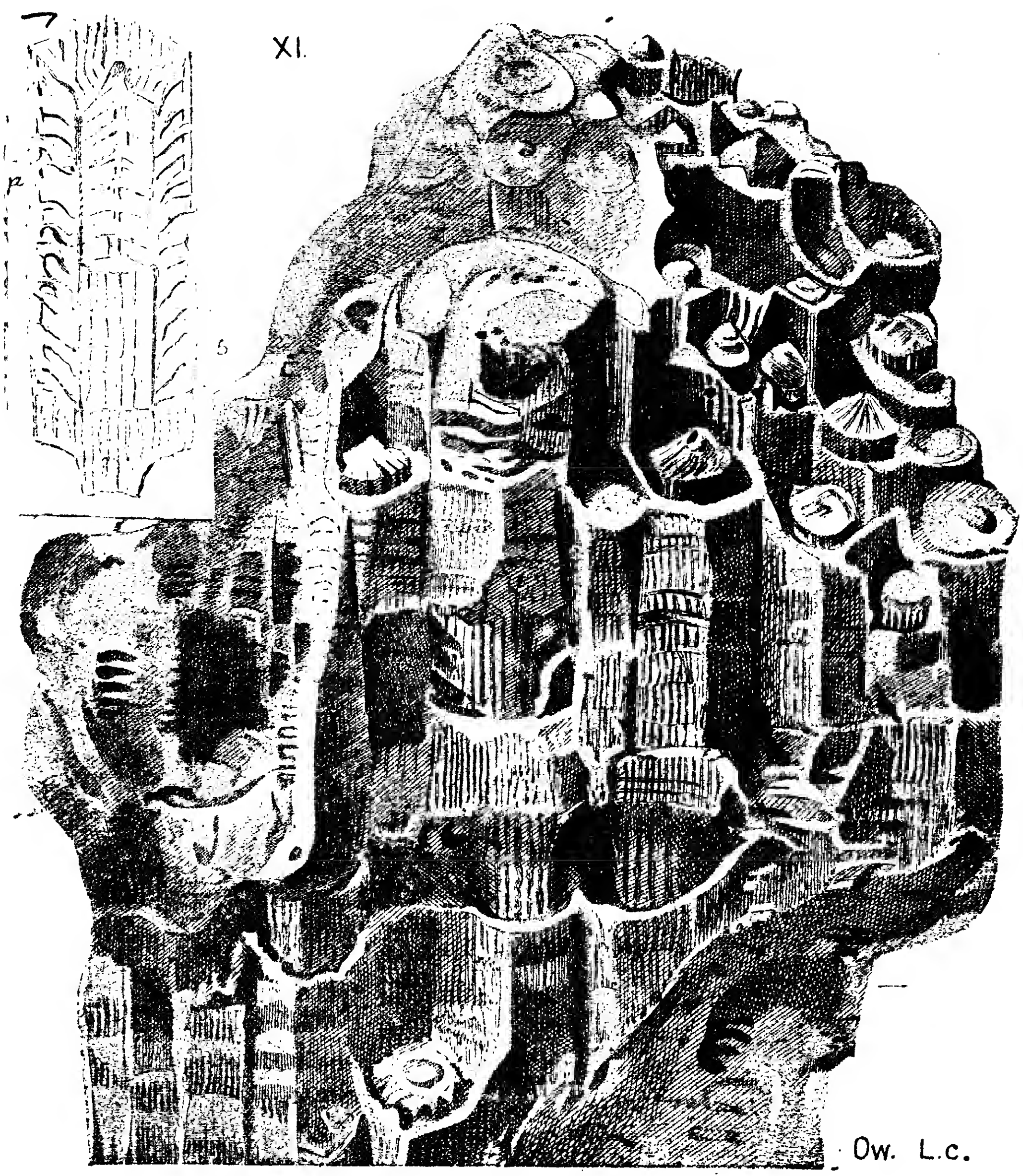
Lithostrotion canadense. (*L. mamillare*, Collett.—*Ax-*

XI.



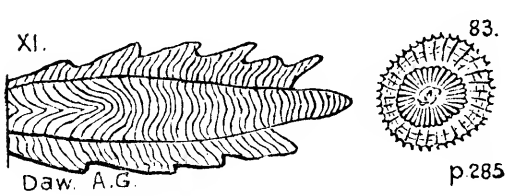
Ind. 1881. 3 Pl. 52

Lithostrotion canadense *continued.*

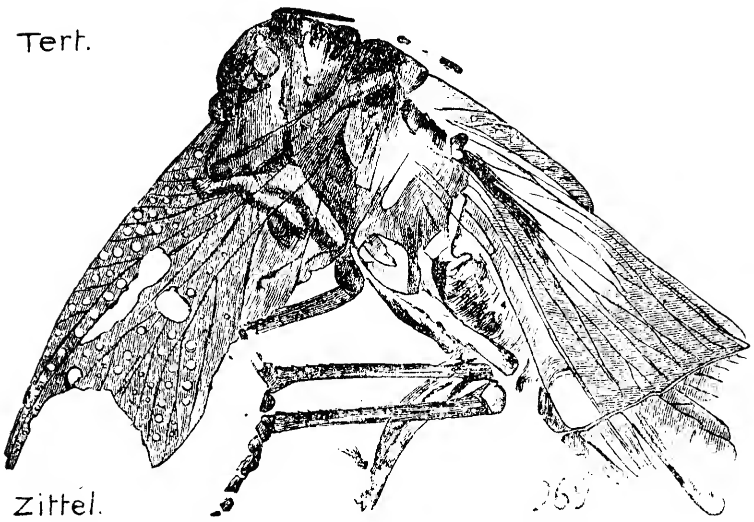


inura canadensis. Castelnau, 1843, Terr. Silur. d'Amerique.) Collett's Indiana Report for 1880, p. 506 (138). Report for 1881, pages 401, plate 52, fig. 3, upper surface, showing calices of corallites, from the Subcarboniferous *St. Louis limestone.*—I add Owen's fine medal-ruled illustration in Geol. of Wisconsin, etc.—See also Carll's Report I, p. 53; and Stevenson's Report KK, p. 102.—*XI.*

Lithostrotion pictoense, Billings. Dawson's Acadian Geology, 1868, page 285, fig. 83; a fine coral, characteristic of a thick bed of *Carboniferous limestone*, at Limebrook, East River, Nova Scotia.—*XI.*



Lithymnetes guttatus. Scudder. A locust found in the *Oligocene tertiary beds* of Florissant Colorado. Fig. 969 (natural size) in Zittel's handbuch. — *Tertiary.*



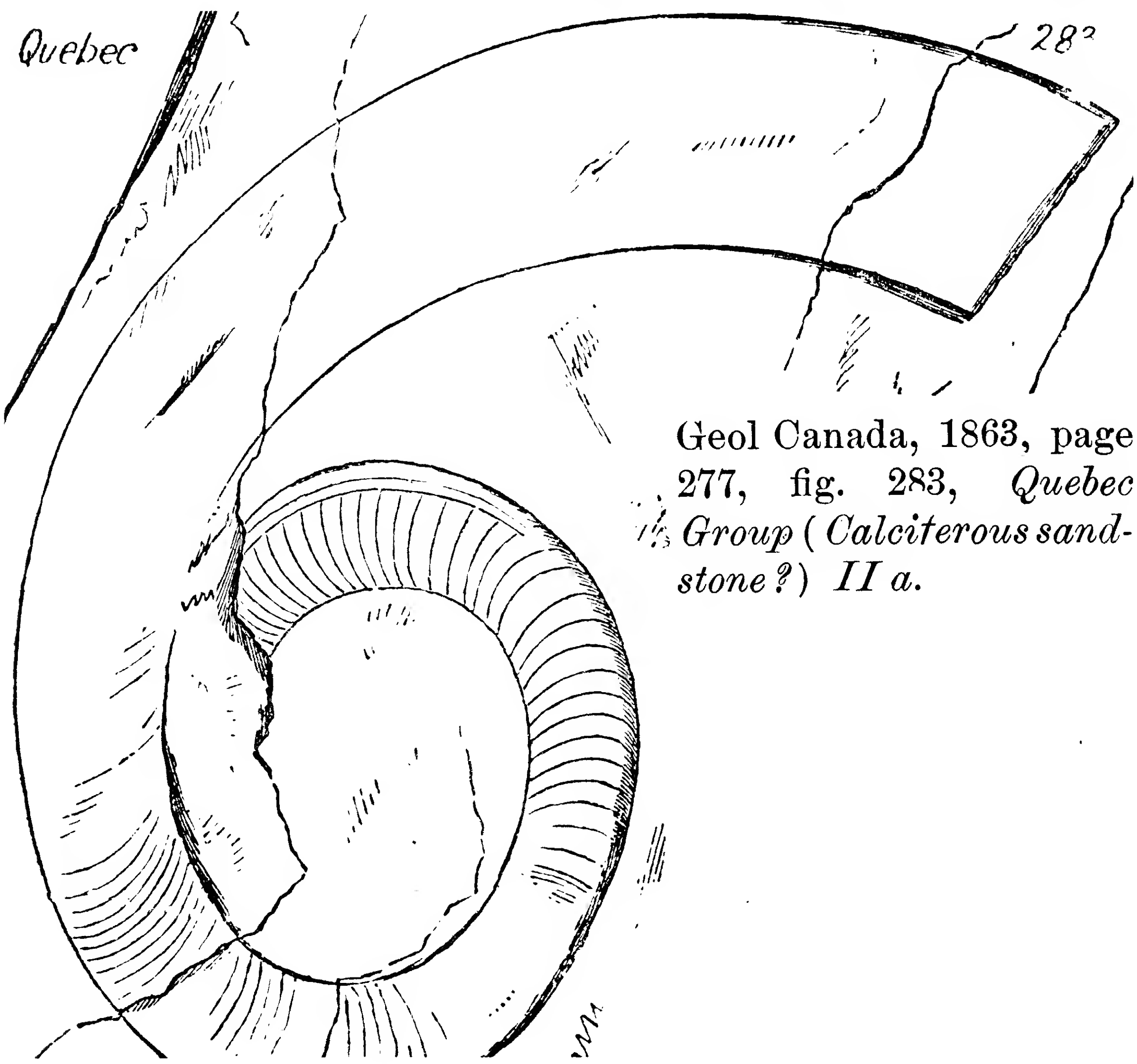
Littorina antiqua. See **Holopea antiqua,** *VI.*

Littorina cancellata. See **Cyclonema cancellatum,** *V a.*

Littorina wheeleri. See **Naticopsis wheeleri.** *XV.*

Lituites bickmoreanus. *For figure see page 365.*

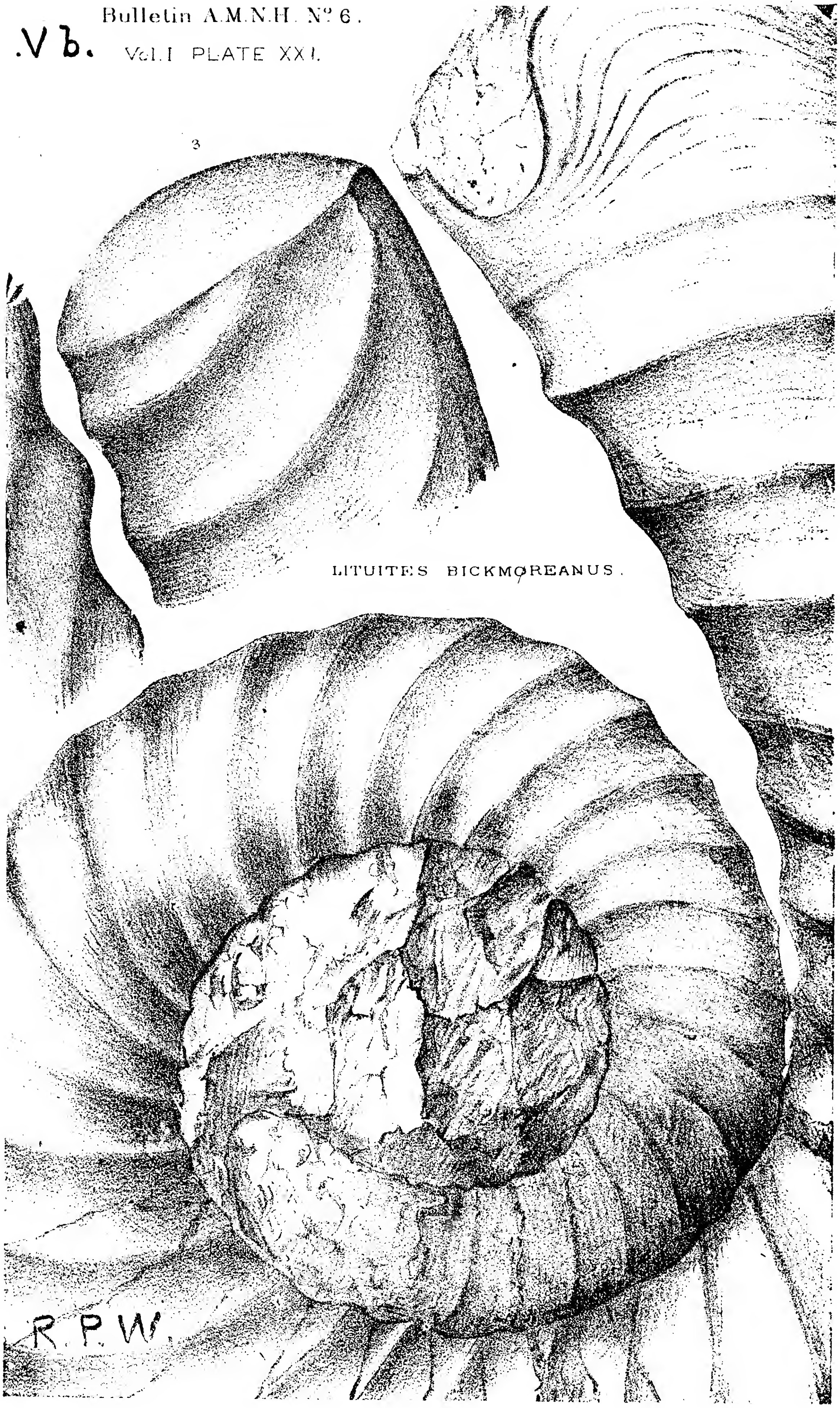
Lituites farnworthi, Billings. Pal. Foss. Vol. 1, 1861.



Geol Canada, 1863, page 277, fig. 283, *Quebec Group* (*Calciferous sandstone?*) *II a.*

Bulletin A.M.N.H. Nº 6.
Vol. I PLATE XXI.

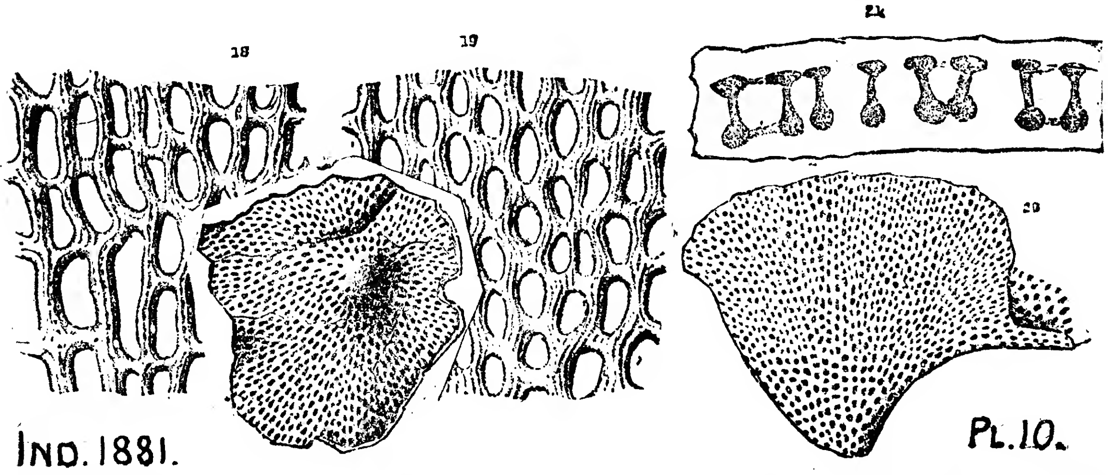
.Vb.



LITUITES BICKMOREANUS.

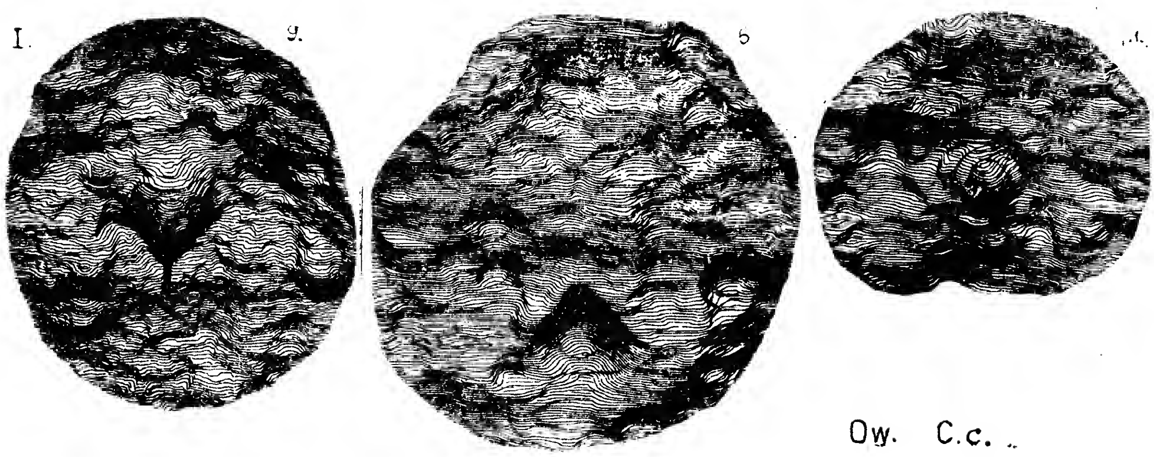
Lituites ? ortoni, Meek. *See Appendix.*

Loculipora (*Fenestella*) **ambigua,** Hall (*Hemitrypa dubia,*



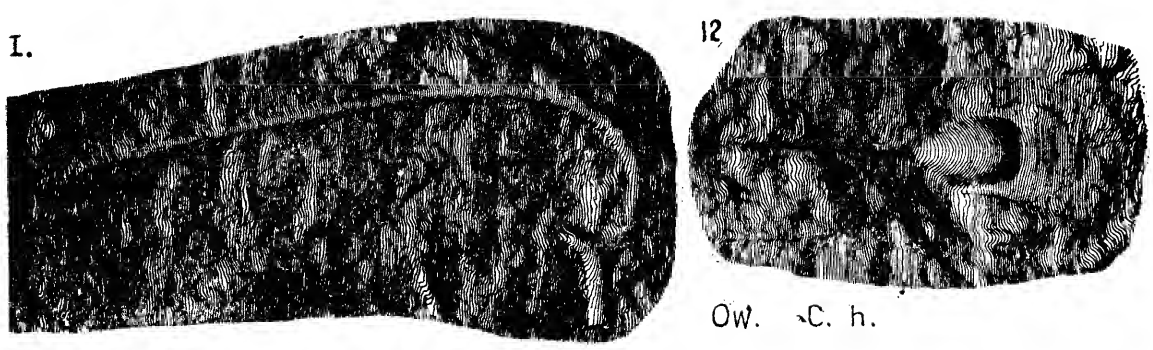
Hall, 28th Rt., 1876; *Fenestella ambigua,* Hall, 28th Rt., 1879). Collett's Indiana Report of 1881, page 248, plate 10, figs. 17 to 21. In well-preserved specimens there are rows of minute pits between the striæ.—*Niagara, Vb.*

Lonchocephalus chippewaensis (*Concocephalus chippe-*



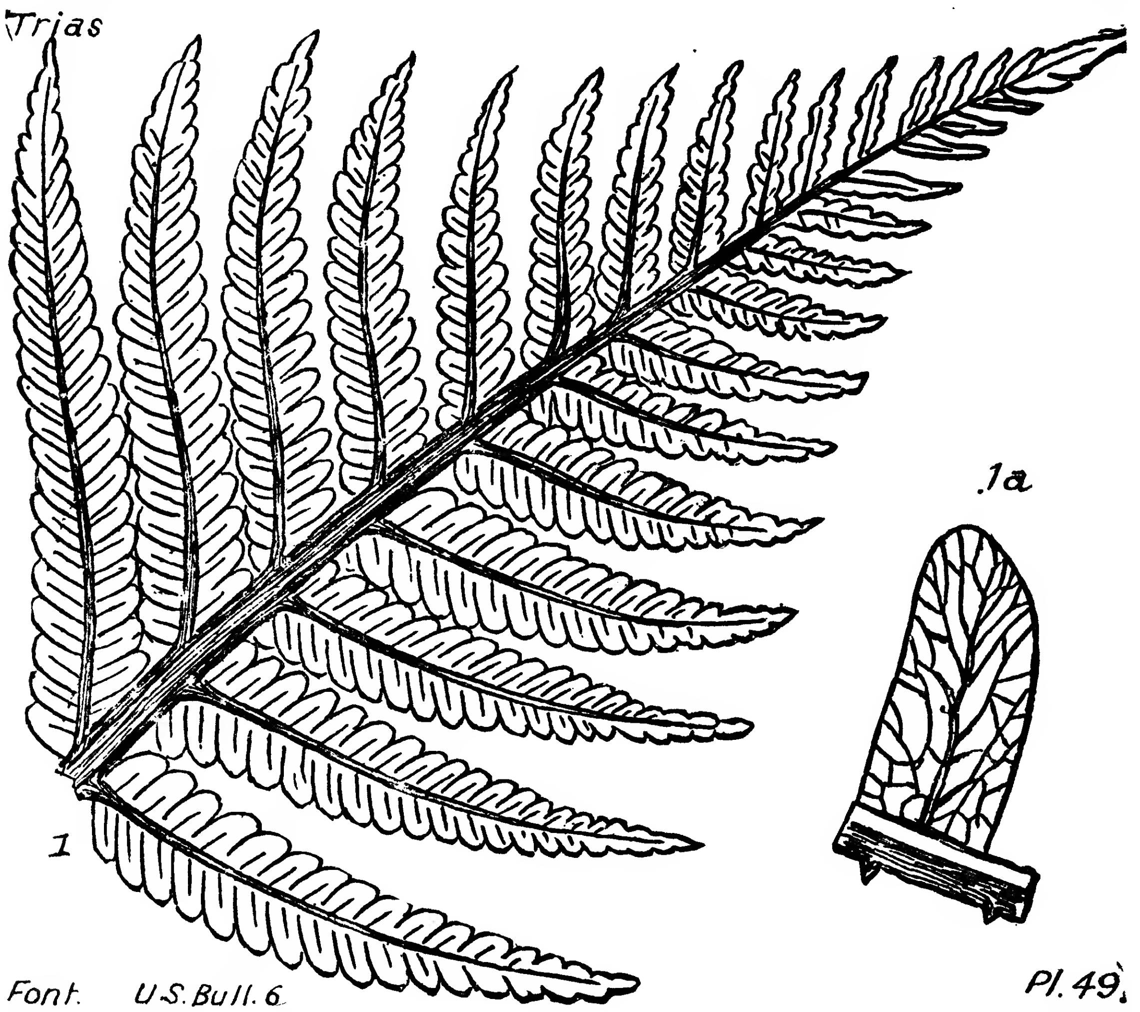
waensis, Owen, 1852, pl. 1, figs. 6, 14, pl. 1 A, fig. 9, from the Fourth *Trilobite bed* on the Menomenie river.—*I.*

Lonchocephalus hamulus. (*Conocephalus hamulus,*



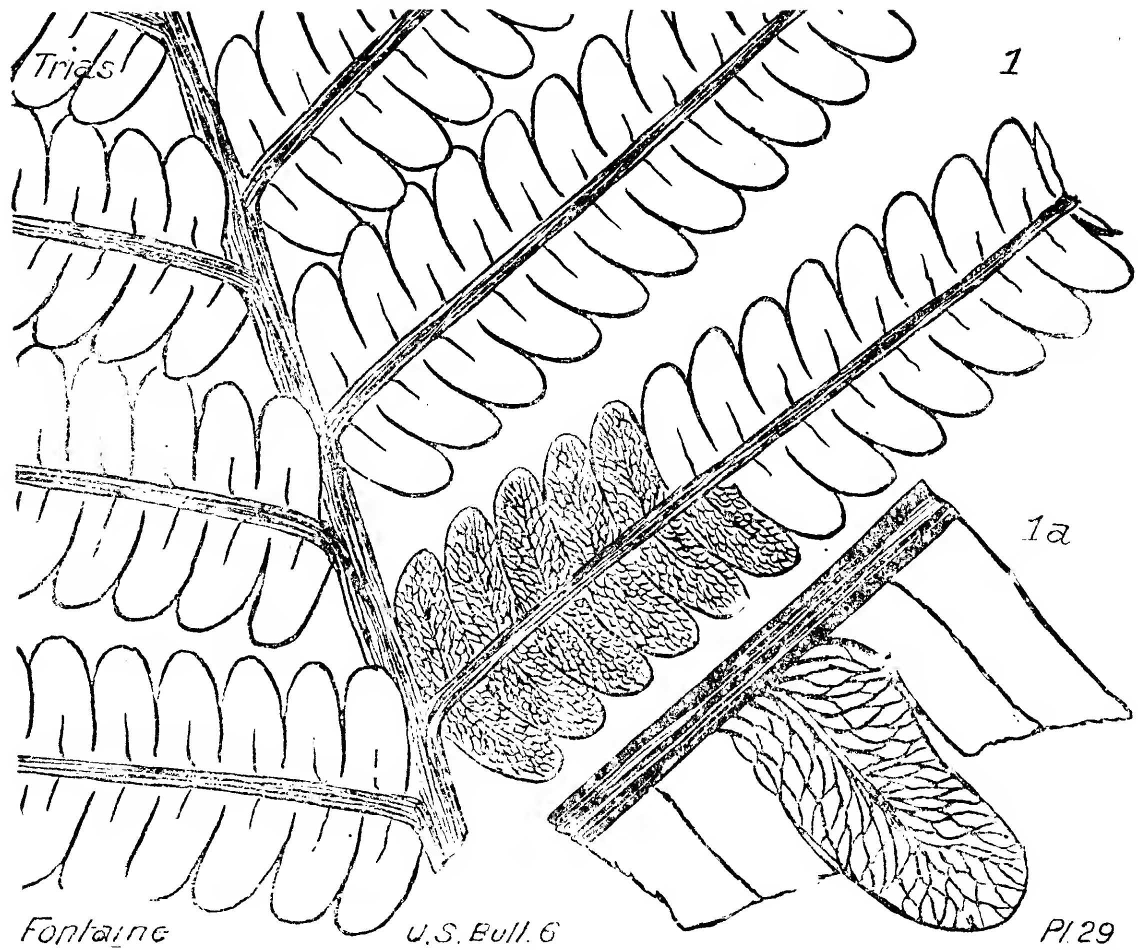
Owen, 1852, plate 1A, figs. 8, 12, a curious hook-shaped spine attached to the back of the headpiece, projecting backward along the middle line of the body; from the Third *Trilobite bed*, Miniskah river.—*Potsdam*, *I.*

Lonchopteris oblongus, Fontaine. (*Archostichites oblon-*



gus, Emmons, Am. Geol., p. 101, plate 4, f, 6, 8), U. S. G. S. Volume 6, 1883, page 103, plate 49, fig. 1, summit of a frond; 1 *a*, *much enlarged*, pinnule. Much like *L. virginiensis*, with a slight difference of nervation. At Ellington's, Va.—*Trias.*

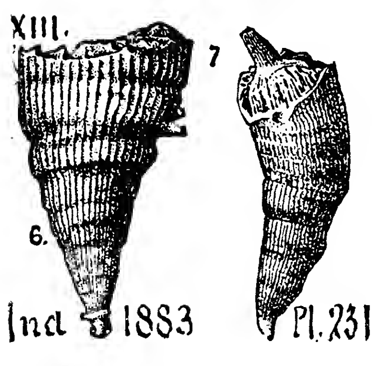
Lonchopteris virginiensis. Fontaine, Older Triassic Flora of Va. U. S. G. S. Vol. 6, p. 53, pl. 29, f. 1, part of frond with normal rounded pinnules; 1 *a*, *magnified* pinnule showing nervation. (Omitted: 2, pinnæ with acute pinnules; 3, with largest pinnules; 4, with broad rounded pinnules; Pl. 28, f. 1, summit of large frond; 1 *a*, enlarged pinnules; 2, pinna with long sharp pinnules.) Must have been a splendidly large fern, rather variable, more like the Carboniferous Ferns than any other. Like *L. rugosa*, Bgt. of France, and *L. rohlii*, Andr. of Aix la Chapelle. Most like *L.* (*Acrostichides*, Emm.) *oblongus.*



Aspinwall and Clover Hill, in sandstone (with *Clathopteris*), probably between main and lower coals.—*Trias.*

Lophodus —— in the *Black Foss. limestone*, 250′ below Pittsburgh coal bed, Fayette Co. Report L, p. 36. *Pittsburg series*, or *Barren Measures.—XIV.*

Lophophyllum (*Streptelasma*) **proliferum**. (*Cyathaxonia prolifera*, McChesney. New Pal. Foss. Coal Measures, 1860.) Collett's Indiana Report of 1883, page 118, plate 23, fig. 6, *natural size*, side view, upper portion compressed, making it look wider than usual; fig. 7, another with the cup broken so as to show the central cup-cone (columella.) Specimens vary in their proportions. Species very common in all the western coal measures. A slenderer form is called by Worthen *Cyathaxonia distorta*; a robuster form by Collett *Lophophyllum sauridens.—XIII–XV.* Common throughout the Coal measures. Collett. — It has been found in the *Ferriferous limestone* of the Allegheny Coal series, in N. Butler Co. (Rept.



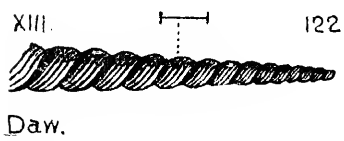
V, p. 147) and Beaver Co. (Q, 62).—In *Decker cr. shale* under Mahoning SS. at Morgantown and in Greene Co., Pa. (L, p. 36). —In the *Brush cr. limestone*, 150′ beneath the Crinoidal L. in Beaver Co., (Q, 34, 154.)——Abundantly in the *Green crinoidal limestone* of the *Pittsburgh* (Barren Measure) *series*, in Indiana Co. (H4, 78), and in the Monongahela region (K, 80; KKK, 309.)—Spec. C 2–10(three specs.)? See OO, p. 239. Also C1–3 (eight).—*XIII, XIV, XV.*

Lophophyllum sauridens, Compare **L. proliferum.** *XIII.*

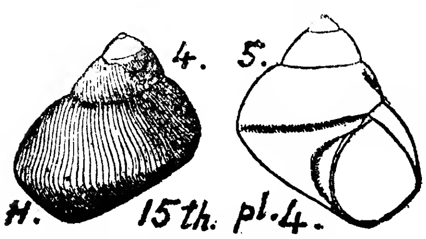
Lophospira calcifera, Whitfield. *IIa. See Appendix.*

Loricaria. Newberry. *See Appendix.*

Loxonema acutulum, Dawson. Acadian Geology, 1868, page 310, f. 122, *magnified;* an extremely slender and very minute shell, with 15 + whorls, with traces of from four to five revolving lines; more slender and delicate than the *L. polygyra*, McCoy, of the Irish Coal measures, and *L. acicula*, Phil.—*Carboniferous limestone* of Windsor, N. S.—*XI? XIII?*



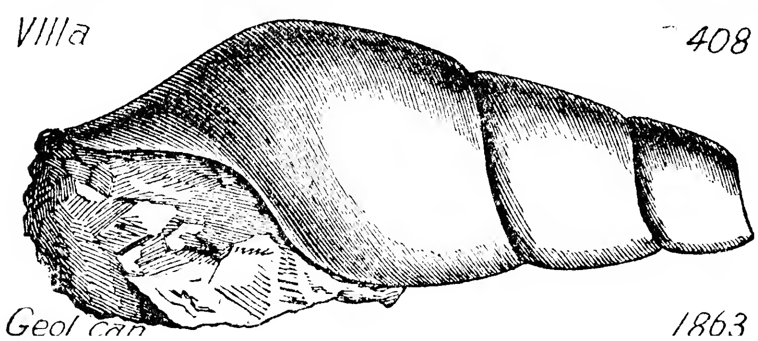
Loxonema (now **Isonema**) **bellatulum,** Hall, 14th An. Rt., 1861, p. 104; 15th An. Rt., 1862, plate 4, figs. 4, 5. (S. A. Miller's Cat. Pal. Foss. makes *Loxonema* a synonym of *Isonema.*



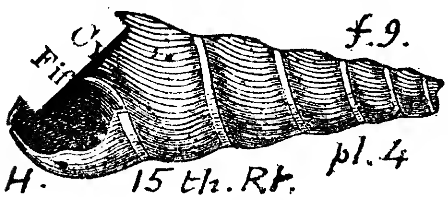
Loxonema boydii. See **Murchisonia boydii.** *Vc.*

Loxonema compactum, Hall, Pal. N. Y. Vol. 3, 1859, Low. Held.—Geol. Canada, 1863, page 958, fig. 460.—*VI.*

Loxonema cotteranum, Billings. Canadian Journal, Vol. 6, 1861. Geology of Canada, 1863, page 376, fig. 408. *Corniferous limestone. VIIIa.*



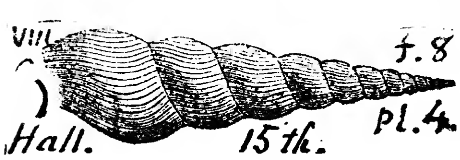
Loxonema delphicola, Hall, 15th Annual Report, N. Y.



1862, page 52, plate 4, fig. 9. *Hamilton shales*, at Delphi, Onondago Co., N. Y., but differing from the common *Loxonema* of the *Hamilton* in its less convex whorls, straight striæ (bent abruptly on the last whorl), and overlap of whorl upon whorl. Claypole's collections in Perry county, Pa. Specimens 5–3 (nineteen examples) from Barnett's mill in *Hamilton upper shale;* 105–4 (three) Hentzell's narrows near Clark's mill, from *Ham. sandstone;* 196–7 (two) Rough and Ready, Huntingdon county, bottom beds of *Ham. mid. shale* (T3, p. iii); also at Mapleton, in *Ham. upper shale* (T3, p. 109). Frequent in *Ham. shale* and in *ball ore under Tully limestone*, in Madison t., Columbia county (G7, pp. 77, 207).— *VIII c.*

Loxonema fitchi, Hall. Pal. N. Y., Vol. 3, 1859. *Lower Helderberg*. Found by Dr. Barrett at Port Jervis, in White's *Stormville shales* above and *Stormville limestone* beneath the *Stormville conglomerate*, in the Pike Co. Rt., G6, p. 132.— *VI. See Appendix.*

Loxonema hamiltoniæ, Hall. (*L. nexilis*, Hall. Fourth



Dist., N. Y., 1843, p. 201; but not *L. nexilis* of Phillips.) 15th Annual Report, N. Y., p. 862, page 53, plate 4, fig. 8. A specimen 1¾ inches long showed 13 whorls. Striæ curved as in *L.* sinuosa. Common in *Hamilton Strata*, on the New York lakes.— *VIII c.*

Loxonema hydraulicum, Hall. 24th Rt., 1872, from the *Hamilton hydraulic lime.*— *VIII c.*

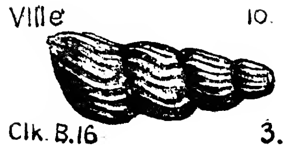
Loxonema nexile. (*Terebra nexilis; T. sinuosa.*) Hall,

4th Dist. page 200, fig. 80, 8. *Hamilton.* (See Phillips, Pal. Foss. 99, xxxviii, f. 183, 1841. Sowerby in Geol. Transactions, [2] V, pl. liv, f. 17).— *VIII c.*

Loxonema nitidulum. See **Polyphemopsis nitidulus.** *XIII.*

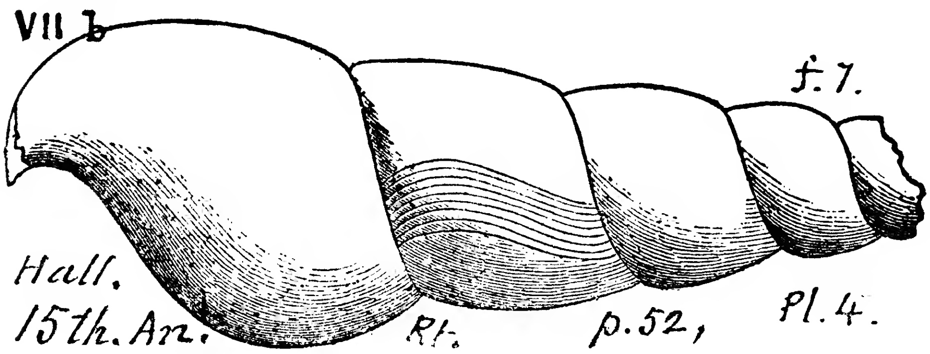
Loxonema newberryi. See **Macrocheilus newberryi.** *XIII.*

Loxonema noe. Clarke, Bull. 16, U. S. G. S. 1885, p. 55, pl. 3, fig. 10, *magnified 3 times;* found in concretions and soft underlying beds, Briggs Gully and Parrish Gully, Ontario Co., N. Y. The only species of the genus in the *Naples* (*U. Genesee*) formation, and quite distant from the *Loxonemas* of the Hamilton strata below, and the Chemung strata above; larger and fewer ribs.— *VIII e'.*

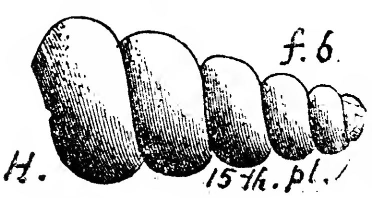


Loxonema obtusum, Hall. Pal. N. Y., Vol. 3, 1859. *Lower Helderberg;* found by Dr. Barrett at Port Jervis in *Stormville limestone*, G6, p. 134.— *VI.—See Appendix.*

Loxonema robustum, Hall, 15th Annual Report, New York, 1862, page 52, plate 4, fig. 7, a cast, without surface marks, referred to *Loxonema* on account of its flat whorls and close suture. Another fragment, found with it, has a banded suture and is a distinct species. *Schoharie* grit, Eastern N. Y.— *VII b.*



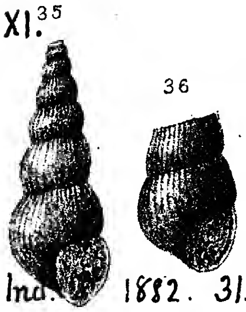
Loxonema solidum, Hall, 15th Annual Report, 1862, page 51, plate 4, fig. 6. Intermediate between *L. compacta*, and *L. obtusa;* specimens all imperfect, without shell, and only to be distinguished by form and proportions of whorls. *Schoharie grit*, Eastern N. Y.— *VII b.*



Loxonema terebra, Hall. Illus. Dev. Foss. 1876, *Chemung*, Claypole's Coll. Spec. 196–6 (two) at Rough and Ready RR. cut, Hunt. Co. Pa., from bottom bed of *Hamilton middle shales* (T3, 111), and at Mapleton, from the *H. upper shales* (T3, 109).—In Cat. OO, p. 237, specimens 872–40 (impressions); 872–46 (impression of this sp. ?); 872–37 (poor casts of this sp. ?); all from Howell's coll. at Nichols, Tioga county, N. Y. from *Chemung strata.* See Rpt. I, p. 93.—Also, spec. 883–6 (impression and part of cast), 883–7, –11, –22, –35, –40, –45, –68, Tioga Co., N. Y., *Chemung.— VIII c, VIII g.—See Appendix.*

Loxonema yandellanum, Hall, Trans. Alb. Inst., Vol. 4, 1856, p. 28; Whitfield, Bulletin 3, Am. Mus. Nat. Hist., p. 77, plate 8, figs. 35, 36, in Collett's Indiana Rt., 1882, page 365, plate 31, fig. 35 and 36 (a fragment) both *magnified three times.*—Subcarboniferous (*Warsaw limestone*) formation at Spergen Hill, Ind.—NOTE. See fig. 38, under *Bulimorpha bulimiformis.—XI.*

XI. 35 36



Ind. 1882. 31.

Loxonema vincta. See **Murchisonia vincta,** *XI.*

Lumbriconereites austini. See **Worm teeth.**—*IV.*

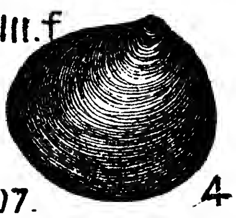
Lucina lirata. See **Paracyclas lirata.** *VIII a.*

Lucina ohioensis. See **Paracyclas ohioensis.** *VIII a.*

Lucina retusa. Hall's Report on the Fourth or Western District of New York, 1843, page 245, fig. 107, 4. *Portage formation.* Shell obliquely suborbicular; break small, oblique; surface marked with concentric lines, which are stronger on the front margin. *Portage formation* on Lake Erie Shore.— *VIII f.*

Lucina retusa, Hall. The figure given on page 116 of the Dictionary is said by H. S. Williams (Ms. corr. Jan. 1889) to be not a *Cardiola* because having no radiating folds, and it is placed here at his suggestion.

VIII. f

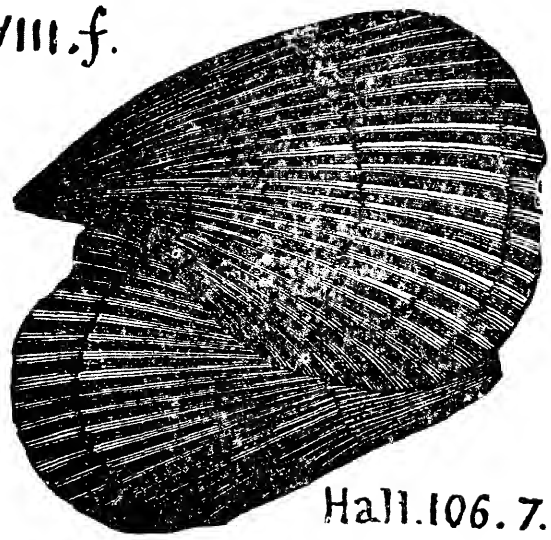


107. 4

Lucina varysburgia, H. S. Williams, Bull. 41, U. S. Geol. Sur. 1887, plate 3, fig. 14, *twice natural size;* resembles *Paracyclas chemungensis,* Hall, Pal. N. Y. V. i, pl. 45, f. 23; still more *Cardiomorpha* (*Ungulina*) *suborbicularis,* now *Edmondia tenuistriata,* Hall.—From the green nodular shales between the two *Fucoides verticalis sandstones* C3 and C4 of H. S. Williams' Upper Devonian Section at Varysburg, Western New York. *Portage, VIII f.—See Appendix.*

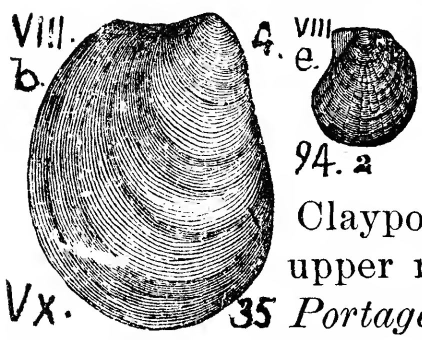
Lucina wyomingensis, H. S. Williams, Bull. 41, U. S. G. S. 1887, plate 3, fig. 13, *twice nature;* resembles *Lucina* (*Paracyclas*) *lirata,* but has a more erect beak, radiating striæ at the cardinal angles, and no finer intermediate concentric striæ; and the concentric folds are not sharp but rounded.—*Portage shales* at Varysburg, N. Y. (472 A) on H. S. Williams' map. *VIII f.—See Appendix.*

Lunulicardium* acutirostrum (*Pinnopsis acutirostra*).

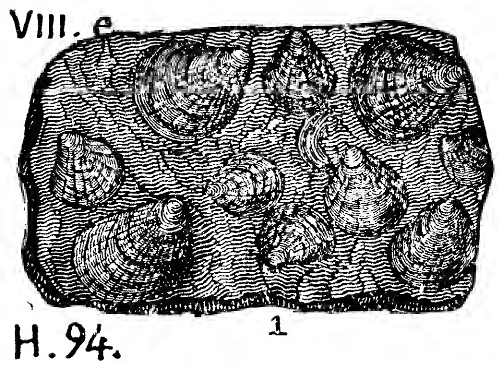


Hall, Report on the Fourth District of New York, 1843, page 243, fig. 106, 7; a peculiar shell among the more common forms of the *Portage formation* on Cashauqua creek, N. Y. Its wedge-shaped surface has 26 diverging ribs, crossed by many faint, wavy lines and a few stronger wrinkles of growth; the sharp projecting beak is slightly incurved.—*VIII f.*

Lunulicardium fragile. Figures wrongly named *Aviculopecten fragilis*, on page 74 of this Dictionary (R. P. Whitfield's corrections, Jan. 1889).—Hall, Pal. N. Y. Vol. 5, 1877, *Hamilton.* In Perry Co., Pa., Claypole's Spec. 146–2 (seven specimens) from upper road (n. fork) Newport to Baileysburg, *Portage* and *Chemung*; 197–4, Mapleton, Hunt. Co., *Hamilton*; 202–1 (five) Mapleton. In *Genesee* shale, 10′ to 30′ beneath *Portage* (T3, p. 108); also at McConnellstown, on Piney ridge at the top of the *Genesee* (T3, p. 108); also at Mapleton in *Hamilton upper shale* (T3, p. 109); also at Huntingdon car-works, in *Marcellus* (*Corniferous?*) *limestone* (T3, p. 115). In Centre Co., Pa., in *Marcellus shale* (T4, p. 433).—*VIII b, c, e, g.*

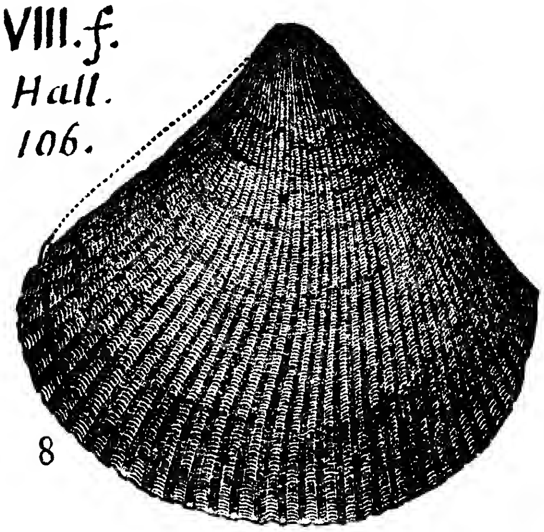


Lunulicardium marcellense. (*Cypricardites marcellensis*). Vanuxem, Report on the Third or Middle District of New York, 1842, page 146, fig. 35, 4, a cast of a fossil shell, one of four peculiar to the *Marcellus* formation, the others being *Goniatites expansus*, *Nautilus* (*Goniatites*) *marcellensis*, and *Leiorhynchus* (*Orthis*) *limitaris.*—*VIII b.*



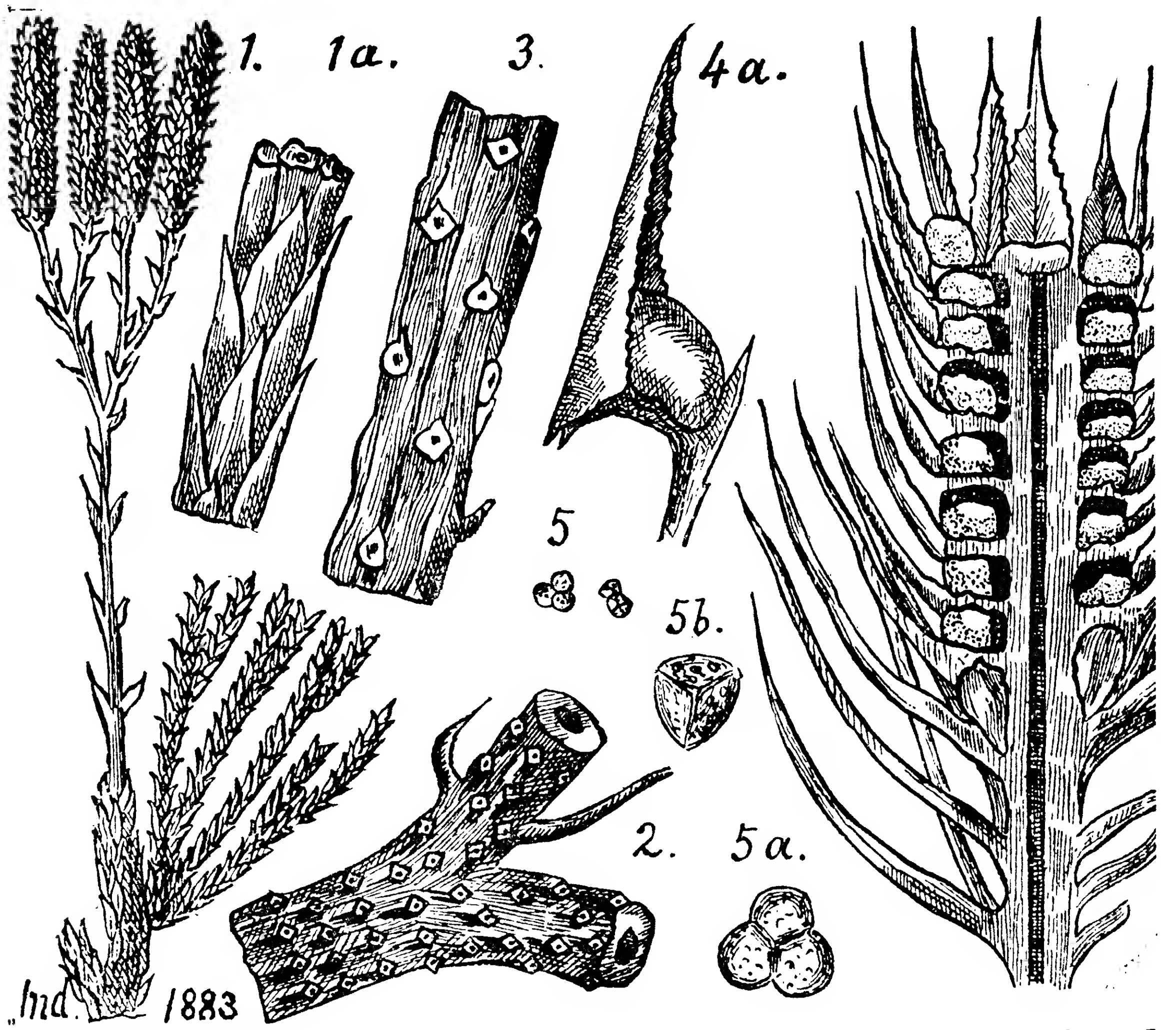
*Hall and others spell Munster's genus thus; but S. A. Miller spells it *Lunulacardium.*

Lunulicardium ornatum (*Pinnopsis ornatus*). Hall,



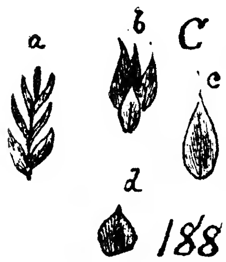
Report on the Third or Western District of New York, 1843, page 243, fig. 106, 8, so much like *Lunulicardium acutirostra* (which lived with it in the same *Portage sandstone* formation) that they are often mistaken for each other; but this has more than 40 diverging ribs, and the other only 26; and they are crossed by beautifully arched striæ. The general shape of the two shells differs also.—Cashaqua creek, N. Y.—*VIII f.*

Lycopodiaceæ, called Club Mosses, now living in tropical



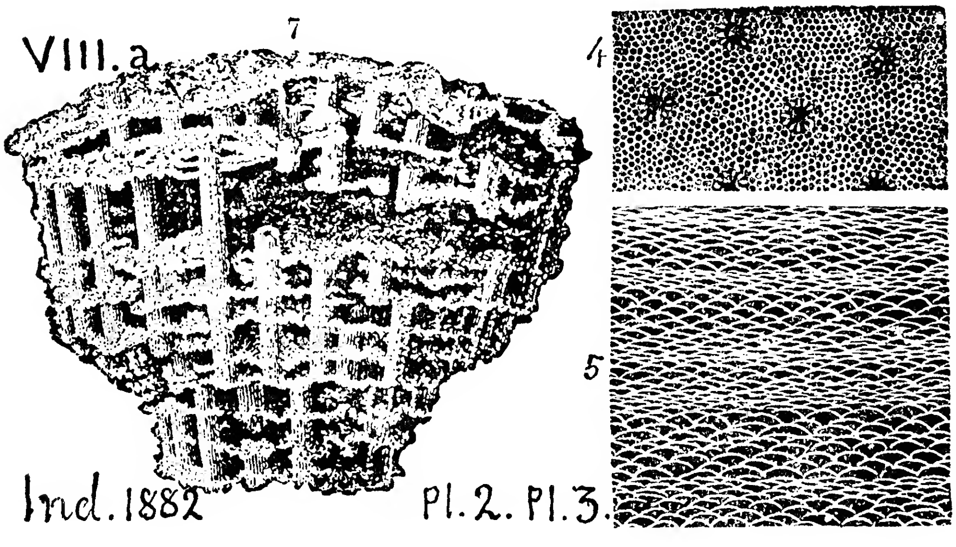
countries, explain a whole class of vegetable fossil forms found in the roof shales of coal beds. See Collett's Indiana Report for 1883, page 76, and his plate 16, figs. 1, 2, 3, stem and branches of a living *lycopod*; figs. 4, 4*a*, *enlarged*, of axilary sporanges; figs. 5, 5*a*, 5*b*, large seed (*macrospores*), or in some cases spores of two sizes in separate seed cases (sporanges), the larger kind being organs of germination, the smaller a sort of pollen to fertilize the larger ones; and of these spores almost whole layers of coal are made.—See Q, p. 55.—*XIII.*—NOTE. Under **Sporangites bilobata, huronensis,** and **papillata,** Dawson, will be found figures of such spores, both of natural size, and magnified, by J. M. Clarke.

Lycopodites matthewi, Dawson. Acadian Geology, 1868, page 543, fig. 188, c (*a*) branch and leaves; (*b*, *c*, *d*,) leaves of different shapes. Can. Nat. Vol. 6, p. 171, fig. 8. Found in the graphitic Devonian shale in the city of St. John, N. B., but not seen elsewhere. See Canadian Naturalist, Vol. 6, page 171, fig. 8. (Dawson.)—*VIII–IX.*



Lycopodites simplex, the fruiting spike of some species of this genus, like the living *Lycopodium inflexum* for example, and the fossil *Lycopodites leptostachys* of Goldenberg. Lesquereux, Coal Flora, P, p. 779, plate 106, fig. 2; found under Campbell's ledge at Pittston, Pa. *XII.*

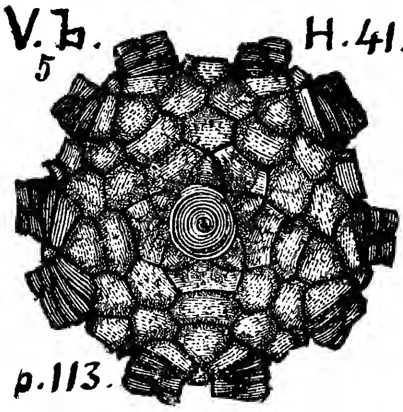
Lyellia americana. (Edwards and Haime, 1851, Mon. Foss. Terr. Pal.) Collett's Indiana Report of 1882 page, 252, plate 2, fig. 4 upper surface, *enlarged;* fig. 5, vertical section, *enlarged,* not cutting the cell tubes, but only the intercellular tissue. Plate 3, fig. 7, side of weathered specimen, showing the furrowed tubes. Upper Helderberg (*Corniferous limestone*, Miller,) *VIII a.*



Lyonsia nasuta. See **Tellinomya nasuta.** *II c.*

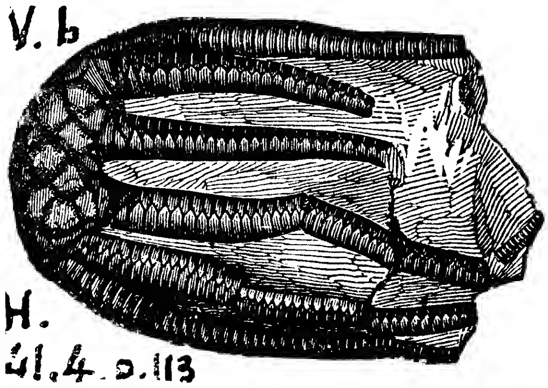
Lyonsia subtruncata. **Modiolopsis truncatus.** *III b.*

V.b. 5



p.113.

H.41. V.b



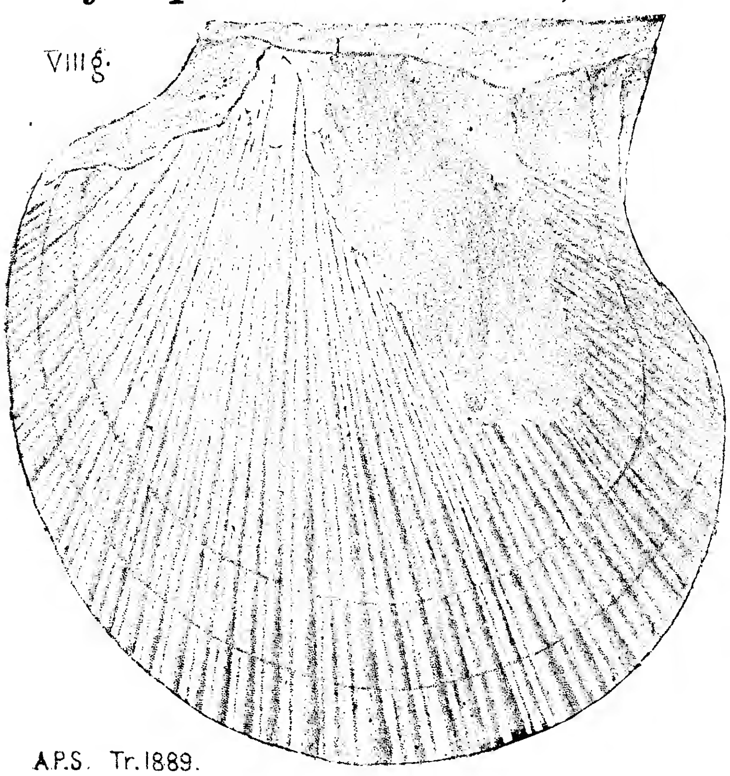
H. 41.4. p.113

Lyriocrinus dactylus, Hall, (*Marsupiocrinites? dactylus*) 4th Distr. N. Y., fig. 41 bis, 4, 5; fig. 5 representing very clearly the arrangement of the coral plates, slightly ornamented. The stem, on which the head grew, is composed of two series of plates, one extending beyond the other, and ornamented around their edges. (See Hall Pal. N. Y. Vol. 2, 1852.) *Niagara*, *V b.*

Lyriocrinus melissa, Hall. From Collett's Indiana Report of 1881, p. 269 plate 14, figs. 18 to 28; also plate 15, f. 11. Of these I have selected f. 18, summit of a large individual, showing evidence of a nearly central proboscis; f. 19 base of large imperfect cup; f. 20, 21, very symmetrical specimen, usual form up to the bases of the arms; f. 22, ordinary size; five-sided ring where the stalk was set into the head, plates beautifully striated; f. 23, side *enlarged twice;* f. 25, bottom of same, showing the nodes on the (*continued on p. 377.*)

Lyriopecten alternatus, *n. s.* Simpson Trans. Amer. Philos. Soc. Philada., 1889, page 446, fig. 12, founded on specimens No. 9552, 9953, in Randall's collections, one mile north of Warren, Pa., wrongly labeled *Aviculopecten.*—*Chemung? VIIIg.*—NOTE. Full descriptions of this and as many of the other new species as could not come here will be given in the Appendix.

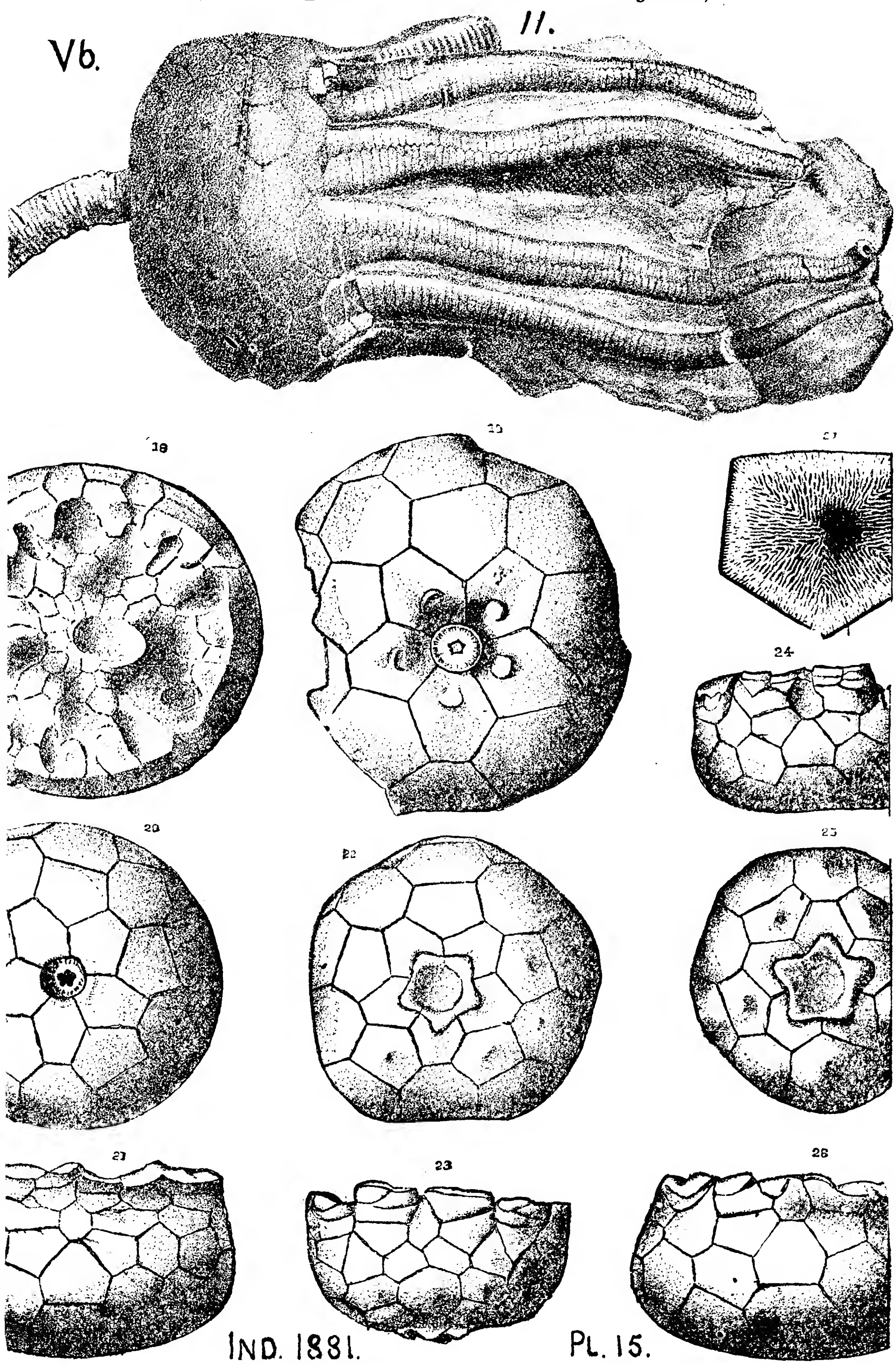
VIIIg.



A.P.S. Tr. 1889.

(*Continued from L. melissa, on p. 376.*)

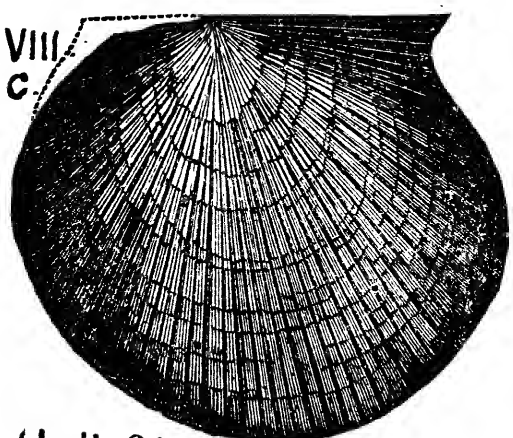
basal plates; f. 27, *enlarged* first radial plate of specimen 22, showing character of the striæ. Plate 15, fig. 11, specimen with the arms, and a part of the stalk.—*Niagara*, *V b.*



Lyriopecten fasciatus, recognized by G. B. Simpson in specimen 9579 of Randall's collections at Warren, Pa., in *Chemung-Catskill* strata, *VIII–IX.—See Appendix.*

Lyriopecten macronotus, Hall. Claypole's Cat. Spec. 27–13, (doubtful), from opposite Newport, in Perry Co., Pa. *Chemung strata*, *VIII g.—See Appendix.*

Lyriopecten orbiculatus. (*Avicula orbiculata.* Hall, Geol. Fourth District of New York, 1843, page 202, fig. 81, 1, Hamilton) *Aviculopecten orbiculatus.* Claypole's list of fossils found in Perry Co., Pa. Report F2 Preface. Catalogue, spec. 5–149 (two), collected at Barnett's mills, N. W. of New Bloomfield, Perry Co., Pa., from *Hamilton strata*, *VIII c.*



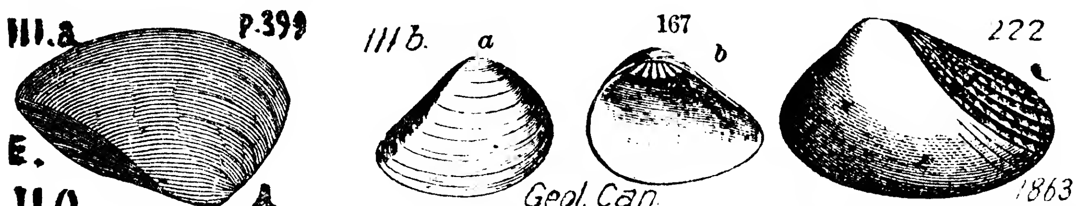
Hall. 81. 1.

Lyriopecten priamus. Claypole's list of fossils in Perry Co., Pa. Report F2. Preface, p. xv.—Catalogue of collections, spec. 27–12 (two) opposite Newport, on the Juniata river, in *Chemung strata*, *VIII g*; spec. 51–26, from near King's mill, Penn twp., Perry Co., in *Chemung-Catskill*, *VIII–IX.—See Appendix.*

Lyriopecten tricostatus. See **Avicula tricostata.**—*VIII g.*

Lyrodesma cincinnatiense. *See Appendix.*

Lyrodesma poststriatum. (*Nuculana postsriata.*) Em-

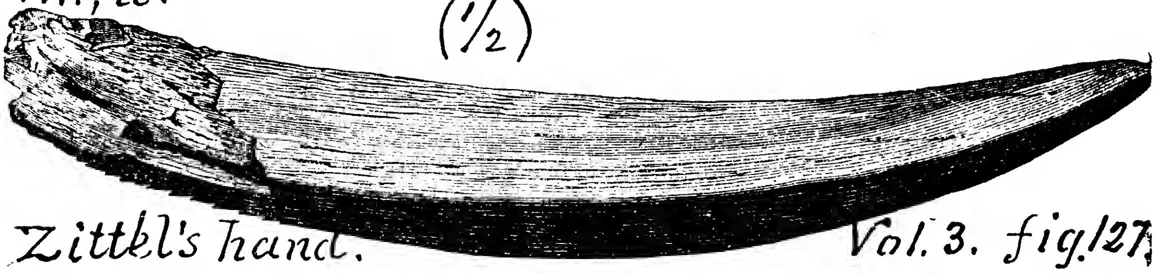


mons, Geol. 2nd Dist., N. Y., 1842, page 399, fig. 110, 4. *Black river formation.* Also, Geol. Canada, 1863, fig. 167 *a, b*, *Trenton;* and fig. 222, *Hudson river formation.* *II c*, *III b.*

NOTE.—G. B. Simpson finds it in collections of Hale and Hall at McKee's furnace, in *Clinton ore roof shales*, spec. 501–39; 505–10; 505–11 (OO, p. 233). Possibly spec. 501–48 (two examples), very much like *Palæoneilo brevis*, of the *Chemung.* Also 507–17, Matilda furnace, Mifflin Co., Pa.—*Va.*

Machæracanthus major, New. Pal. Ohio, Vol. 1, pl. 25, f. 2.

VIII, *a.* (½)

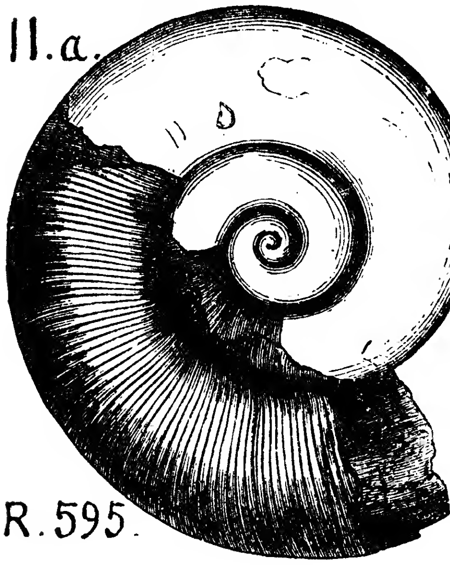


Zittel's hand. Vol. 3. fig. 127

Machæracanthus peracutus. *See Appendix.*

Maclurea labiata. See **Raphistoma labiatum**, *IIb.*

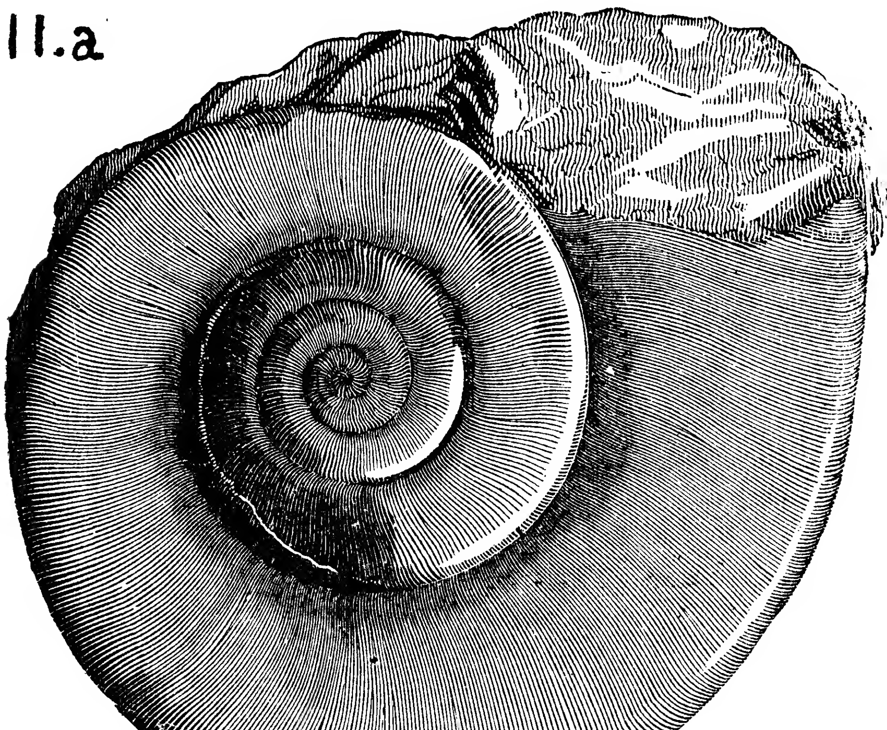
II.a.



R. 595.

Maclurea magna, LeSueur. J. Nat. Sc. Acad. Phil., Vol. 1, 1818. Rogers, page 817, fig. 595. Emmons, page 276, fig. 73, 1. *Chazy* formation, *II b.* It is one of the few large gasteropod shells found in the 6000 feet of limestone strata, of Blair Co., Pa., and only in the upper half of the mass, i. e. in the *Chazy subdivision.*) C. E. Hall in T 3, p. 367.) The same is true in Huntingdon and Centre Cos. (Ewing in T4, p. 423.)

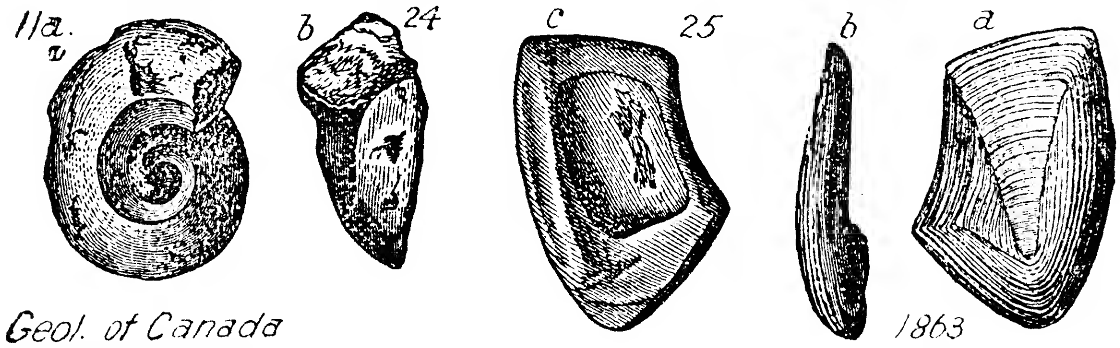
II.a



E. 73. p. 276

NOTE. Most commonly nothing more than a white spiral line can be seen on the rock specimen; this line representing the edge of the shell-whorl converted into crystalline carbonate of lime, *calcite.* Such a section of *Maclurea* (with some smaller sections of *Euomphalus*) was found by Clark, June, 1875, in a quarry on Nero Peters' land, 2 m. E. of Ballietsville, Lehigh Co., Pa., in what seem to be *Chazy* strata, (Report D2, p. 21.) *Maclurea* or *Euomphalus* occurs also in J. Dach's quarry, 1¼ m. S. W. of Bath, near the Jacksonville road, Northampton Co., Pa., in *Chazy strata* (D3, p. 161, 183.)—*II b.*

Maclurea matutina, Hall, Pal., N. Y., Vol. 1, 1847, *Calciferous sandstone.* Geol. Canada, 1863, page 115, fig. 24 *a*, view from below; *b*, view of aperture. Figs. 25, a. b. c, exterior, side and inside views of a lid (*operculum*) to a *Maclurea*, perhaps of this species. NOTE.—H. D. Rogers, Geol. Pa., 1858, p. 817, reports it found in the limestone valleys of Pennsylvania. —*II a.*

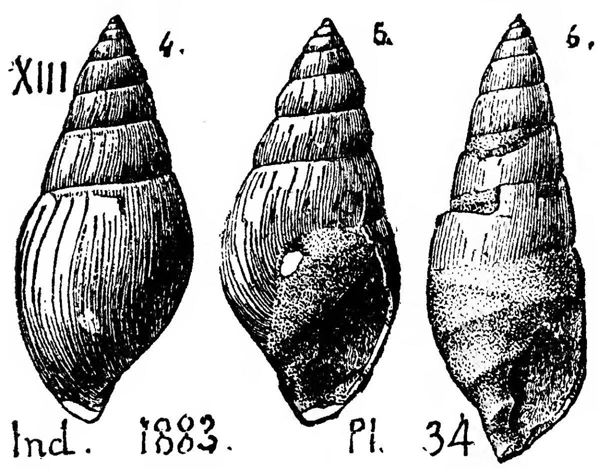


Maclurea sordida. See **Ophileta sordida.** *II a.* For figures by Whitfield, 1889, *see Appendix.*

Maclurea striata. See **Raphistoma striatum.** *II b.*

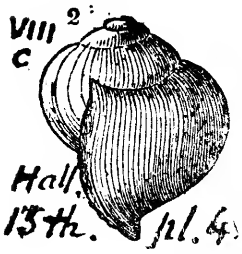
Macrocheilus attenuatus. See **M. fusiformis.** *XIII.*

Macrocheilus (Soleniscus) fusiformis, (Hall, Geol. of Iowa, part 2, 1858, page 718, plate 29, fig. 7. *Macrocheilus attenuatus*, proposed by Hall,1877, because *fusiformis* was preoccupied by Sowerby; but *Macrocheilus* is one of Hope's genera of beetles, 1838; therefore the adoption of *Soleniscus* by Meek and Worthen, 1860, for coal measure gasteropods (snails of this species). Collett's Indiana Report of 1883, page 154, plate 34, figs. 4, 5, *natural size*,

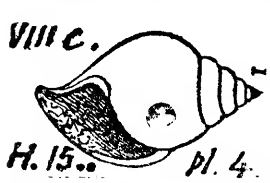


opposite sides; fig. 6, another shell broken so as to show the thick and inner lip, columellar fold and broad groove more plainly. *Upper coal measures* in Iowa and Indiana.—See **Polyphemopsis fusiformis.** *XIII.*

Macrocheilus hamiltoniæ. Hall. 15th Annual Report, New York, 1862, page 49, plate 4, figure 2. Resembles somewhat the carboniferous *M. ventricosus*, but has a larger and not so slender a spire, and its last two whorls are ventricose.—*Hamilton formation, VIII c.*



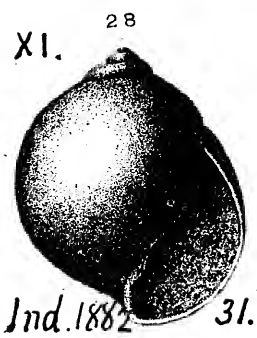
Macrocheilus hebe. Hall. 15th Annual Rt., 1862, page 48, plate 4, fig. 1. "This shell has all the characters of the genus *Macrocheilus* of the *Coal Measures*, and is the second well marked species I have observed in the *Hamilton group.*" Like *M. newberryi*, (*Carboniferous*) with some differences. Differs also from *M. ventricosus.*—*Goniatite* (*Hamilton*) *limestone*, at Manlius, N. Y.—*VIII c*



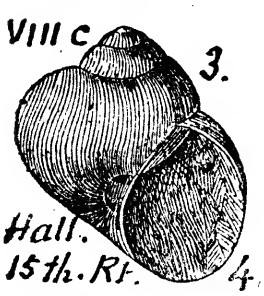
Macrocheilus inhabilis. See **Mach. primigenius.** *XIII.*

Macrocheilus klipparti. *See Appendix.*

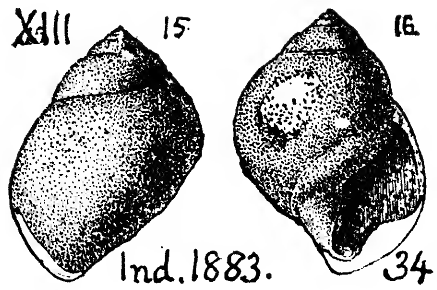
Macrocheilus? littonanus. (*Natica littonana*, Hall, Trans. Alb. Inst., 1856. *Mach. littonanus*, Whitfield, Bull. 3, Am. Mus. Nat. Hist. 1882, plate 8, fig. 28.) Collett's Indiana Survey Rt. of 1883, page 369, plate 31, fig. 28, *magnified four times*, front view. Resembles *Littorina pusilla*, McCoy's Carb. Foss. Ireland. At Bloomington, Ind. *Subcarboniferous. XI.*



Macrocheilus (*Holopea*) **macrostomus**, Hall, 15th Annual Report, New York, 1862, page 49, plate 4, fig. 3.—Like some of the *Platystomata* shells, but texture of shell and surface marks different. Fine equal growth-lines strongly directed backwards from the suture. Like *Holopea;* but aperture and columella not having been seen, relationship can only be suspected. *Hamilton lime shales*, Madison Co., N. Y.—*VIII c.*

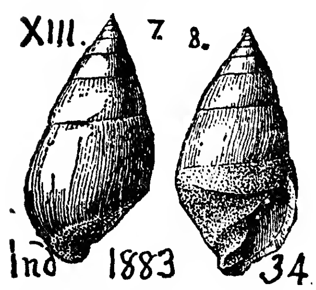


Macrocheilus (*Soleniscus?*) **medialis.** (Meek and

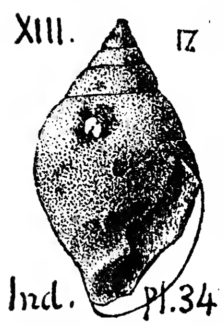


Worthen, Proc. Academy of Natural Sciences at Philadelphia, 1865. Illinois Report, Vol. 2, 1866, plate 31, fig. 5 *a*, 5 *b*, from near Springfield, Ill.) Collett's Indiana, 1883, plate 34, fig. 15, 16, *natural size*, opposite sides, thickened lip, no fold.—*Coal measures. XIII.*

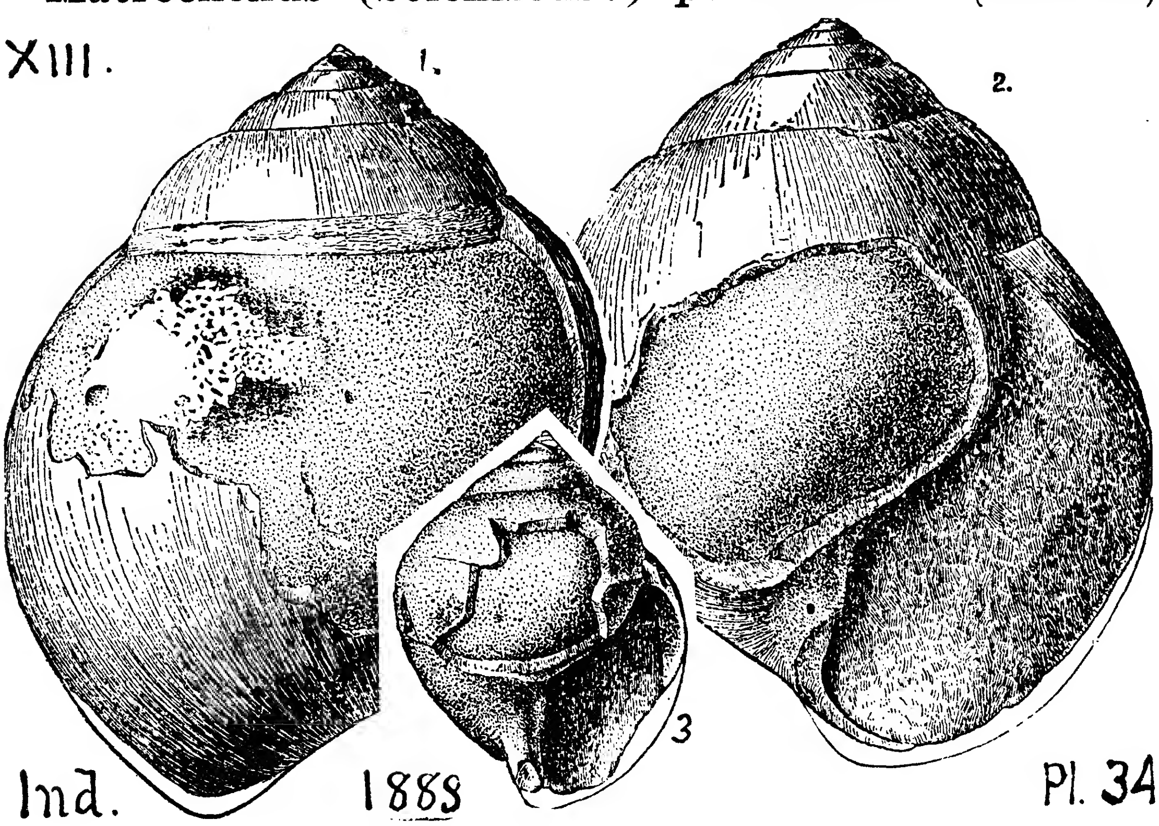
Macrocheilus (Soleniscus) newberryi. (*Loxonema newberryi*, Stevens Am. Jour. Sci., Vol. 25, 1858, page 259. *Macr. new.* Hall, Geol. Iowa, part 2, 1858, plate 29.) Collett's Indiana 1883, page 153, figs. 7, 8, *natural size*, opposite sides, last volute outside broken away. Danville, Ill. Coals M, N.—*XIII?*



Macrocheilus (*Soleniscus*) **paludinæformis.** (Hall, Geol. Iowa, Part 2, 1858, p. 719, plate 29, fig. 10.) Collett's Indiana Rt., 1883, page 154, plate 34, fig. 17, *natural size*, side view, outer part of last whorl gone, showing fold and groove. NOTE. Hall suggests that Conrad's *Plectostylus* is a cast of this species.—Found in the *Coal measures* of Indiana, Illinois and Iowa.—*XIII.*

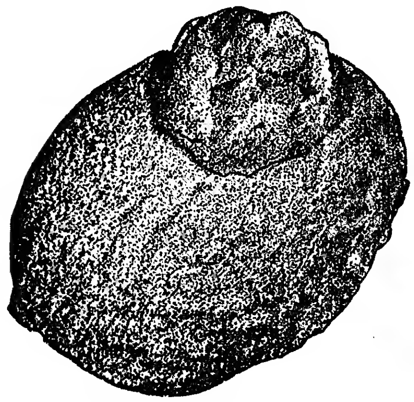


Macrocheilus (Soleniscus?) ponderosus. (Swallow,

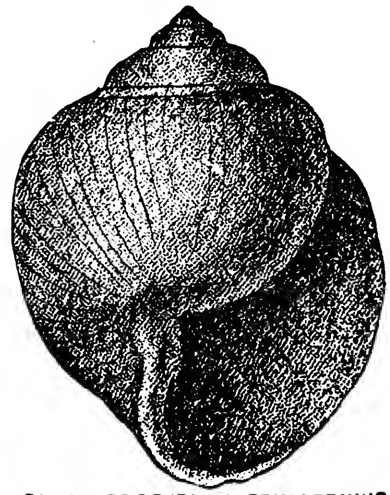


Trans. St. Louis Acad. Sci., 1858, p. 202.) Collett's Indiana 1883, plate 34, figs. 1, 2, *natural size*, large specimen from Iowa.—*Upper Coal Measures, XV?*

Macrocheilus primigenius. Conrad. See fig. 3 in last wood cut above, from Collett's Indiana Report of 1883, plate 34. (*Stylifer primigenia*), Conrad, Trans. Geol. Soc. Pa. Vol. plate 1,12, fig. 2. *Macrocheilus inhabilies* Morton).—*Coal measures;* somewhat common shell from Ohio to Iowa. Collett.—Recognized by Heilprin in the collection of fossils from the carboniferous *Mill Creek limestone* bed (1000′ above the conglomerate), near Wilkesbarre, Pa., in the possession of the Wyoming Hist. Society. See Geol. Sur. Pa., An. Rt. 1885, pages 446, 457.—Found by J. J. Stevenson in the Coal Measures of Western Pa. and W. Va. (KKK, p. 310); in the *Decker Cr. shale* (under Mah. SS,) at Morgantown. (L, p. 37.) Also in the *Crinoidal limestone*, (*XIV*), 250′ beneath Pittsburgh coal, Fayette Co. (L, p. 75), and on the Conemaugh (H4 p. 78). It occurs in *Ferriferous limestone*, Beaver Co. (Q, p. 62); Lawrence Co. (QQ, p. 47, 106); Mercer Co. (Q3, p. 25); northern Butler (V, p. 146).—*XIII, XIV.*



1a MACROCHEILUS PRIMIGENIUS.



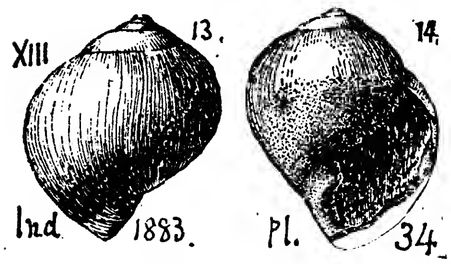
3A MACROCHEILUS PRIMIGENIUS

Macrocheilus subcostatus ? Owen. Geol. Wis., Iowa and Minn. 1852, pl. 2, fig. 9, a cast bearing a strong likeness to D'Orbigny's species (Verneuil's *Buccinum Schlotheimii*) in European Devonian but Owen's is from L. Sil. magnesian lime. of Iowa. *II c.*

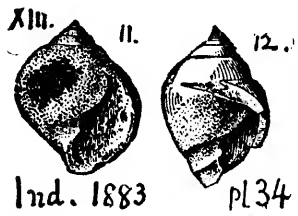
II c.

Ow. Mac.

Macrocheilus (*Soleniscus*) **texanus,** (Shumard Trans. St. Louis Acad. Sci. 1859, Vol. 1. p. 402. Collett's Indiana Rt. 1883, page 155, plate 34, figs. 13, 14, *natural size*, opposite sides of the shell. Coal measures of Texas; and at Danville, Ill. To be looked for in *Upper Coal Measures* of Indiana, and of course in those of Ohio and Western Pennsylvania as well. The figures are of the Illinois specimen. Dr. C. A. White suspects that it is nothing more than a large variety of *Macrocheilus ventricosus*, although it is somewhat more globose, and the spire is proportionately less prominent than usual in that species. *XV.*



Macrocheilus (*Soleniscus*) **ventricosus,** Hall. Geol. Iowa, Part 2, pl. 29. fig 8. (*Soleniscus brevis*,) White. 1881. Exploration 100th meridian, Supp. Vol. 3, plate 28, fig. 5.) Collett's Indiana Rt. 1883, page 155; plate 34, fig. 11, nearly perfect side view; fig. 12, broken opposite side, showing collumellar fold and broad groove. *Upper Coal measures;* Ill., Iowa, N. Mexico; variable.—It has been found by I. C. White in Beaver, Lawrence, Mercer and Butler counties Pa., in the *Ferriferous limestone* of the Lower Productive Coal Measures, Q, 62; Q2, 47, 106; Q3, 25, 77, 78; V, 146;—by Stevenson, at Morgantown, in the *Decker's Cr. shale*, under the Mahoning sandstone, L, 37:—and in the *Crinoidal limestone*, 250′ beneath the Pittsburgh coal bed, in Fayette Co. L, 35.—*XIII, XIV.*



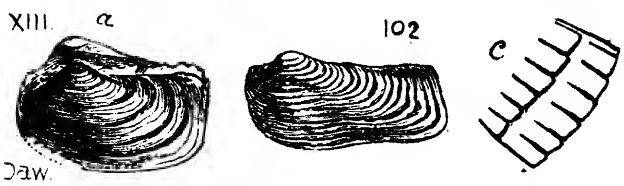
Macrocheilus———? found by J. J. Stevenson in the *Lower Carboniferous* strata in the gaps of Fayette and Westmoreland Co., Pa. KKK, 311.—*X, XI.*

Macrochilina; generic name proposed by Bayle in 1880, Journal de Conchyliologie, [3] Vol. I, 19, to be used instead of **Macrocheilus,** above, because the latter name has been preoccupied by Hope. (S. A. Miller's Cat. Pal. Foss. Supplement, 2d Ed. 1883.)

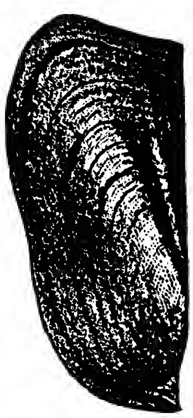
Besides the above mentioned, Miller's Cat. refers to more than a dozen other species of this widely distributed and long lived genus of Gasteropod shells.

Macrodon hamiltoniæ, Hall. 1870, Prelim. Notice Lam. shells, Claypole's list, Report F2, preface, p. xiv. *Hamilton* formation. See Cat. OO, p. 231, specimen 5–62 (two) collected near Barrett's mill, N. W. of Bloomfield, Perry Co., Pa. Multitudes of them occur in the *Bedford shale* of Ohio, which is higher in the series. Report I, p. 73.—*VIII c.*

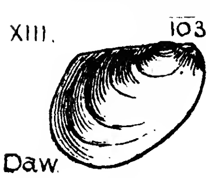
Macrodon hardingi, Dawson. Acadian Geology, 1868, p, 302, fig. 102, *a*, medium sized cast of the inner surface; *b*, outer surface; *c*, *magnified* sculpture; shell thick, usually represented by casts of interior, smooth, with deep scars; outer surface covered with regular squamous concentric folds, fringed with delicate ray-lines; beautiful shell, abundant (especially in Windsor bed *e*); characteristic of upper stages of *Lower Carboniferous limestones.* Allied to *Byssoarca reticulata*, M'Coy, Irish coal measures; to ***Arca** m'coyana*, and *anatina*, De Kon. of Belgium; and to ***Byss.** tumida* of the Permian. Largest specimens 1¼ inch long.—*XI?*



Macrodon obsoletus. Meek, Regent. Rt. Univer. Virginia, 1071; Geol. Ohio, Pal. Vol. 2, p. 334, pl. 19, fig. 9; recognized by Heilprin among the *Mill Creek limestone* carboniferous fossils in the museum of the Wyoming Hist. Soc., at Wilkesbarre, Geol. Pa. An. Rt. for 1885, page 456, fig. 19; 1000′ above the Pottsville Conglomerate No. XII.——In Beaver, Lawrence, Mercer and Butler Cos. it occurs in the *Ferriferous limestone*, not far above the Conglomerate. Q, 62; Q2, 47; Q3, 25; V, 147. In Fayette Co. it occurs in the *Crinoidal limestone* of the Barren Measures, L, 35.—*XIII, XIV, XV.* NOTE. For figure from Pal. Ohio, Vol. 2, p. 334, plate 19, fig. 19, see *Appendix.*

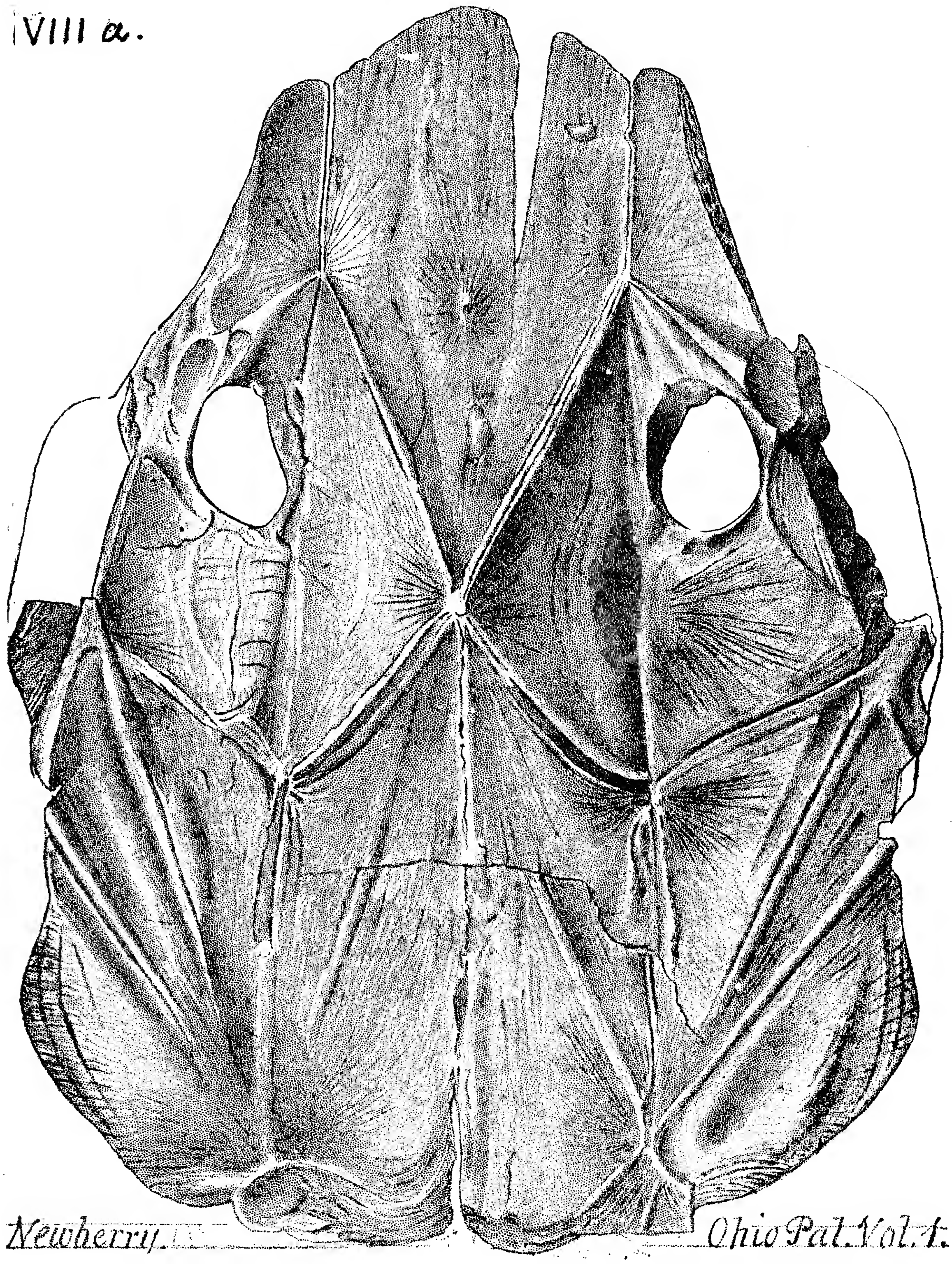

19 MACRODON OBSOLETUS.

Macrodon? shubenacadiensis, Dawson. In Acadian Geology, 1868, p. 303, fig. 103, a cast of the shell; genus uncertain; very common in Nova Scotia and Cape Breton in *Carboniferous limestones.* *XI?*



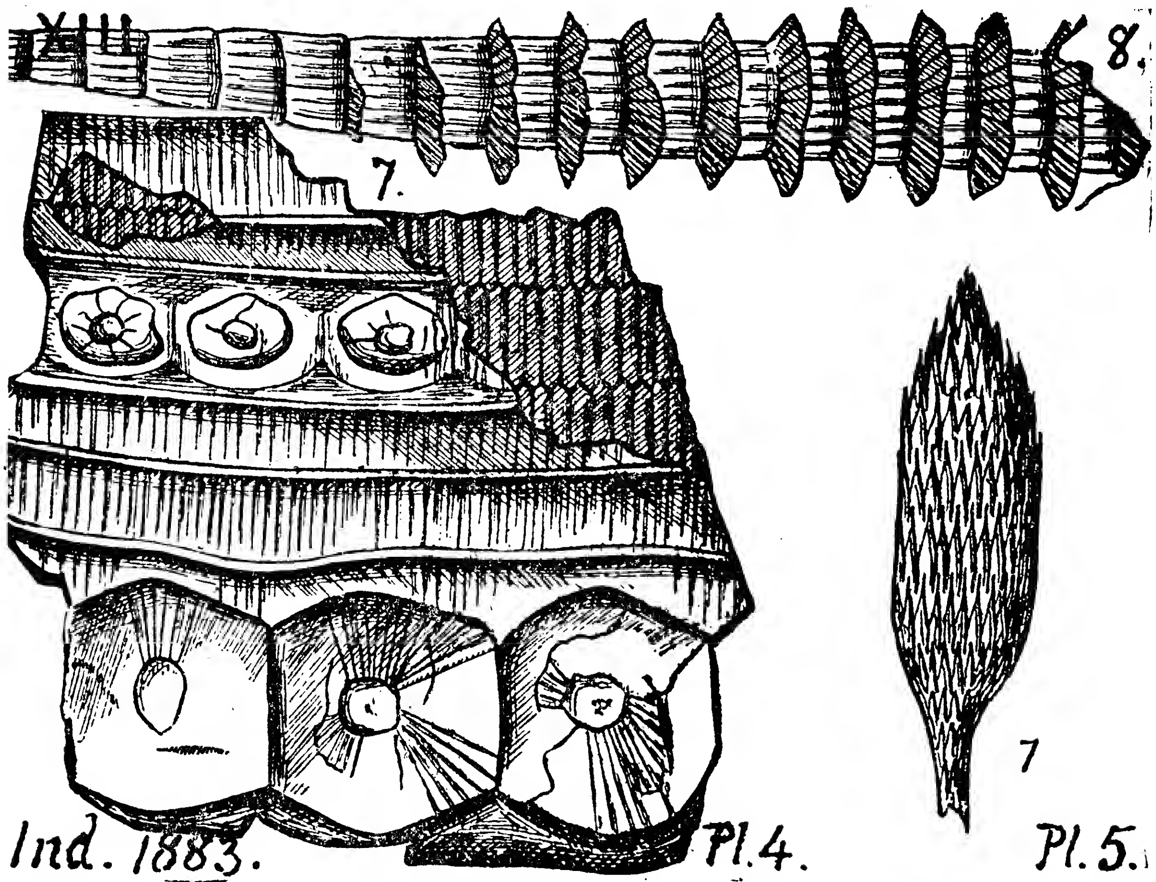
Macropetalichthys sullivanti, Newberry. Palæontol. of

VIII a.



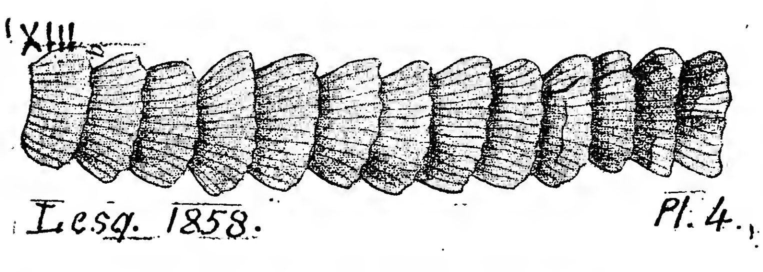
Ohio, Vol. 1, 1873, page 294, plate 24, fig. 1; under side of head plate; original figure (natural size) *reduced* in the proportion of 5½ to 4.—*Corniferous limestone* (Upper Helderberg) formation, Sandusky, Ohio.—*VIII a.* NOTE. For Pal. Ohio, Vol. 1, plate 25, fig. 1, 1a, and diagram on page 294 of that volume, *see Appendix.* The figure here given was redrawn by Mr. Simpson from the original in Newberry's volume.

Macrostachya, Schimper. (Lesquereux's Coal Flora of Pa.



page 60, plate 3, figs. 17 to 19 *a;* page 721, plate 109, fig. 3.) Collett's Indiana Report of 1883, page 47, plate 4, figs. 7, 8, plate 5, fig. 7, fragment of stem and large spikes, which are abundant in the *Kittanning bed* at Cannelton, Beaver Co., Pa. Lesquereux adds (p. 721) that three different forms of *Macrostachya* are known. *XIII.*

Macrostachya (*Asterophyllites*) **aperta,** Lesq. Geol. Pa., 1858, p. 852, plate 1, fig. 5, (4.) Coal Flora, Additions and Corrections, Rt. P, part 2, 1884, page 829, plate 3, figure 20.

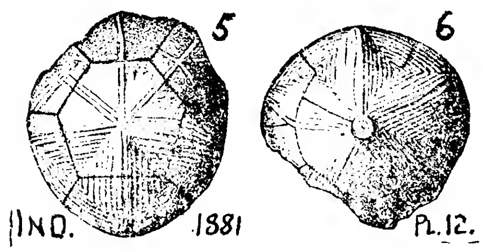


Rarely found. *Anthracite coal bed M* at New Philadelphia, Schuylkill Co.; and in the *Kittanning bed,* at Cannelton, Beaver Co., Pa.—*XIII.*

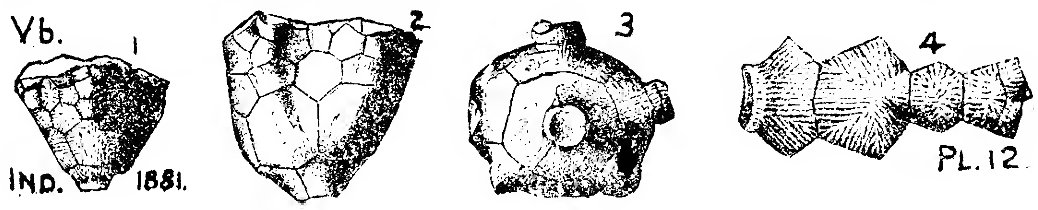
Macrostachya communis, Lesq. Additions, etc., 1884, in C. Flora, P, p. 828, plate 3, figs. 17, 18. (Considered by Schimper to belong to *Macrostachya infundibuliformis.*—Locally very abundant at Cannelton, *Kittanning bed;* at Westwood near Pottsville; and at the Archbald & Olyphant *Anthracite* mines;—mixed with stems and branches of *Asterophyllites equisetiformis.—XIII.—See Appendix.*

Macrostachya minor. Lesq. Additions to Coal Flora, 1884, Rt. P, p. 829, plate 3, figs. 19, 19 *a*. At first supposed to be a mere variety of *M. communis;* but lately found "at the same locality in numerous specimens all with the same character and of the same size."—Conglomerate bed at Campbell's ledge. Lacoe's collection.—*XII.—See Appendix.*

Macrostylocrinus fasciatus. (*Cyathocrinus fasciatus*, Hall, Doc. Ed. 28 Rt. N. Y. Mus. 1876, pl. 13, f. 5, 6.) Hall, Mus. Ed. 1879, p. 130, pl. 13, f. 5, 6. Figures taken from Collett's Indiana, 1881, plate 12, figs. 5, 6, *enlarged two diameters.—Niagara, Vb.*

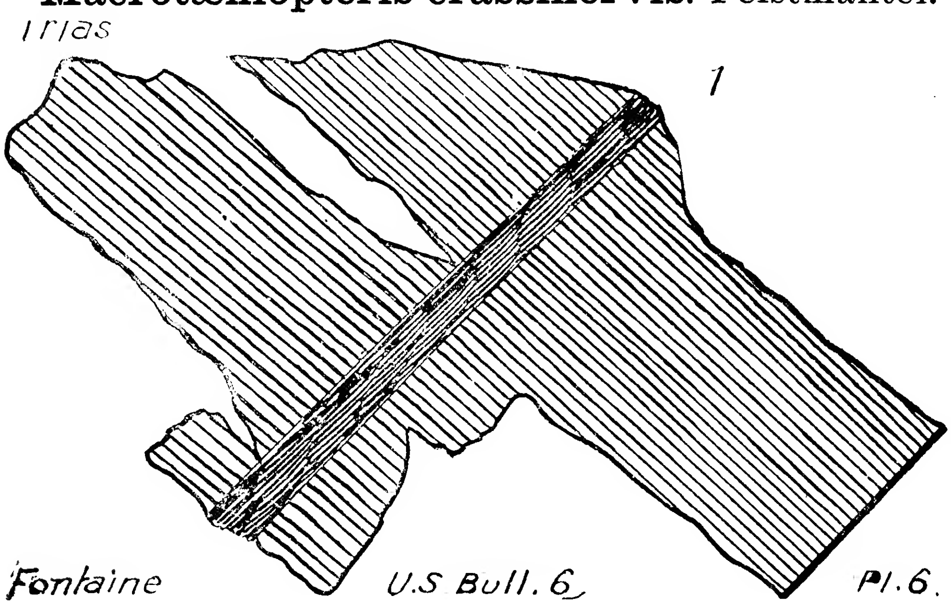


Macrostylocrinus striatus. Hall Trans. Alb. Acad. Vol.



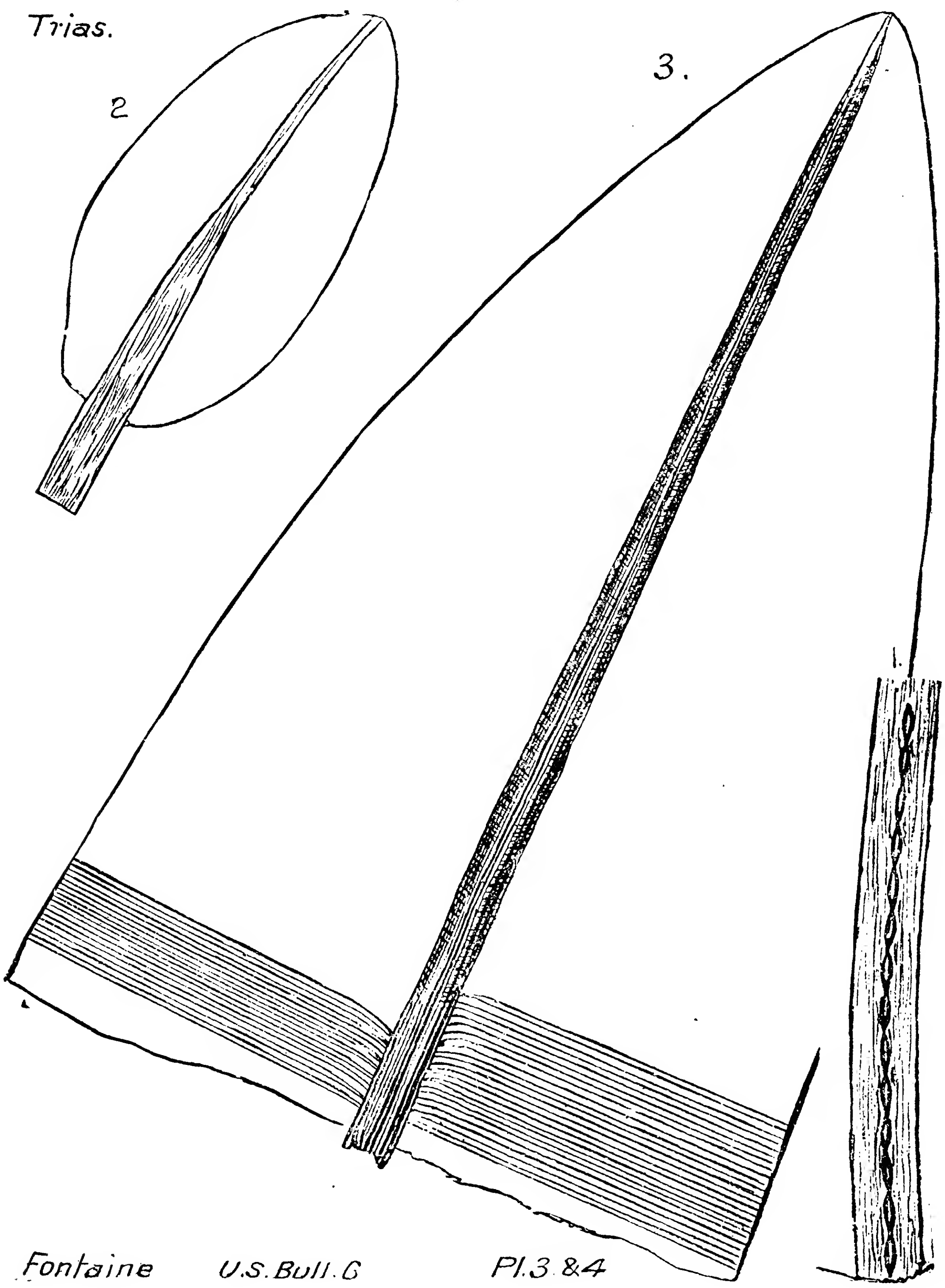
4, 1863; 28th, Rt. St. Mus. 1879, p. 129, pl. 13, figs. 1 to 4. Collett's 1881, plate 12, fig. 1, small individual, perfect striæ; f. 2, 3, larger specimen, no striæ; f. 4, *enlargement* of basal plate and one ray, showing striæ.—*Niagara, V b.*

Macrotæniopteris crassinervis. Feistmantel. Fontaine's Older Triassic Flora of Virginia, U.S. Geol. Survey, Volume No. 6, 1883, p. 22, 23, plate 6, fig. 1, leaf of smallest size, ap-



parently toward the top of a leaf. (Pl. 5, fig. 5 gives a fragment of a larger leaf; lateral nerves slightly oblique. Pl. 6, fig. 2, gives width of large leaf, 17 cm. which must have rivaled the *M. magnifolia.* Feistmantel's plant, found in the Rajmahal coal measures of India, was not so large.) Species mostly clearly defined; very rare; only seen at Clover Hill, in sandstone under main Richmond coal bed, with other plants only found here.—*Trias.*

Macrotæniopteris magnifolia. (W. B. Rogers). Schimper.



Fontaine's Older Triassic Flora of Virginia, in U. S. G. S. Volletin 6, 1883, pp. 18–22, plate 3, figs. 2, a young leaf, *nat. size ;* 3 tip of medium sized leaf, and part of its venation. Fructification not clearly made out; apparently elliptical sori, single row on midrib, or two rows one each side of it. (See W. B. Rogers' description " On the Age of the Coal Rocks of Virginia," Trans. Ass. Amer. Geol. & Nat.) Frond 2½ by 14 inches; 4 by 24 inches; 6½ by 40 inches long, estimated from fragments. (Reduced full grown leaf, Pl. 4, f. 3, and much reduced more blunted tip, Pl. 4, fig. 4; also *nat. size*, Pl. 5, fig. 1 to 3; small acute leaf Pl. 3, f. 1, 1a, 3; unusual form Pl. 4, f. 2—all omitted here.) Midrib fleshy. Nerves compound (See Pl. 5, f. 4a, omitted); and fruit? (Pl. 4, fig. 1, 1a, omitted.) Nearest ally *M. gigantea*, European *Rhætic ;* & *M. lata*, India. It is the most widely diffused, abundant and characteristic plant in the Mesozoic of Virginia, abounding near the main Richmond coal, and from that to the top of the series; often alone; commonly with *Equisetum rogersi.* It must occur in Pennsylvania, at Phœnixville or elsewhere.—Trias.

Mallotus villosus. *See Appendix.*

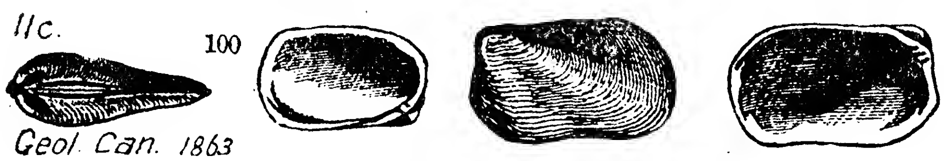
Man. *See* **Palæolithic human skulls.**

Marsupiocrinites. See **Lyriocrinus dactylus.** *V, b.*

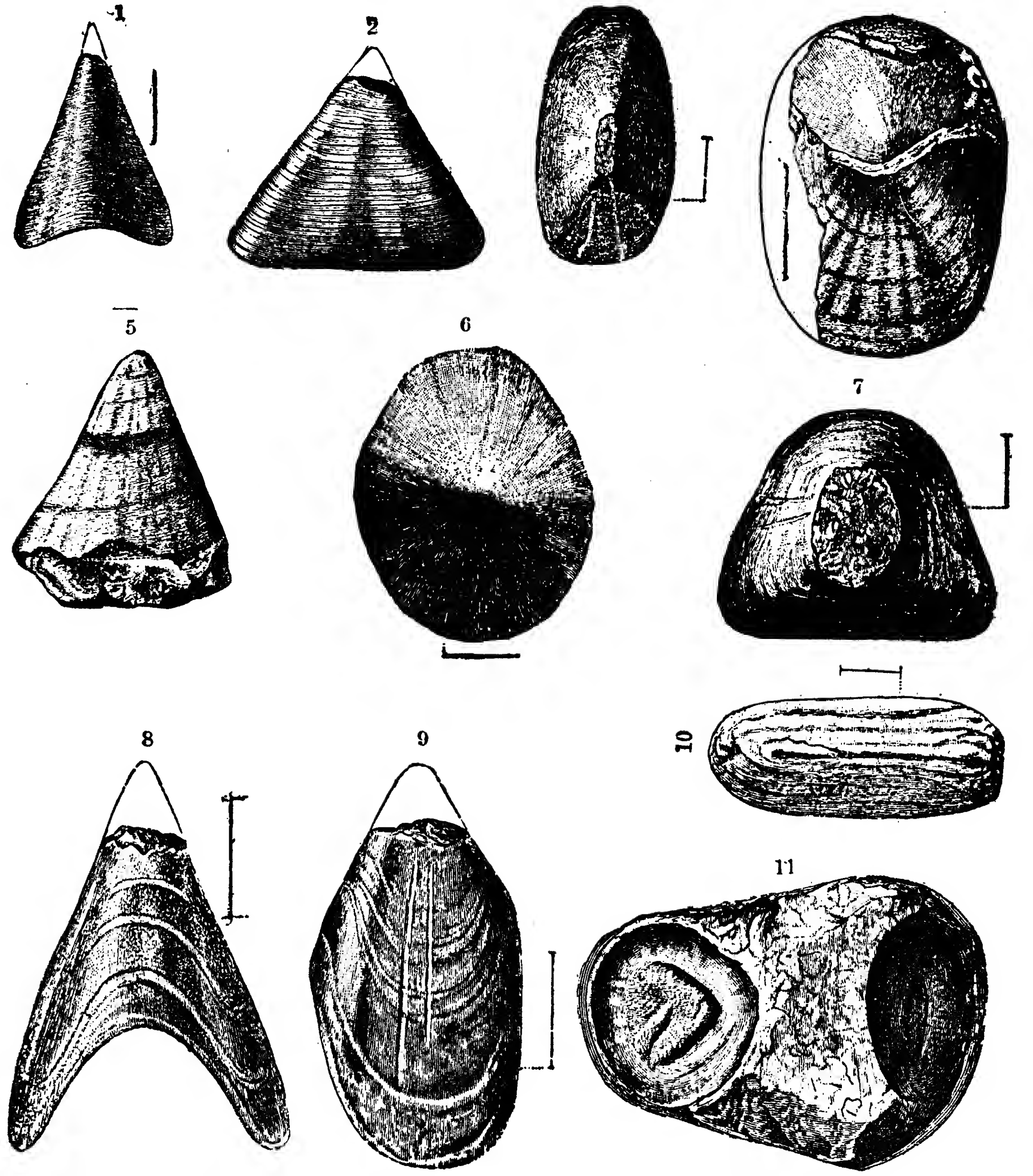
Martinia lineata. See **Spirifera lineata.** *XIII.*

Mastodon americanus, Cuv. Numerous fragments of this extinct American elephant's teeth,scull,vertebræ and leg bones, belonging to a large and a small individual, were found in the Port Kennedy cave, Chester Co., Pa. Cope. Proc. A. P. S. 1871, p. 95.—Also from the Ohio river bed at Pittsburgh; see K, p. 22.—Also a tusk in the *Glacial Drift* at Tunkhannock, Wyoming Co. Pa. 67, pp. 20, 123.—*Quarternary* or *Postpleiocene.* See Collett's Indiana Report of 1884, page 33, and figures on plate 3, f. 1, 2; plate 6, f. 1.—*Human age.*

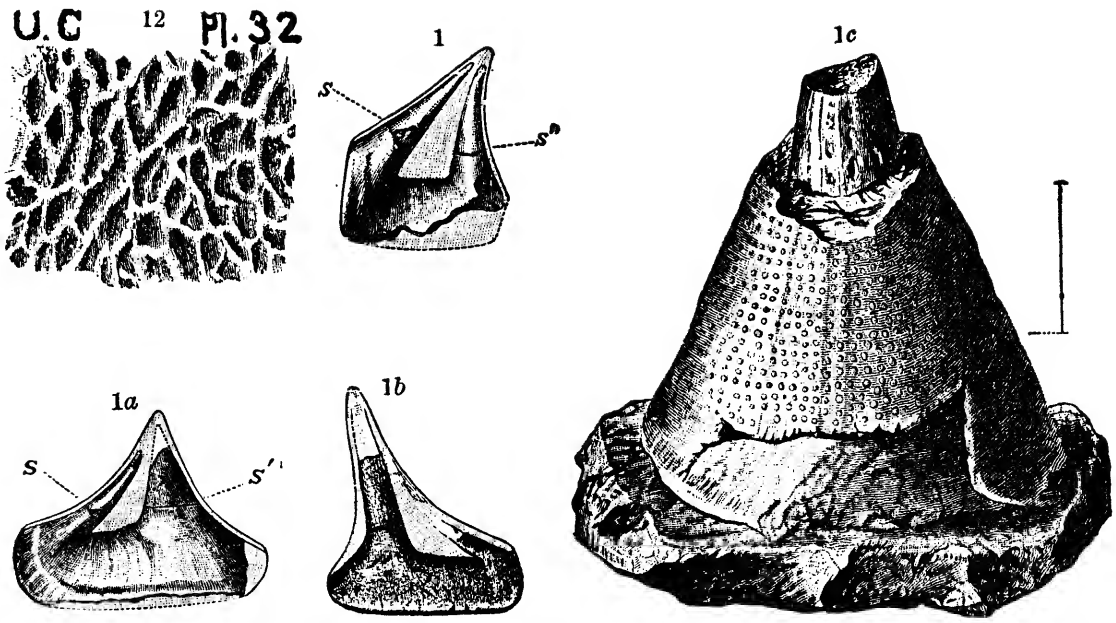
Matheria tener, Billings. Geology of Canada, 1863, page 147, fig. 100, *a*, back; *b*, inside of right valve; *c*, outside of left valve; *d*, inside of same. *Trenton group*, *II c.*



Matthevia variabilis. Walcott, Bulletin, U. S. G. S. No.



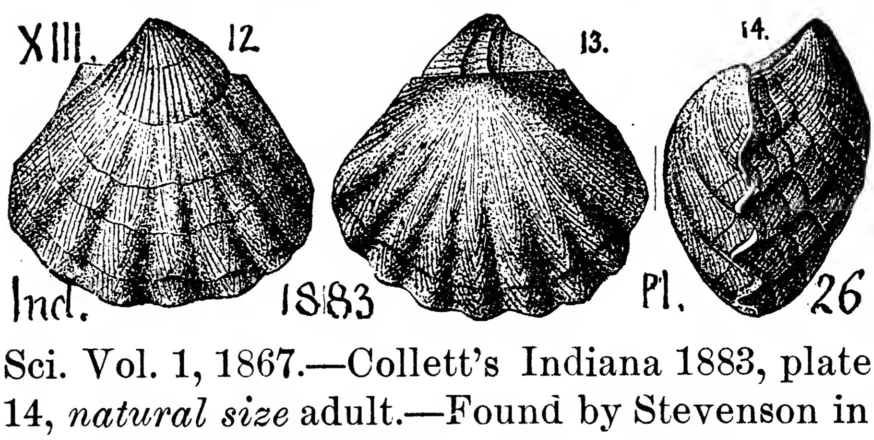
30, page 224, plate 32, fig. 1 to 12; plate 33, figs. 1*a* to 1*f*.—The first appearance of a family resembling the *Conularia* family, in a *Lower Cambrian* formation, one mile north of Saratoga Springs, N. Y.—*L. C.*—Associated with *Cryptozoon poriferum.* Hall, 36th An. Rept.; *Platyceras minutissimum* Walcott; *Ptychoparia calcifera*, Walcott; *Dicellocephalus hartii*, Walcott; and *Dikellocephalus speciosus* Walcott;—in limestone *over* Potsdam sandstone.—Fig. 1, 2, 3, end, side and summit views of the most characteristic form, *enlarged*; Fig. 4, lid (operculum), portions of shell removed; Fig. 5 more conical than 1; Fig. 6, cast of inside of another lid; Figs. 7, 8, 9, top, end, side views of the conical variety, with deeply sinuous



margin; Fig. 10, partition (septum) across inner chamber (as at S′, fig. 1a, pl. 33.); Fig. 11, section of apex broken off at septa in inner chamber. Fig. 12, inner surface of chamber of habitation, *enlarged*.—On plate 23, are figs. 1, 1*a*, 1*b* casts of chamber of habitation and inner chambers; septa, at *s*, *s*′.; fig. 1*c*, end view of conical specimen, showing cast of an inner chamber, etc. Other figures omitted.—*Lower Cambrian*, *L. C.*

Mazonia woodiana, Meek and Worthen. A spider from Mazon Cr. Geol. Sur. Ill. Vol. 3. *Coal measures*, *XIII.*

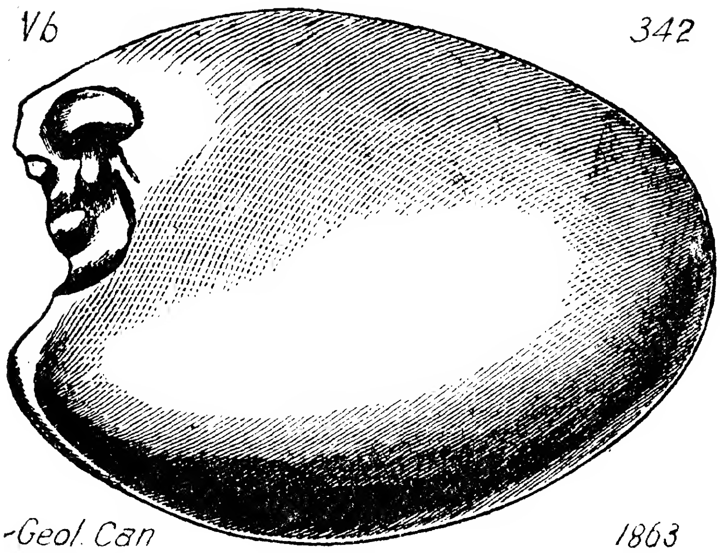
Meekella striatocostata. *Plicatula striatocostata*, Cox,



Geol. Sur. Kentucky, Vol. 3, 1857, page 568, plate 8, fig. 7.) Worthen and St. John, Trans. Chicago Acad. Sci. Vol. 1, 1867.—Collett's Indiana 1883, plate 26, figs. 12, 13, 14, *natural size* adult.—Found by Stevenson in the *Coal Measures* of S. W. Pa. KKK, p. 309.—*XIII.*

Megalichthys jaw and teeth figured by Hall, in Geol. W. Div. N. Y., 1843, p. 282. from *Chemung-Catskill red beds*. Pal. Ohio, Vol. 1, plate 40, fig. 3, 3*a*. *See Appendix*. Prof. Hall at first classified the animal by the scales, *Sauritolepis*, (Alb. Inst. 1840); afterwards by the fin, *Sauripteris* (Geol. N. Y. 1843.) But it is a fish.

Megalomus canadensis, Hall. Pal. N. Y. Vol. 2, *Guelph.*

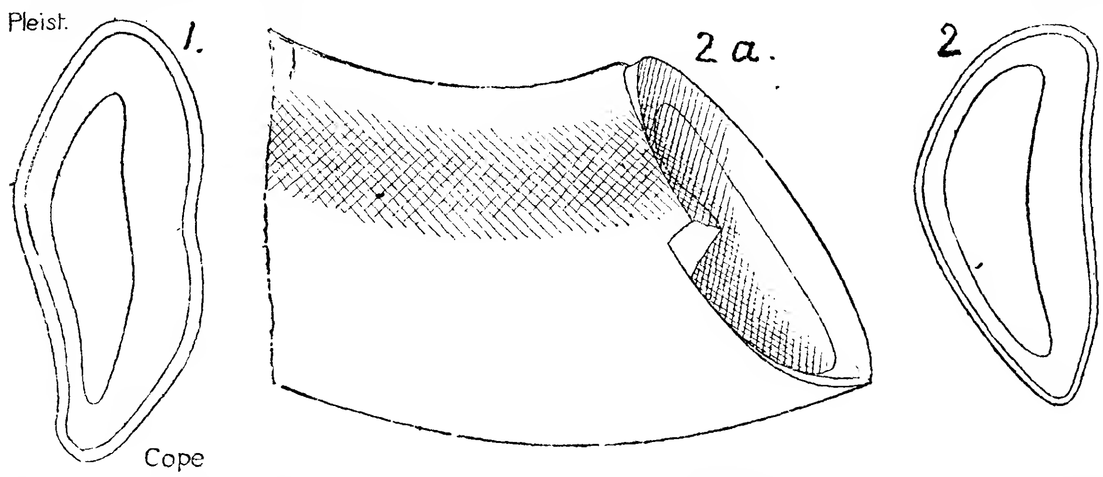


Geology of Canada, 1863, page 338, fig. 342, a cast of the interior of a specimen. NOTE. The *Galt* or *Guelph* beds overlie the Niagara, limestone in Upper Canada.—V *a'*.

Megalonyx dissimilis, Leidy. Cope. Proc. A. P. S. 1881. Port Kennedy cave.

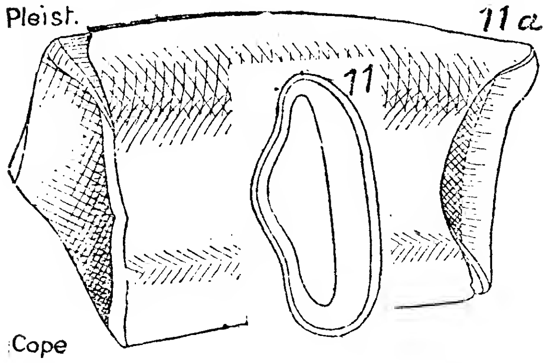
Megalonyx jeffersoni, Harlan. First described by Jefferson to the Amer. Phil. Soc., Phila., 1797, claws, femur, ulna, and radius, found in a cave in "Western Virginia" (Kentucky.) Dr. Wistar, of Phila., and then Cuvier showed that it was a gigantic *Sloth*. Many remains of it have been since then found in our cave deposits, and more recently in the sand beds of Oregon. It probably fed upon the upper foliage of small trees which it bent down with its powerful arms, supporting itself on its great tail. As its descendants grew smaller they were obliged to climb, and those still extant in South Amerca live wholly in the trees. (Collett's Indiana Report of 1884, page 39, plate 5, figs. 1, 2.—*See Appendix.*)

Megalonyx loxodon, Cope. Proceedings Amer. Philos. Soc.

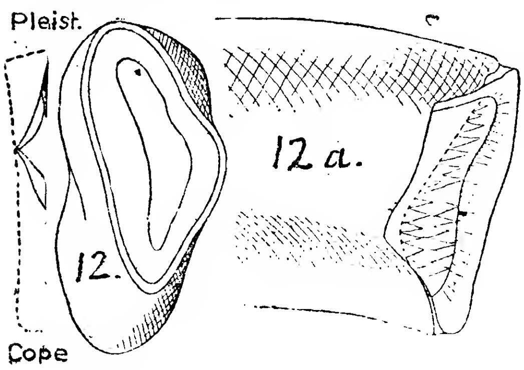


April 7, 1871, Vol. 12, p. 74, f. 1, 2. Sections of canine molars of a gigantic sloth (2 a, profile of 2 from within) found in the Port Kennedy cave, Chester Co., Pa. Compare *M. dissimilis*, Leidy.—*Post-pleiscene?*

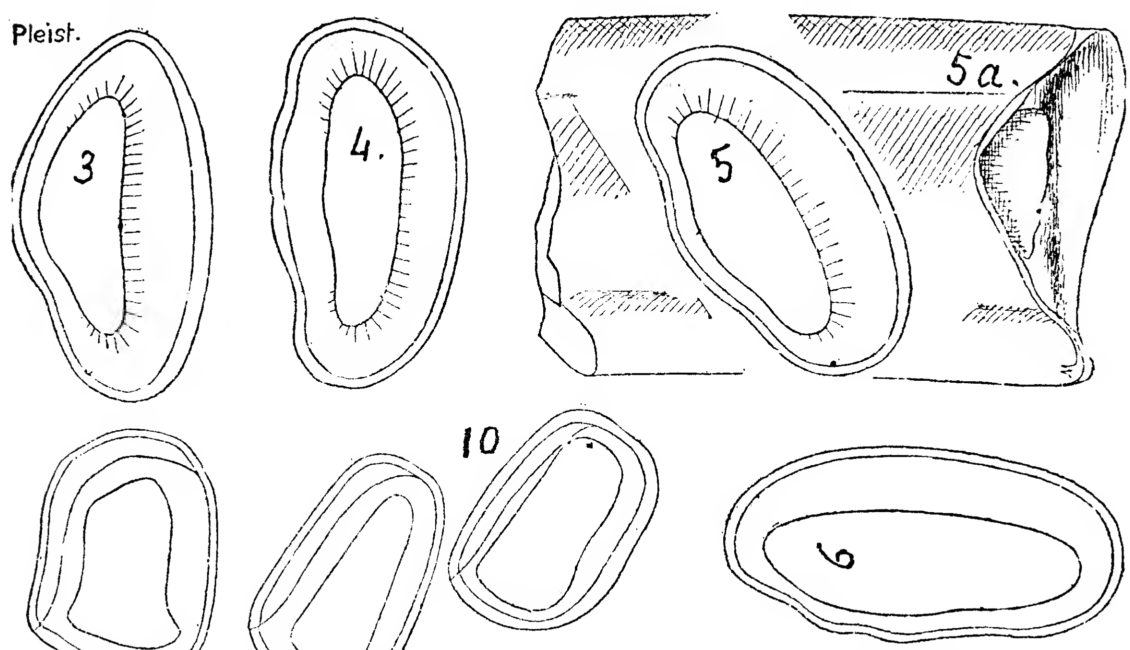
Megalonyx sphenodon, Cope. Amer. Philos. Soc. Proc. Vol. 12, 1871, p. 83, f. 11, crown of tooth, 11 *a*, same from inside. Another large sloth found by C. M. Wheatley in his famous excavation of the Port Kennedy cave, Chester Co., Pa.—*Post-pleiocene ?*

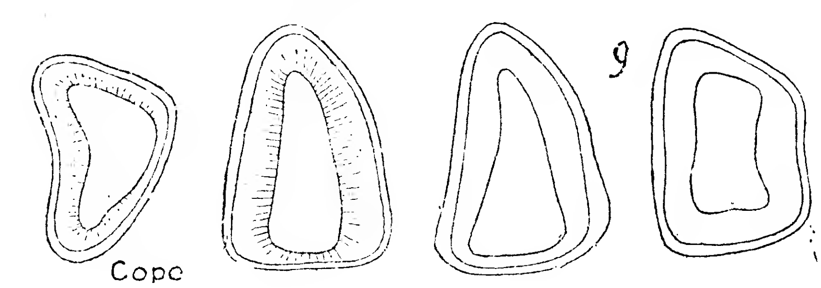


Megalonyx tortulus, Cope. Amer. Philos. Soc. Proc. Vol. 12, 1871, p. 84, fig. 12, canine molar, 12 a, inside view, of another large sloth found in the Port Kennedy cave.—*Post-pleiscene.*



Megalonyx wheatleyi, Cope. Amer. Philos. Soc, Phila., 1871, Vol. 12, p. 80, fig. 3, 4, 5, 6, sections of canine molars of a large extinct sloth; 5 *a* side view of 5 from inside, 9; sections of

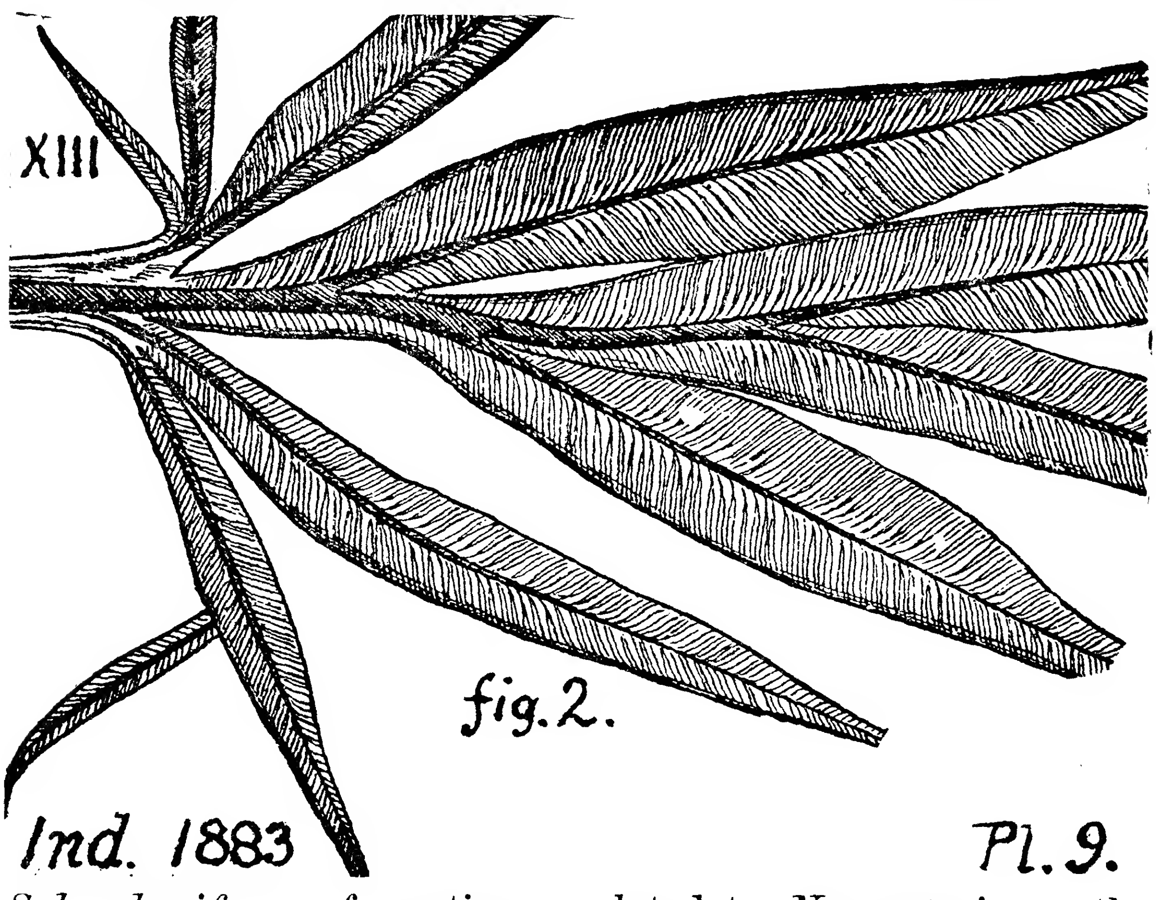




crowns of upper molars; 10, sections of crowns of lower molars on the right side. Compare *M. jeffersoni*, Leidy.—Found in Port Kennedy cave, Chester Co., Pa., with fragments of long bones of uncertain reference. Named after the late Charles M. Wheatley, of Phœnixville, to whom the geology of our State owes so much.—*Post-pleiocene.*

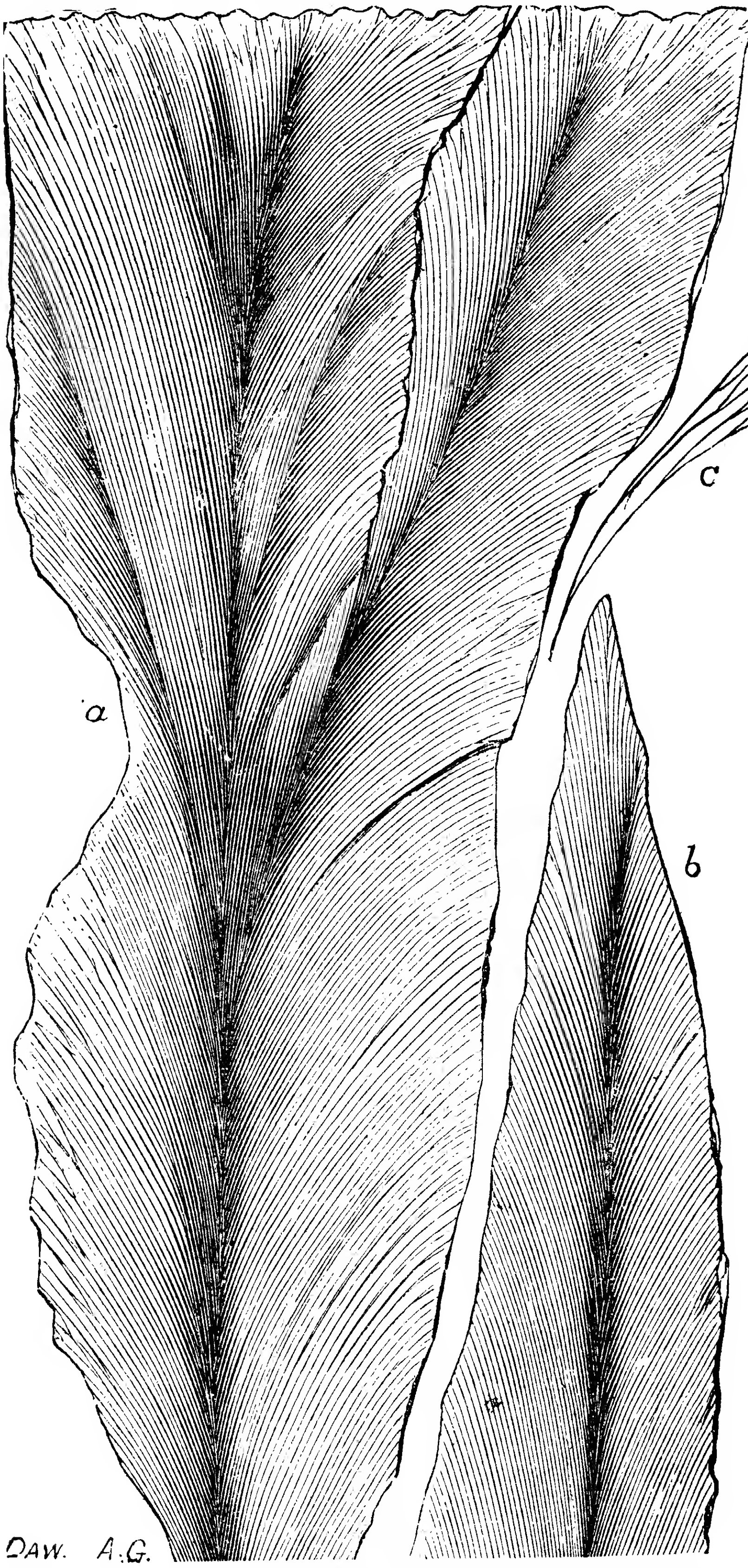
NOTE.—These species of gigantic extinct *sloths* with enormously powerful claws (onyx, hence the generic name) lived with gigantic *Armadillos*, *Mammoths*, &c., in Pennsylvania just before the Glacial and Human age set it, and some of them even later.— The large extinct fossil animal remains of the Windward islands, the Brazilian fossil tiger and armadillo lately found by Mr. Willcox in Florida, &c., show the separation of N. and S. America as a recent event.

Megalopteris, Dawson; a genus confined to *Devonian* and



Subcarboniferous formations; related to *Neuropteris* on the one side, and *Alethopteris* on the other; having nerves like those of *N.* and leaflets arranged like those of *A.* Its nervation alone distinguishes it from Heer's genus *Danæopteris*, Lesquereux in Coal Flora, page 148. Collett's Indiana Rpt. 1883, plate 9, fig. 2.— *VIII*, *IX*, *X*.

Megalopteris (*Neuropteris*) **dawsoni.** Hartt. Acadian Geology, 1868, page 550, figure 193, "mid-rib not accurately given in the figure;" *a*, fragment of pinna; *b*, point of pinnacle; *c*, mode of venation.—*Devonian* in New Brunswick. —*VIII–IX.*



This remarkable fern, says Sir William Dawson, discovered by Mr. Hartt at St. John, N. Brunswick, Canada, presents curious points of affinity to Cyclopterids, and may, when more fully known, be placed in a distinct genus. The pinnæ, particularly when the midribs are thick, show a strong tendency to split up in a direction to the rachis. (*Sic*). I have sometimes noticed them folded in a conduplicated manner. The nerves fork twice, or thrice. (Hartt.)

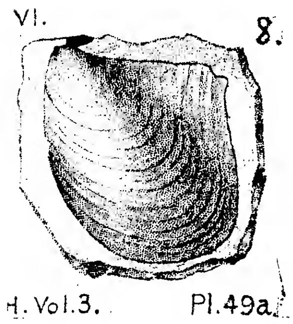
Megalopteris hartii, Andrews. *See Appendix.*

Megalopteris lata, Andrews. *See Appendix.*

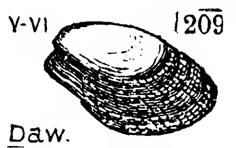
Megalopteris minima, Andrews. *See Appendix.*

Megalopteris ovata, Andrews. *See Appendix.*

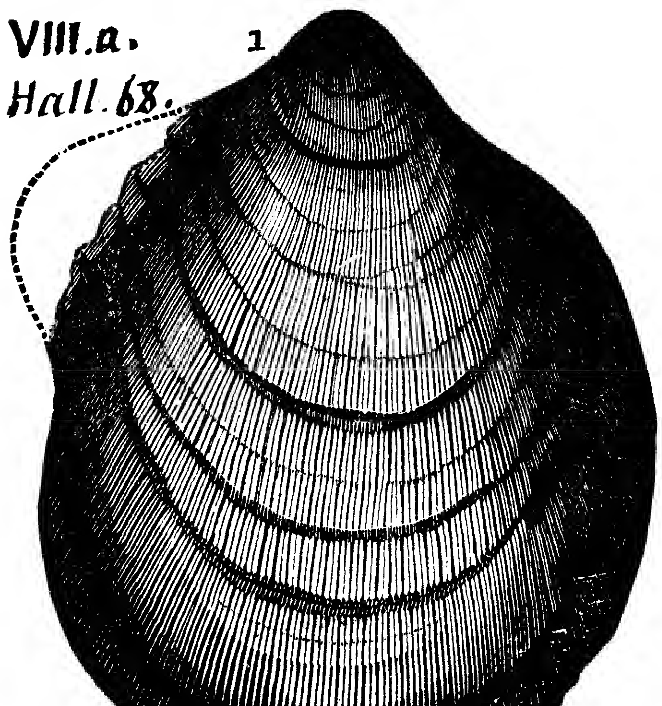
Megambonia aviculoidea, (Hall, 1859, Pal. N. Y., Vol. 3, p. 274. plate 49a, f. 8. Low. Held.) Claypole's list of fossils F2. preface, xiii. Specimen x–20 (two) west of Old Juniata Furnace, Centre t., Perry Co. *Lower Helderberg.*—In Bedford borough, it occurs in strata exactly like the *Tentaculite limestone of New York.* T2, p. 89.— *VI.*



Megambonia ? cancellata, Hall. Dawson's Acadian Geology, 1868, p. 602, fig. 209; surface cancellated by a cross pattern of concentric and radiating, raised striæ. Arisaig, Nova Scotia.— *V?*



Megambonia cardiiformis. (*Pterinea cardiiformis.*) Hall, Report on the Fourth or Western District, of New York, 1843, page 172, fig. 68. 1, a perfect specimen; showing equal valves; hind wing; radiating fine striæ; prominent growth lines; large prominent beak. Perfect casts were also found at the place (Clarence Hollow, N. Y.). It closely resembles a *Pterinea* (*Megambonia*) of the *Oriskany* sandstone.—*Corniferous* (*Upper Helderberg*) *limestone formation.— VIII a.*



Megambonia jamesi, Meek. *See Appendix.*

Megambonia lamellosa, Hall, Pal. N. Y., Vol. 3. 1859, *Oriskany.* Found at Mapleton, Huntingdon Co., Pa. Spec. 200–5 (three) from the *Oriskany sandstone.* Also in Royers' ridge and Sandy ridge, at Orbisonia, and at Three Springs in the R. R. cut through *Oriskany.* T, 35; T3, 119; see *OO*, p. 235, spec. 702–2 (two).—This or an allied *Oriskany* species is seen in the

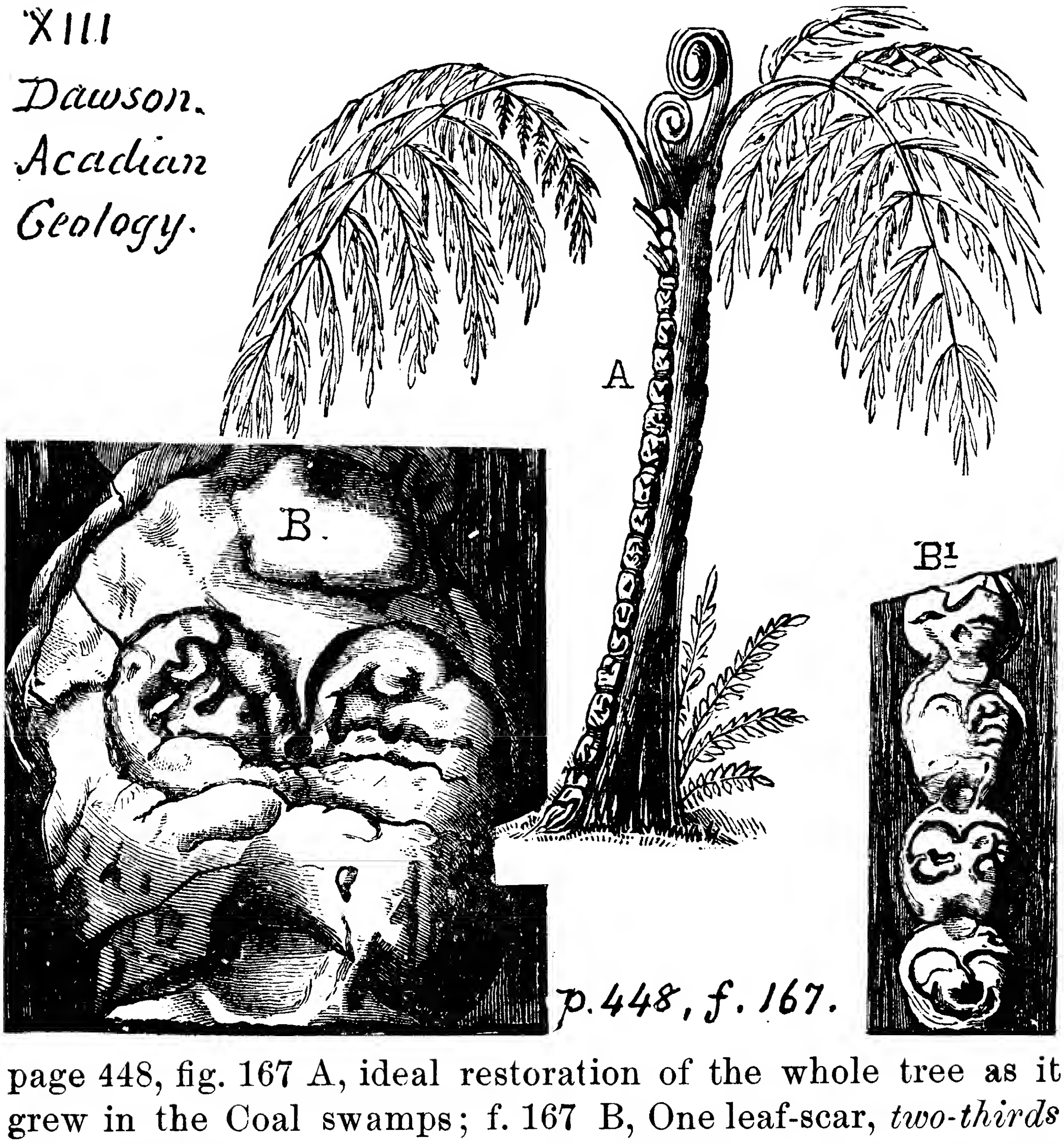
Hindman section on Willis Creek, T2, 86; also, on the road from Beegles to Exlines, in King township, T2, 132; also, abundantly at Bedford Springs, but not well preserved; all in *VII.*

Megambonia ovoidea, Hall, Pal. N. Y. Vol. 3, 1859, *Lower Helderberg.* Found by Dr. Barrett in the *Stormville* (Lower Helderberg) *limestone* of Monroe and Pike Cos., Pa., at Port Jarvis. G6, p. 134—*VI.*

Meganteris ovoides. See **Rensselæria ovoides.** *VII.*

Megaphyton magnificum, Dawson. Acad. Geol. 1868,

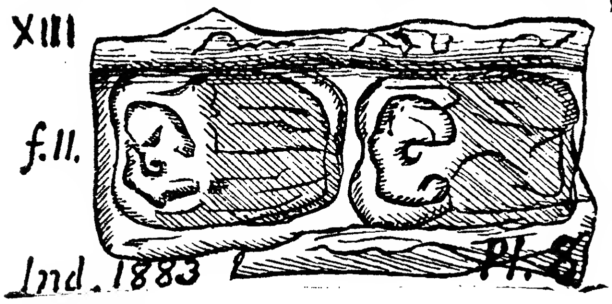
XIII
Dawson.
Acadian
Geology.



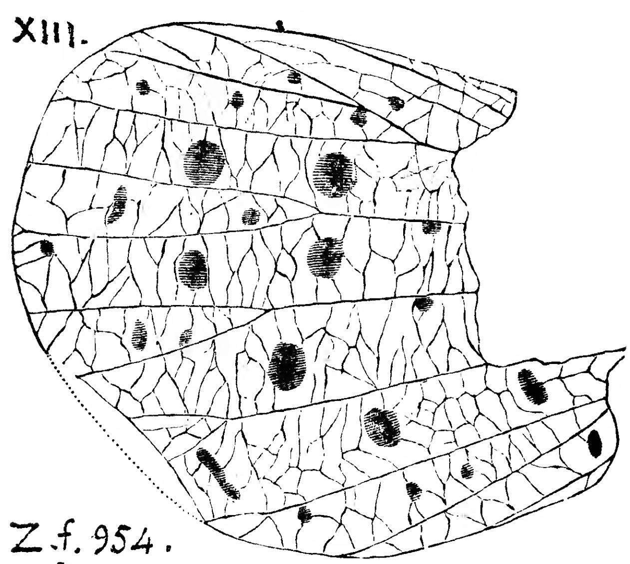
p. 448, f. 167.

page 448, fig. 167 A, ideal restoration of the whole tree as it grew in the Coal swamps; f. 167 B, One leaf-scar, *two-thirds natural* size; f. 167 B 1, a row of the scars, on a much reduced scale. These peculiar trees bore their enormous fronds in two rows, one on each side of the trunk; although so unlike modern forms Dawson gives reasons for classing them in the family of ferns. Their tissues under the microscope are not distinguishable from those of ferns and Lycopods. (Dawson.)—*XIII.*

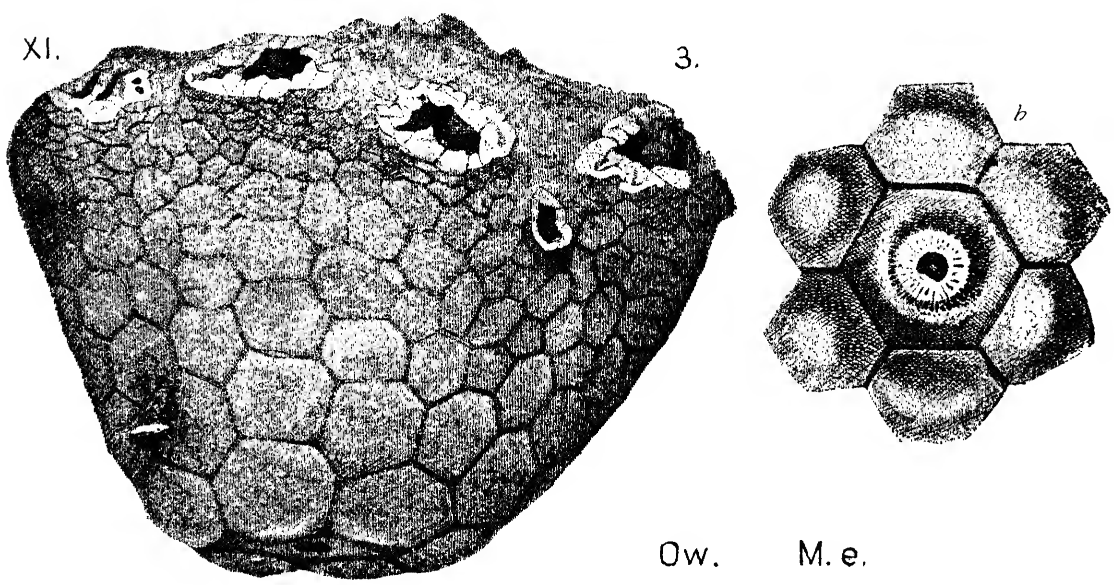
Megaphytum protuberans, Lesquereux. Coal Flora, page 352; Illinois Report, Vol. 2, page 158, Plate **47,** figs. 1, 2. Collett's Indiana Report, 1883, page 75, plate 8. fig. 11; ranging (like *Stemmatopteris*) from the Conglomerate up to the Pittsburgh Coal bed, and even into the *uppermost Coal Measures.*—*XII,* up to *XVI.*



Megathentomum pustulatum.—Scudder. A neuropterous insect-wing of the Coal age, found in the *Coal Measures* of Mason Creek, Ill. Proc. Bost. S. N. H. Vol. 11. 1868, p. 401. Zittel's Handbuch der Palæontologie, Vol. 2, 1885, p. 762, fig. 954, to show that wings of that early age of insect life were sometimes spotted, and probably colored.—*XIII.*



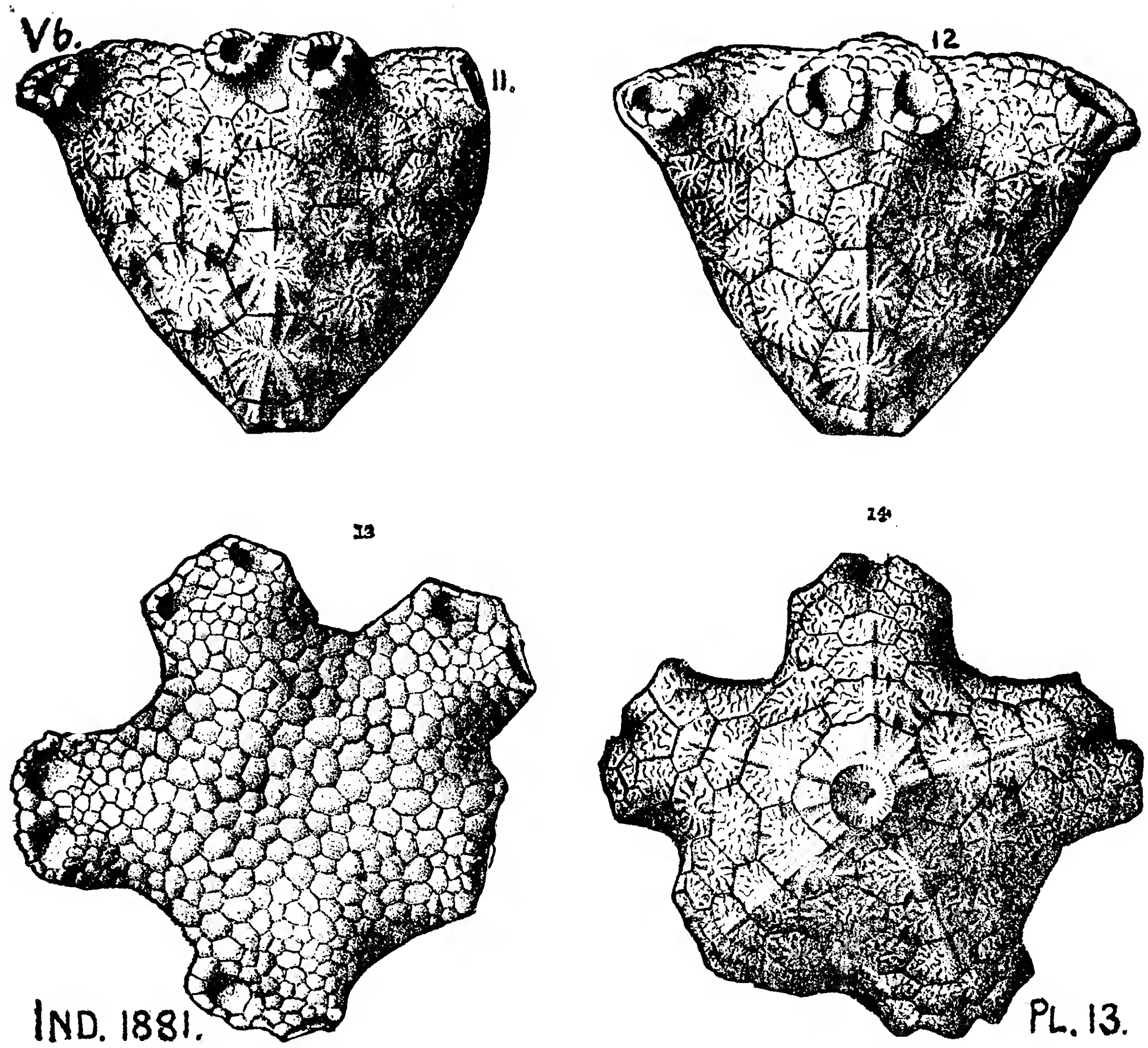
Megistocrinus evansii. Owen and Shumard, Geol. Wis.,



Iowa and Minn., 1852, pl. 5 A, f. 3, a, b. Natural size. From the *Burlington limestone* of Iowa, subcarboniferous.—X*I*.

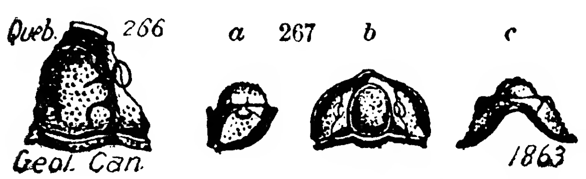
Melocrinus bainbridgensis, H. & W. *See Appendix.*

Melocrinus obconicus, Hall, Trans. Alb. Inst. Vol. 4, 1863,



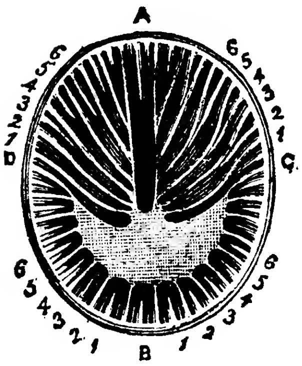
p. 206; 28th An. Rt. N. Y. Mus. 1879, p. 138, pl. 14, figs. 11—14. Figures from Collett's Indiana report of 1881, p. 269, plate 13. figs. 11, 12, side and front, *enlarged twice;* fig. 13, summit, *enlarged*, plates of dome; f. 14, base *enlarged.*—*Niagara*, *V b.*

Menocephalus globosus, Billings. Geology of Canada,



1863, page 237, fig. 267, *a*, side view; b, upper surface; and c, front view of the head of this little trilobite of the *Quebec group. Lower Silurian? Cambrian?*

Menocephalus sedgewicki, Billings. Geol. Canada. See figure 266, *somewhat enlarged*, under *M. globosus*, above.



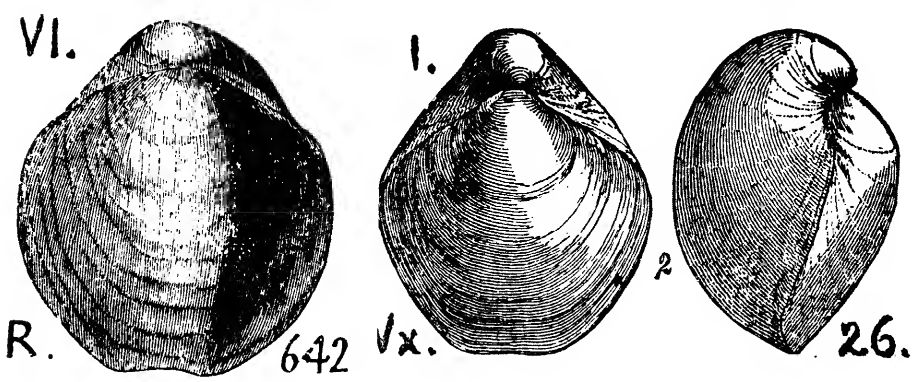
Menophyllum tenuimarginatum, E. & H. a coral cup, figured in A. Winchell's Geological Studies, 1866, page 212, fig. 128. The same figure is found in Zittel, Vol. 1, page 229, fig. 136, from the mountain limestone of Tournay in Belgium, *magnified twice.* It is given here for its beauty; but this *strong-leafed* (*Menophyllum*) genus of corals, has not yet been recognized in America.—*XI.*

Merista arcuata, Hall, Pal. N. Y. Vol. 3, 1859, *Lower Helderberg.* In Perry Co. Pa. found in the Chert beds, Spec. 216–8 (two).—In Huntingdon Co. abundant in lowest 50′ of the *Lewistown limesone*; T, p. 41.—At Orbisonia; C. E. Hall.—In Bedford Co. at Mann's quarry, where the *Lower Helderberg* is rich in fossils. T2, p. 187.—*VI.*—*See Appendix.*

Merista bella. See **Meristella bella.**—*VI.*

Merista intermedia. C. E. Hall's collections at Bell's Mills, Blair Co., Pa., from *Clinton Strata.* *Va.*

Merista lævis. (*Atrypa lævis. Vanuxem.*) Rogers, page 825, figure 642. Vanuxem, page 120, figs. 26, 2. *Lower Helderberg.*—Found by Dr. Barnett,



at Port Jervis, in White's *Stormville limestone*, G6, 134.—In Perry Co. Claypole's specimens 6—8 (two); x—10 (small box full); 11—9 (three); x—13; x—15 (two) on the same slab with a *Meristella bella.*—In Huntingdon Co. is abundant in the lower 50′ of *Lewistown limestone*, T, 41; over the *Waterlime beds* of the Aughwick Valley, at Orbinsonia. T3, p. 126. See Ashburner's specs. 601—22 (seven specimens). Cat. *OO*, p. 234.—608–8 (identified by J. Hall, Nov., 1888), from Hogback, Monroe Co., Pa. *Lower Helderberg.*—*VI.*

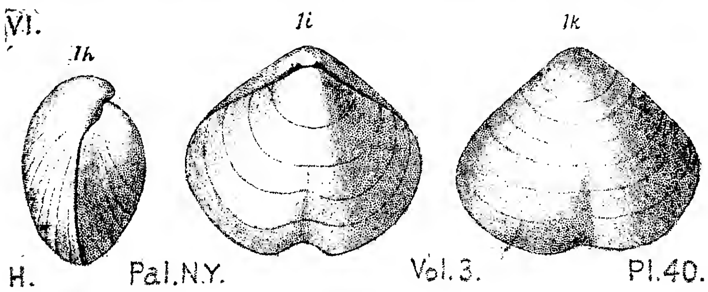
Merista lata, Hall, Pal. N. Y. Vol. 3, 1859, *Oriskany.* Reported by Claypole in Perry Co., Pa.; by Stevenson in Bedford Co. on Beegle's–Exlines road, King t. (T2, 132); abundant south of Bedford Springs (p. 148); in Hyndman section (p. 86); by Ewing in Center Co. (T4, 431.)— *VII.—See Appendix.*

Merista subquadrata, Hall, Pal. N. Y. Vol. 3, 1859, *Lower Helderberg.* In Cat. OO, p. 603 & Hall's specimens 603–1 (twenty-seven of them) from Sandy Ridge, back of Orbisonia, Huntingdon Co., Pa.— *VI. See Appendix.*

Merista sulcata (*Atrypa sulcata.*) Hall, Report on the Fourth District of New York, 1843, page 142, fig. 58, 5. Vanuxem, 1842, page 112, fig. 23, 5. *Waterlime formation.— VI.*

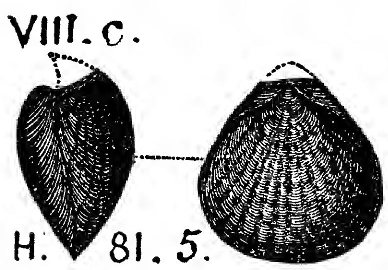
Merista typa, Hall. (*Camarium typum*, Hall), State Museum report 1859, p. 43; also Pal. N. Y. Vol. 3, page 487, pl. 95 A, fig. 2 *a*, *b*, 3, 4, 5, 6. Spec. 602—1, from field back of sand quarry, Orbisonia, Hunt. Co., Pa. *VI.—See Appendix.*

Meristella bella (*Merista bella?* Hall, 1859, Pal. N. Y. Vol. 3, p. 248, plate 40, figs. 1 *h*, *i*, *k*. *Lower Held.*) Claypole's collections in Perry Co., Pa., spec. X—13 ; X—15 (two), both in the upper shaly beds; and 187–6,–7 (three), from the same strata three miles east of Ickesburg.— *VI.*

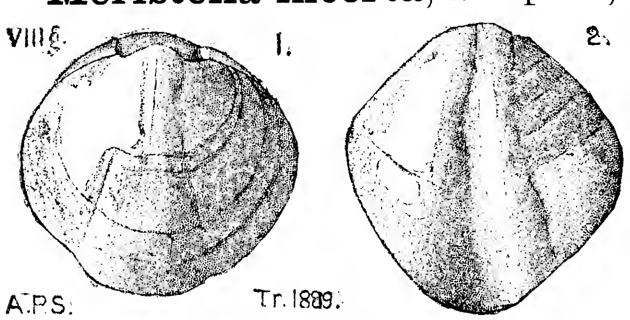


Meristella cylindrica, Hall. *See Appendix.*

Meristella haskinsi, Hall, Pal. N. Y. Vol. 4, page 306, plate 49, figs. 26 to 35; drawn from the same specimens which furnished fig. 81, 5 of Geol. 4th District, 1843, given on page 62, above, of this Dictionary, under the wrong name of *Atrypa.* (R. P. Whitfield's corrections, Jan. 1889.)



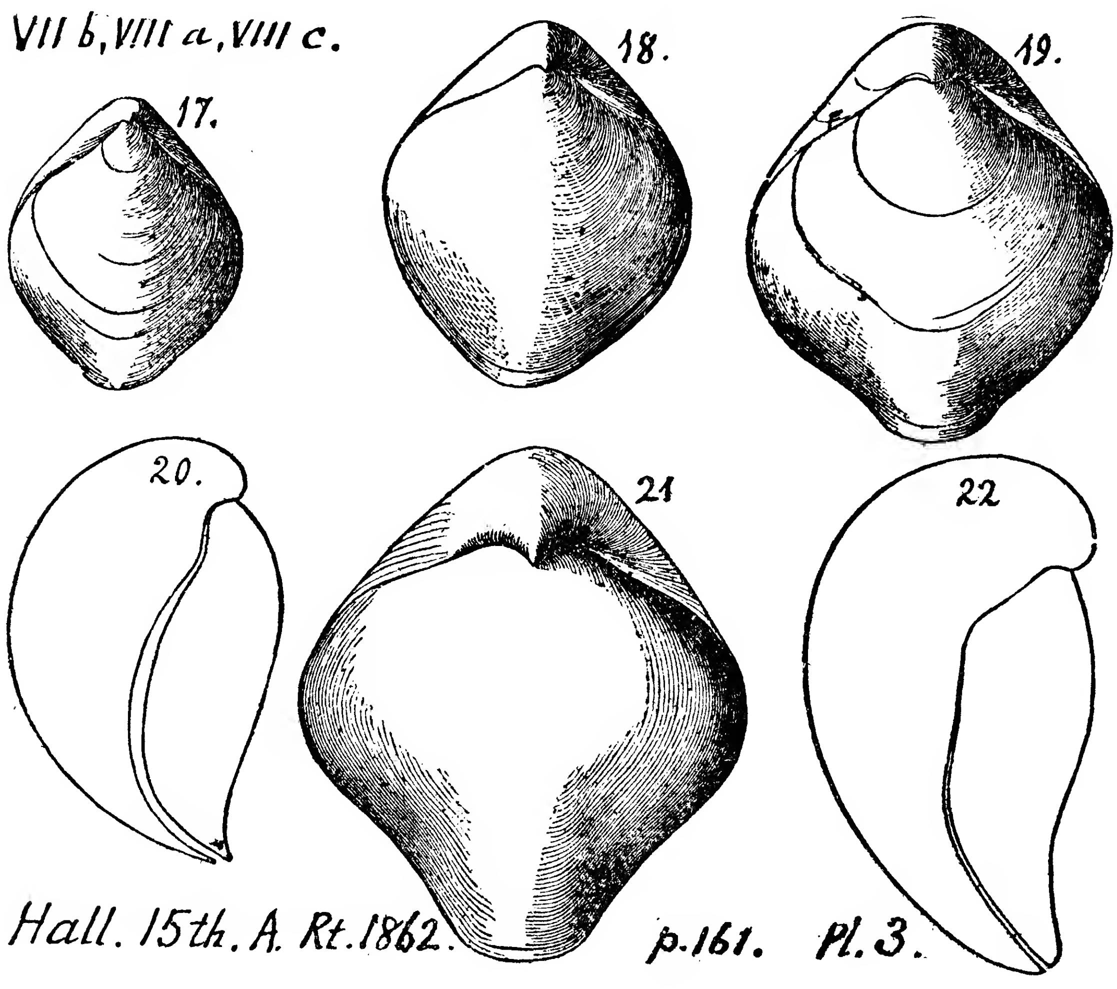
Meristella incerta, Simpson, n. sp., Trans. Amer. Philos. Soc. Phila., Vol. 1889, page 412, Fig. 7. Shell subrhomboidal, greatest width at or a little below the middle; length of the ventral valve equal to the width; of the



the dorsal valve, slightly less. . . . Ventral valve the more convex; greatest convexity a little above the middle, abruptly curving to the cardinal margin, and more gradually to the front. A comparatively deep, broad sinus extends from the beak to the base, forming one of the most conspicuous features of the species Umbo prominent. . . . . . General aspect of surface that of a smooth shell with a few strong lines or varices of growth. There are indications of radiating striæ, and it is possible that specimens in a better condition of preservation would show both radiating and concentric striæ. The form of this species is very similar to that of *Meristella bella*, of the Lower Helderberg group, but that species has a depression on both the ventral and dorsal valves, while this species has a fold on the dorsal valve. The subrhomboidal form distinguishes it from any species of the Upper Helderberg groups. *Formation and locality.* Chemung group, near Warren, Warren county, Pennsylvania.

Meristella lævis. See *Merista lævis.* - *VI.*

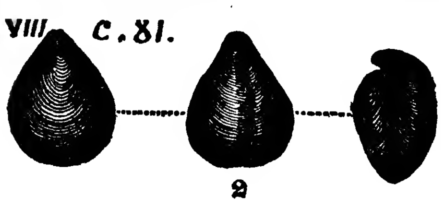
Meristella nasuta, Hall. (*Atrypa nasuta*, Conrad, 1840.)



15th An. Rt. 1862, pl. 3, f. 17, 18, 19, showing gradations in size and front extension; 10, profile of 19; 21, 22, dorsal and profile views of large specimen, probably of this species; the prolongation in front being wider and more extended than common. — *Schoharie grit, Up. Held. & Hamilton, VII b, VIII a, VIII c.*

Meristella rectirostra, Hall, Trans. Alb. Inst. Vol. 10, 1879. Figures from Collett's Indiana Report of 1881, p. 301, plate 27, figs. 10, 11, 12, back, front and side of type specimen; f. 13, back of one more slender; f. 14, shows size and direction of the spires, or gills. *Niagara, V b.*

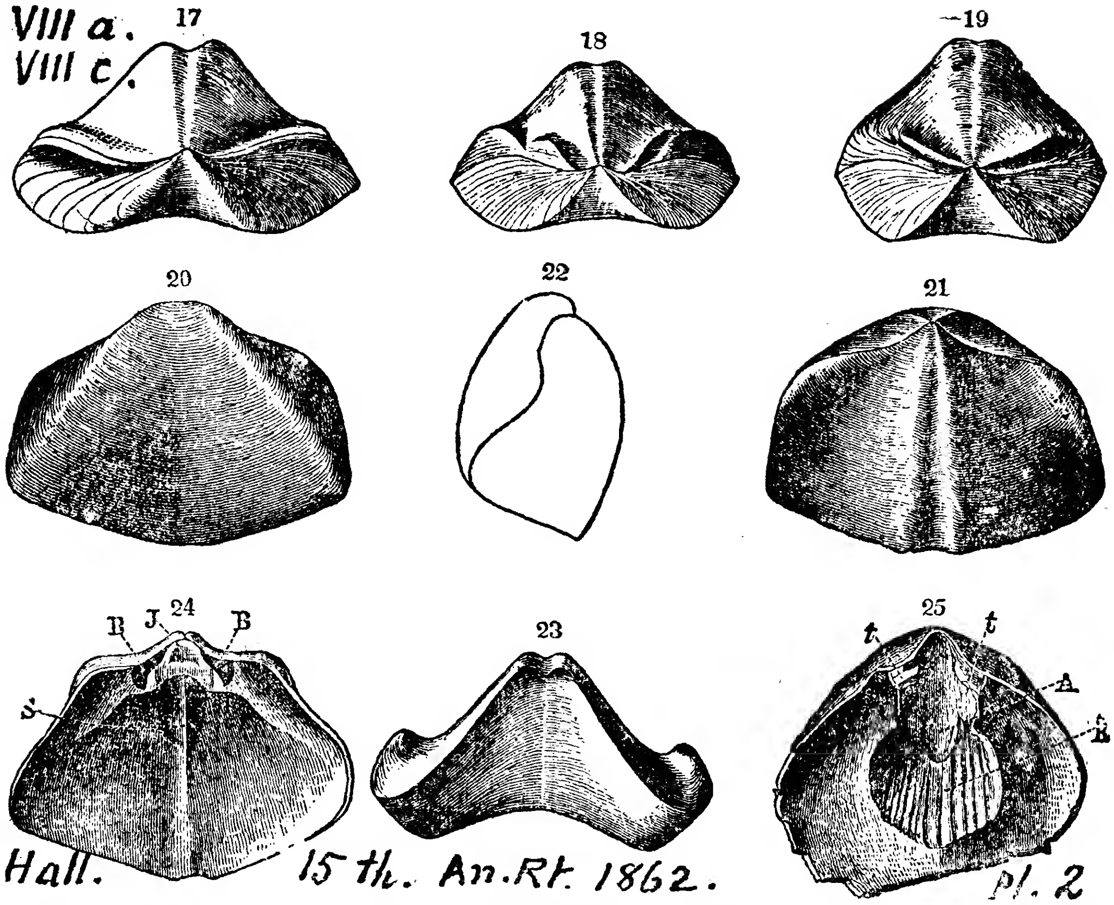
Meristella rostrata. (*Atrypa rostrata.*) Hall. Report on the Fourth District of New York, 1843, page 202, fig. 81, 2, a very neat little shell, marked by a few concentric lines of growth, and apparently found only in the thin bed of *Encrinal limestone* (under the *Moscow shale*, which is the top subdivision of the New York *Hamilton*) on Eighteen Mile creek, N. Y.— *VIII c.*—Also in the *Tully limestone, VIII d.*



Meristella scitula. (*Atrypa scitula; Atrypa circe.*) Hall, Report on the Fourth District, N. Y., 1843, page 171, fig. 67, 1, a very scaly shell, with hardly perceptible concentric lines, but a characteristic long beak to the lower valve. Williamsville, Erie Co., N. Y. *Corniferous (Upper Helderberg) limestone. VIII a.*

Meristella (?) unisulcata. Hall, (*Atrypa unisulcata*, Conrad, 1841,) 14th An. Rt. 1861, p. 101; 15th An. Rt. 1862, pl. 2, f. 17, a cardinal view of a well-preserved form, from the Upper Helderberg limestone, in which there is a ridge-like fold on the dorsal valve, parallel with and close to the hinge-line or cardinal margin of the valve. In fig. 18, a specimen from the Hamilton group, this fold is more oblique, rising from

(**Meristella unisulcata**, continued.)



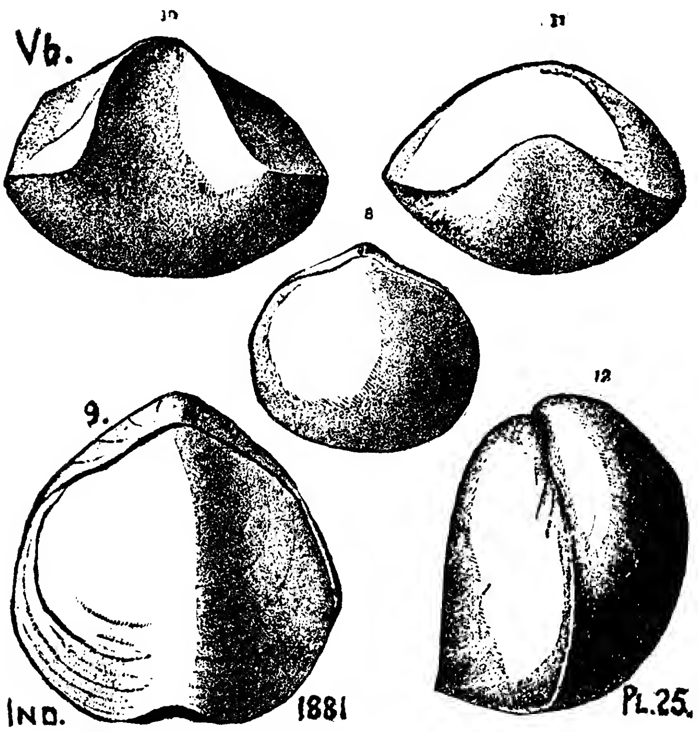
near the beak, as shown in the figure, while there is a second fold on the side of the shell. Fig. 19 is a specimen from the Upper Helderberg limestone of the West; in which the fold is sharp and clearly defined, slightly oblique, and intermediate to the former two; the specimen is more gibbous than those from the limestone of New York. Figs. 20 and 21 are ventral and dorsal views of a large specimen from the limestone of New York; fig. 22, profile of the same; fig. 23, front view of the same. Fig. 24, interior of the dorsal valve, showing a median septum, cardinal process, teeth, sockets, and bases of the crura. Fig. 25, interior of ventral valve, showing the teeth and muscular impression. (Figs. 24 and 25, * * * * from the limestone of the Falls of the Ohio.) Hall proposed for the Hamilton form *M. unisulcata*, var. *biplicata;* and the western form *M. unisulcata*, var. *uniplicata.*— *VIII a, c.*

Meristella ——? found in the *Oriskany shales* (here the only representative of *VII*) south of Port Jervis, in New Jersey. G6, p. 123, on Pike and Monroe Cos., Pa.— *VII.*

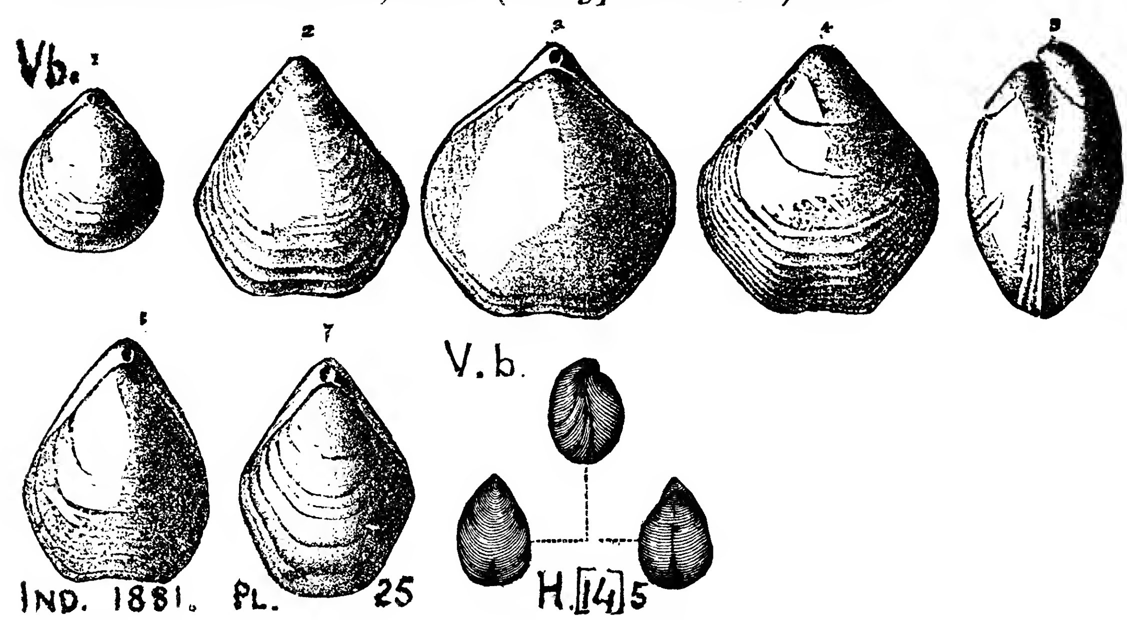
Meristella ——? found by C. E. Hall among Carll's *Chemung* collections in N. W. Pa.— *VIII g.*

Meristella ? Spec. 890–3, of Sherwood, E. Liberty, Bradford Co. *Upper Chemung*, *VIII g.*

Meristina (*Meristella*) **maria,** Hall, Pal. N. Y. IV, 1867, p. 299; 28th Rt. Mus. Edit. 1879, pl. 25, figs. 8–12.—Pal. Ohio, Vol. 2, page 132, plate 7, figs. 5, 6. —Figures here taken from Collett's Indiana report of 1881, p 299, plate 25, fig. 8, back of a young shell, which has not begun to develop the middle groove, and is proportionately broader than old ones; figs. 9, 10, back and front of a large mature individual; fig. 11 front of another with a slighter groove; fig. 12, side view of 9.—*Niagara*, *V b.*

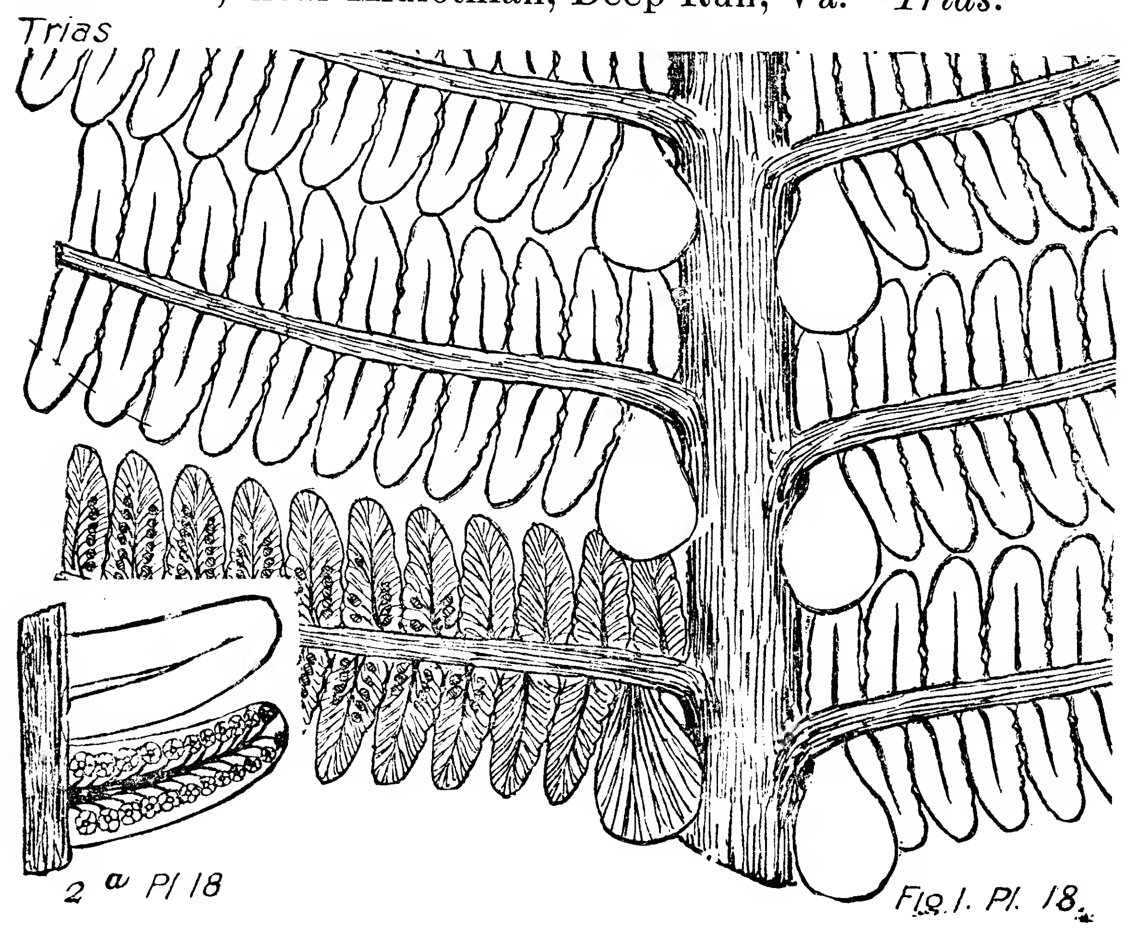


Meristina nitida, Hall (*Atrypa nitida.*) Geol. 4th Dist. Tab. of Organic Remains, p, 11, No. 14 (No. 13 on the plate), fig. 5. *Niagara limestone.* See Pal. N. Y. Vol 2, 1852, p. 268, pl. 55, fig. 1*a* to 1*c*; a very abundant little shell in the *Niagara shale* at Lockport, N. Y.; quite varied in form and proportion and



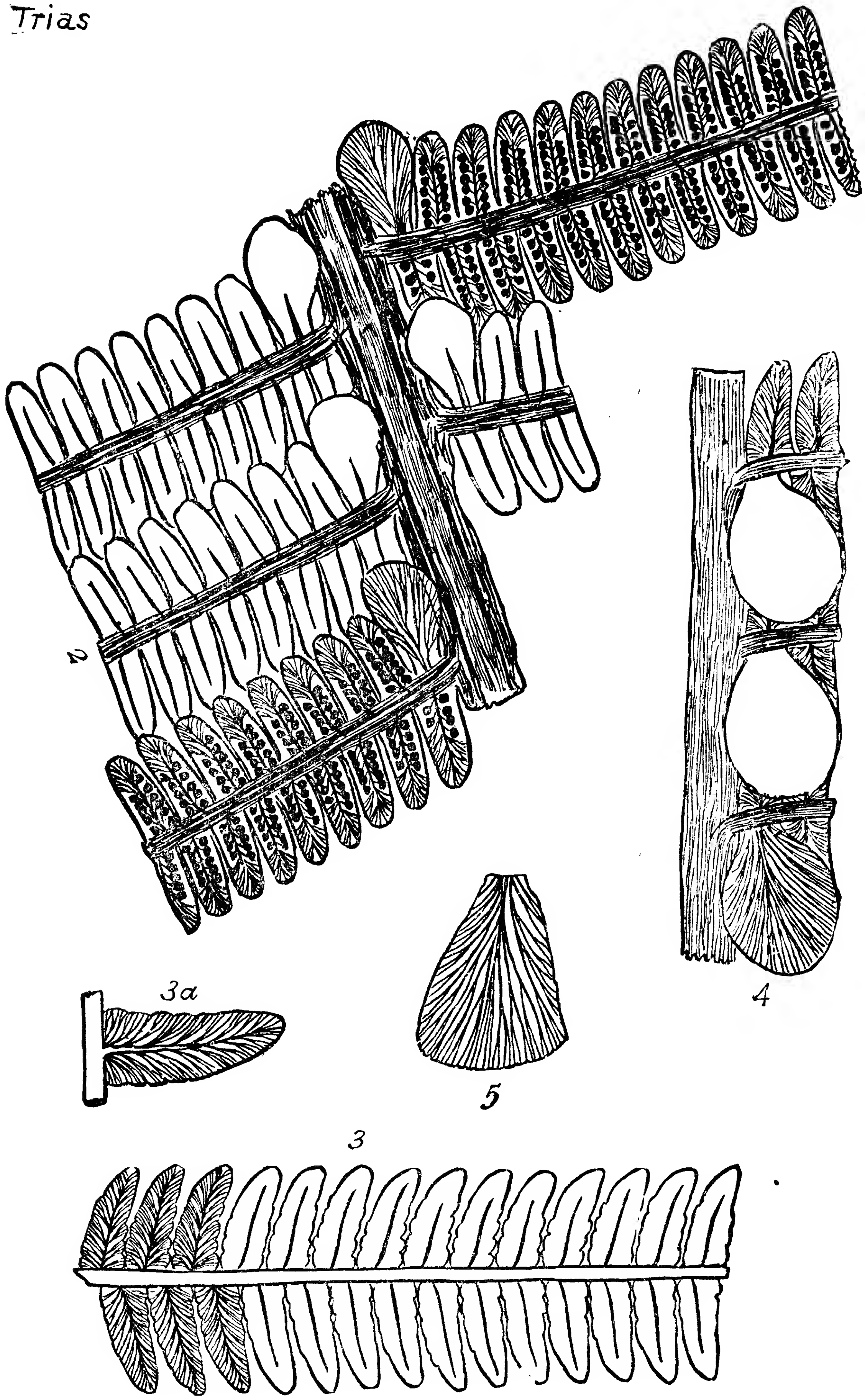
usually distorted by pressure. Its remarkably smooth surface usually shows only a few lines of growth; but in some cases strong ones.—The other figures are taken from Collett's Indiana Report of 1881, p. 300, plate 25, fig. 1, back of a small roundish specimen; f. 2 front of a rhomboidal specimen; f. 3, back of large ovate form also emarginate in front; shows hole (foramen) in beak; f. 4, front of large spec. strongly emarginate in front; f. 5, side view of 3; f. 6, back of narrow specimen, with slight emargination in front; f. 7, back of another.—*Niagara V b.*

Mertensides bullatus, (*Pecopteris bullata*, Bunb.) Fontaine. Older Trias Flora of Virginia, U. S. G. S. Bull, 6, p. 35, pl. 15, figs. 2, part of compound fertile pinna; 3, last sterile pinna; 3*a*, *magnified*, pinnule to show nervation; 4, compound sterile pinna; 5, largest heteromorphous pinnules. (Other figs. on plates 16, 17, 18, 19, omitted.) Specimens in great number and fine preservation. Unlike all later plants except *Pecopteris lobifolia*, L. and H., Yorkshire *Oolite*. Fructification interesting, resembles that of *Laccopteris*. Abundant in shales and soft sands over the lower coal at Carbon Hill and Clover Hill; near Midlothian, Deep Run, Va.—*Trias.*

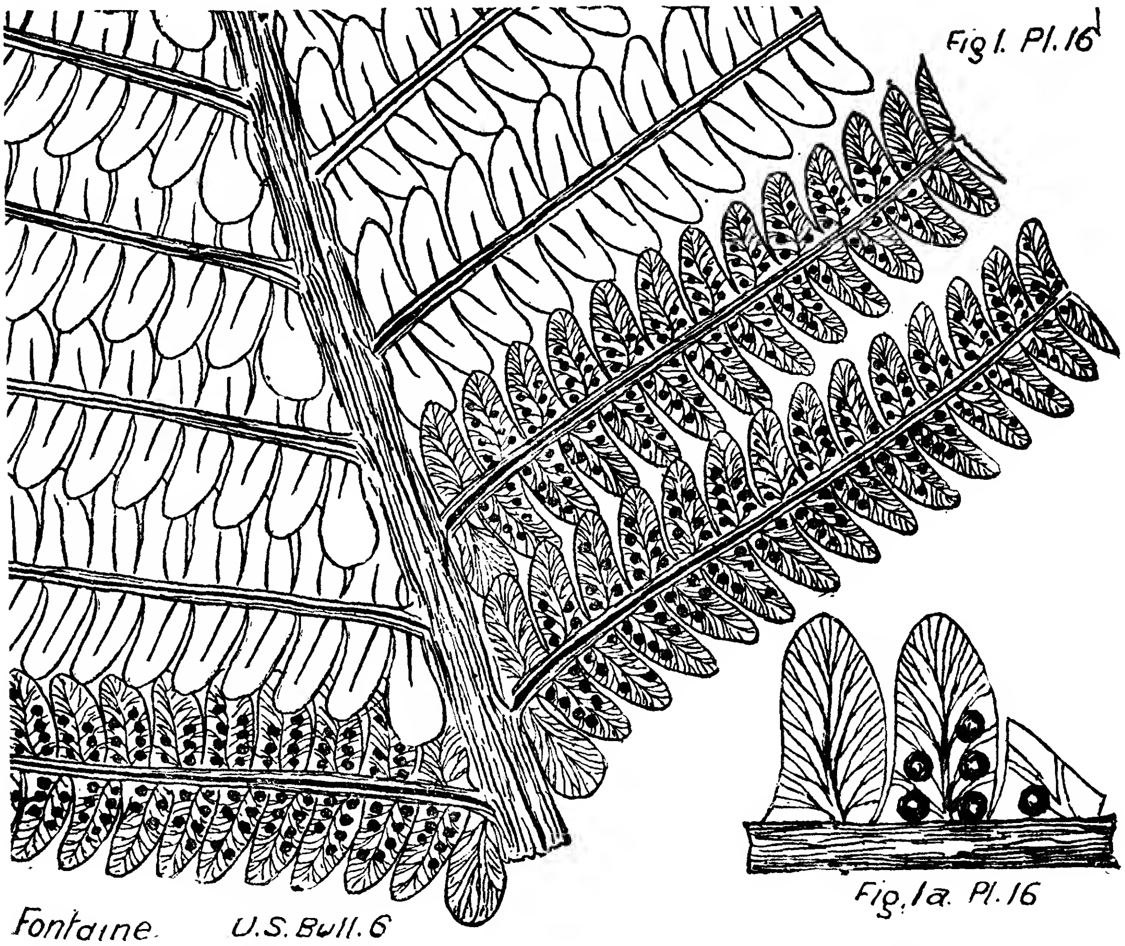


(**Mertensides bullatus**, continued.)

Trias



Mertensides bullatus, continued.)

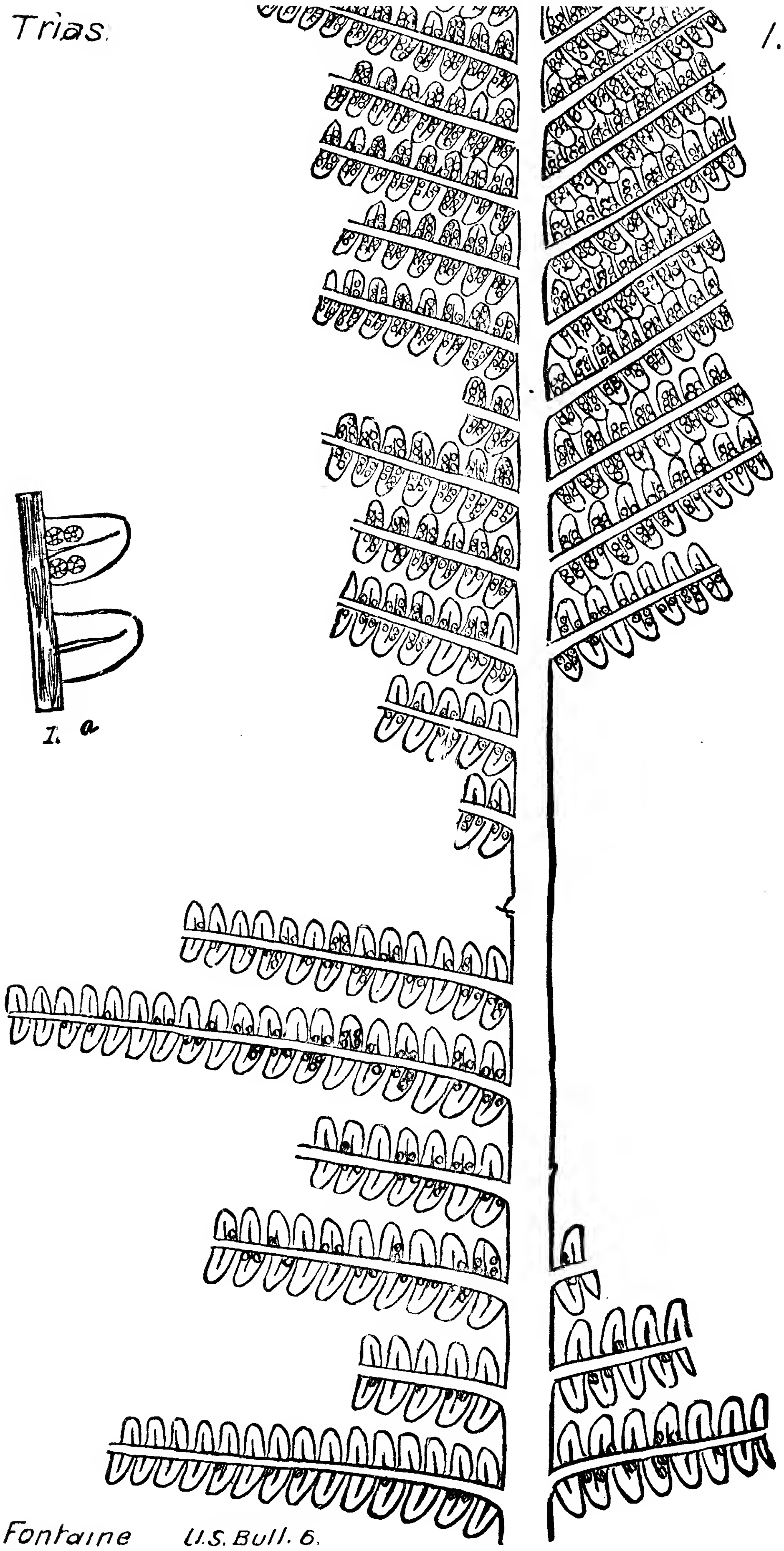


Mertensides distans, Fontaine. Older Triassic Flora of Virginia, U. S. G. S. Vol. 6, p. 39, pl. 15, fig. 1, a compound normal leaf; 1*a*, *magnified*, fruitage on pinnules. Sterile frond not seen. Pinnules thick and corriaceous. Leaf so dense that no nerves except the middle one can be made out. A small plant very like *Gleichenites microphyllus*, Schenk, European *Rhætic*. Compare also *Pecopteris gracilis*, Heer, European *Trias*. Very rare, at Clover Hill Colliery, in flaggy soft sandstone with small coals above main Richmond bed.—*Trias*.

Mesodmodus —— ? *fish scales* frequent in the *Meadville upper limestone* of Crawford Co. I. C. White, Q4, p. 83.—NOTE. St. John and Worthen's genus, 1875, Geol. Sur. Ill., Vol. 6, three species: *explanatus*, *exculptus*, and *ornatus*.—*X*.

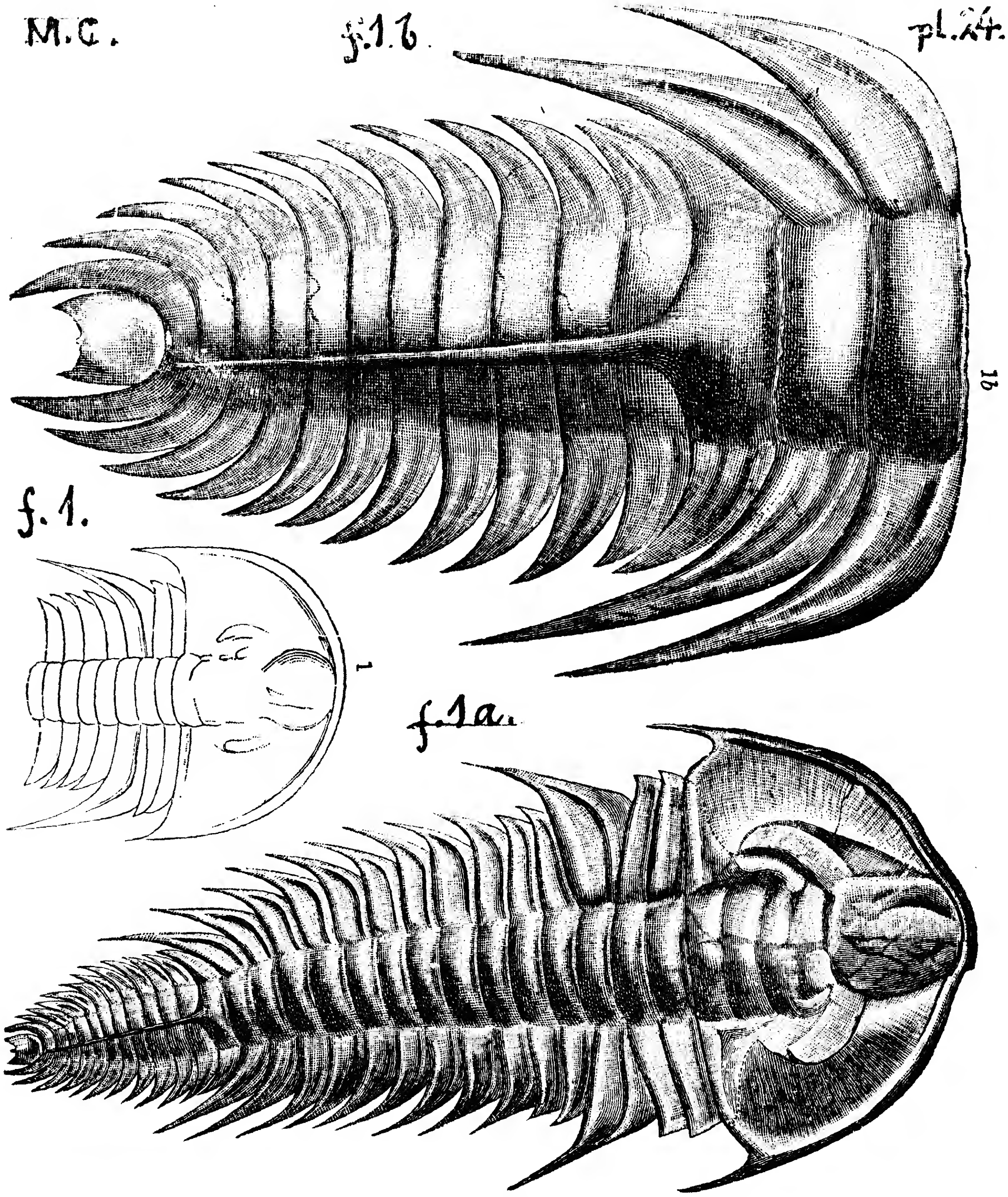
Mesonachis vermontana. (Walcott, 1885, Am. J. S., pl. 29, figs. 1, 2.—*Olenus vermontana*, Hall, 12th An. Rt. 1859, fig. 2; Pal. N. Y., Vol. 3, 527; *Barrandia vermontana*, Hall, 13th An. Rt. 1860; Geol. Vt. 1861, Vol. 2, pl. 13, fig. 2; *Paradoxides vermonti*, Emmons, 1860, Manual of Geol., p. 280, Note A; *Paradoxides vermontana*, Barrande, 1861, Bull. Soc. Geo. France,

(**Mertensides distans.** See page 409.)



Fontaine U.S. Bull. 6. Pl. 15

(**Mesonachis vermontana,** continued from page 409.)



XVIII, pl. 5, fig. 8; *Olenellus vermontana*, Hall, 15th An. Rt. 1862; etc.)—Walcott, Bulletin U. S. G. S. No. 30, page 158, plate 24, fig. 1, copy of original figure of type specimen in Am. Mus. N. H., New York city. Fig. 1 *a*, Mr. Hurlburt's specimen; fig. 1 *b*, *enlargement* of its tail end, to show the spine projecting from its 15th segment.—*Lower Cambrian* (*Georgian*) formation, at Parker's quarry, Vt. Heads have been found in Labrador.—*L. C.*

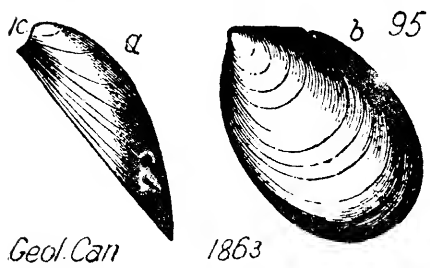
Metoptoma alta, Whitfield. *II a*. *See Appendix.*

Megalopteris minima, Andrews. *See Appendix.*

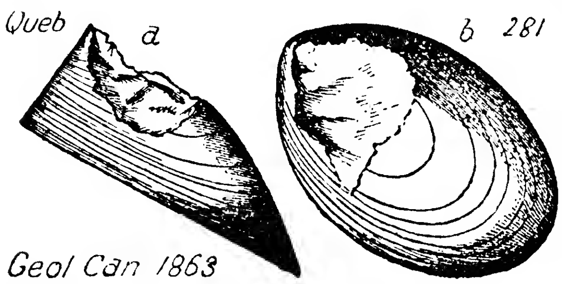
Megalopteris ovata, Andrews, *See Appendix.*

Metoptoma cornutæforme. Walcott. Potsdam Fauna Saratoga Co., N. Y. 1888. Figs. 10, 11. See Bull. U. S. G. S., page 62. *Upper Cambrian* (*Potsdam*) formation, and confined to it. To be sought for in Pennsylvania along the north-west flank of the South mountain, and along the North and South Chester Valley Hill ranges.—*U. C.*

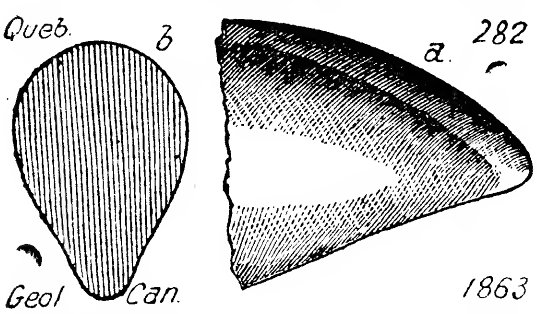
Metoptoma erato, Billings. Geology of Canada, 1863, page 145, figure 95 *a*, side view, *b*, back view. *Trenton group. II c.* Description in Pal. Fossils, Vol. 1, 1862, *Black Rivnr group. II c.*



Metoptoma niobe, Billings. Geology of Canada, 1863, page 276, fig. 281 *a*, side view; *b*, view of the upper side. From the *Quebec group. Lower Silurian;* or *Cambrian.* Described in Pal. Foss. Vol. 1, 1862. *Calciferous sandstone formation, II a.*



Metoptoma orithyia, Billings. Geology of Canada, 1863, page 276, figure 282 *a*, side view; *b*, outline of the base. *Quebec group.* Description in Poalæzoic Fossils of Canada, Vol. 1, 1862. Specimens from *Calciferous sandstone. II a.*

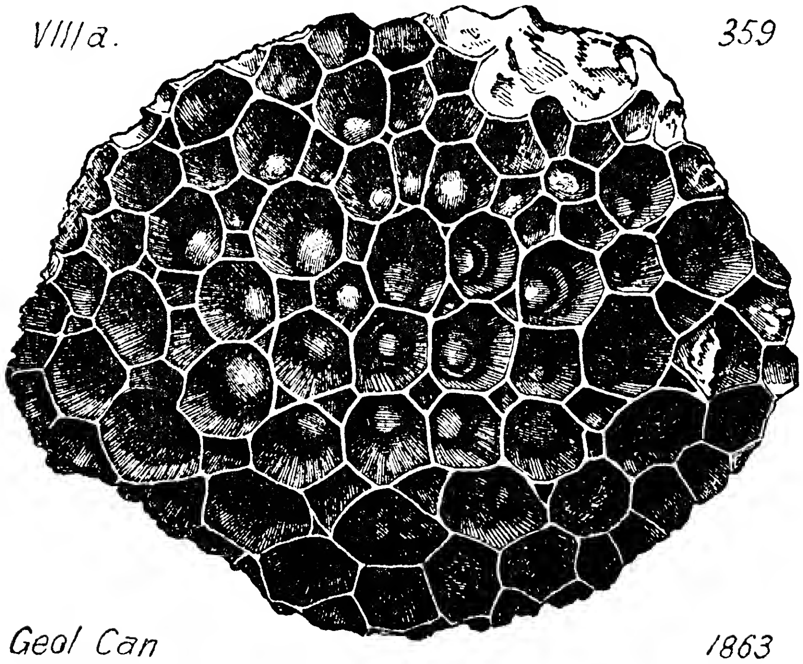


Metoptoma ? rugosa. See **Stenotheca rugosa.** *L. C.*

Miamia bronsoni, Dana. An insect found in Mason Creek nodule, Ill. Amer. Jour. Sci. [2] Vol. 37, 1864, p. 34, 35, fig. 1. *Coal measures, XIII.*

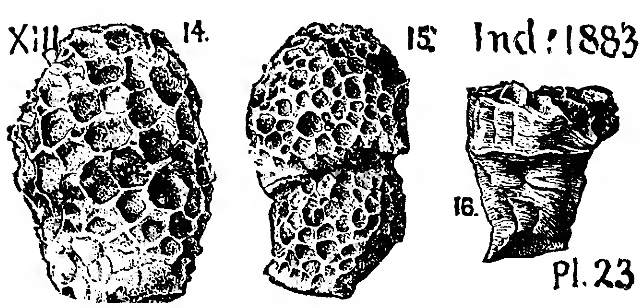
Miamia danæ, Scudder. See **Gerarus danæ**, Scudder. *XIII.*

Michelinia convexa, D'Orbigny. Geology of Canada, 1863,



page 364, figure 359. Found in the *Upper Helderberg* (*Corniferous*) *limestone* of Canada.—*VIII a.*

Michelinia eugeneæ, White, in Collett's Indiana Report of



1883, page 119, plate 23, figs. 14, 15, 16, *natural size*, side views of three separate specimens. The base of the coral was evidently attached to some foreign body. Collett says it is the only known species of the European genus Michelinia of DeKoninck as yet found in American coal measures (at several places in Indiana and Illinois).—*XIII.*

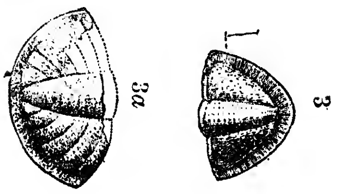
Michelinia ——? Genus recognized by J. Hall, Nov., 1888, in Spec. 808–17, from Dingman's Falls, Pike Co., Pa. *Hamilton, VIII c.*

Microdiscus (*Dawsonia*) **dawsoni**, Hartt. Dawson's Acad-

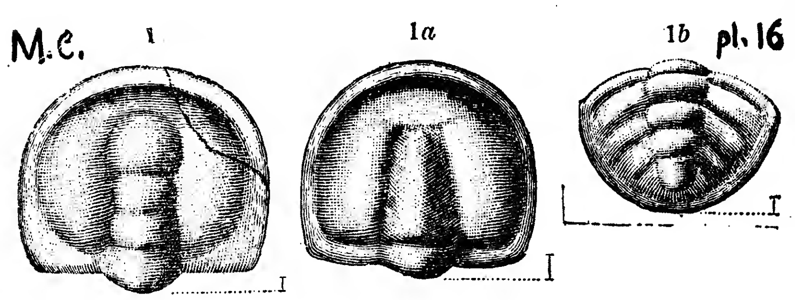
Fig. 228.

ian Geology, p. 654, fig. 228, *magnified* head of this pretty little trilobite, always broken, heads and tails separate; surface finely granulated, (not shown in figure;) never seen with the *Conocephalites* at Ratcliffe mills, St. John, but quite abundant in the Coldbrook shales; *Cambrian. IIC.*

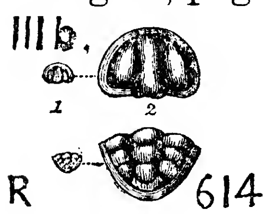
Microdiscus dawsoni, (Hartt, in Acad. Geol.) Walcott, Bulletin, U. S. G. S. No. 10, page 23, pl. 2, fig. 3, head shield *enlarged three times;* fig. 3 *a*, tail shield *enlarged three times.*—*Middle Cambrian* (*Saint John*) New Brunswick, *M. C.*



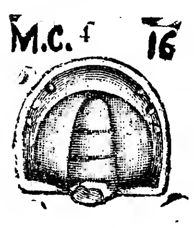
Microdiscus lobatus. (*Agnostus lobatus*, Hall, 1847, Pal. N. Y. Vol. 1, p. 258, pl. 67, figs. 5*a*.—*f*.) Ford, 1873, Amer. Jour. S. [3.] vi, 135, foot note.—Walcott, Bull. U. S. G. S. No. 30, page 156, plate 16, fig. 1, head *very much enlarged;* 1*a*, another head, to show range of variation; 1*b* tail (pygidium) *very much enlarged.*—Found in the *Low. Cambrian* (*Georgian*) formation,—multitudes of them occurring in the conglomerate limestone on the ridge east of Troy, N. Y.—NOTE. Formerly considered characteristic of Hudson river slate formation. See *Agnostus lobatus*, above. *L. C.*.



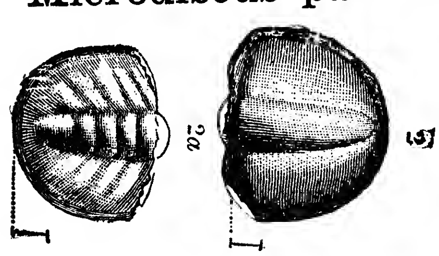
Rogers, page 820, fig. 614. (*Beyrichia lobata.*) Middle Cambrian. (Formerly considered a Hudson river (Loraine) formation species (III b.) Described as a *Beyrichia*, but it is a trilobite. Figs. 1 show the natural size, figs. 2, enlarged.

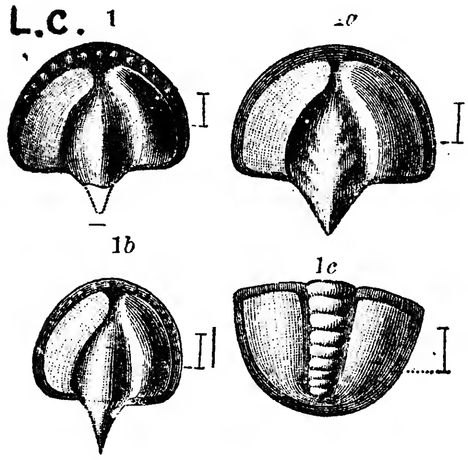


Microdiscus meeki, (Ford, Am. J. S. [3] xi, 371.) Walcott, Bull. U. S. G. S. No. 30, page 155, plate 16, fig. 4, head (drawn by S. W. Ford) this, the only specimen found, necessarily stands as the type of the species; *Lower Cambrian* conglomate limestone in ridge east of Troy, N. Y.—*L. C.*

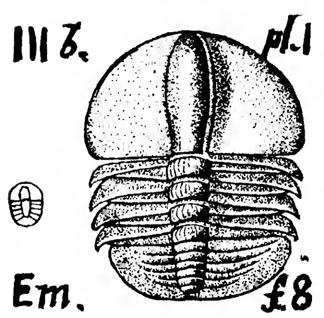


Microdiscus parkeri, Walcott, Bulletin, U. S. G. S. No. 30, plate 16, fig. 2 and 2*a*, head and tail, *enlarged five times.*—*Georgian* formation; Parker's Trilobite quarry, north of Georgia Plains, Franklin Co., Vermont.—*L. C.*

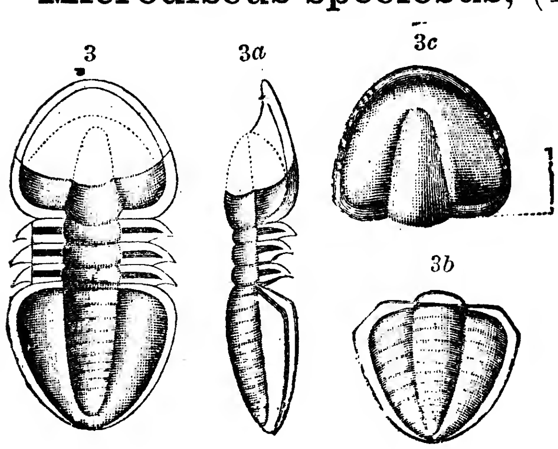




Microdiscus punctatus, (Salter, Q. J. G. S. London, 1864, xx, 237, pl. 13, fig. 11—Whiteaves, Am. J. Sc. 1878, xvi, 225.—*Microdiscus pulchellus*, Hartt, No. 13 of list sent to Dawson.) Walcott, Bull. U. S. G. S. No. 10, page 24, plate 2, figs. 1, 1*a*, 1*b*, head shields (glabellæ) showing variations of form and making, *enlarged four times*. Fig. 1*c*, tail piece (pygidium) *enlarged three times.—Middle Cambrian* (*Saint John*) formation, New Brunswick, and New Foundland.—*M. C.*



Microdiscus quadricostatus, (Properly a young *Trinucleus.*) Emmons, American Geology, Vol. 1, part 2, page 116, plate 1, fig. 8, *enlarged about five diameters.* Wolcott, in Bull. U. S. G. Sur. No. 30, page 152, says, Emmons' genus *Microdiscus* was founded on a specimen of *Trinucleus.* — Barrande thought Emmons' minute forms might be the young fry of some large trilobite like *Trinucleus.* (Salter.)—Now, many of these minute species are known (*punctatus*, *speciosus*, etc.,) and grouped as *Microdiscus*, midway between the *Agnostus* and the *Conophrys* groups. *Pemphigaspis bullata* (Hall, 16th An. Rt. p. 221) is closely related.—Emmons' specimens were found in the White fragile (*H. River*) shales. His name *Microdiscus* cannot be applied to his specimens; but it is retained for all the minute Cambrian species. (Walcott.)



Microdiscus speciosus, (Ford, 1873, Am. J. S. VI, p. 137, fig. 2 *a*, *b*. XIII p. 141.) Walcott, Bulletin U. S. G. S. No. 30, page 154, plate 16, fig. 3, 3*a*, top and side, *enlarged twice*; 3b, tail (pygidium) *enlarged twice.* Fig. 3c. very perfect head from Troy.—*Lower Cambrian* (*Georgian*) formation in Canada, and not rare near Troy, N. Y.—

(NOTE. Resembles Salter's Welsh *Microdiscus punctatus* in Menevian formation. Head resembles *Microdiscus dawsoni* from Middle Cambrian (Saint John) formation. — See also *Microdiscus pulchellus.*)—*L. C.*

Microdon bellistrita. See **Eodon bellistriata.**— *VIII c.*

Microdon ellipticus, Whitfield (*Cypricardella elliptica?*

Microdon, Conrad, 1842, being a name preoccupied by Agassiz in 1833 for a genus of fishes, has been changed to *Cypricardella.* See S. A. Miller's Cat. Amer. Pal. Fossils, p. 194. Hall's *Microdon subelliptica* is described in Trans. Alb. Inst. Vol. 4, 1856. Collett's 1882, plate 30, fig. 37, Spergen Hill, *subcarboniferous*, *XI.*

Microdon nucleata. See **Cypricardella nucleata.**—*XI.*

Microdon oblonga. See **Cypricardella oblonga.**—*XI.*

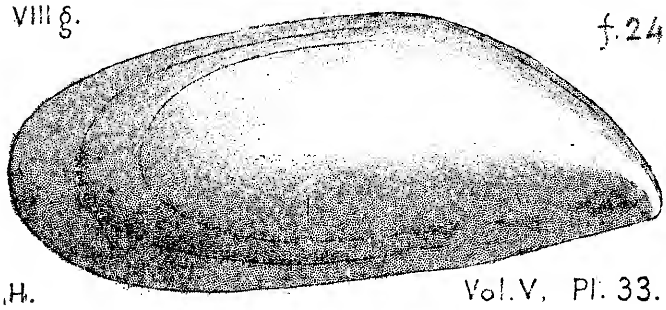
Microdon subelliptica. **Cypricardella subelliptica.**—*XI.*

Modiella pygmæa, Hall, Pal. N. Y. Vol. 5, part 1, plate 76. He found it with other fossil forms on specs. 808–12,–13 of Fellows' collection at Dingman's creek falls, Pike Co., Pa., from *Hamilton strata*, *VIII c.—See Appendix.*

Modiola angusta, (a mistake for **Amnigenia catskilliensis,** Hall, Pal. N. Y. V, i, p. 516), the only fossil seen by Prof. Stevenson in the whole *Catskill formation* in Bedford Co., Pa. (T2, p. 75) and that only along the Wills creek outcrop. It occurs in one of the highest beds, bed No. 30 of the Hyndman Section (T2, p. 103) about 300′ below the base of the Pocono formation. If this be the *one shell only* found in the the Oneonta Sandstone of New York, which Hall makes *Portage*, it is remarkable that it is here the *one only shell* of the *Catskill.—IX.—For figure and explanation see* **Amnigenia catskilliensis** *in Appendix.*

Modiola concentrica. **Modiomorpha concentrica.** *VIII c.*

Modiola (*mytilops*) **metella.** (Hall, 1870, Prelim. notice of Lamell. shells; Pal. N. Y. Vol. V. plate 33, fig. 24, *Chemuug.*) Claypole's list of fossils in Perry Co., Pa., F2, preface p. xv. — *Chemung-Catskill beds*, *VIII-IX.*

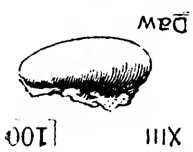


Found also by I. C. White at Rupert, Columbia Co., in bed 30 of Section 13, (G7, p. 69,) in *Chemung*, *VIII g*.

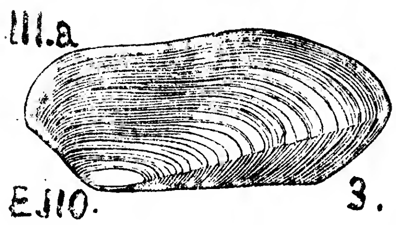
Modiola minor. Lea. Jour. Acad. Nat. Sc., Phila. [2] Vol. 2, 1852, recognized by Heilprin, *doubtfully*, among specimens from the *Anthracite slates* of the Northern Coal field, in the Museum of the Wyoming Hist. Soc. at Wilkesbarre. Geol. Sur. An. Rt. 1885, p. 451.—*XIII.—See Appendix.*

Modiola casts in loose pieces of sandstone found by Carll on Gibson run, 1 m. N. E. of Jamestown, Crawford Co., Pa., probably from the *Berea grit*. Cat. O, spec. 3300.—*X*.

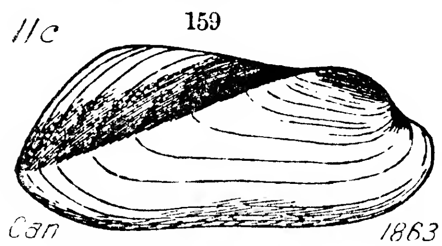
Modiola pooli, Dawson. Acadian Geology, 1868, p. 301, fig. 100, a cast of the shell; nearly cylindrical, with delicate surface lines of growth; found in *Carboniferous limestones* of Nova Scotia.—*XIII?*



Modiolopsis anodontoides (*Cypricardites anodontoides, sinuata.*) Emmons, Geology of the Second District 1842, page 399, fig. 110, 3. *Utica formation.* (Conrad, 1847, Hall, Pal. N. Y., Vol. I.) *Loraine* (*Hudson river*) *formation.—III a, b.*



Modiolopsis carinata, Conrad. Hall, Pal. N. Y., Vol. 1, 1847, *Trenton group.*—The figure here given is taken from Sir Wm. E. Logan's Geology of Canada, 1863, page 173, fig. 159.—*Trenton. II c.*



Modiolopsis concentrica, H. & W. *See Appendix.*

Modiolopsis cincinnaticus, H. &. W. *See Appendix.*

Modiolopsis curta, Hall, Pal. N. Y., Vol. 1, 1847, *Hudson river group.* Reported by Prof. Ewing as found by him in that formation in Centre Co., Pa. T4, p. 427,—*III b.—See Appendix.*

Modiolopsis dubia ? (Hall, 1859, Pal. N. Y., Vol. 3, Low. Held.) Claypole's list of fossils from Perry Co., Pa., F2. Preface p. xiii. *Lower Helderberg, VI,* See Cat. OO, p. 234, Spec, 604-1, in Fellows & Genth collections at Manning's quarry near Hazardville, Carbon Co., Pa.; and 606-2, in Fellows' coll. on Hogback, Shawnee, Pike Co., Pa.; both in *Lower Helderberg. VI.—See Appendix.*

Modiolopsis faba. (*Nuculites faba*). Emmons, page 395, fig. 106, 5. *II c. Trenton* (Conrad, 1842, in Emmons, *II c*, *Blackriver* and *Trenton*, *III b*, *Loraine formations*. See specimens 205-1, and 205-2 (twenty of them) in C. E. Hall's collections near Reedsville, Mifflin Co., Pa., (OO, p. 232,) in strata probably lower than *Trenton*; also 207-1 (twenty) and 207-2, in F. Platt's collections in Morrison's Co., Blair Co., in *Chazy strata*, *II b*.

Modiolopsis gesneri, Billings. Geol. Can. 1863, p. 172,

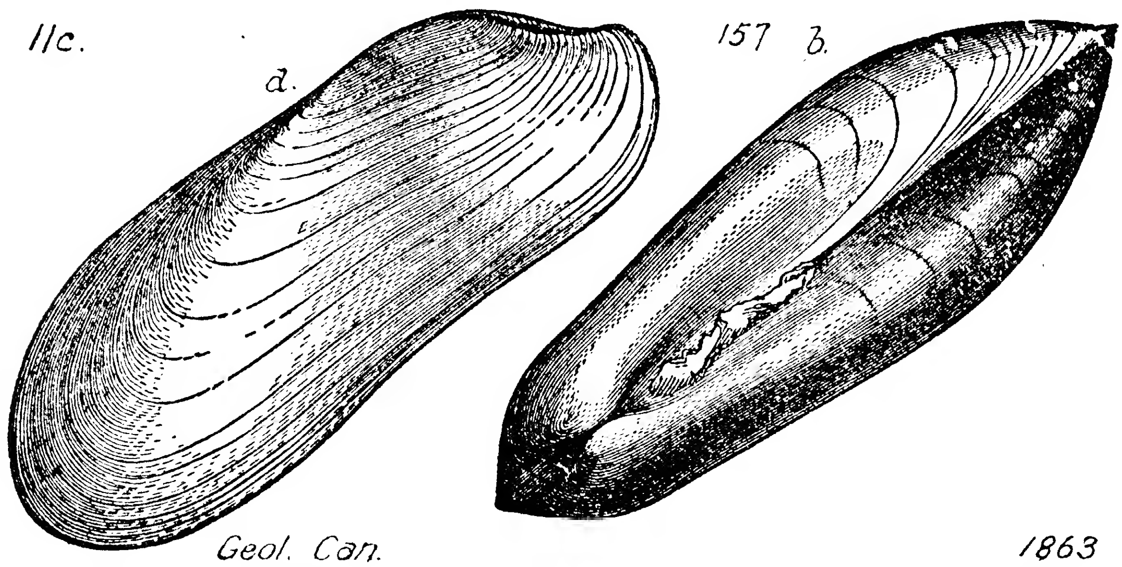
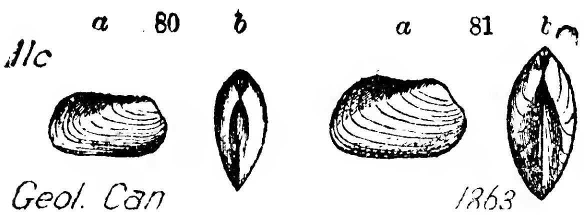
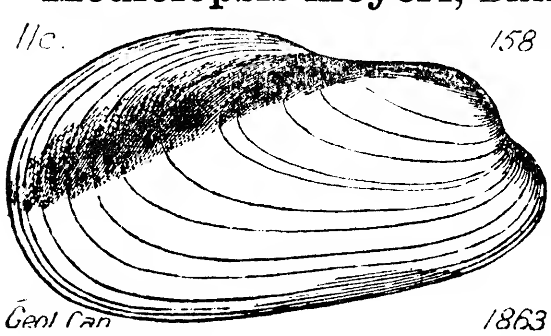


fig. 157 *a*, side view; *b*, dorsal view. *Trenton group. II c.*

Modiolopsis maia, Billings. Geology of Canada, 1863, page 143, fig. 80 *a*, right valve; *b*, dorsal view. (Fig. 81 is *M. nais*, Billings. See below on page 420.) — *Trenton group. II c.*

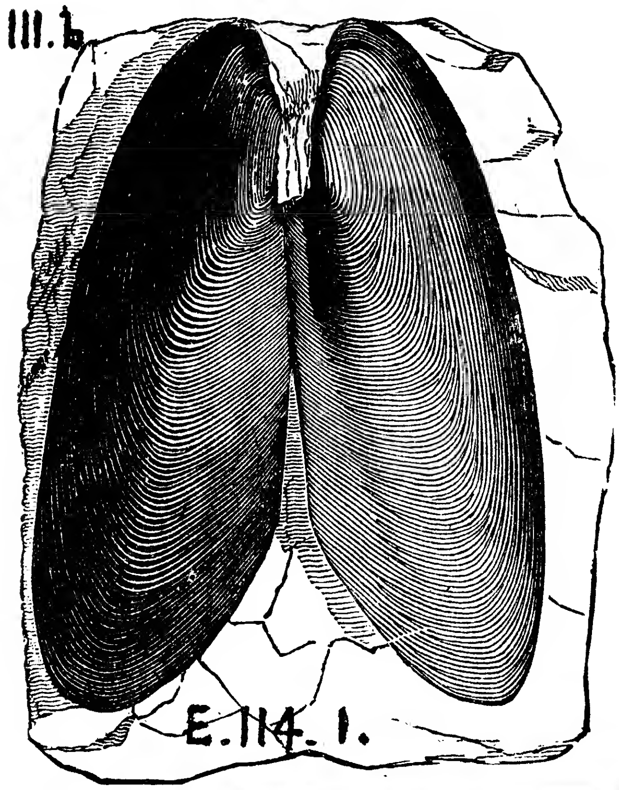


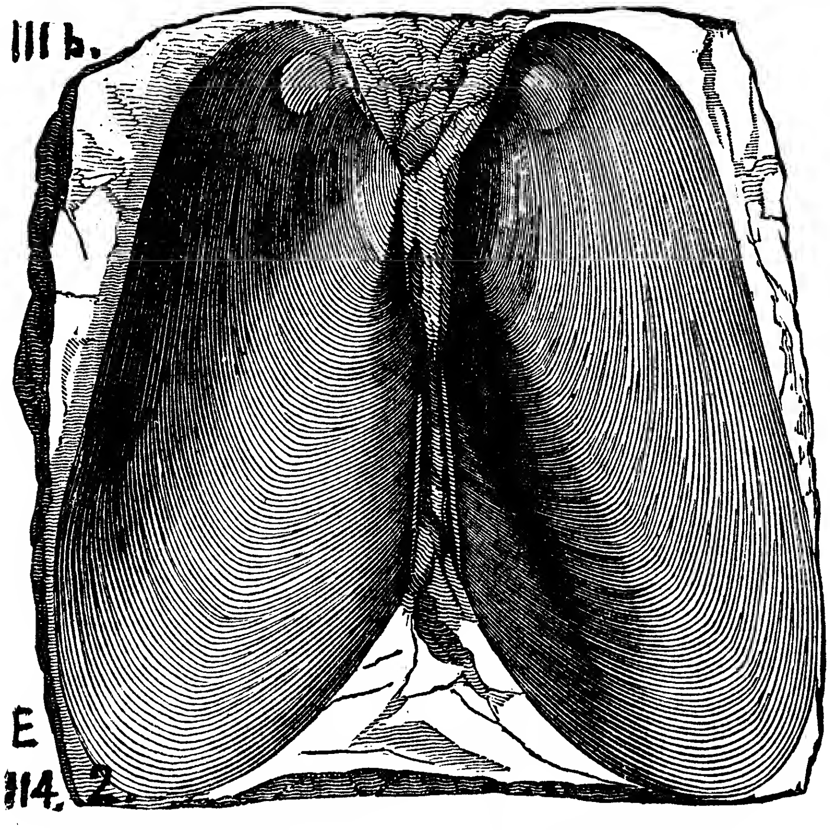
Modiolopsis meyeri, Billings. First named and described in Pal. Foss. Canada, Vol. 1, 1862. Figure here given is taken from Geology of Canada, 1863, page 173, figure 158, from the *Trenton group* in Canada. *II c.*



Modiolopsis modioliformis, Meek and Worthen. Geol. Survey of Illinois, Vol. 3, 1868. *Trenton, II c.*

Modilopsis modiolaris, (*Pterinea modiolaris ; Cypricard-*

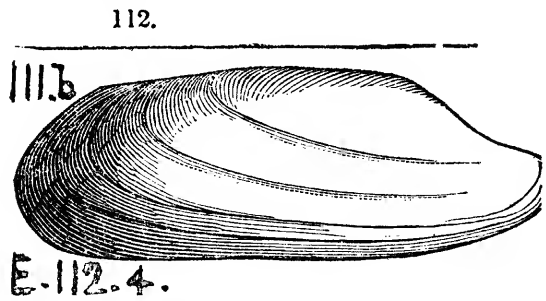




ites angustifrons, *cypricardites ovata*. Emmons' Geology of N. Y. fig. 114, 1, 2.—Rogers, Geol. Penn. 1858, Vol. 2, page 821, fig. 618.—Conrad 1838.—Pal. Ohio, Vol. 2, page 83, plate 2, fig. 17.—Found in the *Loraine shale*.—*III b*.

Modiolopsis ———? Collected by C. E. Hall in 1875, on Marshall's creek, Monroe Co., Pa., in *Hamilton*, or *Marcellus strata*. Proc. A. P. S. Jan. 5, 1876.—*VIII b. c.*—Reported by Prof. Ewing, T4, p. 427, as found in *Loraine* (*Hudson river*) *shale*. *III b*.

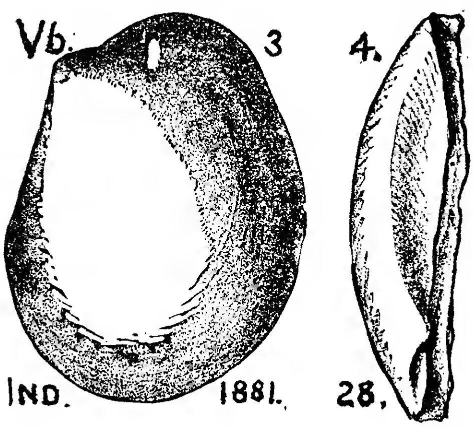
Modilopsis nasuta. (*Cypricardites modiolaris* and *nasutus.*



Emmons, page 403, fig. 112, 4, *Loraine* (*Hudson river*) *formation*, (Conrad, Ann. Rt. N. Y. 1841.) Like *Pterinea carinata* it occurs *only* in this formation, and is never seen in the *Trenton* or *Utica* (Emmons).—*III b.*

Modiolopsis nais, Billings. Geology of Canada, 1863, p. 143, fig. 81 *a* (*See under M. maia above*) right valve; b dorsal view. *Trenton group II c.*

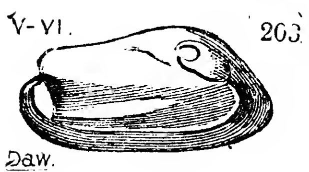
Modiolopsis perlatus, Hall, 28th Rt. N. Y. Museum, Doc.



Ed. 1876, pl. 27, figs. 3, 4, copied into Collett's Indiana report of 1881, p. 315, pl. 28, fig. 3, right valve characteristic of the species; fig. 4 hinge view showing its great convexity or roundness.—*Niagara, V b.*

Modiolopsis pholadiformis, Hall. *See Appendix.*

Modiolopsis rhomboidea, Hall. Dawson's Acadian Ge-



ology, 1868, p. 600, fig. 203; surface evenly striated, concentrically; front muscular scar very strong, back scar less so but still very conspicuous and subduplicate; some resemblance to *M. primigenius* (*Unio primigenius*, Conrad, Ann. Rt., N. Y., 1838, *Medina sandstone*), but less ventricose in the middle, &c. Arisaig, Nova Scotia.— *V?*

Modiolopsis truncata, Hall. *See Appendix.*

Modiolopsis subalatus, Hall. Pal. N. Y., Vol. 2, 1852,

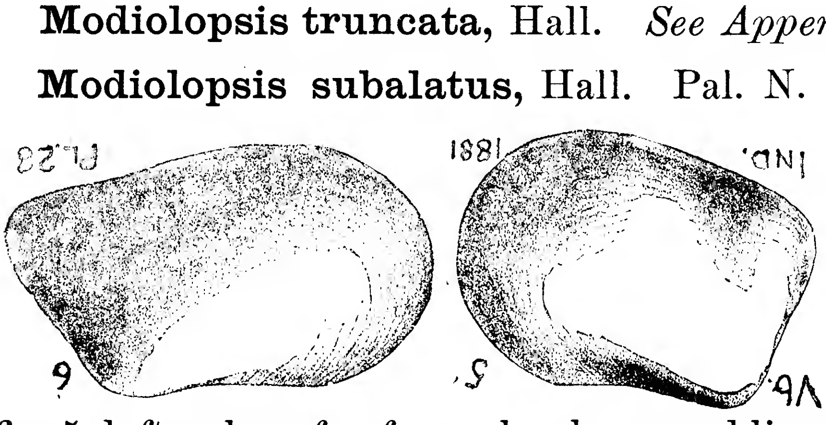
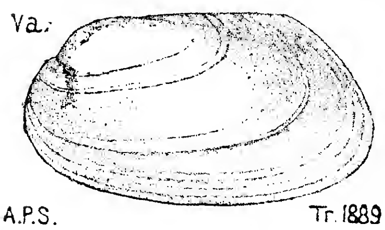


plate 27, figs. 5, 6; 28th An. Rt. of Museum, 1879. Collett's Indiana report of 1881, p. 315, plate 28, fig. 5, left valve of a form closely resembling the *M. subalatus* of New York, but of larger dimensions; fig. 6, right valve, having a proportionally greater length; in this feature more nearly approaching the New York species. *Clinton and Niagara.*—See specimens 501–19*a*, 40, 46–50, in Hale and Hall's collections at the McKee fossil ore bank, Mifflin Co., Pa. (OO, p. 233); Spec. 502–9 (nine examples); 502–16*b*; 502–21; same outcrop, roof shale of ore bed; 504–42 from Bell's Mills; and 508–16 in Hall and Fellows' coll. at Orbisonia, also in *Clinton shale.*— *Va. Vb.*

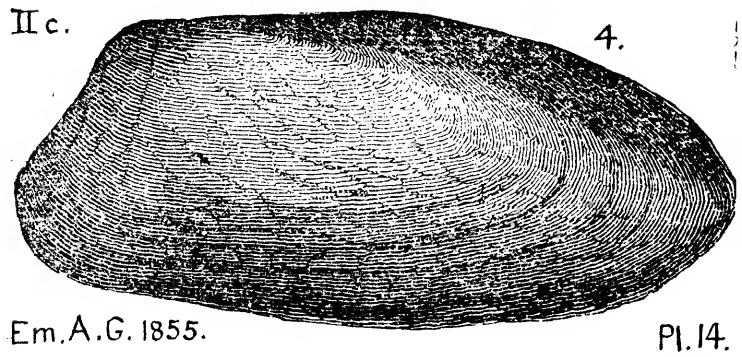
Modiolopsis subcarinata, Hall, Pal. N. Y., Vol. 2, 1852, *Clinton.* Found by C. E. Hall in Ferguson Valley, Mifflin Co., Pa., in *Clinton,*— *Va.* *See Appendix.*

Modiolopsis subrhomboidea, N. S. Simpson, Trans. A. P. S., Phila., 1889, page 450, fig. 17; founded on specimens 501–47 of Hale and Hall's collections at McKee's ore bank. Shell of medium size, rhomboid ovate in outline; length twice the height; basal margin slightly convex along the middle, curving to the extremities; posterior margin abruptly rounded below, somewhat more gradually recurving to the cardinal line; cardinal margin slightly arcuate; anterior margin sharply rounded. Valves flattened, greatest convexity at the umbonal ridge. Hinge line slightly oblique, extending a little more than two-thirds the length of the shell. Beaks appressed, situated about one-fourth the length of the shell from the anterior end; umbonal ridge not distinctly defined; posterior slope rounded, becoming flattened just before reaching the cardinal line. Surface marked by fine concentric lines, and at irregular distances apart by varices of growth. The anterior muscular impression is moderately large, well marked, and situated just within the anterior margin below the beak. The best preserved specimen has a length of 24 mm., and a height of 13 mm. This species may be distinguished from *M. subcarinatus* by the less clearly defined umbonal ridge, the somewhat arcuate hinge line, and absence of a constriction in the basal margin. *Formation and locality.* Clinton shale, above fossil ore, at McKee's ore bank, north-east of McKee's house, Ferguson valley, seven miles north-west of Lewistown, Mifflin county, Pennsylvania.— *Va.*

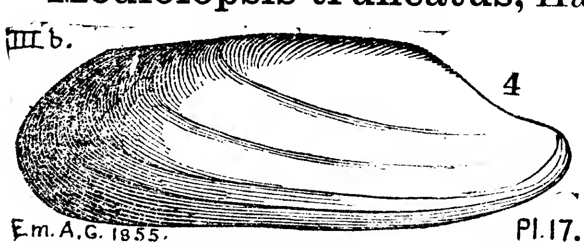


Modiolopsis terminalis, Hall. Pal. N. Y. Vol. 1.—*III b.*

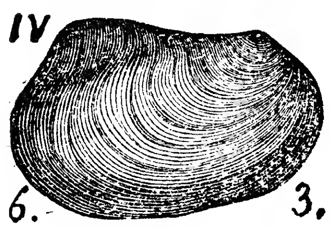
Modiolopsis trentonensis, Hall, Pal. New York, Vol. 1. 1847. *Trenton.* *Tellinomya trentonensis,* Emmons Am. Geol. I, ii, page 170, plate 14, fig. 4; thin shell; surface marked by fine concentric lines; shell near the front end rather thick and cylindrical. Note. This may be the species in C. E. Hall's collections of 1876, from *Trenton limestone* beds on the Little Juniata.—*II c.*



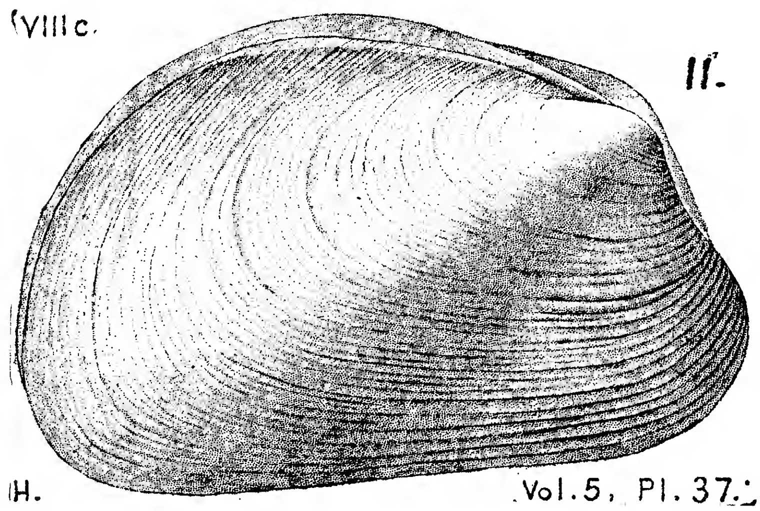
Modiolopsis truncatus, Hall, Pal. New York, Vol. 1. 1847. Hud. Riv. group. *Lyonsia subtruncata,* D'Orb. Emmons Am. Geol. I, ii, 1855, 171, plate 17, fig. 4; beak near the front end which has the muscular scar.—*Loraine* (*Hudson River*) *shale* formation, South-western Virginia. (Emmons.)—*III b.*



Modiomorpha alta. (*Cypricardites alata.*) Hall, Geology of the 4th District of New York, 1843, page 48, fig. 6, 3. (*Cypricardia alata*). (*Unio primigenius,* Conrad.)—More abundant at Lockport, N. Y., than elsewhere. (Hall.)—*Medina, VI.*



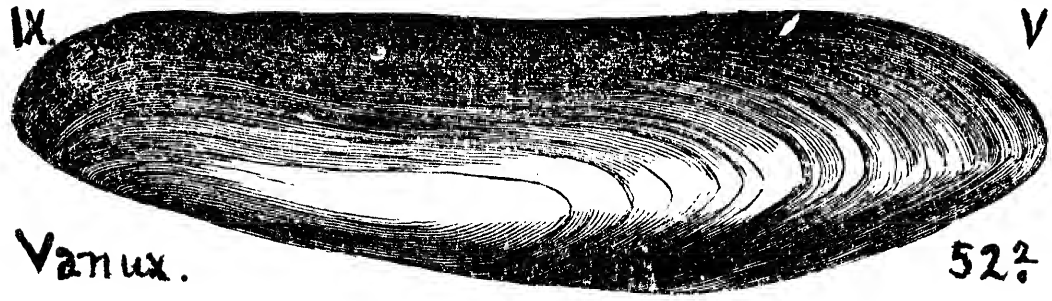
Modiomorpha alta. (*Cypricardites alta.* Conrad, Ann. Rep. N. Y. 1841.) Fig. from Hall, Pal. N. Y. Vol. 5, plate 37, fig. 11. *Hamilton.*—Claypole's list of fossils in Perry Co., Pa. F2, Cat. Spec. 5–167, collected at Barnett's mill near New Bloomfield, from *Hamilton upper shale, VIII c.*

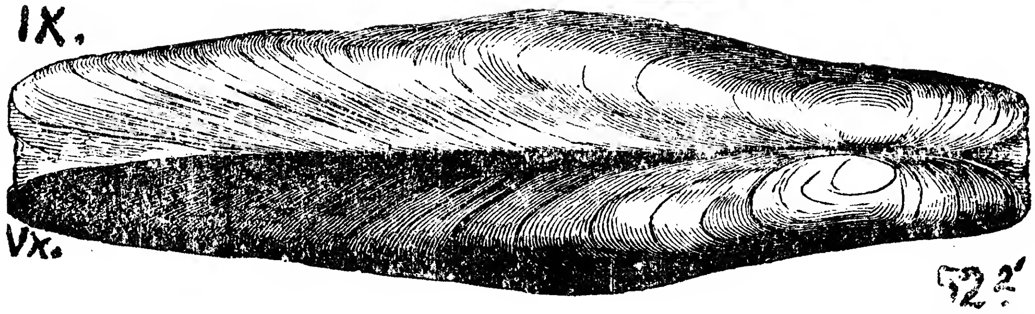


—Specimens also in Randall's Collections at Warren, from *Chemung Upper beds.* C. E. Hall. *VIII g.*—A specimen *resembling it*, doubtfully, identified by Heilprin in the Collections of the Wyoming Hist. Soc. Wilkesbarre, from *Anthracite black slate.*—XIII.

Modiomorpha amygdaloides, found by C. E. Hall among Carll's Collections of 1875, in the Oil Region. MS. Rt. Dec. 30, 1876. *Chemung upper beds ? VIII g–IX.—See Appendix.*

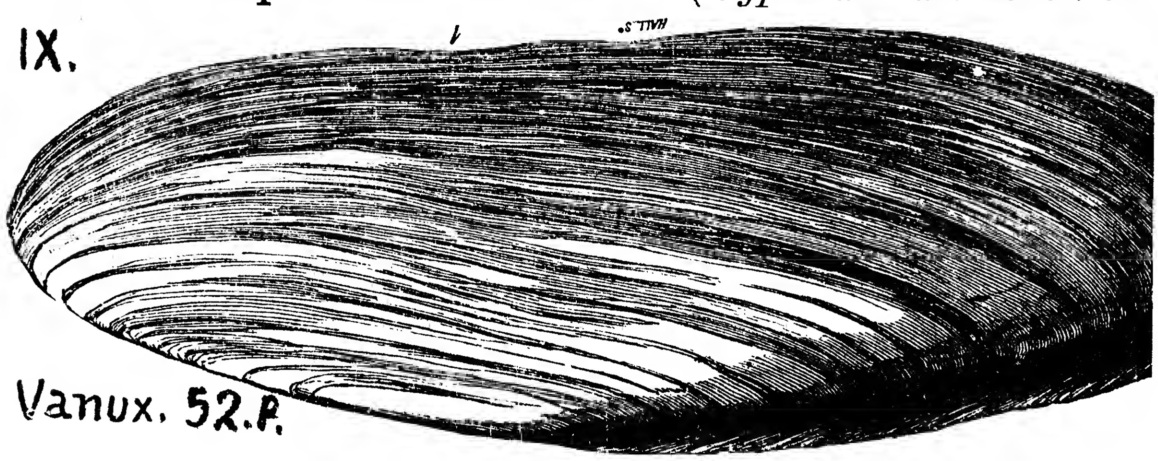
Modiomorpha angustata. (*Cypricardites angustata.*)





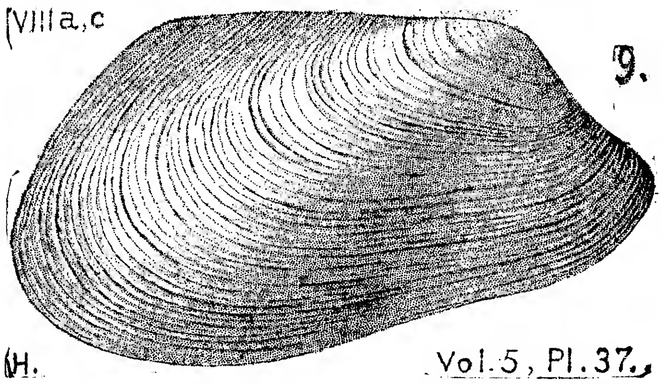
Vanuxem, 1843, page 186, fig. 52. Hall, 1843, plate fig. [72.] Catskill formation. *IX.*—This became in Hall's, Pall. N. Y., Vol. 5, part 1, p. 516, the **Amnigenia catskilliensis,** which is the only shell as yet found in the *Oneonta* (*Portage*) *sandstone* of eastern New York. *See Appendix under* **Amnigenia catskilliensis.**

Modiomorpha catskilliensis. (*Cypricardia catskillien-*

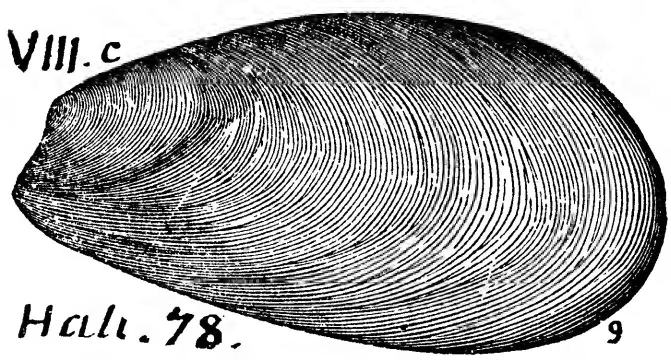


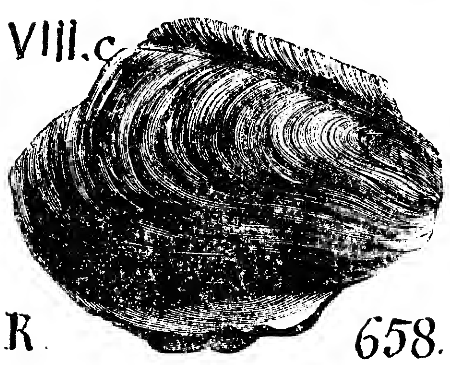
sis.) Vanuxem, 1843, page 186, fig. 52, 1. Found by Claypole on Jenkins' farm, 5 m. S. of New Bloomfield, Perry Co., Pa., in *Chemung-Catskill strata.* Spec. 57–64.—*VIII–IX.*—This Hall puts, with *Cypricardites angustata*, under **Amnigenia catskilliensis.** *See that name in the Appendix.*

Modiomorpha complanata. (Hall, 1870, Prelim. Not. Lamell. shells; Pal. N. Y., Vol. 5, pl. 37, *a*, fig. 9. U. Held.) Claypole's list of Perry Co. Penn, fossils, F2, Spec. 5–187. collected at Barnett's mill, Perry Co., from *Hamilton upper shales;* and by I. C. White, near Grafton, Penn township, Huntingdon Co. (T3, p. 109), in the same, 50′ below the *Tully limestone.*—*VIII c.*—A form nearly resembling this species was found by Heilprin among the *Anthracite coal measure* fossils of the Wyoming Historical Society, near Wilkesbarre.—*XIII.*



Modiomorpha concentrica. (*Modiola concentrica.*) Hall, page 196, fig. 78, 9. Rogers, page 827, fig. 658. *Hamilton.* (Compare *Modiola semi-sulcata* in Murchison's Silurian Researches, VIII, fig. 6.)—Conrad, 1838.—(Claypole finds it in Perry Co., Pa., in *Hamilton* strata and also in *Chemung.* Specimens 5–17 (four); 5–127; 37–7; 68–11; 68–19; 99–51 (two); 110–27; 115–2; 197–1; 233–4; i. e. at Barnett's Mills, Perry Co.; Bloomsburg, Col. Co.; Drumgold's tannery, Perry Co., near New Bloomfield; Mapleton, Huntingdon Co.; Roseburg, Perry Co.; all in *Hamilton upper shales.* Also, 2½ m. N. of Liverpool, Perry Co.; Bloomsburg, Col. Co.; New Bark tannery, Perry Co.; all in *Chemung lower*



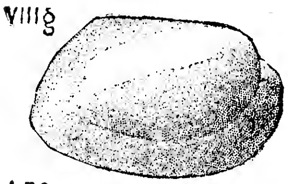


strata (see T3, 109). In Bedford Co. it was found by Stevenson in sandstone bed No. 30 the Yellow Creek section, Hopewell township, 2957 feet below the assumed base of *Catskill formation.*— *VIII c, g.*—See spec. 801–27 from Marshall's creek, Monroe Co., Pa. (OO, p. 235); spec. 809–6, from canal at Port Jervis, in *Hamilton strata, VIII c.*

Modiomorpha neglecta ? See Claypole's Barnett's Mill, Perry Co., specimen 5–98, reported in Cat. OOO, as from *Hamilton upper shales. VIII c.*

Modiomorpha quadrula ? Hall Prelim. Not. Lam. 1870, *Chemung.*— See Claypole's spec. 104–28, from opposite Shermansdale mill, Perry Co., in *King's Mill sandstone, Chemung–Catskill transition beds. VIII g—IX.*—See specimen 876–4 (OO, p. 237) in L. E. Hick's collection near Big Shanty, McKean Co., Pa. *Chemung VIII g.—See Appendix.*

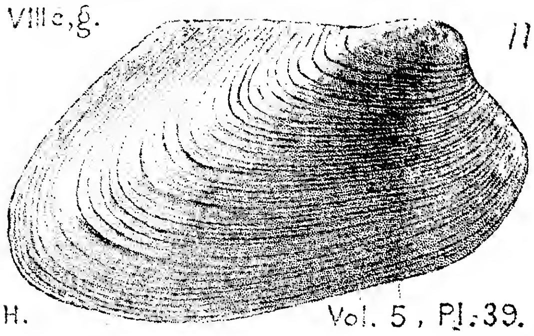
Modiomorpha rigidula, Simpson, n. sp., Trans. Amer. Philos. Soc., Phila., 1889, page 449, fig. 16.



Shell of medium size or smaller, subquadrangular in outline; height a little more than three-fifths the length of the shell; basil margin regularly and gently curving from the anterior to the post-basil extremity; posterior margin gently curved, slightly oblique, sometimes nearly at right angles to the basil margin; cardinal line essentially straight; anterior rounded abruptly, extended, without limitation by a sinus. Beaks a little more than one-fourth the length of the shell from the anterior end; umbonal ridge prominent, extending from the beaks to the postbasal extremity. Valves convex towards the basal margin, becoming gibbous above the middle and in the umbonal region; posterior slope convex near the beaks, becoming flattened as it approaches the posterior margin. Surface marked by concentric striæ which frequently become obsolete on portions of the shell. On casts of this species the pallial line is sometimes so strong as to give a distorted appearance to the specimen. This species may be distinguished from *Modiomorpha rigida*, of this formation, by its greater gibbosity, the less oblique posterior margin, less clearly defined umbonal ridge, and the more prominent beaks. *Formation and locality. Chemung group*, Tioga village, Tioga Co. Pa.— *VIII g.*

Modiomorpha subalata. *Cypricardites subalata.* Conrad, Ann. Rt. N. Y., Hall, Pal N. Y. Vol. I, i, plate, 39, fig. 11. Hamilton.) Claypol's specimens 43–1; 43–11 (two); 57–13 (three); 57–24; 57–26; 103–15; 104–4; 104–6; from one mile above Shermansdale, on Sherman's creek, Perry Co. (*IX*); from Jenkin's farm, 5 m. S. of New Bloomfield (*VIII–IX*); from opposite Shermansdale mill (*King's mill SS. VIII–IX*); and from ½ mile N. of King's mill (*Chemung, VIII g.*)

VIII c, g. 11



H. Vol. 5, Pl. 39.

Modiomorpha subalata, *Var.* **chemungensis,** *new variety?* Simpson, 1888, to be found on specimen 850–4 *b*, in Sherwood's collections at Lawrenceville, Tioga Co., Pa., from *Chemung, VIII g.*

Modiomorpha ——— ? New species? (G. B. Simpson.) Specimen 888–86 (unlike all published figures), in Sherwood's coll. Sharon township, Potter Co. *Upper Chemung, VIII g.*

Modiomorpha ——— ? Claypole's spec. 103–13 (two) from ½ m. N. of King's mill, in *Chemung, VIII g.*

Modiomorpha ——— ? Claypole's spec. 161–18, from Millerstown fossil ore works, in *Clinton V a.*

Modiomorpha ——— ? Sherwood's spec. from Tioga Co. *Chemung, VIII g.*

Molgophis brevicostatus, Cope. *See Appendix.*

Molgophis macrurus, Cope. *See Appendix.*

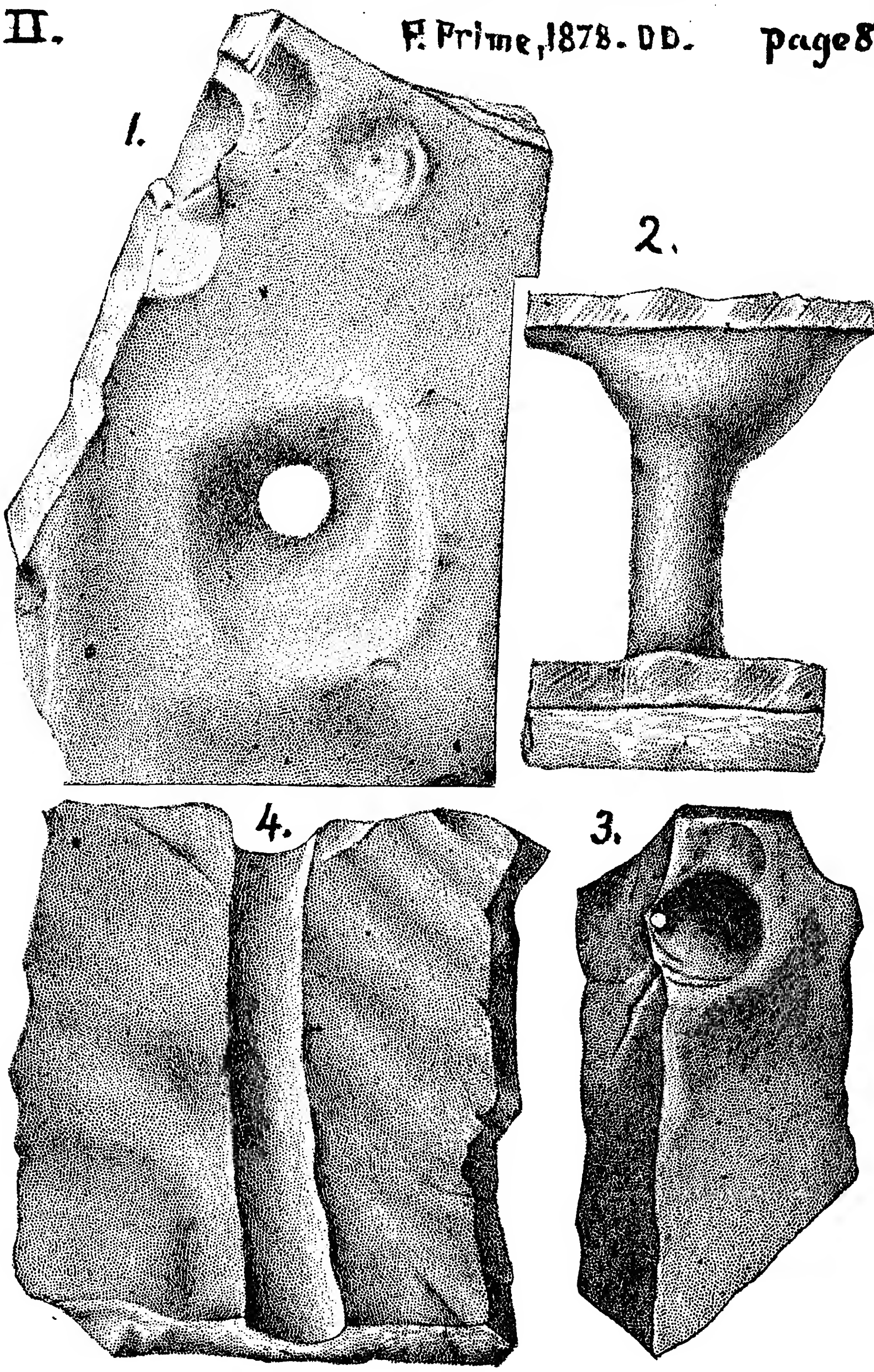
Molgophis wheatleyi, Cope. *See Appendix.*—NOTE. This genus of batrachian reptiles found in the *Coal measures* of Ohio (Diamond bed) was described by Dr. Wyman in Am. Jour. Sci., 1858, p. 11, fig. 1; by Cope in Proc. Acad. N. S., Phila., 1868, p. 220, and in Trans. A. P. S., Phila., XIV, p. 20. The three species are figured in Pal. Ohio, Vol. 2, 1875, plates 43, 44, 45.

Monocephalus salteri? Billings. First placed by Walcott (see Proc. Acad. N. S. Phila. 1887, Jan p. 16, plate 1, fig. 6) in the *Georgian* formation because it occurs under the *Potsdam* and over the *Georgian* proper. Now that the *Geor-*

gian (*Olenellus*) *zone* is placed beneath the *Braintree* (*Paradoxides*) *zone* as *Lower Cambrian*, this and certain other trilobites are kept in the *Middle Cambrian*. (MS. letter, Dec. 1888.)—*M. C.*—*See Appendix.*

Monocraterion lesleyi. Prime. Report, Geol. Sur. Penn-

II. F. Prime, 1878. DD. page 80

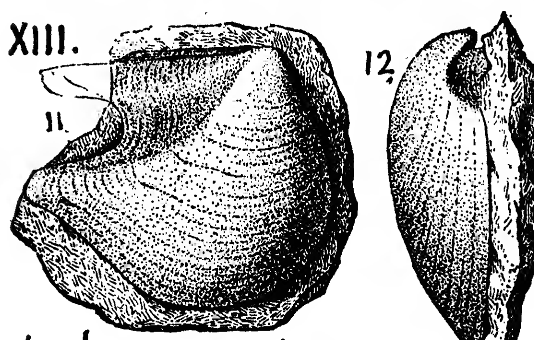


sylvania, in Northampton county, DD, 1878, page 79, 80, plate 27

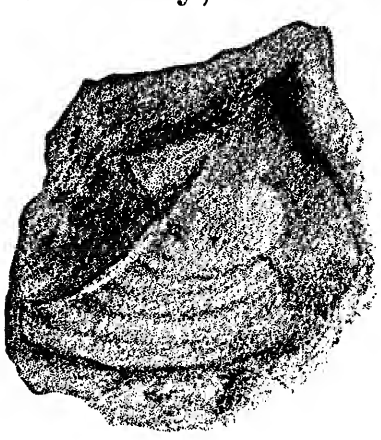
5, fig. 1, cast left by the dissolution of the fossil; fig. 2, plaster cast of the hole in fig. 1. Fig. 3, a smaller specimen. Fig. 4, a section through the tube of a third specimen. Traces of tentacles discernible around the upper edge of the funnel in both specimens. (Figs. *natural size.*) Found by Ellis Clark, Jr., ½ mile northwest of Helfrick's spring, in the bed of Jordan creek, Lehigh county, Pa. Recognized by Dr. Otto Torrell, director of the Geol. Survey of Sweden, as a species of his genus *Monocraterion* found in a sandstone at Lugnas, W. Gothland, in Cambrian (Harlech or Longmynd) rocks, below the *Paradoxides hicksii* beds.—(See Acta Univer. Lund. 1869 Pet. Suec. Form. Camb. page 13.)—Probably low in Calciferous limestone formation. *II a.* Found again in 1887 by W. Charles Laubach of Riegelsville, Bucks Co., Pa., in a limestone quarry, three-quarters of a mile northwest of Durham Iron Works; many specimens.—They are probably worm-burrows made by some animal quite different from the worm which made *Scolithus linearis.*

Monomerella newberryi, H. & W. *See Appendix.*

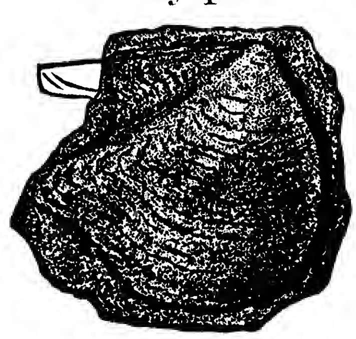
Monopteria gibbosa. (*Pterinea gibbosa*, Meek & Worthen, Proc. Chicago A. N. S., 1866, p. 20, Illinois Report 1866, Vol. 2, page 340, plate 27, fig. 11) Collett's Indiana Rt. 1883, page 139, plate 30, figs. 11, 12, *natural size*, outside and front views of two separate right valves.—*XIII.* Coal Measures of Gallaton county, Illinois.—One very plain example found by Heilprin among the Mill creek limestone specimens in Mus. Wyoming Historical Soc. at Wilkesbarre, Pa.—*XIII*, 1000′ up in the Anthracite Coal Measures. See Geol. Pa. An. Rt., 1885, p. 444, 445, figs. 11, 11 *a.* Closely allied to *M. auricula*, Stevens,



Ind. 1883. Pl. 30



11 MONOPTERIA GIBBOSA.

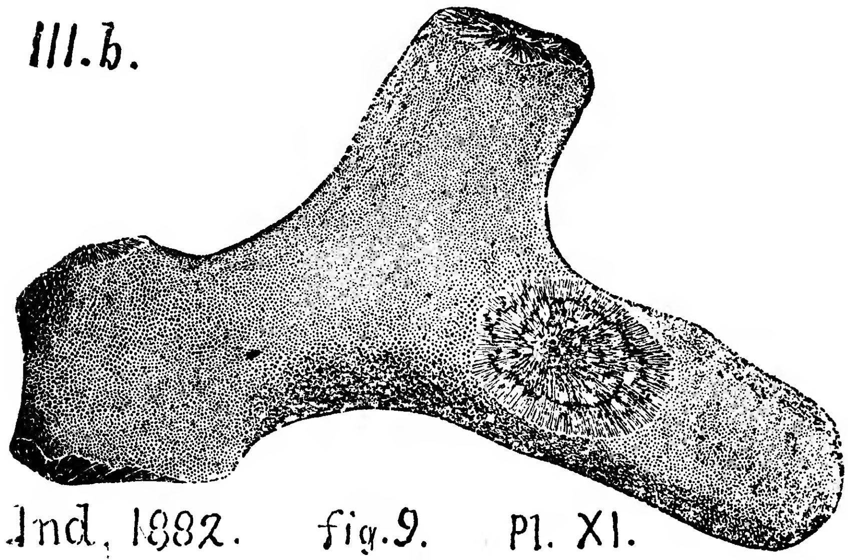


11A MONOPTERIA GIBBOSA.

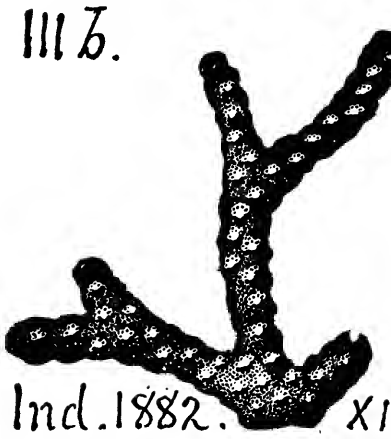
Am. Jour. Sci. XXV, 265; and to *Gervillia longispina*, Cox, Kentucky, Sur. Rt. III, p. 568, Heilprin.

Monticulipora abrupta. See **Chætetes abruptus.** *VI.*

Monticulipora andrewsi. (Nicholson, Structure and aff. of *Monticulipora*, 1881) Collett's Indiana Report of 1882, page 249, plate XI fig. 9.–(*Cincinnati*) *Hudson river formation. III b.* This is supposed to be the type of *M. fibrosa.*

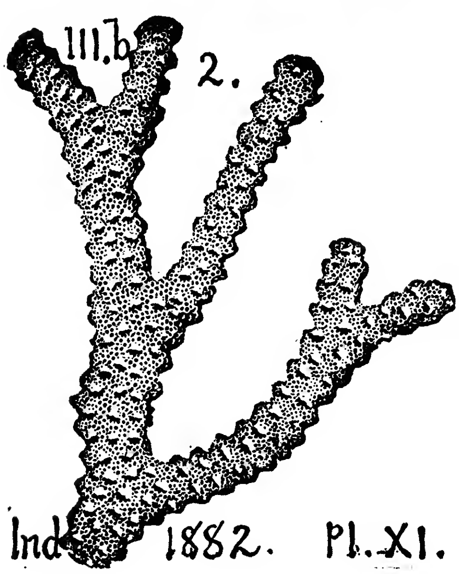


Monticulipora approximata. (Nicholson) Collett's Indiana Report of 1882, page 250, plate XI, fig. 6, fragment of corallum.—*Hudson river* (*Cincinnati*) *formation. III b.*—Nicholson called it *Chetetes approximatus*, in the Quarterly Journal of the Geological Society, London, 1874, on account of its close approximation to the character of the next species, *Monticuliporo dallii.*

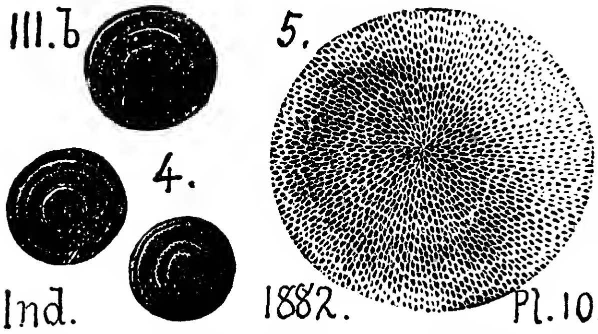


Monticulipora dallii. (Edwards & Haime) Collett's Indiana Report of 1882, page 249, plate XI, fig. 2, fragment of coral, showing mode of branching, and number and arrangement of projections on its surface.—*Hudson river* (*Cincinnati*) *formation. III b.* Edward and Haime called it *Chetetes dalli*, in their Polypes fossiles des Terrains palæozoiques, Paris, 1851.

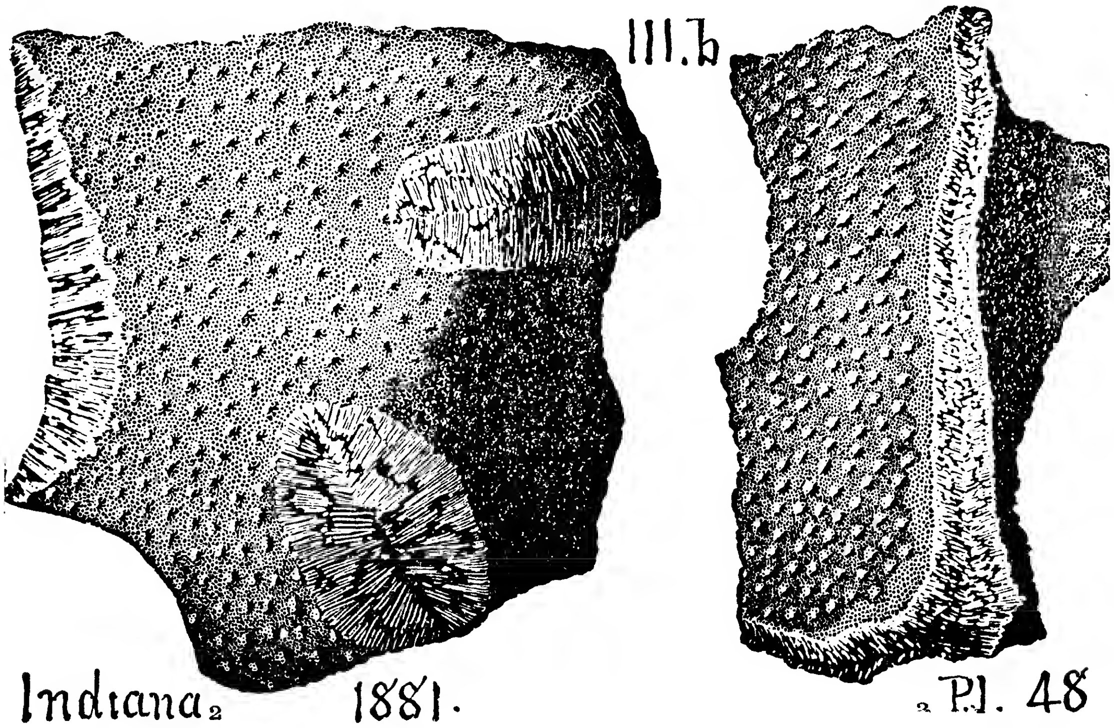
For *Monticulipora*, see D'Orbigny's Prodrome de Palæontologie, Vol. 1, 1850.



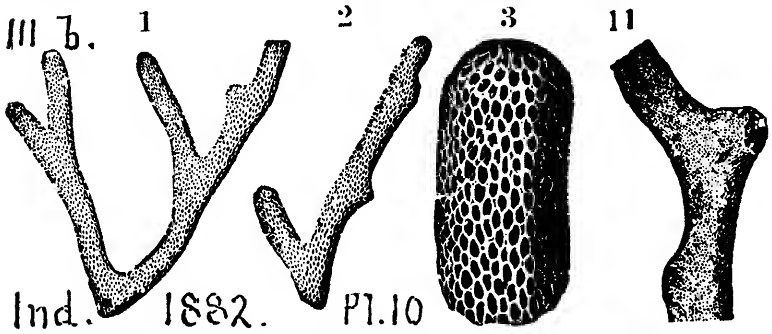
Monticululipora discoidea, James. Cat. Lower Silurian fossils, 1871. Nicholson, Pal. Ohio, Vol. 2, p. 206, 1875. Collett's Indiana Report of 1882, page 247, plate 10, fig. 4, drawings of the bases or undersides of three specimens. Fig. 5, upper side of a specimen, *enlarged.—Hudson river* (*Cincinnati*) *formation* in southern Ohio. *III b.*



Monticulipora frondosa, D'Orbigny. Collett's Indiana Report of 1881, page 380, plate 48, fig. 2, on the surface ot which are the mamillæ or little knobs; and when broken the slender corallite tubes are seen. Fig. 3 another specimen.—*Hudson river* (*Cincinnati*) *formation. III b.*

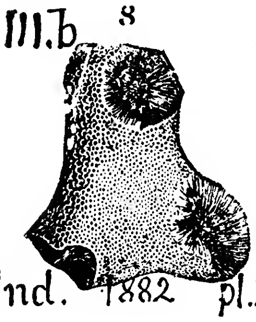


Monticulipora gracilis, (James. Nich. Cat. Foss. Cin. 1871) —Collett's Indiana Report of 1882, page 248, plate 10, figs. 1, 2, fragments; fig. 3, end of a fragment *enlarged;* plate 11, fig. 11, one branch. —*Hudson River* (*Cincinnati*) *formation. III b.*



Monticulipora jamesi, Nicholson, Pal. Ohio, Vol. 2, p. 200, 1875) Collett's Indiana Report of 1882, page 248, plate xi, fig. 8, a small fragment. —*Hudson River* (*Cincinnati*) *formation III b.*—Nicholson called it *Chetetes jamesi*, in the Quarterly Journal of the Geological Society, London, Vol. 30, 1874.

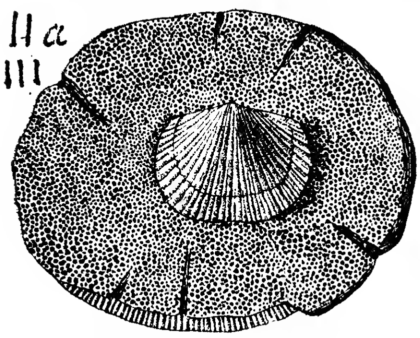
III.b 8



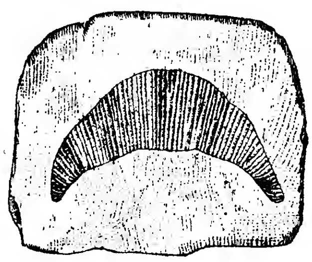
Ind. 1882 pl.XI

Monticulipora lycoperdon. (*Chætetes lycoperdon, Favosites lycoperdon;* H. D. Rogers, page 818, fig. 597. *Trenton formation. IIc.* Hall, Pal. N. Y. Vol. 1, 1847, plate 24, fig. 1*a* and 1*c*, the latter of a specimen the base of which is attached to a shell (*Orthis testudinaria*).

II a III

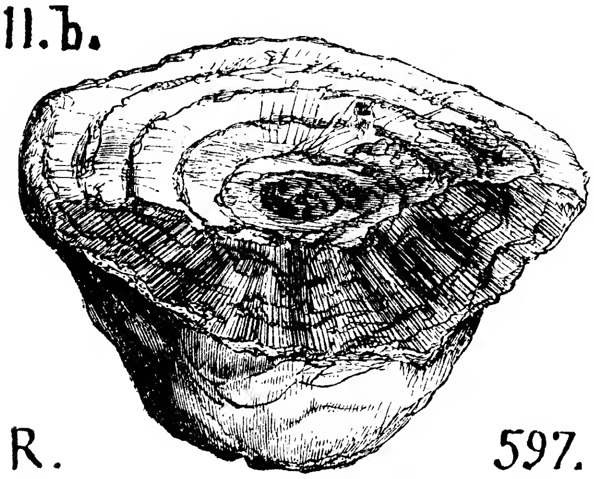


1 a



In Penn. seen in colonies in the quarries on the Delaware river at Howell's cotton mills, Northampton Co.; sparingly at A. Knecht's, near Stockertown, close to the Bushkill; and, with two or three other forms, on Martin's Creek. F. Prime's Rt. DDD, p. 162, 166. —In Canoe Valley, Huntington Co., found by C. E. Hall in *Black river* beds; and in Nittany and Kishicoquilis valleys in *Trenton* beds; and in Canoe valley in *Utica* and *Loraine shales.* Proc. A. P. S. Jan. 5, 1876. They crowd some of the *Trenton* beds. T 3, p. 367. In Bedford Co., seen by Stevenson in *Hudson river* beds on Woodbury-Ravers gap road, at C. Miller's. T2, p. 178.—In Centre Co., by Ewing in *Trenton*, T4, 424.—*II c. III b.*

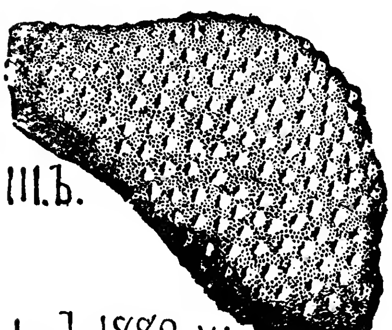
II.b.



R. 597.

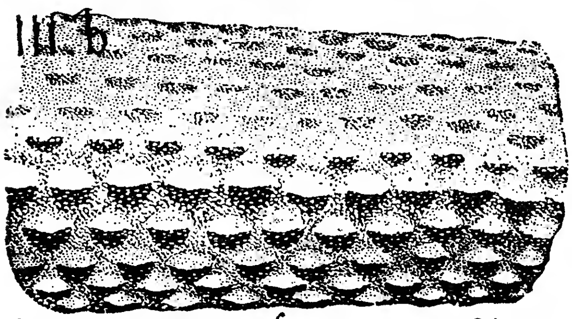
The following specimens are in the Survey collections of 1874, 5, examined by G. B. Simpson in 1888. (See OO, cat. p. 231.) Spec. 203–2, an interesting slab of Trenton limestone, with (A) the largest spec. in one corner, fairly good to draw; 203–5 (poor); 203–7, a slab with four specs. none good; 203–11, 15, 20 (all three poor); 203–22 (fifteen specimens, of which those marked A, B, C, will make excellent drawings); 203–33 (two poor); 203–35, A, large and fair, B, smaller and not so good); 303–41, A, poor; 203–42 shows the walls well; 203–44 B, good illustration of particular phase of growth; 203–45, poor; all these are from the N. side of the creek, ¼ m. W. of Bellefonte, Centre Co.—209–2, a poor slab, merely lithological; 209–4, shows plainly the structure given in Hall's Pal. Vol. 1, plate 21, fig. 1 g. Both these are in Sander's Coll. ¼ m. E. of Fredericksburg, Blair Co. in *Black River limestone*, *II c.*—210–25, *b*, poor; 210–28; 210–45, poor, but shows fragments of interior tubes; 210–49, poor, weathered; 210–55, shows very good surface; 220–63, excellent surface; 210–64, very good epitheca exhibition; 210–65, hemisphericas in good condition; 210–67 *b* (three spec.); 210–69 *b*, very good epitheca; 210–71, fair show of masses exhibiting the tubes; 210–71, fair epitheca; 210–72, ditto; 210–87, fair; 210–96; 210–100, doubtful; 210–101, very poor; 210–105 three fair sections; 210–109, good section; 210–112, poor show of interior tubes; 210–118, a slab showing interior of several individuals, and the tubes more or less, but in poor condition; 210–132, very poor; 210–153; all collected by Fellows, 1876, at Bellefonte, in *Trenton limestone*, *II c.*

Monticulipora mammillata. d'Orbigny. Collett's 1832, plate xi, fig. 1, a fragment.—*Hudson River. III b.*



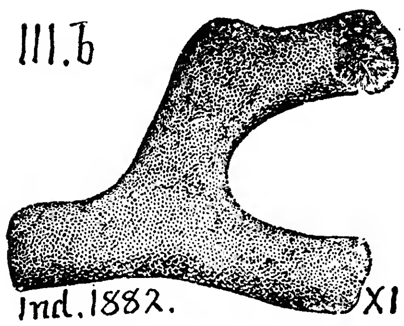
Monticulipora pulchella. Spec. 203–18 (OO p. 231) in C. E. Hall's collection at Bellefonte, in *Trenton II c.*; 210–62 *a*, at Bellefonte; spec. 211–9 (twenty-five examples) on the Little Juniata, above Tyrone forges, Pa., all in *Trenton strata*, *II c.*

Monticulipora tuberculata, (Edwards & Haime, Pal. Foss. des Terres Pal. 1851) Collett's Indiana Report of 1882, page 251, plate 10, fig. 6, specimen (natural size) attached to piece of *Orthoceras.*—*Hudson River* (*Cincinnati*) *formation. III b.*—Called *Chetetes tuberculatus.*

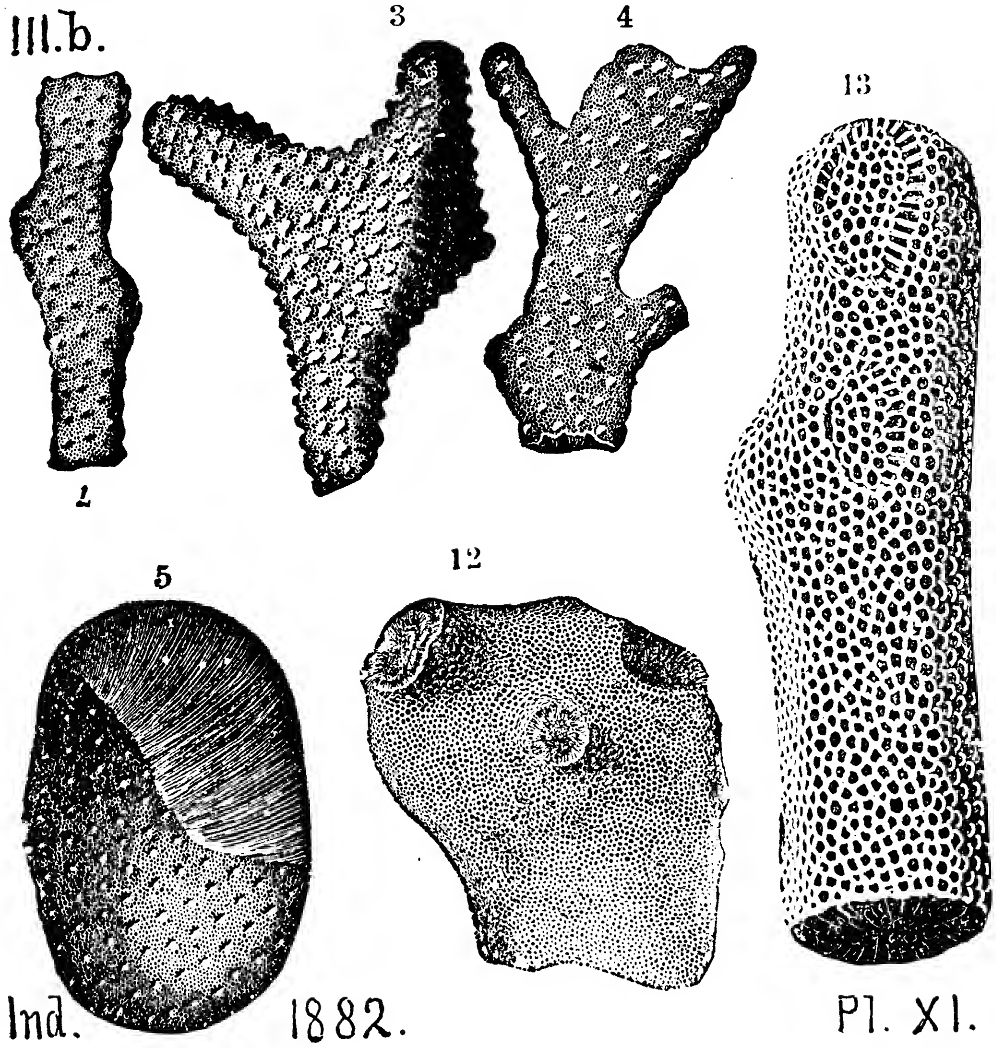


Ind. 1882. f. 6. Pl. 10

Monticulipora ulrichi. (Nicholson, Structure & Aff. of Mont. 1881) Collett's Indiana Report of 1882, page 249, plate xi, fig. 10, a small fragment.—*Hudson River* (*Cincinnati*) *formation. IIIb.*—S. A. Miller remarks here that he showed in Jour. Cin. Soc. N. H., Vol. 5, that Nicholson's six *sub-genera* are of very little value.

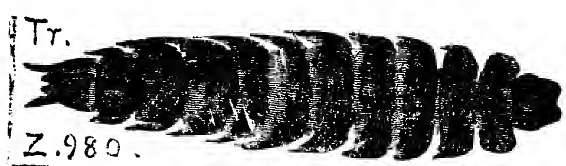


Monticulipora corals of undetermined species figured in Collett's Indiana Report of 1882 (Van Cleve's Corals) plate xi, figs. 3, 4, 5, 7, 12, all *natural size*, and 13, *enlarged*. In *Hudson Riv.* (*Cincinnati*). *IIIb.*



Monticulipora ———? in the Lower Carboniferous rocks of Fayette and Westmoreland Cos., Pa., in the gaps of the Conemaugh, Loyalhanna and Youghiogheny rivers. Stevenson, KKK, p. 310.—*X*, *XI.*

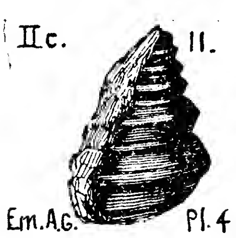
Mormolucoides articulatus. Hitchcock. A grub found in the Connecticut valley sandstone strata, and therefore to be sought for in our red shales of Bucks, Montgomery, Lan-



caster, York and Adams counties. Figure taken from Zittel's Handbuch, Vol. 3, p. 776, fig. 980, *enlarged three-fold.—Trias formation.*

Mud flow, fossilized.* Owen, Geol. of Wisconsin, Iowa and Minn. 1852, plate 1, fig. 1, a medal ruled relief picture of the surface of a slab of argillacious grit; relief from quarter to half an inch; not like any ripple markings on a shore; rock resembles volcanic grit; suggests volcanic mud descending a hillside from a fumarole. Red sandstone of the shore of Lake Superior. *Cambrian ?*—The *Portage flags* in New York and in Pennsylvania show an abundance of *mud flow surfaces* which cannot be ascribed to any volcanic action, and therefore it seems needless to seek such an origin for those of Cambrian age, Q4, p. 119.—In Bedford Co., Pa., *mud flow casts* are numerous on nonfossiliferous olive *Chemuny flags*, in King township, Imler's cross roads. Stevenson, T2, p. 133.—In Huntingdon Co. they appear on the flags (*Portage ?*) exposed below Huntingdon, Ceds No. 63 of the Pa. R. R. cut section, with *fucoides graphica.* I. C. White, T3, p. 265.—*VIII f, g.*

Murchisonia abbreviata, Hall. Pal. New York, Vol. 1,



1847. *Chazy* group.—Emmons, Am. Geol. Vol. 1, part 1, 1855, p. 162, plate 4, fig. 11, II*c*; rare in the *Bird's eye* limestone of N. Y. Emmons.—S. A. Miller's Cat says that Hall's name was preoccupied by DeKoninck in 1841.

Murchisonia angustata, Hall, Pal. N. Y. Vol. 1, 1847. *Bird's eye limestone IIc.* Recognized by C. E, Hall in the collections of 1875 in the Kishicoquilis Valley, Mifflin Co., Pa. *Blackriver limestone IIc.—See Appendix.*

Murchisonia anna, Billings. Can. Nat. and Geol. Vol. 4,

1853. Geol. of Canada, 1863, page 119, fig. 32 *a;* figs. *b*, *c*, *d*, *e*, *f*, are five small specimens supposed to be of the same species. *Calciferous sandstone, IIa.*

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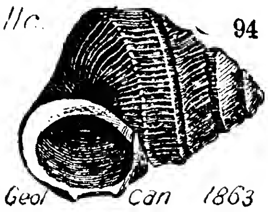
* For figures see page 435.—See also Hall's excellent wood cut in Geol. N. Y. 1843, page 233, fig. 101, which will be reproduced in the Appendix.

Mud flow. *For description see page 424.*

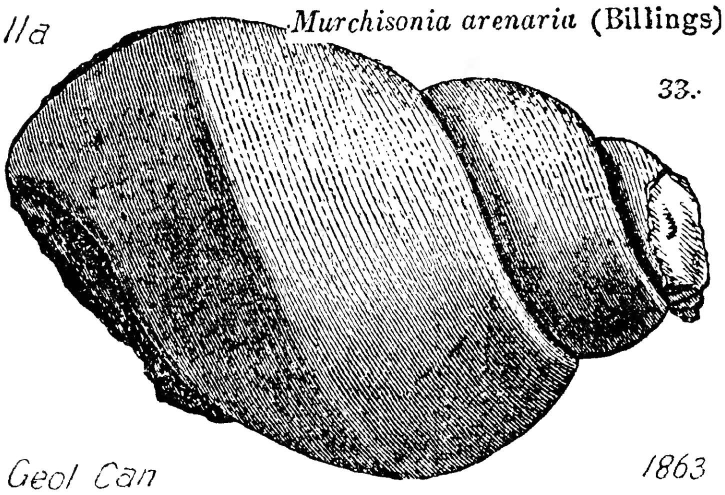
Murchisonia arachne, Billings. Geology of Canada,



94 1863, page 145, figure 94. *Trenton group,* —*II c.*

Murchisonia arenaria, Billings, Canadian Naturalist, and

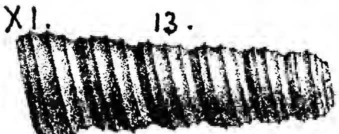
Murchisonia arenaria (Billings)



Geologist, Vol. 4, 1859. Geology of Canada, 33. 1863, page 120, fig. 33. *Calciferous sandstone,* —*II a.*

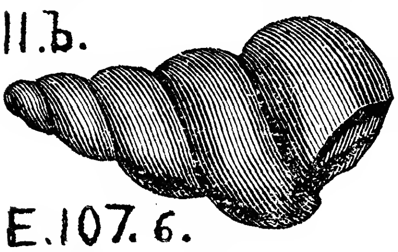
Murchisonia attenuata (Hall, Trans. Alb. Inst. Vol. 4,

XI. 13.



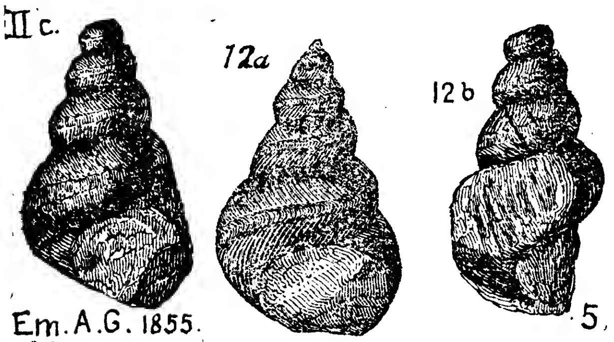
page 27, 1856;—Whitfield, Bull. 3, Am. Mus. Nat. Hist. N. Y. p. 88, plate 9, fig. 13, 1882). Collett's Indiana Report, 1883, page 32, 360, plate 32, fig. 13, *enlarged six times,* type specimen imperfect, from the Subcarboniferous of Spergen Hill. Ind.—*XI.*

Murchisonia bellicincta, Hall. Pal. N. Y. Vol. 1, 1847,

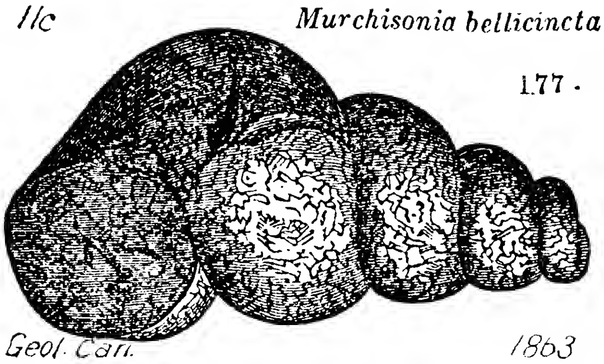


who thus identifies Emmons' *Pleurotomaria* ——? in Geol. 2d. Dist. N. Y. 1842, page 396, fig. 107, 6, from the *Trenton formation;* but finds the same in the *Hudson River formation. IIc, III b.*

Murchisonia bellicincta. (Hall, Pal. N. Y. Vol. 1, 1847,



Trenton and Hud. Riv. groups.) Emmons, Amer. Geol. 1855, Vol. 1, ii, p. 162, plate 5, figs. 12, 12*a*, 12*b* (see also fig. 12, and fig. 16.) Shell ornamented by flat spiral band in center, and



traversed lenghthwise with zigzag scratches, angulated at the the band.—II*c*, usually in casts, and common in the Trenton limestone in Jeff. Co., N. J. Emmons.—III*b*. Hud. Riv. also. Hall.—A figure is added, to show the size, from Owen's Geology of Wis. Iowa and Min. 1852, pl. 2,

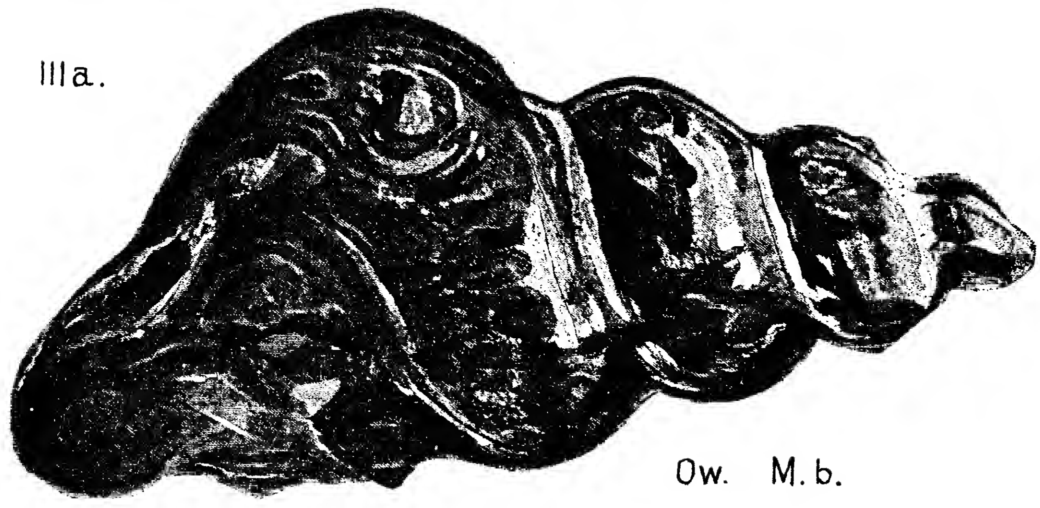
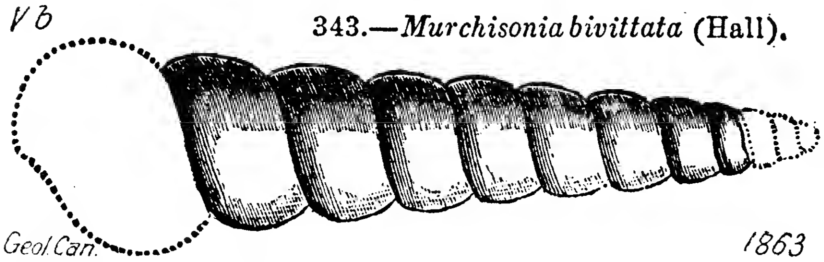


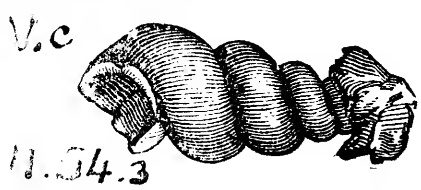
fig 8, a cast from Turkey river. Iowa.

Murchisonia bicincta. See **Murchisonia milleri.** II,c and III,b.

Murchisonia bivittata, Hall. Pal. N. Y., Vol. 2, 1852 Geol. Canada 1863, page 339, fig. 343. *Guelph,* or *Galt formation,*immediately overlying the *Niagara limestone.* *V b'.*



Murchisonia boydii, (*Loxonema boydii.*) Hall's Geol. 4th. District, N. Y. 1843, page 137, fig. 54,3 *Salina formation Guelph formation*) *Vc.* A cast of the shell, with a little of the shell itself

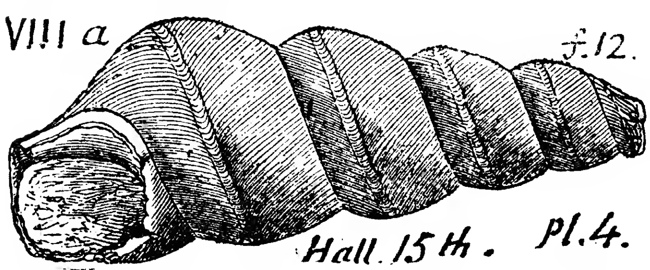


preserved, showing the characteristic generic arched or undulating striæ. Specimen found near Newark, Wayne Co., N. Y., but not yet in Pennsylvania *Salina rocks*, *Vc.*

Murchisonia ? confusa. Whitfield. *IIa. See Appendix.*

Murchisonia conula. See **Pleurotomaria conula.** *XI.*

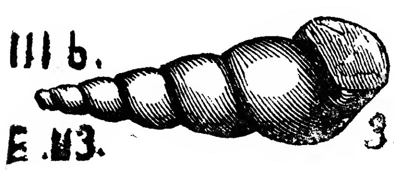
Murchisonia desiderata, Hall. 15th Annual Report, N Y., 1862, page 50, plate 4, fig. 12. —*Upper Helderberg formation*, *VIII a.* Concentric striæ on the surface raised in little bundles (fascicles), bending backward gently from the suture, reach the flattened spiral band. This shell, living with *M. maia*, and *M. leda*, differs by its greater length of volutions and flattening on the upper side. *Upper Held· Corniferous limestone* at the falls of the Ohio. Probably some of the many New York casts were made by it (Hall).— *VIII a·*



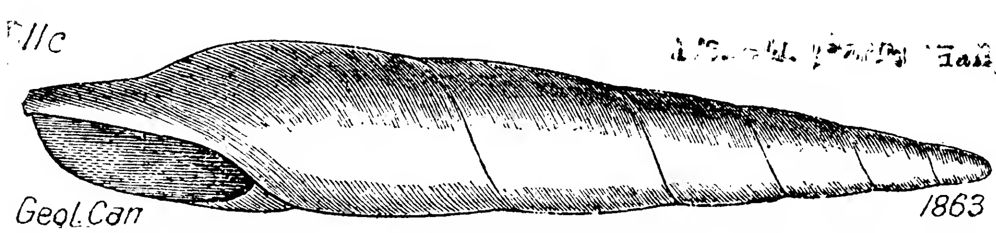
Murchisonia elegantula. See **Pleurotomaria elegantula.** *Subcarboniferous. XI.*

Murchisonia gracilens. Whitfield *IIa. See Appendix.*

Murchisonia gracilis ? What Emmons calls a *Pleurotomaria*, in his Report on the second District of New York, 1842, page 404, fig. 113, 3, from the *Loraine* (*Hudson River*) *shale*. *III c.*

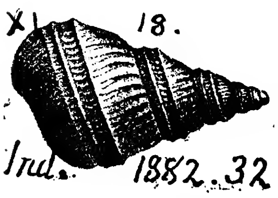


Murchisonia gracilis. (H. D. Rogers, Geol. Pa., 1858, page 821. No figure.) Hall, Pal. N. Y., Vol. 1, 1847, pl. 39, fig. 4 *b*, *Hudson river*. Geol. Canada, 1863, p. 183, fig. 178. *Trenton formation*, *IIc.* In Huntingdon Co., Pa., it is occasionally found in some of the *Trenton beds* on the Little Juniata. C. E. Hall, T3, p. 367. In Centre Co., Ewing (T4, 424, 427), reports it from both the *Trenton limestone and Loraine shale. IIc,*



IIIb.—See specimens (three) 210–47 (OO, p. 232) of doubtful species, much worn and unsatisfactory, in Fellows' collections at Bellefonte. *Trenton limestone, IIc.*

Murchisonia gypsea, Dawson. Acad. Geol., 1868, p. 310, fig. 123, a cast of a shell like, but larger than, *M. nana*, De Kon. and with only two revolving ridges on the whorls. *Carb. lime.* of Windsor, N. S.—*XI?*



Murchisonia insculpta. (Hall, Trans. Alb. Inst., Vol. 4, 1856.—Whitfield, Bull. 3, Am. Mus. Nat. Hist., N. Y., 1882, page 85, plate 9, fig. 18). Collett's Indiana Rt., 1882, page 359, plate 32, fig. 18, *magnified four times.* Resembles *Murch.* (*Pleurotomaria*) *conula,* with some differences. In some specimens with *single* volutions, the *strong nodes* are the characteristic feature. Some show cross striæ.—*Subcarboniferous.* Spergen Hill, &c., Ind. *XI.*—NOTE. All these Spergen Hill forms were drawn and described in the Museum of the Central Park at New York, and although copied from the Indiana report, should be credited to the Museum. (Whitfield's MS. letter, Jan., 1889.)

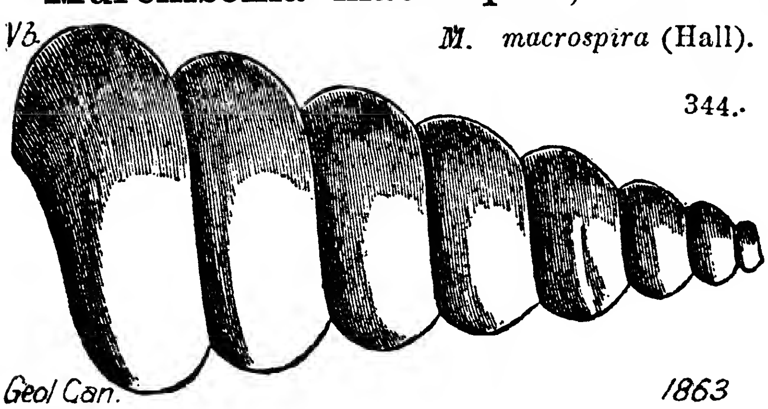
Murchisonia leda, Hall. 14th An. Rt., N. Y., 1861, p. 103; 15th An. Rt., 1862, plate 4, fig. 10.—*Upper Helderberg formation, VIIIc.*

IIa. *Murchisonia linearis* (Billings)

Murchisonia linearis, Billings. Can. Nat. and Geol., Vol. 4, 1859, *Calciferous sandstone* formation. Geol. Canada, 1863, page 119, fig. 31.—*IIa.*

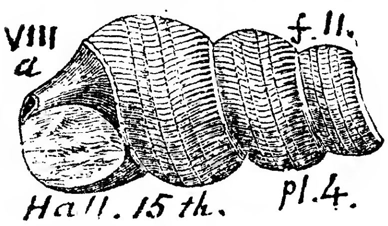
M. macrospira (Hall).

344.

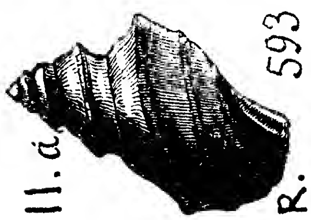


Murchisonia macrospira, Hall. Pal New York, Vol. 2, 1852, p. 346, pl. 83, f. 5. *Guelph formation.* Geology of Canada, 1863, p. 339, fig. 344.—*Vb'.*—Hall's fig. is a mould of 4 whorls, with strong keel and a canal on the last.

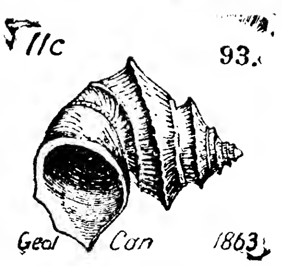
Murchisonia maia, Hall. 14th Annual Report of New York, 1861. page 103; 15th An. Rt., 1862. plate 4, fig. 11.—*Upper Helderberg formation*, *VIII a*.



Murchisonia milleri. (*M. bicincta.*) Rogers' Geology of Pennsylvania, 1858, page 817, fig. 593 *Trenton & Loraine formations.* (Hall, Pal. N. Y. Vol. 1, 1847. First name pre-occupied by McCoy in 1844.)—*II c*, *III b*.

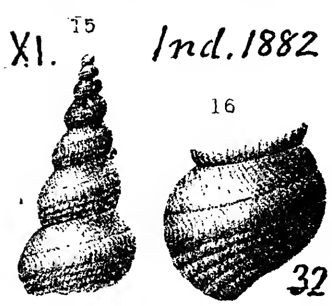


Murchisonia obsoleta. *See Appendix.*

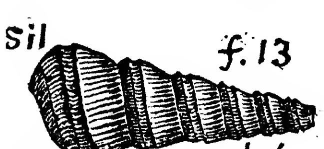


Murchisonia serrulata, Salter. Canadian Organic Remains, Decade 1, 1859, *Black River formation.* Geol. Can. 1863, page 145, fig. 93.—*II c*.

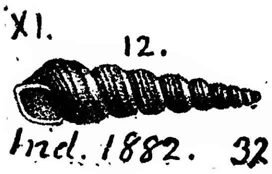
Murchisonia terebriformis. (Hall. Trans. Alb. Inst. 1856, Vol. 4. Whitfield Bull. 3, Amer. Mus. Nat. Hist. 1882, plate 3, figs. 15, 16) Collett's Indiana Rt. 1883, page 362, plate 32, fig. 15, *enlarged twice*, type specimen; fig. 15, last volution *still further enlarged.* —*Subcarboniferous.*—*XI.*



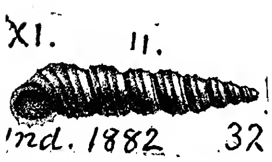
Murchisonia turricula. Billings, Rt. of Progress, Canada, 1857, *Middle Silurian.* Hall, 15th Annual Report New York, 1862, page 50, plate 4, fig. 13, much *enlarged.* Surface marked by strong concentric raised striæ above the band, and lower striæ below it. Suture line deep, and continued beyond the edge of the lip in a slender spiral line. Length only ¼ inch. Like *M. desiderata*, but whorls more angular, suture deeper, striæ stronger. *Hamilton*, *VIII c.*



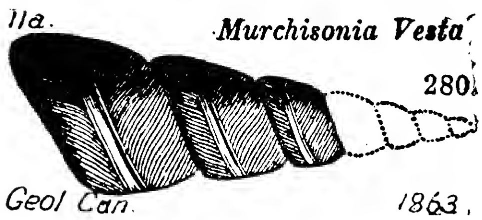
Murchisonia turritella. (Hall, Trans. Alb. Inst., 1856, Vol. 4.—Whitfield, Bull, 3, 1882, plate 9, fig. 12.) Collett's Indiana Report of 1882, page 361, plate 32, fig. 12, *enlarged twice.* Spergen Hill, Indiana. *Subcarboniferous.* *XI.*



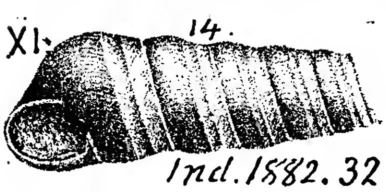
Murchisonia vermicula. (Hall, Trans. Alb. Inst., 1856, Vol. 4.—Whitfield, Bull. 3, Am. Mus. N. H. N. Y., 1882, plate 9, fig. 11.) Collet's Indiana Report of 1882, page 361, plate 32, fig. 11, *enlarged five times. Subcarboniferous. XI.*



Murchisonia vesta. Billings, Pal. Foss., Vol. 1, 1862. *Calciferous sandstone.* Geology of Canada, 1863, page 276, fig. 280. *Quebec group. II a.*



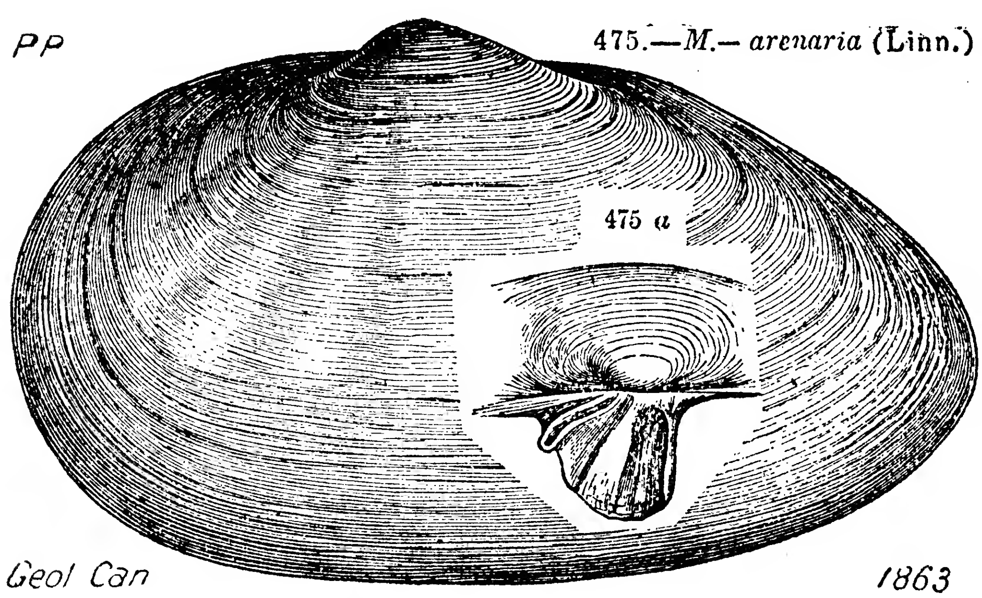
Murchisonia vincta. (*Loxonema vincta.* Hall, Trans. Alb. Inst., Vol. 4, 1856.—*Murch. vincta,* Whitfield, Bull. 3, 1882, plate 9, fig. 14.) Collett's Indiana Survey Rt., 1882, page 363, plate 32, fig. 14, *enlarged twice,* most perfect type specimen.—*Subcarboniferous. XI.*



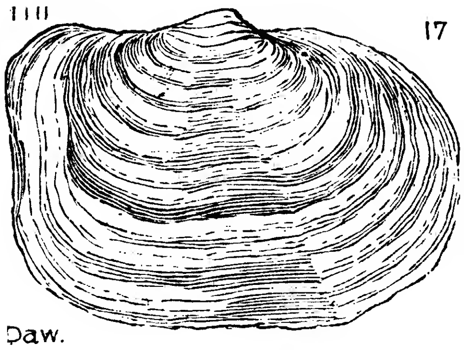
Murchisonia ——— ? See Claypole's collection, specimen X–13 from quarry near McArnold's, 1 m. W. of New Bloomfield, in *Hamilton upper shales, VIII c.* Also X–19, in N. Bloom. same, *VIII c.* Also X–14 (eight specimens, Limestone ridge ½ m. N. W. of N. Bloom. same, *VIII c.*

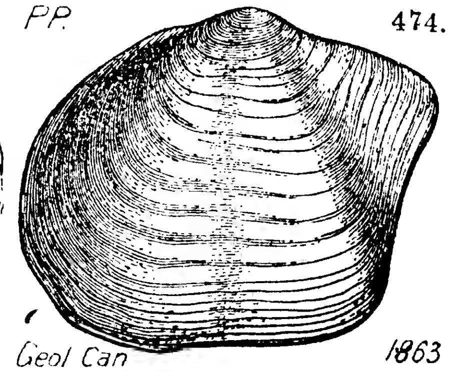
Murchisonia ——— ? With *Calymene,* Claypole's Spec. 24, from Thunder hill, Honey creek station, near Lewistown, in *Hudson river shale, III b.*

Mya arenaria, Linnæus. Geology of Canada, 1863, page 963, fig. 475, left valve; *a,* portion of the hinge. Found in the *Champlain clay* of Canada —PP.

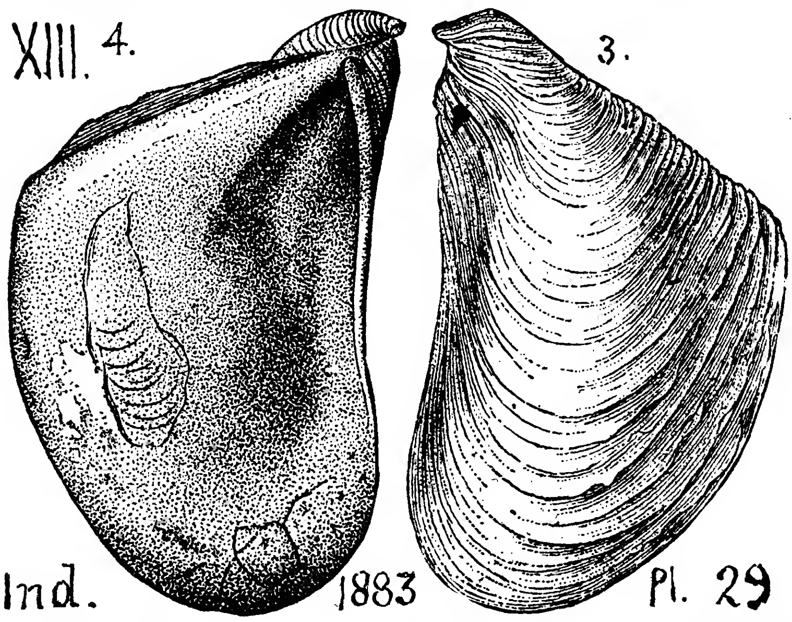


Mya truncata, Linneus, Dawson's Acadian Geology, 1868, p. 74, fig. 17. Geol. Canada, 1863, fig. 474, left valve.—*Champlain clay*. PP.

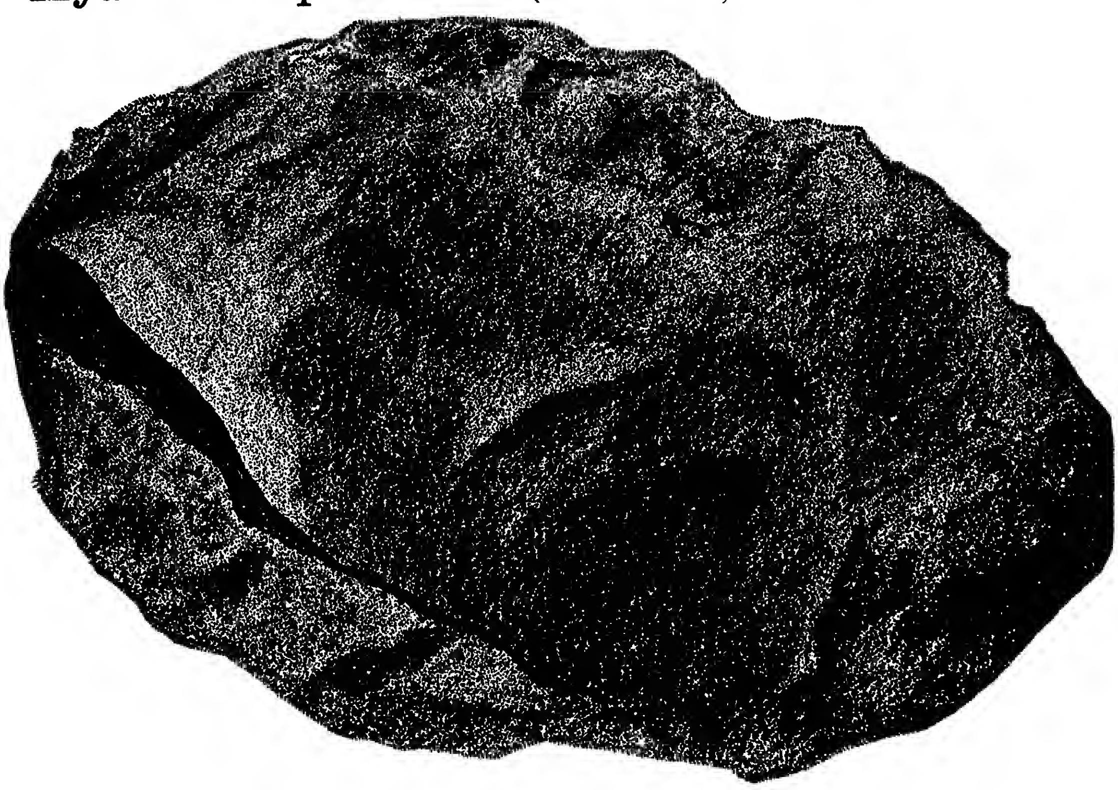


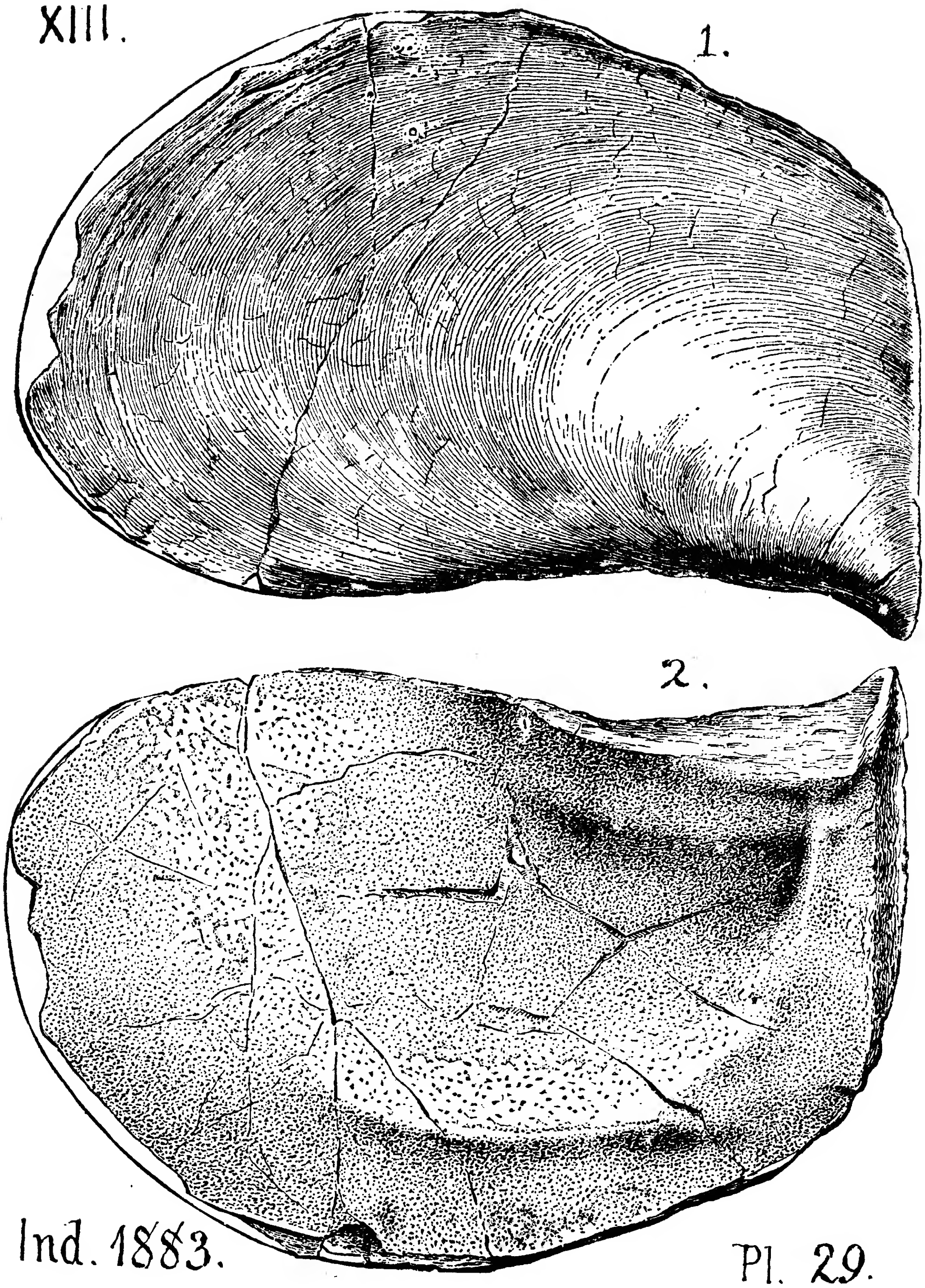


Myalina recurvirostris. (Meek and Worthen. Illinois Geol. Reports, Vol. 2, 1866, page 344, plate 27, fig. 9.) Collett's Indiana Geological Report of 1883, page 140, plate 29, fig. 3, outside of left valve, *natural* size; fig. 4, inside of same left valve.—*U. Coal Measures. XV.*



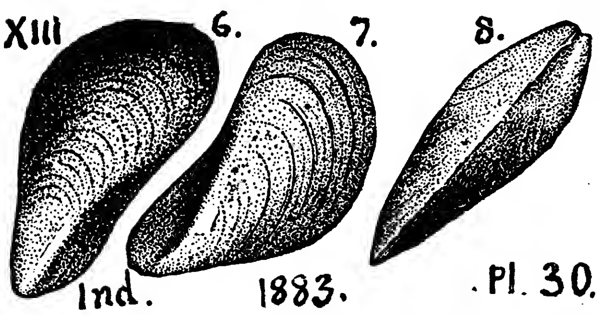
Myalina subquadrata. (Shumard; in Swallow's Missouri





(Geol. Report, page 307, plate C, fig. 17.) Collett's Indiana Geol. Report for 1883, page 140, plate 29, fig. 1, out side of right valve, with unusually narrow base, *natural size*; fig. 2, in side of same valve.—*Upper Coal Measures* in Knox, Gibson and Posey counties, Ind.—*XV.*—Recognized as several fragmentary casts and impressions, by Heilprin among the fossils in the Mus. Wyoming Hist. Soc. at Wilkes-Barre, from the Mill Creek limestone, 1,000′ above the base of the *Anthracite Coal*

Measures. Geol. Survey of Penna. Annual Report for 1885, pp. 446, 454, figs. 15, 15 A.—*XIII.*

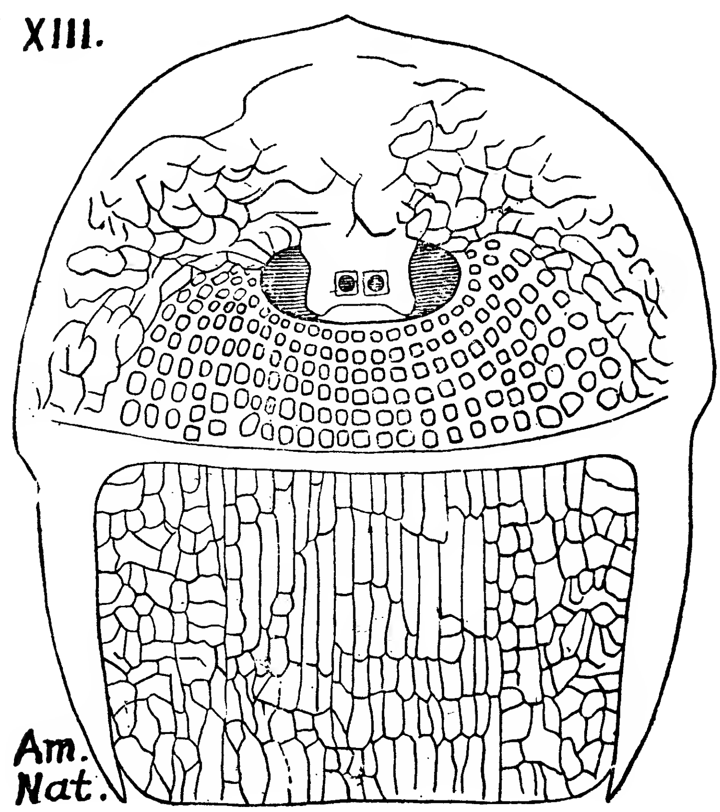


Myalina (?) swallovi (McChesney. New Palæozoic Fossils, 1860, page 57.) Collett's Indiana Report for 1883, page 141 plate 30, fig. 6, *natural* size, outside of left valve; fig. 7, outside of right valve; fig. 8, back of another specimen.—*Upper Coal Measures*, characteristic shell in all the States of the Mississippi Valley. Found in three counties of Indiana, at coal bed M.—*XV.*

Myalina ——— ? in Fayette and Westmoreland gaps; Stevenson, KKK, 311; *Lower Carboniferous*, *X*, *XI.*

Myalina ——— ? on the Monongahela river, Morgantown, W. Va.; (Stevenson, L, 37); in *Decker's creek shale* under Mahoning sandstone, *XIII.*

Myalina ——— ? in Fayette Co., Pa. (L, 36) in *Crinoidal limestone*, 250′ beneath Pittsburgh coal bed. *XIV.*

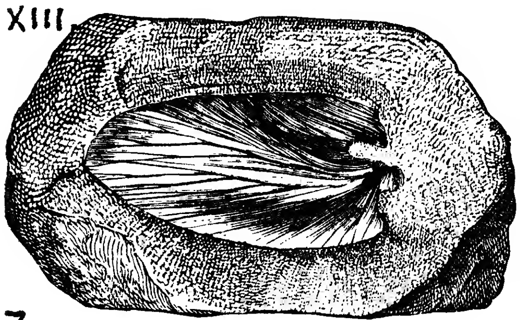


Mycterops ordinatus, Cope. American Naturalist, Dec. 1886, page 1029, fig. 1, and Oct. 1888, page 876, plate 15, fig. 3, a cast of the cranial and nuchal buckler of a fish-like vertebrate animal of the *Coal Measures* of Pennsylvania, in the cabinet of Mr. R. D. Lacoe of Pittston, Luzerne Co., Pa., allied to, but different from the species of the older (Devonian) families of *Pterichthys*, *Cephalaspis*, *Bothriolepis*, *Holoptychius*, etc.

combining as it does the eyeholes of *Cephalaspis* with a nosehole of *Bothriolepis* between the eyeholes, and divided into two by a narrow bridge.—*XIII.* NOTE. Prof. Cope was good enough to send me this figure to insert here. On the same pages of the Am. Naturalist the reader may find a figure of Whiteaves' *Bothriolepis canadensis* for comparison.

Mylacris anthracophilum.* Scudder. A cockroach wing of the Coal age, found in the Illinois Mazon Creek coal measure nodules at Colchester. Geol. Surv. Ill. Vol. 3, 1868, p. 368–570, f. 5, 6. Zittel's Handbuch der Palæontologie, 1885, Vol. 2, p. 754, fig. 930, *natural size.* (Compare **Lithomylacris angustum,*** Scudder, from Pittston, Pa.)—*Coal measures, XIII.*

XIII



Z.

Fig. 930.

Mylacris antiquum,* Scudder. An insect from Mazon Creek, Ill. Mem. Boston S. N. H., Vol. 3, 1884, p. 300. In Lacoe's collection at Pittston, Pa. *Coal measures, XIII.*

Mylacris bretonense,* Scud. (*Blattina bretonense*, Scud Canad. Nat. [2] Vol. 7, p. 271, fig. 1) Mem. Bost. S. N. H. Vol. 3, 1879, p. 41, pl. 5, fig. 1. From the *Coal measures* of Sydney, C. Breton.—*XIII?*

Mylacris carbonum. Scudder. Mem. Bost. S. N. H., Vol. 3, 1884, p. 304, pl. 27, fig. 6, 7, 10. An insect from the anthracite coal measures at Wilkes-Barre, Luzerne Co., Pa., and Cannelton, Beaver Co., Pa. Lacoe's collection.—*XIII?—See Appendix.*

Mylacris heeri, Scudder. Mem. Bost. S. N. H. Vol. 3, 1879, p. 43, pl. 5, fig. 11. From the *Coal measures* of Sydney, C. Breton.—*XIII?*

Mylacris lucifugum.* Scudder. Bost. S. N. H., Mem. Vol. 3, 1879, p. 43, pl. 5, fig. 11. Another insect from Port Griffith near Pittston, Pa. Lacoe's collection.—*XIII.—See Appendix.*

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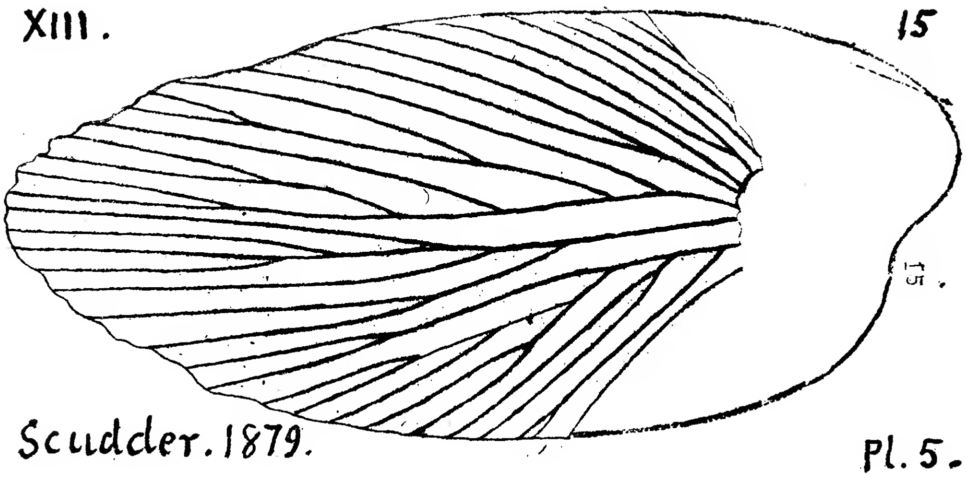
* S. A. Miller's Cat. makes this *feminine.*

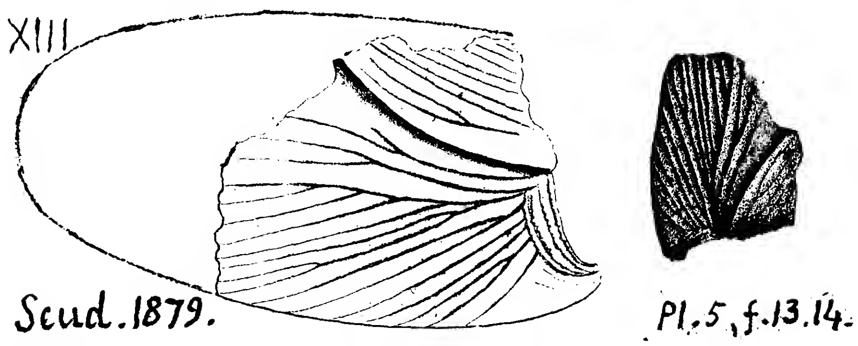
Mylacris mansfieldi. Scudder. Mem. Boston Soc. Nat.



Hist. Vol. 3, 1879, pl. 5, fig. 15, found by Mr. Mansfield in his *Darlington* (*Kittanning*) *coal* roof shales at Cannelton, Beaver Co., Pa.; in the Lacoe collection at Pittston.—*XIII.*

Mylacris ovale. Scudder. Mem. Bost. S. N. H., 1884, p. 308, pl. 37, f. 5. Cannelton.—*XIII.—See Appendix.*

Mylacris pennsylvanicum. Scudder, Mem. B. S. N. H. 1879, pl. 5, f 13, 14, an insect's wing from *Kittanning* (Darlington cannel coal) bed roof shales, found by Mr. Mansfield; now in the collection of Mr. Lacoe, at Pittston, Luzerne Co., Pa.—*XIII.*



Mylacris priscovolans. Mem. Bost. S. N. H. 1884, p. 307, pl. 27, f. 9, Scudder. Cannelton.—*XIII.—See Appendix.*

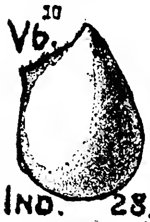
Mylodon ? harlani, Owen, a gigantic extinct *Sloth*, the claws of which were found by C. M. Wheatley in the Port Kennedy cave (in Potsdam SS.) Chester Co., Pa. See Cope's list, Proc. A. P. S. Phila. 1871, p. 85.

Mytilarca chemungensis, (*Inoceramus chemungensis*, Conrad Jour. Acad. Nat. Sci. Phila., vol. 8, 1842, *Chemung;*) found by Stevenson in the gaps of the Conemaugh and Youghiogheny, S. W. Pa. KKK, p. 311, in *Devonian strata* brought up on the anticlinal axes. Specimens 855–226, 856–11 (two) in Sherwood's coll. in Sullivan and Clymer townships, Tioga Co., Pa., and 872–45b, Tioga Co., N. Y. *VIII g.—See Appendix.*

Mytilarca damnoniensis (*Inoceramus damnoniensis*); characteristic of the Chemung; found in Blair Co. Pa. Report T, 29. *VIII g.—See Appendix.*

Mytilarca occidentalis (*Mytilus occidentalis*, White & Whitfield, Proc. Bost. S. N. H. Vol. 8, 1862, *Kinderhook limestone* of the West.) Recognized by C. E. Hall in Carll's Collect. of 1875, in N. W. Penna. in *Chemung upper strata. VIII—IX.*—See Hall, Pal. N. Y. Vol. 4, pl. 33, fig. 3.—See Cat. OO p. 236; Spec. 852–4 (fair example); 855–36 (doubtful); 8 ,5–39 (possibly a new species); 856–11 (doubtful species); all from Sherwood's collections in Tioga Co. Pa.—Spec. 869–14, from LeBoeuff's quarry in *Panama Conglomerate*, Erie Co. Pa.—Spec. 872.39 *a* (doubtful species) Howell's coll. at Nichols, Tioga Co. N. Y.—*VIII–IX?—See Appendix.*

Mytilarca sigilla, Hall. 28th Report N. Y. Museum, 1876,

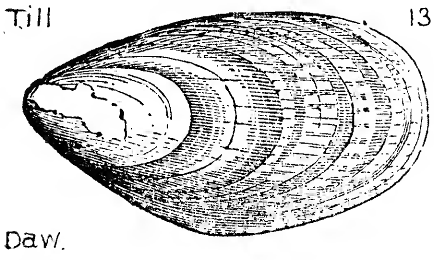


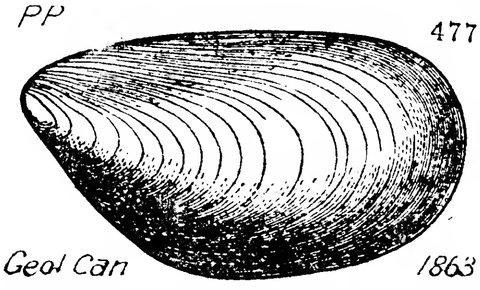
Doc. Ed. pl. 28, fig. 10. Copied into Collett's Indiana report of 1881, p. 316, plate 28, f. 10, cast of the interior of a small right valve; Surface markings unknown. — *Niagara formation*, *Vb.* — (*Mytilarca Sigillum*, Hall.)

Mytilops metella. See **Modiola metella.** In the Penn. Geol. Sur. Coll. specimens 850–19 in Sherwood's coll. at Lawrenceville, Tioga Co., Pa. and 9622 in Randall's coll. at Warren, Pa. both in *Chemung*, or *Chemung-Catskill*, *VIII–IX.*

Mytilops præcedens, recognized by G. B. Simpson in specimens 9498, 9570, 9622 of Randall's collections at Warren. *Chemung-Catskill*, *VIII–IX.—See Appendix.*

Mytilus edulis, Linn. Dawson's Acadian Geology, 1868, p





74, fig. 13, over boulder clay at St. John, and in *Leda clay* & *Saxicava sand.* Canada, Geol. Can., 1863, page 963, fig. 477.—*PP.*

End of Vol. 1.

ERRATA FOR VOL. I.

The following corrections and additions have been kindly sent to me on returned duplicate sheets of this volume as it passed through the press. They are here printed in a form which will allow those who value them as highly as I do, to cut them apart and paste them upon the pages where they belong. Typographical errors of no importance may be neglected; but no scientific mistake should be allowed to stand in print uncorrected when a correction of it has been obtained. I take this occasion to express my gratitude to my correspondents, all and singly. It will be seen that I have availed myself of every emendation, or expression of opinion, made to me, adding the initials of the annotator, as follows:

J. D. D.	Dana, Prof. J. D.—of New Haven.
J. W. D.	Dawson, Sir James W.—of Montreal.
E. W. C.	Claypole, Prof. E. W.—of Akron, Ohio.
J. C.	Collett, Dr. John—of Indianapolis.
E. D. C.	Cope, Prof. E. D.—of Philadelphia.
W. M. F.	Fontaine, Prof. W. M.—University of Va.
J. H.	Hall, Prof. James.—of Albany, N. Y.
C. H. H.	Hitchcock, Prof. C. H.—of Hanover, N. H.
G. H. H.	Horn, Dr. Geo. H.—of Philadelphia.
J. F. J.	James, Jos. F.—of Washington, D. C.
R. D. L.	Lacoe, Mr. R. D.—of Pittston, Pa.
J. L.	Leidy, Dr. Jos.—of Philadelphia.
L. L.	Lesquereux, Dr. Leo.—of Columbus, O.
G. F. M.	Matthew, Mr. G. F.—of St. John, N. B.
S. A. M.	Miller, Mr. Sam. A.—of Cincinnati, O.
J. S. N.	Newberry, Prof. J. S.—of Columbia Coll, N. Y.
J. M. S.	Safford, Prof. J. M.—of Nashville.
S. H. S.	Scudder, Mr. S. H.—of Cambridge, Mass.
J. J. S.	Stevenson, Prof. J. J.—Univ. City of New York.
A. W. V.	Vogdes, Lieut. A. W.—Fort Hamilton, N. Y.
C. D. W.	Walcott, Mr. C. D.—U. S. G. S., Washington.
I. C. W.	White, Prof. I. C.—Morgantown, W. Va.
R. P. W.	Whitfield, Prof. R. P.—Amer. Mus. New York.
H. S. W.	Williams, Prof. H. S.—of Ithaca, N. Y.
A. W.	Winchell, Prof. Alex.—of Ann Arbor, Mich.
N. H. W.	Winchell, Prof. N. H.—Minneapolis.

Note. The first figure indicates the Page ; the second, the Line.

1, 1. **Acantherpestes major.** (Meek & Worthen) Scudder. Mem. Bost. Soc. N. Hist. Vol. 3, 1882, p. 150—156, pl. 11, fig. 1—4, 6—8, 10, 11. Amer. J. S. Vol. 46, p. 25. Geol. Sur. Ill. Vol. 3, p. 558. In Lacoe's collection at Pittston, Pa.

1, 1. Erase caterpillar.
1, 2. Read *Myriapod.*
1, 6. Read *Handbuch.*
1, 11. For *belly* read *segments.* (J. H.)
1, 18. For *baggy*, a better word is *spiny.* (S. H. S.)—Insert "probably" after "some," since there are no known aquatic myriapods (J. L.)
2, 15. Read *antennæ.*
2. 30. *Acanthotelson stimpsoni* is classed by Packard, Mem. Nat. Acad Sci. Vol. 3, 1887, p. 124, as the young of *A. eveni.* (A. W. V.)
3, 1. Insert **Acervularia communis**, n. sp. *See Appendix.*
4, 3. 24. Read, *Oneidaense.*
4, 25. Better figures of **Acrothele matthewi** will be found, with full descriptions in articles on Fauna of *St. John Group.* NOTE.—This group is not equivalent to *Menevian* alone, but contains faunas of *Solva*, *Menevian*, and both Lower and Upper *Lingula flags* of Great Britain. (G. F. M.)
4, 38, over **Actinoceras** insert **Acrotreta**, an important genus of the *Cambrian.* (G. F. M.) *See Appendix.*
5, 1. For **Actinodesma**, read **Glyptodesma.** (J. H.)
5, 11. Read Catskill.
5, 35. Read Claypole's.
6, 14. Read **boydi.** (J. H.)
6, 41. Insert **Actinopteria emacerata.** *See Appendix.*
7, 11. Erase the note ; for *L. perstrialis* is a brachiopod. (J. H ; A. W.)
7, 20. For **Actinopteria**, read **Leiopteria.** (J. H.)
7, 31. For **Noggerathia bockschian** (properly **Noeggerathia bockschiana**) read **Archæopteris bockschiana.** (L. L. and R. D L.)
7, 32. **Adaphlebia lacoana**, Scudder. A hexapod insect (cockroach), from Mazon Creek, Ill. Mem. Bost. S. N. H. Vol. 3, 1835, p. 345, pl. 32, fig. 6. *Coal measures, XIII.*
Aethophlebia singularis, Scudder. A hexapod insect (cockroach), from Mazon Creek, Ill. Mem. Bost. N. H. S. vol. 3, 1835, p. 338, plate 31, fig. 9. *Coal measures, XIII.*
7, 32. Insert White after **springeri.** (J. H.)
8, 8. Erase corals (J. H. and J. M. S.)
8. 13. Read 1887.
8, 14. **Agnostis acadicus** and *A. cambrensis* (*limbati*) belong to the same group of *Agnosti ;* but *A. brevifrons*, *Angelin*, belongs to the quite different group of *Brevifontes* ; and *A. interstrictus*, apparently, to a third group, that of the *Longifrontes.* See Tulberg's essay on the *Agnosti.* (G. F. M.)
8, 21. For L and Lower, read M. and Middle. See foot note to p. 134. (C. D. W.)
8, 23. For E. read G.
8, 24. Read Angelin.
8, 25. Read *integer.*
8, 26. Read Baar.
8, 35. For M. and Middle, read L. and Lower (C. D. W.)
8, 38. For *Obolella coelata*, read *Lingulella cœlata.* (J. H.)

8, 32. **Agnostus nobilis** is referred now to Lower Cambrian, since the discoveries of Schmidt in Russia, and Walcott in America. (G. F. M.)

9, 15. For L. and Lower, read *M.* and *Middle.* (C. D. W.)

9, 18. For **Sp. cincinnaticum,** Claypole would read **cincinnatiense.**

9, 25. *coxana,* and (27) *lævis,* names abandoned. (R. D. L.) *coxana,* now *owenii.* (L. L.)

9, 33. Read *virginiana.*

9, 37. Read *Sphenopteris.*

10, 2. *Sullivanti* is not an *Alethopteris,* but a *Callipteris,* or *Callipteridium* (L. L.)

10, 6. Read *virginiana.*

10, 19. For 500 read 900. (I. C. W.)

10, 38. Add : very abundant over the Sharon coal bed in Summit co., Ohio. (E. W. C.)

11, 1. Read *lonchitica,* Schlot.

11, 2. Erase "1824. Flora der Vorwelt, adders tongue fern" for reasons given in L. Lesquereux's MS. letter of Dec. 27, 1889.

11, 3. For 887, read 177. (L. L.)

11, 21. After "other species" insert "the nervation being obsolete " (L. L.) See coal Flora, p. 178, where the species (fig. 2) is considered to be a variety of *A. lonchitica ;* adding " of which the shape, size, etc." See letter.

12, 1. After *nervosa,* insert Goepp.=*Pseudopecopteris nervosa,* Lesq.= *Diplothmema nervosum,* Stur.=*Mariopteris nervosa,* Zeiller, &c., &c. (L. L.)

12, 1. Read Brongt.

12, 4. From " He" to "Abundant" on line 15, erase all ; and also the sentence "But, line 19 &c. to species line 21." (L. L. as above.)

12, 23. Dr. Lesquereux wishes erased all from " So called" to "frond," line 37 ; and to insert under *Callipteris rugosa* (p. 107 below) his remarks on page 169 of the Coal Flora.

13, 5. Read Brongniart.

13, 6. Read Mr. R. D. Lacoe.

14, 6. Add : *See Appendix,* where newer and better specimens will be figured by Lesquereux.

15, 18. *Pteris aquilina,* the common brake. (J. W. D.)

15, 40. **Alethopteris** ——? Two species of coal measure type, reported by I. C. White, from the Tipton coal beds in Blair Co., hitherto supposed to be *Pocono No. X coals* (MS. letter, Feb. 27, 1889.)

16, index. For ALET, read ALGÆ.

16, 11. For plant seeds, read "seeds of land plants ; and also of fishes and molluscs." (L. L.)

16, 16. Antarctic ?

16, 30. Read (*Caulerpites*).

16, 32. After 1866, insert: also Coal Flora, p. 7, pl. A. figs. 1–6. (L. L.)

16, 40. Read *antiquus.*

17, 6. *A. simplex,* add (originally described by Lesquereux in G. S. S. Cox's Second Geol. Rt. of Kentucky, 1875, p. 139. The species *milleri, gracilis, divaricatus,* quoted on line 1, were described in the same report on pp. 136, 137.

17, 14. After "weeds," insert: now recognized as an ancient congenor of the glass-sponges of the present ocean. (J. D. D.; E. W. C.; J. H.; R. P. W.)
17, 15. Read *Palæophycus.*
17, 14–17. "This remark is far from true of most of them." (J. H.)
17, 16. Read *Cruziana.*
17, 17. "as proved by Nathorst." "Not proved, but asserted." (L. L.) "Hardly true of *Buthotrephis* and *Asterophycus.* (E. W. C.) Some of these palæophycus are undoubtedly branched. (G. F. M.)
17, 28. "The best palæontologists." "The illustrious Saporta first of all." (L. L.)
17, 35. For Milltown, read Neilltown.
18, 1. Read **clavatum**. (E. W. C.)
18, 26. Read **terminale.** (E. W. C.)
18, 29. For gays read gaps.
18, 28. Prof. Stevenson writes: "I think that the Umbral rocks [Mauch Chunk red shale, No. XI] of Fayette Co., down to the bottom of the iron ores will have to go into the Pottsville conglomerate [No. XII]; this refers to **Allorisma terminalis** of the Big Bottom ore of Dunbar." (MS. letter, Jan. 4, 1889.)
19, 3. For form atoms read formations.
19, 31. For **minima** read **minimus.** (E. W. C.)
19, 39. Read Rominger's.
20, 4. **Ambocœlia biconvexa,** Claypole, n. sp. has been drawn but not published and awaits Prof. Claypole's attention to it, with others in the same condition.
20, 4. For Salina read Lower Helderberg (E. W. C.)
20, 5. For Montour read Columbia. (E. W. C.)
20, 6. Insert **Ambocœlia præumbona.** *See Appendix.*
20, 26. *Hamilton upper shales.* Better *uppermost shales,* the probable equivalent of the *Moscow shale* of N. Y.; for there is not sufficient evidence that the *Tully L.* of N. Y. exists in Pennsylvania. (E. W. C.)
20, 39. "This is doubtless a mistake; and the fossil referred to is very likely to be **Ambocœlia planoconvexa.**" (E. W. C.) Prof. Stevenson crosses off the three bottom lines of p. 20, and top line of p. 21, with the note, "I have seen the specimen and know it to be the *Spirifer urii* of Europe,=*Spirifer planoconvexus* of America, and and very different from *Ambocœlia umbonata.*
21, 39. Read **Ambocœlia.**
22, 1. For underscribed read undescribed.
For O, read OO.
22, 2. Read Shawnee.
22, 7. Read recognized.
22, 13. For "origin at" read original.
22, 21. Read *Triarthrus.*
23, 38. There are no *Ammonites* in the Coal measures. The mistake was made in Prof. Rogers' Geol. Penna. 1858; and in Reports L & H4 instead of quoting Rogers, the mistake was made of quoting Stevenson.
24, 22. Read **paradoxa.** (E. W. C.)
24, 31. Read *Amplexus?*

24, 36. For formations read faunas. (E. W. C.)
25, 1. Read Haime.
25, 4. Read tabulæ.
25, 5. For **Amynilespes** read **Amynilyspes.** It is not a caterpillar, but a centipede, or millipede. (S. H. S.) Mem. Bost. N. H. S. Vol. 3, 1882, p. 178, pl. 78, fig. 1-4, 9.
25, 12. Same error.
25, 11. Read **Ancyrocrinus.**
25, 14. Read *Lower Cambrian.*
25, 27. Insert **Ampyx americanus,** the only American species of this genus directly from American strata. (A. W. V.) *See Appendix.*
26, 17. Insert **Anisichnus gracilis** *See Appendix.*
Also **Anisopus gracilis.** *See Appendix.*
Also **Anisopus gracilis.** *See Appendix.*
26, 22. Erase *Pecopteris longifolia.* It is a *fern*: and *Annularia longifolia* is a horse-tail plant. Both of Brongniart's species. (R. D. L; and also L. L. who calls this a "bad error.")
27, 14. Read sphenophylloides.
27, 17. Read **romingeri.** The original figure, borrowed by Collett, is in the Proc. A. P. S. Phil. Vol. 17, No. 100, p. 163.
27, 19. Read Rominger.
27, 22. For reeds or bamboos, read *equisetaceæ,* land plants of the horse-tail family; but reeds and bamboos belong to the class of Mono-cotyledons, and do not appear in rocks earlier than the Triassic. (L. L.)
After abundant, insert: and of gigantic size. (L. L.)
28, 2. Read Brongniart.
28. 21. Add (after Survey) Found plentifully by Lacoe in subconglomerate shale under Campbell's Ledge above Pittston, Pa. White's Rt. G7, p. 39.—*XI.*
29, 2. **Anomœpus intermedius.** Bird track. *Trias. See Appendix.*
29, 7. For Brogt, read Brongt.
Anthracerpes typus, Meek & Worthen. A myriopod insect, from Mazon creek, Ill. Proc. Acad. N. S. Philada., 1865, p. 51. *Coal measures. XIII.*
Anthracomartus pustulatus, Scudder. A spider, from Mazon creek nodule, Ill. Proc. Amer. Acad. A. & S. Vol. 20, p. 18. *Coal measures. XIII.*
Anthracomartus trilobitus, Scudder. A spider, from Mazon creek nodule, Ill. Proc. A. Acad. Boston. Vol. 20, p. 17. *Coal measures. XIII.*
29, 13. Read *Anthraconectes.*
29, 14. **Anthracothemma robusta,** Scudder. A hexopod insect (cockroach), from Mazon creek nodule, Ill. Mem. Bost. N. H. S. Vol. 3, 1885, p. 337, plate 30, fig. 1, 5, 6. *Coal measures, XIII.*
29, 29. Insert **Apatichnus crassus.** *See Appendix.*
Also, **Aphodius præcursor.** Horn, Trans. Amer. Entom. Soc. Vol. 5, p. 245. Insect found in the bone cave at Port Kennedy, Chester Co., Pa.
Also, **Arabellites procursus.** See **Worm teeth.**
30, 1. Hinde is now working out this group of Sponges and will make some changes. (C. D, W.)

30, 23. For an Loup, read au Loup.
30, 29. For *M.* read *L.* i. e. *Lower Cambrian.* (C. D. W.)
31, 4. For *M.* read *L.* (C. D. W.)
31, 6. **Archæogryllus priscus.** Scudder. A hexopod insect (cockroach) from Ohio. Proc. Bost. S. N. H. Vol. 11, 1868, p. 402. *Lower Carboniferous. XIII.*
31, 7. **Archæophyton**, a very doubtful plant. (G. F. M.)
32, 4. Read Goep.—Same on p. 33, line 11.
33, 1. **Archæopteris halliana** can hardly extend from the Lower Devonian to Carboniferous. The different figures given of it seem sufficient proof of different species. (G. F. M.)
33, 14. *Cyclopteris jacksoni*, a distict species from **Archæopteris halliana.** (J. W. D.) who adds: "*A. gaspiensis* of my Geol. Survey Report, 1882, is certainly a distinct species."
33, 28. "Lesq. in Coal Flora, 1880, p. 304, remarks that the figure in the Geological Survey of Canada, pl. 15, f. 175 represents," etc. (Lesquereux's correction of the passage. MS. letter of Dec. 27, 1889.)
34, 1. After "reference," add: " but refers this fructification to *A. jacksoni*, because that is the only species found with it. (See Dawson, Second Rt. on Erian Plants of Canada, 1882, where the species of *Archæopteris* are fully discussed." (J. W. D.)
34, 5. Read *A. jacksoni.* Also *A. hitchcockiana.* (L. L.)
34, 6. Add: *See Appendix.*
35, 1. For "identifies it with," read: "refers it to." (L. L.)
35, 3. "Abundant under Campbell's Ledge (*XII*) near Pittston," read "Abundant in the Coxton bluffs of the Susquehanna river above Pittston, that is, in the outcrops of the *Catskill formation.*" As the passage now stands it is a bad error. The note that begins on line 6 indicates the real locality and formation. *See Appendix.*
35, 11. **Archæopteris obtusa.** Figures given are those of true *Archæopteris* plants. (G. F. M.) Fig. 188 of the Canada survey (referred to on page 36, line 9) does not properly represent the venation; see fig. 188 *b*, on the same plate XVI. (G. F. M.)
35, 12. For *Noegguathia* on the figure, read *Noeggerathia.*
35, 18. For *XI*, read *IX*; i. e. for *Mauch Chunk* read *Catskill.*
35, 39. After "species" add: "but see Dawson's Report of 1882, plate 22, where a better figure of the fossil is given."
36, 6. For feather, read frond.
36. 8. Read: The *Cyclopteris obtusa* in Geol. Sur. Canada, Fossil plate 16, fig. 188, is said by Lesquereux to look like *Archæopteris.* (L. L.)—But see plate 22, 1882, above quoted. (J. W. D.)
36, 12. Read Owen's.
36, 14. Read **laxa.**
37, 1. **Archimylacris acadicum**, Scudder. A hexapod insect (cockroach) from Pictou, N. S. Acad. Geol. 2d. Ed. 1868, p. 388, f. 153. *Coal measures, XIII?*
Read **Archimylacris parallela.** (E. W. C.)
37, 4. For Vol. 8, read Vol. 3.
37, 10. **Archimylacris paucinervis**, Scudder. A hexapod insect (cockroach) from Mazon Ck., Ill. Lacoe's List of Pal. Foss. Insects, 1883, p. 5. Zittel, by enumeration and locality, p. 576; *Coal measures, XIII.*

Architarbus rotundatus, Scudder. A spider found in a Mazon creek nodule, Ill. Geol. Sur. Ill. Vol. 3, p. 568, f. 4. *Coal measures, XIII.*

Archiulus xyloboides, Scudder. A myriopod of the *Coal measures, XIII.*

Arthrolycosa antiqua. Amer. Jour. S. Vol. 7, 1874, p. 219-223.

37, 13. Read **Aristozoe.** (J. H.)

40, 2. Read Evitts.

40, 10. Add *See Appendix.*

40, 11. **Arthrophycus montalto.** Compare with *Munsteri flagellaris*, Sternb. Flora d. Vorw, pl. 8, fig. 3; and Heer, Flora Foss. Helv. plate 66, f. 4, 5. (R. D. L.)

41, 4. To "normal order" add "that is, of chronological sequence, although they have been subjected to extraordinary physical dislocations."

41, 10. See also *Sternbergia.* (E. W. C.)

41, 16. Read **hiatidens.**

43, 7. Read *longicaudatus.*

44, 4. Erase "the Pocono sandstone strata, X, in the mountain gaps of," and erase "*X* to" on line 6. (J. J. S.)

44, 8. For "in Subconglomerate (Pocono, X) measures in the mountain gaps of" read "in the *Coal Measures* of." (J. J. S.)

44, 11. For X, read XIV. (J. J. S.)

44, 13. For gaps, read Coal Measures; and for X, read XIV. (J. J. S.)

45, 12. Read Brongniart.

45, 13. Erase "*Calamocladus*" to "*Lycopods.*" (L. L. who adds that the sentence is untrue.)

45, 15. For seeds, read spores. (E. W. C.)—The figures represent spikes or fruiting parts of *Asterophyllites*, to show their relation to those of *Equisetum;* but they may be left here. (L. L.)

46, 3. Read *hippurites.*

48, 1. **Calamostachys ovalis.** Coal Flora, 717, pl. 89, f. 3, 4. (R. D. L.)

48, 8, 9, 10. Erase these three lines. There is no such species; it was a printer's error in setting up White's list. The fossil is **Annularia sphenophylloides**, Zenker, which see, on p. 28 above. (L. L. and R. D. L.)

48, 25. For **longifolia**, read **tuberculata.** See Coal Flora, p. 723, pl. 89, figs 1, 2. (R. D. L.)

49, 8. Insert in their places: 854-7 (too wide); 854-21 (three); 854-37.—Also on line 18, 855-43—On line 21, 856-16 (?).—On line 24, 860-2*a*.—Also, at the end 869-9, 878-3, 891-1. And, *see Appendix for new data.*

49, 10. 854-19 must, I think, be a new species, as it is marked *pustulata;* or else must be in *Chemung strata.* (H. S. W.)

49, 31. For Acad. read Inst.

50, 18. Read Jervis.

50, 32. *See Appendix.*

51, 5 to 8. Erase as a wrong identification. (R. P. W.) It is **Athyris spiriferoides.** (E. W. C.)

52, 1 to 3. The reference in KK, 291, is to **Athyris subquadrata**; for *A. subtilita* is an upper carboniferous species. (J. J. S.)

52, 31. *Atops trilineatus* is not allowed by S. A. Miller to be the same as *Ptychoparia trilineata*, and will be retained by him in his Catalogue. But if it be synonymous *Atops* has precedency over *Ptychoparia* as a generic name. (S. A. M.)

52, 28. Insert **Athyris**——? 878-3 of Hicks' collections between Wetmore and Ludlow in McKean Co. *Chemung, VIII g.*

52, 30 and 32. Read *Lower* Cambrian. (G. F. M.)

52, 33. **Atops trileneatus** has been placed by Walcott under *Calymene Triarthrus, Ptychoparia*, and *Conocoryphe*, but it will not fit. Why not retain the original name? It belongs to the *Paradoxides zone*, the *Middle Cambrian* of Walcott, but not the *M. C.* of Sedgwick. (A. W. V.)

52, 39. For *VI c* read *II c*.

52, 40, For **Camarella**, read **Triplesia**. (J. H.)

53, 1. For **aspera**, read **spinosa**. *A. aspera* is a different and European species. (R. P. W.)

53, 13. For turkunde, read tenkunde.

53, 23. Erase from "Perry" to "xiii."

53, 26. For 100' and 300, read 200 and 100.

53, 28. Portage? (J. J. S.)

54, 1 These two figures from Vanuxem are not of any *Atrypa*, but represent **Orthis impressa**. (J. H.; R. P. W.; H. S. W.)

54, 13. **Camarella congesta**? (J. H.)

54, 19. Read **Atrypa**. It is a synonym of *A. spinosus*, Hall. (R. P. W.)

54, 40. Read **Rensselæria**.

55, 1. **Atrypa exigua**. This species has an internal process similar to that of *Centronella*, showing it to be allied to that genus. (R. P. W.)

55, 7. *Atrypa extans*. Not a *Camarella* (which is a Pentameroid) but one of the *Rhynchonellidæ*. (R. P. W.)—After **extans** insert= *Triplesia extans*. (J. H.)

55, 30. **Atrypa implicata**. The figure is not that of *A. imb.* of Hall, or Sowerby; but apparently a *Nucleospira*. And the reference in line 32 is incorrect. (J. H.)

55, 36. **Atrypa impressa**. For **Atrypa** read **Orthis**. (R. P. W.)

56, 2. For **Atrypa intermedia** read **Whitfieldia intermedia**, Davidson. (R. P. W.) The first of the four figures is one of *Atrypa imbricata*. (J. H.)

56, 15, 25 and 32. For **Atrypa** read **Rhynchonella** in all three cases. (J. H.; R. P. W.; J. J. S.)

56, 40. Read **Leiorhynchus limitare**. (E. W. C.)

57, 3. Read **Leiorhynchus mesacostale**. (E. W. C.)

57, 5. For **Atrypa**, read **Meristella**. (J. H.)—**Whitfieldia**. (R. P. W.)

57, 11. For **Atrypa neglecta**, read **Rhynchonella**. (J. H. and R. P. W.)

57, 13. Insert next, **Atrypa nodostriata**. Specimen 507-15.

57, 15. Read **Rhynchonella**.

58, 12. Requires verification. (E. W. C.)

58, 19. For Lawrence Nille, read Lawrenceville.

58, 22. For *Hipparionyx consimilis*, read *Atrypa affinis*. (J. H.)

58, 28. For *Hipparionyx similaris*, read *consimilis*. (J. H.)

60, 32. Portage sandstone? (J. J. S.)

61, 9. See corrections by R. P. W. on pages 53, 54 above.

61, 12. For **Merista,** read **Meristella.** (J. H.)
61, 13. For **Atrypa,** read **Orthis.** (J. H.)
62, 1. The first figure is a **Meristella.** (J. H.)—**Terebratula lincklæni,** Hall, Pal. N. Y. Vol. 4, pl. 60, fig. 61 to 63. (R. P. W.)
The second figure is a **Rhynchonella.** (J. H. and R. P. W.)
The third figure is a **Meristella.** (J. H.)—**Meristella haskinsi,** Hall, Pal. N. Y. Vol. 4, pl. 49, f. 96, drawn from the same specimens. (R. P. W.)
62. 6. For **Atrypa——?** Erie Co. read **Lunulicardium.** (J. H.)
62, 10, 19. For V. read Upper. Same error in line 26.
63, 3 and 12. The same error.
64, 6 and 35. The same error.
65, 1. Read Haime; and for *Oaninia*, read *Caninia*.
66, 13. **Heliophyllum halli**; one individual, with the torn off tubes of another attached individual left sticking to the front of it. (J.H.) These were thought to be a parasitic *Aulopora;* and the coral was wrongly named *Cystiphyllum.—Aulopora tubæformis* is usually found upon *Cystiphyllum*, but somewhat rarely on *Heliophyllum.* (J. H.)
66, 39. Read Waterlime.
67, 19. For **Avicula,** read **Leptodesma acanthoptera.** (J. H.; R. P. W.; H. S. W.)
67, 25. Erase "has a sharp hind wing," for several hundred other species have the same. (J. H.)
67, 26. For **Avicula,** read **Ambonychia bellistriata.** (R. P. W.)
67, 29. For **Avicula,** read **Ambonychia carinata.** (J. H.; R. P. W.)
67, 33. *Loraine* with one *r* is correct. (A. W. V.)
68, 1. For **Avicula,** read **Pterinea demissa.** (R. P. W.)
68, 11. "*Lyonsia* is now *Sedgwickia.*"?? (J. H.)
68, 17. **Avicula elliptica.** (R. P. W.)
68, 26. For **Avicula,** read **Actinopteria emacerata.** (J. H.)—Fig. *a* is a *Pterinea.* (R. P. W.)
69, 1 to 3. Not identified on Claypole's revised copy of his Catalogue. (E. W. C.)
69, after 6. Insert **Avicula honeymani,** Hall, Silurian of Nova Scotia, Dawson's Acadian Geology, p. 604, allied to *A. emacerata.* (J. W. D.)
69, 7. The second figure (from Rogers) is a *Pterinea.* (R. P. W.)
69, 15. The figure of **A. leptonota,** is upside down.
69, 17. For Nethart's read Neihart's.
69, 26. For **Avicula** read **Pterinea rugosa.** (R. P. W.)
69, 31. For *Cytheria* read *Cytherina*, and for *rogosa*, read *rugosa.*
69, 35. After **speciosa** insert (*Glyptocardia retrostriata*, Von Buch.) (J. H.)
The first figure (H. 106, 1,) is a **Chonetes.** (R. P. W.)
The second small figure (H. 106, 2 a) is *Cardiola speciosa*, Hall, Pal. N. Y. Vol. 5. (R. P. W. and E. W. C.)
69, 37, 38. Not only the *Cashaqua shales*, but also the *Genesee*, *Hamilton*, and *Marcellus.* (J. H.)
70, 5. For **Avicula** read **Pterinea subplana.** (R. P. W.)
70, 17. For **trentoneonsis,** read **trentonensis.**

2

70, 40. Specimen 2-9 is another fossil. (E. W. C.) Of spec. 18-21 he has no record. He has no recollection of finding *Avicula triquetra* anywhere, and does not believe that it exists at the two localities quoted.

71, 2. For **Avicula** — ? Rogers, fig. 663, read **Actinodesma.** (R. P. W.)

71, 18. For **Avicula** ——? Rogers, fig. 678, read **Leptodesma.** (J.H.)

71, 26. For **Avicula** ——? Rogers, fig. 679, read **Ptycopteria.** See Hall's Pal. N. Y. Vol. V, part 1, plate 23. (R. P. W. and J. H.)

71, 40. Add, *See Appendix.*

73, 18. Insert **Aviculopecten caroli.** (*Crenipecten caroli.*) *See Appendix.* (J. H.)

74, 8. For **Aviculopecten**, read **Lunulicardium fragile** (J. H.; H. S. W.) **Lunulicardia fragilis.** (R. P. W.)

75, 15. Meek afterwards took back his Permian. (J. J. S.)

75, 22, For **Lyrispecten** read **Lyriopecten.**

75, 23. For **Aviculopecten pectiniformis**, read **Pterinea chemungensis**, Conrad. Pal. N. Y. Vol. 5, part 1, plate 16, fig. 10 drawn from the same specimen which furnished the large figure (117 Hall) here given. (R. P. W.)

76, 27. Figure upside down.

77, 1. For **Aviculopecten** read **Pterinopecten suborbicularis**, Hall. Pal. N. Y. Vol. 5, part 1, plate 8. (R. P. W.)

77, 10. For Cussegago, read Cussewago.

77, 14. For Hubbieville, read Hobbieville.

77, 15. For **Whiteii**, read **Whitei.** (E. W. C.)

78, 2. Portage ? (J. J. S.)

78, 9. For *Strictorhynchus*, read *Streptorhynchus.*

78, 27. For Faighney, read Faichney.

78, 29, 34. For *III* read *IV.*

79, 37. For (*Scunapaulia*), read (*Jeanpaulia*). (W. F. F.)

80, 1. Read **Baphetes planiceps.** (J. S. Newberry.)

80, 2. For scull, read skull.

80, 10. Read **Olenellus.**

80, 10 and 12. For *M. Middle*, read *L. Lower Cambrian.* (G. F. M.)

80, 14. The figure of **Bathygnathus borealis** is upside down. (E. D. C.)

81, 7. For *quadraspinosus*, read *quadrispinosus.*

81, 30. G. F. Matthews thinks **Protypus** not a good genus, the forms included under it being too diverse.

81, 32. The two figures represent two distinct genera. (H. S. W.)

82, 17. G. F. Matthews objects that formations *III b* to *VII* is too great a range of time for any species.

85, 40. For White, read Stevenson.

86, 26. For **Bellerophon profundus**, read **Bucania profunda**, Emmons, whose specific name has the precedency. See Hall's Pal. N. Y. Vol. 1, p. 186, *B. expansa.* (R. P. W.)

86, 1. For **Bellerophon** read **Bucania punctifrons.** Hall, Pall. N. Y. Vol. 1, p. 187.

89, 27. For 1885, read 1855.

91, 18. **Primitia.** See Ann. and Mag. Nat. Hist., London, [3] Vol. 16, p. 417. (G. F. M.)

91, 35. **Beyrichia ungula**, n. s. Claypole, and those following are still in the hands of Prof. Rupert Jones, whose descriptions are expected soon. (E. W. C.)

92, 5. **Beyrichia** ———, in Bedford borough, Pa., T 2, p. 89; *Tentaculite limestone, VI.* (J. J. S.)

92, 33. **Billingsia saratogensis.** C. D. Walcott refers to a note under table of contents of Bulletin 30, promising the substitution of another generic name; adding that he hopes to complete his study of these forms in the spring of 1889.

92, 40. *Blattina.* See **Mylacris bretonensis.** *Blattina.* See **Gerablattina fascigera.** *Blattina.* See **Mylacris heeri.** *Blattina.* See **Etoblattina venusta.**

93, 8. For unsheathed, read sheathing. (E. W. C.)

94, 12. Read **Sauripteris taylori.** "Not *Bothriolepis*, and not a *Placoderm*, but a scaled *Ganoid*, allied to *Holoptychius*." (J. S. Newberry.)

94, 18. For *tubuculata*, read *tuberculata.*

94, 20. See discussion of **Protozoa**, versus **Bryozoa**, in the Illinois Report (J. C.).

96, 26. It must have been a **Bellerophon patulus**, or some other one of the Hamilton or Chemung species, that Prof. White found. (R. P. W.) G. F. M. also protests against so long a range of time.

97, 2. For 1856 read 1855.

97, 25. That is, in the *Chazy limestone* itself, *11b.* (R. P. W.)

97, 28. Add, also in the Silurian of Nova Scotia. See Acadian Geology.

97, 37. Credit this and all other Spergen Hill figures and descriptions to the publications of the American Museum, Central Park, New York, and as lent to the Indiana Geological Survey. (R. P. W.)

98, 6. For *canliaculatus* read *canaliculata.* (E. W. C.)

98, 25. For Brunschweig, read Braunschweig.

98, 40. Insert **Buthotrephis flexuosa.** Peach Bottom roofing slate quarries, York county, Pa. *See Appendix.*

99, 1. S. A. Miller means to change this to Bythotrephis in his next edition.

99, 8. Hall (Pal. N. Y. Vol. 2, p. 18) renames the Trenton species *Buthotrephis tenuis;* leaving *B. gracilis* as exclusively a *Clinton* species. (R. D. L.)

101, 12. Compare the graphitic fucoids on the Peach Bottom slates, York county, Pa. (E. W. C.) *See Appendix.*

102, next 4. Insert **Buthotrephis tenuis,** Hall, Pal. N. Y., Vol. 2, p. 18; a new name given to *B. gracilis*, to remove the Trenton form from the Clinton form.

102, 13. *Buthus? carbonarius*, Meek & Worthen. See **Eoscorpius carbonarius.**

102, 19. For **Cadodus** read **Cladodus**; and remove the whole four lines to page 131, below.

105, 38. *Calamites suckowii* has recently been reported by I. C. White from the Tipton run coals, in Blair Co., Pa., hitherto considered coal beds of the *Pocono, No. X*, formation. (MS. letter Feb. 27, 1889.)

104, 4. E. W. C. would write it **canniformis.**

105, 20. I. C. W. prefers *XII* to *XI; i. e.*, places these shales in the conglomerate.

106, 18. Calamites are plentiful *in the shale above* the limestone, not in the limestone itself. (J. J. S.)

106, 36. For **Calamostachys**, read **Annularia.** (R. D. L.)

108, 9. For **Callipteris** read **Callipteridium**. (R. D. L.)
108, 21. **Triarthrus** is a good genus and ought not to be placed under *Calymene*. It is *Ordovician*. (G. F. M.)
109, 4. Mr. Walcott explains that he never said that this trilobite, *C. beckii*, occurred in the Cambrian, and that his Cambrian *Conocoryphe trilineata* (*Ptychoparia trilineata*) is a different one. See his paper "On the Fauna of the upper Taconic of Emmons," in Amer. Jour. Sc., 1887, page 197. (C. D. W. MS. letter, Jan., 1889,)
109, 6. Whitfield claims that **C. blumenbachii**, is exclusively European: replaced in America by **C. niagarensis**, Conrad.
109, 10. Read "Chart of Fossil Crustacea," by J. W. Salter, and H. Woodward, plate 4, fig. 47. The American species is *Calymene senaria*, Conrad. If *Calymene blumenbachii*, Brongt. be used, it should be replaced by the older name *C. tuberculata*, Brunnich. (A. W. V.)
109, 16. *Entomolithus paradoxus* is considered to be not *Calymene Blumenbachii* but *Paradoxides*. (G. F. M.) which see.
109, 19. For *Hemicrypterus* read *Hemicrypturus*.
110, 5. *Callicephala*, Green, 1832, precedes *senaria*, 1841. (Collet.) Green's name ought to be retained. (S. A. M.)
Insert **Calymene rostrata** from the *Clinton formation* in Georgia, and probably to be found in the *Clinton* of Pennsylvania. (A. W. V.)
110, 40 Insert **Calymene vogdesii**, for the same reason. (A. W. V.)
111, 1. For **Calymene——?** read **Dalmania callicephala**, Hall. (R. P. W.)
111, 14. Probably an error. I have no record of, nor can remember any such find. (E. W. C.)
111, 16. For **Camarella ambigua** read **Triplesia**. (R. P. W.)
111, 22. For **Camarella antequata** read **Rhynchonella**. (R. P. W.)
111, 26, 28. Read *Lower Cambrian, L. C.* (G. F. M.).
111, 29. For **Camarella bisulcata**, a *Terebratuloid* shell (R. P. W.) He adds, that Billings's **Camarella** is a *Pentameroid* genus.
112, 1. **Camarella congesta** is an **Athyris**. (R. P. W.)
112, 11. **Camarella extans**, is a **Triplesia**. (R. P. W.)
112, 17. **Camarella hemiplicata**, is a true *Camarella*.
112, 17. **Camarella nucleus**, is a *Triplesia* (R. P. W.)
112, 10. It does not occur in the *Salina formation* (E. W. C.)
113, 1. For *Rhynchonella mœra*, read *Camarophoria wortheni*. (R. P. W.)
113, 29. Dawson describes four species of **Cardiocarpon**, from Devonian strata at St. John, N. B. (G. F. M.)
113, 31. For **acutirostris** read **acutirostre**.
113, 36. For *Cardiocarpus*, read **Cardiocarpus**, because it is a true Cardiocarpus. (R. D. L.)
114, 2, 3, 8, 28, 29. For *XI*, read *XII*. (I. C. W. who puts these shales not under but in the Conglomerate.)
114, 4. For **Carpolithes bicuspidatus**, read **Cardiocarpus regularis**. (L. L.)
114, 31. The two figures here given do not represent this. They represent *Rhabdocarpus mamillatus*, being copies of fig. 33, 33a, of Pl. 85; whereas fig. 32 represents *C. mamillatus* and should be inserted here, if at all, for the species is a doubtful one and had better be abandoned. (R. D. L.—See also Coal Flora p. 816, 817.)

115, 3. Erase *XI*.

115, 11. For **Cardiocarpon plicatum**, read **Cardiocarpus plicatus**. (R. D. L.)

115, 18. Read **Cardiocarpus regularis** (*Carpolithes regularis;* also *Cardiocarpus ellipticus*). (L. L.) Transfer to this place the two figures on page 118. (R. D. L.)

115, 19. **Cardiocarpus samariæformis**, Newberry. Pal. Ohio, Vol. 1, p. 375, pl. 43, figs. 11, 11a. (J. S. Newberry.)

115, 24. For *XI* read *XII*.

116, 4. The figure given here is not that of a *Cardiola vetusta*, but of a *Lucina? retusa*, Hall, and must be removed to page 372. *Cardiola* is always a radiately plicated shell (R. P. W.)—*For correct figure see Appendix.*

116, 18. **Cardiomorpha suborbicularis**—*Edmondia? tenuistriata*, Hall, 1885, Pal. N. Y. Vol. 5, part 1, plate 63, f. 9. See *Lucina varysburgia*, Williams. (H. S. W.)

116, 34. This is the figure of a *Modiolopsis*. (H. S. W.)

117, 26. **Carpolithes bicuspidatus**, a true **Cardiocarpus**. (R. D. L.) (J. S. N.)

118, 32. For **Carpolithes** read **Cardiocarpus**, and transfer the two figures to their place under **C. regularis**, on page 115. (L. L.)

120, 1, For **Casteroides**, read **Castoroides**.

120, 3. For scull, read skull.

120, 6. For *Quarternary*, read *Quaternary*.

120, after 9. Insert **Caulopteris antiqua**, Newberry, Proc. Geol. Soc. London, 1871, p. 271; one of the two oldest of our tree ferns; found in the Ohio *Corniferous limestone, VIII a.* (J. S. N.)

121, after 3. Insert **Caulopteris peregrina**, Newberry, Proc. Geol. Soc. Lond., 1871, p. 272; one of the two oldest of our tree ferns; found in the Ohio *Corniferous limestone, VIII a.* (J. S. N.).

121, 4. See **Stemmatopteris punctata**, Lesq. Coal Flora, p. 839, 840, pl. 69, f. 3. (R. D. L.)

121, 38. Add **Coleoptera** described by Dr. Horn in Trans. Ento. Soc. Vol. 5, 1876, p. 241–245. (S. H. S.)

122, 35. **Ceratiocaris simplex**, figure, compare with fragment of *Goniotite.* (H. S. W.)

123, 1. Figure. "This was my first effort. Zittel copied this from Walcott in Amer. Lyc. Nat. Hist. N. Y. Vol. XI, 1875. Also Mus. Comp. Zool. Cambridge, Mass. Vol. VIII, 1881. (C. D. W.)

125, 3. Read **Chimærichnus**.

125, after 6 insert, **Calænius punctulatus**, Horn; and **Chœridium ? ebeninum**, Horn; Trans. Amer. Ento. Soc. Vol. 5, 1876, p. 244.

125, after 7 insert, **Chelephlebia carbonaria**, Scudder, Mem. Bost. N. H. S. Vol. 3, pl. 30, f. 8. Also **Chelephlebia elongata**, Scudder. Ditto. p. 328, pl. 29, f. 7.

125, 14. For **carinata**, read **coronata**. See Hall, Pal. N. Y. Vol. 4, p. 133. See also *Stroph. carinata*, Conrad, An. Rt. N. Y., 1839, p. 64.= *Tropidoleptus carinatus*. (H. S. W.)

125, 21 to 29. Erase and correct. *See Appendix.*

126, 2. Erase "=Hamilton." (H. S. W.)

126, 6. Add Claypole's specimens, 5-137, 59-17, and 92-25.

126, 7, 8, 25, read **deflectus, granuliferus, mucronatus**. (E. W. C.)

127, 3, 4, 5. Erase 8; 42, 56, 1, 4, 5, 7; 9, 28, 30. (E. W. C.)
127, 8. For fig. 3, read fig. 8. The consequence of this substitution has been the placing here, under **Chonetes lineatus**, the figure of Hall's **Strophomena rhomboidalis** (*undulata.*)
127, 24. Read **mesolobus**. (E. W. C.)
127, 25. Read **millepunctatus**. (E. W. C.)
128, 1. Read **mucronatus**. (E. W. C.)
128, 16. Read **Chonetes, Productus**, etc. (I. C. W.)
Chonetes nova-scotia is a common and characteristic species of *Upper Silurian* rocks in Nova Scotia and New Brunswick. (G. F. M.)
128, 18. Read **scitulus**. (E. W. C.)
128, 28. Read **setigerus**. (E. W. C.)
130, 22. Add, Geol. Sur. Ill. Vol. 3, 1868, p. 567, fig. 2.
130, 37. The figure due here has been inserted by mistake on p. 178, under its old name of *Cypricardites recurvus..* (R. P. W.)
131, 12. Read Tuomey.
132, 24. Read corallum.
133, 5. This *Cleidophorus* is a typical **Nuculites**. (R. P. W.)
133, 8. The doubt is strengthened by H. S. W.
133, 12. Add, "also in Perry county, Pa." (E. W. C.)
133, next to bottom line. Insert after Lehigh Co. "one of the carnivorous Dinosauria," according to Cope, etc.
134, 2. Add "teeth and" bones. (E. D. C.)
135, 18. For America, read United States.--For *Coccidentalis*, read *C. occidentalis.*
135, 20. A fine species described by Whiteaves, occurs in the Lower Devonian of Gaspe, Canada. (J. W. D.)
135, 28. Read **Gerablattina**; also, **Etoblattina**, **Mylacris**, **Necymylacris**, **Archimylacris**, **Lithomylacris**, all genera of cockroaches found in Pennsylvania. (S. H. S.)
135, 35. Read *obliquus.*
135, 40. Insert **Cochleodus nobilis**, N. and W. Illinois Vol. 2, p. 88, pl. VI, fig. 3–5, pl. VII; the finest species of the genus. (J. S. N.)
136, 1. Read **Codonites**.
136, after 2, insert **Cœlacanthus elegans**, New. **C. ornatus**, New. **C. robustus**, New. Pal. Ohio, Vol. I, pp. 339, 340, pl. 40.
136, 14, 15. H. S. Williams doubts its having been found in the *Chemung.*
136, 24. For New York, read Chicago.
137, 10. Read fossils.
138, 10. This is a figure of a species of *Ctenodus.* (J. S. Newberry.)
138, 17. See Cone-in-cone radiating from nodules of iron ore, and bones of *Dinichthys* in Ohio; described in Geol. Mag. London, 1885, p. 543. (J. S. N.)
138, 30. Safford's Geology of Tennessee explains this structure of coal, at numerous exposures studied by him, as produced by pressure, and analogous to slaty plication.
140, 26. Read G6.
140, 37, 38. *Conocephalites aurora*, is a variety of *Liostracus ouanagondianus.* See my last paper. The fauna to which it belongs is *Lower Cambrian* and will not be received as anything else in Europe. *M. C.* should therefore be *L. C.* (G. F. M.)

140, 39. The same of this species. It should be *L. C.* (G. F. M.)
141, 1, 2. Read *chippewensis*. (E. W. C.)
141, 5. **Ptychoparia** should be **Solenopleura robbii.** (G. F. M.)
141, 6. **Conocoryphe matthewi** should be **Ctenocephalus** and *L. C.* (G. F. M.)
141, 10. **Ptychoparia orestes** should be **Solenopleura**. (G. F. M.)
141, 11. **Conocoryphe** should be **Ctenocephalus.** This genus differs from *Conocoryphe* in the tubercle in front of the glabella, in having a smaller pygidium, &c. (G. F. M.)
141, 13, 14. Read **misera, tenera.** (E. W. C.)
141, 14. **Ptychoparia** should be **Liostracus.** (G. F. M.)
141, 20. Probably not a **Ptychoparia.** (G. F. M.)
141, 24. (*Salteria*) is preoccupied. Therefore read (*Bailiella.*) (G. F. M.)
141, 25. Described by Hartt.
Salteria was used by F. Wyville Thomson in Mem. Geol. Survey (G. B.) Dec. 11, 1864, for a different genus of Palæozoic crustacea (See pl. 11, *Salteria primæva.* Walcott has changed it to *bailiella* in copy of Bull. sent me. (A. W. V.)
141, 30. Some heads nearly as this drawing have been found. (G. F. M.)
141, 32. Does not give the attitude of the spine, which points outward. Same remark applies to the thorax. (G. F. M.)
141, 37. This and others on this page should all be marked *L. C.* (G. F. M.)
142, 1. *Lower Cambrian.* If you speak of the *St. John* formation, or series, it is both Lower & Middle. But the fauna of it which is best known is Lower. All your species from it are no doubt *Lower*. That the St. John fauna here described is *Lower* Cambrian, 1. because it contains *Paradoxides;* 2. because it belongs to the lower half of the *Paradoxides beds.* There are three other faunas in the St. John Group which I have only cursorily referred to in my paper. Two of these are *Middle* Cambrian. The *Upper* one *may* be *Upper* Cambrian. (G. F. M., Jan. 18, 1889.)
142, 4. Described by Hartt. Fig. 2, has been inverted; it is not a pygydium, but a glabella; like fig. 2b.
142, 5. This species occurs larger than figure 2 *a*. (G. F. M.)
142, 14. Read **Ctenocephalus.** (G. F. M.)
142, 16, 18. Read *Lower; L.* (G. F. M.)
142, 18. Described by Hartt.
142, 29. Examples larger than figure 1 b, have been found. (G. F. M.)
142, 30, 31, 33. Read in all three cases *L. C.* (G. F. M.)
142, after 31, insert, **Conocoryphe trilineata,** (species Emmons) Walcott, Fauna of Upper Taconic of Emmons, in Amer. Jour. Sci. Vol. 34, Sep. 1887, Art 22, p. 197.– *See Appendix.*
142, 38. *Conodonts* are abundant also at Cincinnati. (J. F. J.)
143, 1. Read **Conostichus.** (E. W. C.)
143, 39. Read *crebristriata.* (O. B. Harden.)
144, 11. For septune read septum.
144, 40. Insert **C. magnifica,** and other species described by Spencer, in *Bull.* Miss. University, in 1884. (J. W. D.)
144, 40. Insert **Conularia micronema,** Meek; and **C. newberryi,** Meek. Pal. Ohio, Vol. 2, p. 316, pl. 18, figs. 1, 2; among the most characteristic fossils of the Cuyahoga shale in Ohio. (J. S. N.)

145, over 1, insert, **Conularia niagarensis.** Hall, Pal. N. Y. Vol. 2. See *Conularia quadrisulcata* below. (J. W. D.)
145, 22. For **C. quadrisulcata**, read **C. niagarensis.** (*C. quadrisulcata.*)
145, 26. For Miller, read Sowerby. (E. W. C.)
146, 7. Read Fig. 3.
146, 23. Read siphuncle.—How can a *Conularia* have a siphuncle? (G. F. M.)
146, 31. Add dung of reptiles, &c. (J. S. N.)
147, 21. For corallines, read crinoids.
147, 33—36. Erase from "small" to "Mill Cr." These are small branching bryozoa. (E. W. C.)
147, 38. For corallines, read corals. (E. W. C.)
148, 10. Read *Cystiphyllum;* and 11, corals.
148, 23. **Coral,** " Probably **Inocaulis plumulina.** Hall. Pal. N. Y., Vol. 2. (J. W. D.)
149, 1. Read **flexuosum, rugulosum, spicatum.** (E. W. C.)
149, 2. For *Sigillariæ*, read *Cordaiteæ.* (L. L.)
149, 10. Read *congruens.*
149, 36. A new *Cordaites* from the *Devonian* rocks at Meshoppen, Wyoming Co., Pa. See **Dicto-cordaites** *in the Appendix.*
150, 1. Read *Cardiocarpus.*
150, 7. Add: "also very abundant in Nova Scotia." (J. W. D.)
150, 22. Read 86.
151, 1. Read **lacoei.**
151, 2. Insert **Cordaites gracilis.** Recently reported by I. C. White from the Tipton Run Coal beds in Blair Co., Pa., hitherto accounted to be in the *Pocono No. X formation.* (MS. letter Feb. 27, 1889.)
151, 5. Read *folialatus.*
151, 13. **C. principalis** is very abundant in the *Permo-carboniferous* of Nova Scotia & Prince Edwards Island. (J. W. D.)
151, 15. There is no such species as **C. reflexa.** (L. L.)
151, 37. Read *Artisia.*
151, 38. Read *Dadoxylon.*
152, 25. Insert **Cordaites simplex.** See note under *C. principalis*, above.
152, 31—33. Erroneous description. There are no discs; only undulations of the surface; the tube is open inside. (R. P. W.)
153, 2. Read Rogers'.
153, 22. This **Crania corrugata** is probably nothing but the under surface of **Lichenalia concentrica,** a bryozoon. (R. P. W.)—Probably the base of a coral of the *Lichenalian* type. See Pal. N. Y. Vol. 2, plate 40 E, fig. 5, 6. (J. H.)
153, 39, 40. Erase 162, 163, 164; and (1); also the 4 on page 154, line 1. (E. W. C.)
154, 12. For **Crania prima** read **Lingulepis pinniformis,** the smaller (dorsal) valves of which are shown in Owen's figure. (R. P. W.)
154, 24. N. H. Winchell does not consider the *St. Croix sandstone* as ***Potsdam.*** See his Minnesota Geological Reports. (A. W.)
154, 34. **Crematopteris pennsylvanica,** Lesq. is probably a poorly preserved *Cordaianthus.* (R. D. L.)
155, 29. Read *Upper* Cambrian. (G. F. M.)
155, 31. Read *Upper* Cambrian. (C. D. W.)

Crepicephalus. Owen's figure, pl. 1 *a*, fig. 10 should be considered the type species; a true *Ptychoparia.* Walcott uses an old generic name for a new genus; with *Dikelocephalus* (?) *iowensis*, Owen, pl. 1 *a*, fig. 13, for its type. (A. W. V.)

156, 9. For Falls of the Ohio, read Crawfordsville, Ind.

158, 1. Erase "near Bloomsburg" &c. to ——.

158, 40. Read Darran's Narrows. (E. W. C.)

159, 15. Read *Spirifera disjuncta.*

160, 13. Read *Orthoceras.*

160, 21. Erase *IX*, *X*. (J. J. S.)

160, 36. For *Black* read *Green.* (J. J. S.)

161, 5. Read Robinson.

161, 29. Read siphuncle.

162, 11. Read *Proetus.*

163, 40. For *Lower Silurian*, *II*, read *Upper Cambrian*, *U. C.*, associated with *Dicellocephalus*, &c., &c. See Bull. 30, U. S. G. S. p. 21, 26. (C. D. W.)

164, 4. Read *Terebratula.*

165, 1. Read **Ctenoptychius stevensoni**, Worthen.—Read fish tooth. (J. S. N.)

165, 4. Read *Cuculœa.*

165, 5. Read **Cuneomya.**

165, 10. For **Cyathaxonia herzeri**, read **Cyathaxonia wisconsinensis**, Whitfield, Geol. Wisc. Vol. 4, 1882, pl. 14, f. 3—5;—Prelim. Des. Ann. Rt. Wisc. Geol. Sur. 1878, p. 79. (R. P. W.)

165, 20. Read **unita.**

165, 21. For **Cyathocrinus** ——— Hall, read **Lecanocrinus macropetalus**, Hall, Pal. N. Y. Vol. 2, pl. 45, f. 1, &c. fig. 5, 5a, 5b. (R. P. W.; J. C.)—The lower figure however is distinct from the others, and of an undescribed genus. (R. P. W.)—Different genera. (J. H.)

168, 4. Read **Cyathophyllum.**

168, 19. For New York, read Chicago.

169, 17. Read *giganteum.*

169, 23. Read **Cyathophyllum.**

170. 1. Does not seem to be a *Cyathophyllum.* (G. F. M.)

171, after 37. Insert **Cychrus minor**, Horn, and **Cychrus wheatleyi**, Horn, Trans. Amer. Ento. Soc. Vol. –, p. 242, 243. Found in the bone cave at Port Kennedy, Chester Co., Pa.

172, 18. Read *leavenworthanum.*

174, 1. For **Cyclopteris**, read **Archæopteris jacksoni.** See Dawson's Geol. Hist. of plants, p. 74, f. 24. (R. D. L. and J. W. D.)

174, 2. For St. John, read Maine. (G. F. M.)

174, after 4. Insert **Cyclopteris obtusa**, put by Dawson under **Aneimites.** See Report on Fossil Plants of Lower Carboniferous and Millstone grit 1873, p. 27. (R. D. L.)

174, 5. For **Cyclopteris valida**, read **Aneimites valida**. Dawson. (R. D. L.)

174, 6. Read *pervetustum.*

174, after 8. Insert **Cymindis aurora**, Horn, Trans. Am. Ent. Soc. Vol.—, p. 243, insect found in Bone cave at Port Kennedy, Chester Co., Pa.

175, 15. Read *oblongus.*

175, 24. Read **Sanguinolites plicatus.**
175, 25. Read **subelliptica.**
175, 27. Read *subellipticus.*
176, 6. First of the two figures upside down. (J. H.)
176, 25, 26. Erase 29; 65. (E. W. C.)
176, 28. Credit figures and descriptions to Bull. American Museum, in Central Park, New York. (R. P. W.)
177, 9. **Cypr. inflata** does not occur at Watertown, N. Y., but is a Wisconsin species. Emmons' figure here given is probably of some **Modiolopsis.** (R. P. W.)
178, 6. Read *angustatus.*
178, 7. Read **catskillensis.** Also on line 9.
178, 12. Compare this figure with *Palæanatina typa*, Hall, 1870, Prel. Not. Lam. *VIII g.* (J. H.)
178, 29. For **Cyp. recurvus**, read **Cimitaria recurva.** (R. P. W.)
178, 39. For act read fact.
178, 40. Read *Orbicula.*
179, 1. For **Cyp. rhombeus**, read **Cytherodon rhombeum**, Hall, Pal. N. Y. Vol. 5, pl. 75, f. 19-23. (R. P. W.)
179, 18. For better figures than those here given see Geology of Tennessee, Plate 2. (J. M. S.)
180, 1. Read *truncatus.*
180, 32. Erase 9.—Line 33, erase 3, and 25.—Line 35, erase 46, 47, 48, 53.—Line 36, erase 20, 5, 29, 48.—Line 37, 38, erase "Rambo's, *Hamilton SS.* (107-1.)" (E. W. C.)
181, 5. Read **expansum.**
181, 19. Read **trentonensis.**—This figure is an *Oncoceras.* (R. P. W.)
181, 26. This figure is a **Gyroceras.** (R. P. W.)
182, 3. For *X* read *XI.* (J. J. S.)
182, 24. Read Schoharie.
183, 1. Read (*Cyrtonella*). (J. H.)
183, 10. For Meller, read Miller.
183, 31. Read **americanum.**
183, 36. Read Haime.
184, 26. For "bases of crinoidal columns, or stone lily stems" Matthew queries if they be not tubes of *Aulopora.* Claypole says *Aulopora.* A. Winchell also. Whitfield, buds of *Aulopora.* J. F. James, branches or cells of the Polyzoans, probably a species of *Aulopora.* Collett suggests *Tentaculites.*
187, after 18. Insert **Cytherodon rhombeum**, wrongly named *Cypricardites rhombeus* on page 179 above. (R. P, W.)
187, next line. Insert **Dadoxylon**, a kind of wood. (J. W. D.)
187, 21. Read (**Odontochile.**) For *ægeria*, read *egeria.* (E. W. C.)
187, 27. Read **boothi.**
French authors are using *Cryphæus* for such species as *Dalmanites boothi*, Green. But Green's generic name *Cryphæus* is objectionable because used for another genus in Natural History. (A. W. V.)
187, 33. To the figures here add the figure on page 111 above given to **Calymene** ——— ?
manites callitiles is a synonym of **Dalmanites boothi.** (R. P. W.)

188, 7 ; 8 ; 10. Erase 47 ; 14 ; 12, 13. (E. W. C.)

188, 34. Read *longicaudatus.*

189, 16. Read cheek.

189, 21. Read **myrmecophorus.**

189, 26. Claypole and White in their Reports give their reasons for recognizing no Upper Helderberg limestones in Middle Pennsylvania Their reasons are wholly palæontological ; the fossils are all *Marcellus* forms. I do not accept this fact as a sufficient argument for so important a conclusion as the cessation of sediments in the Upper Helderberg age over an area showing no *certain* marks of stratigraphical nonconformability.

189, 31. Read **pleuroptyx.** (R. P. W.)

190, 1. Read **pleuroptyx.** (R. P. W.)

192, 1. Insert **Danacites**, Goepp., and **Dechenia**, Goepp. (L. L.)

192, 5. Read *brachynota* and **brachynota.**

192, 6. The absurd spacing of the page above and below **Delthyris complicata** was the result of the compositor's misunderstanding a direction for spacing out the whole of a short page, given on the last revise.

192, 11. Read *staminea.*

192, 22. For **medialis**, read **audacula**, Conrad. (R. P. W.)

192, 25. Read *mucronata.*

192, 28. Read *radiata.*

192, 30. Read *sinuata.*

192, 31. Read **staminea.**

193, 1. Read **Deltoptychius.**

193, 14. Read (*erpeton.*)

193, 16. For Calamite tree, read *Sigillaria.* (J. W. D.)

193, 22. Read, "or a similar reptile."—Compare Mantell's *Telerpeton elginense* from the Old Red of Scotland. It is my personal opinion that this part of the Old Red is really Lower Carboniferous and not Devonian. The *Telerpeton* may however be even Triassic· (A. Winchell.)

194, 5. Read Tatamagouche.

195, 38. Read (manganesian or ferruginous.)

196, over 38, insert **Dentalium cericeum**, Worthen, Ill. Report, found in the Coal measures of Illinois and Indiana. (J. C.)

196, 21. For *Clæphycus*, read *Chlœphycus.*—Miller & Dyer never made a genus *Zygophycus.* The genera *Aristophycus*, *Chloephycus*, *Trichophycus*, &c., were referred by J. F. James to inorganic causes as early as 1884. See Fucoids of the Cincinnati Group, Jour. Cin. Soc. Nat. Hist. Oct., 1884, Jan., 1885, Vol. 7. (J. F. J.)

198, over 1, insert **Dicallus alutaceus**, Horn, Trans. Am. Ent. Soc. Vol. 5, p. 244, found in the Port Kennedy bone cave, Chester Co., Pa.

198, 1. Read **harti.**

199, 5. For 62, read 21. (G. F. M.)

199, 25. Read *crassus.*

199, 26. Read **Dictyospongia fenestrata.** (G. F. M.)

199, after 37, insert **Dicto-cordaites**, a genus, just established by Dawson. Amer. Jour. Science, July, 1889, allied to *Cordaites*, with figure and description of the specimen from Meshoppen, Wyoming Co., Pa., in Lacoe's cabinet at Pittston, from *Devonian strata. See Appendix.*

200, 1. Read **Dictyospongia prismatica.**
200, 5. Read *Cyathospongia reticulata.*
200, 8. Read **Dictyospongia ramosa.**
200, 14. For are read is.
200, 16. Read **Dictyospongia redfieldi.**
200, 18. Read **Dictyospongia tuberosa.**
201, 1. Read **Dictyospongia**——— ?
201, 25. Read Trevorton.
201, 36. Read Pflanz.
201, 40. Insert **Didymophleps contusa**, Scudder. A cockroach from Vermillion Co., Ill. Mem. Bost. N. H. S. Vol. 3, p. 530, pl. 29, f. 6. *Coal measures, XIII.*
202, 1. Insert **Dieconeura arcuata**, Scudder. A cockroach from Mazon Cr., Ill. Mem. Bost. N. H. S. Vol. 3, p. 336, pl. 30, f. 4. *Coal Measures, XIII.*
202, 5. Diagrams of the dentition of this fish from Pal. Ohio. Vol. 2, pp. 7, 8, will be given in the Appendix.
202, 14. Read *Huron and Cleveland*, or *Ohio shale.*
203, 7. The *Huron shale* of Ohio is not the *Genesee* of New York, but represents all from the *Marcellus* up to the *Portage.* (J. S. N.)
203, 9. Insert **Dinichthys terrelli**, New. Pal. Ohio. Vol. 2, p. 7, and plates. A diagram of the dentition should be given. (J. S. N.) *See Appendix.*
205, 14. Read **cylindraceum.**
205, 20. Read **stramineum.** (That is, made of straws.)
206, 2. Insert **Diplodus compressus** ; **D. gracilis** ; **D. latus**, from Pal. Ohio. Vol. 2, p. 44, pl. 58. (J. S. N.) *See Appendix.*
206, 26. Read *Utica slate III a.* All these graptolites are found in *Utica*, never in *Hudson river* slate. (R. P. W.)
206, 33. Read radicle.
206, 38. Read *Retiograptus.*
206, 40. Read *Utica slate III a.*
207, 2. NOTE.—In Pennsylvania, *Formation No. III* includes *Hudson River slate* and *Utica slate.* While the distinction is evident in Middle Pennsylvania, it is very obscure or entirely disappears in the Lehigh-Dauphin-Cumberland-Great Valley range. Rogers' graptolites were probably found at the bottom of *No. III*, i. e., in the *Utica slate.* Those collected by the survey in recent years were got in the bottom beds (*Utica*). There are in Europe several fixed horizons of graptolites. (See for convenience of reference, Prof. Lapworth's last paper in the Geol. Mag. of London, Feb. 1889, page 65.) There is an *Upper Silurian* horizon of Graptolites, and the entire family of the *Monograptidæ* is confined to that horizon. The *Utica* horizon is much lower and older; and there are other horizons still lower and still older ; to one of which the observation on page 207, lines 12 to 15 refers. *Diplograptus* is a genus of Graptolites supposed to be exclusively confined to *Ordovician* (*Lower Silurian, Siluro-Cambrian*) *strata.* No *Diplograptus* has been accepted as a *Cambrian graptolite* by all palæontologists, although some Cambrian forms have been given this name by individnal palæontologists; for example, *Diplograptus simplex.* The evolution theory is very dogmatic and

despotic, however, and will not allow the identity of two forms found in two widely separated horizons even when the closest scrutiny can detect no difference. Oddly enough the bitterest opponent of evolution, Lewis Agassiz, carried this prejudice to its extreme, by refusing to regard two fossils as of the same species if they were found even in two subdivisions of the same formation.

207, 16. **Diplograptus? simplex.** Probably some other genus. (G. F. M.)

208, 5. Read *Utica* formation, *III a.*

208, 32. For X—6, read 6—10. (E. W. C.)

209, 4. Read "not *Orbicula lamellosa.*" (R. P. W.)

209, 24. Read 1885.

209, 35. For X-10, 16, 20, read 6-21. (E. W. C.)

210, 1. **Discina grandis**, a synonym of **Discina ampla**, to which the whole paragraph should be transferred. (E. W. C.)

210, 14. Hall's Report on the 4th District of N. Y. 1843, is always meant when "Hall" stands thus alone. So of Vanuxem's Report on the Third District of N. Y. 1842, when "Vanuxem" stands alone. "Rogers" standing alone refers to his Geol. Pa. 1858.

210, 24. For 25 read 23. (E. W. C.)

210, 37. Erase 20. (E. W. C.)

212, 28. Insert **Dyscritus vetustus**, Scudder. A cockroach from St. John, N. B. Geol. Mag. Lond. Vol. 5, 1868, p. 172, 176. (See Dawson's figures of these insects in Geol. Mag. Vol. 4, September, 1867, p. 385.)—— *Devonian strata. VIII? IX?*

Eatonia medialis. The first two figures here given are of **Leptocœlia flabellites**, Conrad; the third figure is of **Leptocœlia fimbriata**, Hall. (R. P. W.)

213, 19. Rogers' fig. 640 is an **Athyris.** (R. P. W.)

213, 38. Erase 6. (E. W. C.)

214, 6. Reverse the figure; the creature is now shown lying on its back. (J. H.)

214, 10. Read 655, fig. 863. (R. P. W.)

214, 18. Read spines.

214, after 26 insert **Edestes davisi** found in Australia; **Edestes giganteus**, and **Edestes heinrichi**, both found in Illinois; **Edestes minor**, found in Illinois. (E. W. C.)

214, 27. This is not *Edestes vorax*, but **Edestes minor**, Newb. See Annals of N. Y. Acad. Sc. Vol. 4, 1888. (J. S. N.)

214, 40. For *Subcarboniferous*, read *Coal measures of Arkansas.* The genus **Edestes** in America has up to this date been found nowhere but in the Mississippi Valley coal fields. (E. W. C.)

215, 1. Read **Aspinwallensis.** (R. P. W.)

215, 11. Erase (Black Foss.); the two limestones are different. (J. J. S.)

215, 36 to 40. Erase the whole, as out of place, and better expressed in its proper place on page 330 below.

216, 7. For **Edmondia** read **Cypricardites.** (R. P. W.)

216, under 14 insert **Eileticus anthracinus**, Scudder. Mem. Boston S. N. H. Vol. 3, p. 179, pl. 13, fig. 56, from Mazon creek, Ill., *Coal measures, XIII.—See Appendix.*

216, 37. For throat read thoracic. (chest.)

217, 2. Insert "Hall," before Rogers.

217, 6. Read *tenuitextum*.
217, 13. Read **Baileyi**, and *baileyi*.
217, 18. Read Palæon.
218, 14. For coralline read cystid. (J. C.)
218, 30. Read 68-7.—On line 31, erase 4.—On line 32, erase 11, 12, 14, 15, 25. (E. W. C.)
219, 2. *Eopteris morieri* was considered a vegetable organism, by one of the highest authorities, Count Saporta, of France. But other fossil botanists of eminence dispute it. Sir J. W. Dawson writes to me (Feb. 13, 1889), "I have examined the original specimen of *E. morieri*, and know that it is not a plant, but merely a plumose crystallization of pyrite." "So I was told by the botanists in Europe." (J. S. Newberry.)
219, 38. Read *Enaliosaurian*.
220, 1. Add: Geol. Sur. Ill., Vol. 3, 1868, p. 560.
220, 12. Stevenson objects to my use of the popular name "lobsters;" but this dictionary is not written for men of science, nor even for students of Palæontology as such, but for the people of Pennsylvania, whose convenience in using it I consult first.
221, 14. Erase so-called. (J. W. D.)
221, 15. For Truro read "Grenville and elsewhere in." (J. W. D.)
221, 26. Read *Quaternary*.
223, 1. Read *crithmifolia*. (L. L.; R. D. L.)
223, 37. Read word.
224, 18. Read **verneuilianum**.
225, 15. Read **Archæoscyphia minganensis** (*Ethmophyllum minganense*). This change of name has been made by Walcott after Dr. G. J. Hinde's recent revision of Walcott's *Ethmophyllum* group. Hinde proposes *Archæoscyphius minganensis*, in his "Note on the spicules described by Billings in connection with the structure of *Archæocyathus minganensis*, Geol. Mag. Dec. III, Vol. V. No. 5, p. 226, 1888; and paper read before the Geol. Soc., London, Dec. 19, 1888. He makes it a silicious *sponge*. The other species he makes *corals* of the new family of *Archæocyathinæ*, the type species of which is *Archæocyathus profundus*. For *A. atlanticus*. Hinde establishes a new genus, *Spirocyathus*, a coral of the family of *Archæocyathinæ*. *Ethmophyllum* he retains as the name of another genus of this same family. (J. D. D.) "I do not agree with Walcott's new arrangement of *Archæocyathus* of Billings. See Hinde's recent papers, &c." (J. W. D.]
225, 40. For *Lower Cambrian* read *Lower Silurian* (*Calciferous sandstone,*) *II a*. (C. D. W.)
226, 1. Read **Archæocyathus profundus**. (*Ethmophyllum profundum.*) (C. D. W.)
227, 1. Read **Archæocyathus profundus**. (*Ethmophyllum profundum.*) (C. D. W., who says (Ms. Corr., Feb., 1889) that after Hinde's researches he restores Billings' name for this fossil, but lets *Ethmophyllum rarum* and *rensselæicum* stand with a query mark to each, for the present.)
227, 25. Read **Ethmophyllum ? rarum**. (C. D. W.)
228, 1. Read **Ethmophyllum ? rensselæricum**. (C. D. W.)
228, 22. **Etoblattina balteata**, Scudder, *Gerablattina balteata*, Scud,

See above. Name changed in Proc. Bost. S. N. H. Vol. 24, 1889, p. 46, 48. *Upper Coal measures* of W. Va. *XVI.*

Etoblattina fasciata, Scudder. A cockroach from the *Barren Coal measures* of Richmond, Jeff. Co. O., and the *Upper Coal measures* of Cassville, W. Va. Proc. B. S. N. H. Vol. 24, p. 47, 48,

Etoblattina hustoni, Scudder, Wills creek, Richmond, O. Proc. Bost. S. N. H. Vol. 24, p. 53, *XIV.*

Etoblattina lesquereuxii, Scudder. From the anthracite, Gates vein, near Pittston, Pa. Mem. Bost. S. N. H. Vol. 3, 1879, p. 67–69, pl. 6, f. 3, 4. *XIII.*

Etoblattina marginata, Scudder, Richmond, O. Proc. Bost. S. N. H. Vol. 24, p. 48–50. *XIV.*

Etoblattina mazona, Scudder, Mazon Cr., Ill. Proc. Bost. S. N. H. Vol. 21, 1882, p. 391. *XIII.*

Etoblattina stipata, Scudder, Richmond, O. Proc. Bost. S. N. H. Vol. 24, 1889, p. 50. *XIV.*

Etoblattina strigosa, Scudder, Ditto, p. 52. *XIV.*

Etoblattina tenuis, Scudder, Ditto, p. 46. *XIV.*

Etoblattina variegata, Scudder, Ditto, p. 51. *XIV.*

Etoblattina venusta, Scudder, (*Blattina venusta*, Lesq. Second Geol. Rt. of Arkansas, 1860, p. 314, pl. 5, f. 11). Mem. Bost. S. N. H. Vol. 3, 1879, p. 70, pl. 6, f. 12. From base of *Conglomerate*, at Frog Bayou, Ark.—*XII.*

Eucænus ovalis, Scudder. A cockroach from a Mazon creek nodule, Ill. Mem. Bost. S. N. H. Vol. 3, 1885, p. 325, pl. 29, f. 4. *Coal measures, XIII.*

229, 1. Hall's figure 3, here given, is not of *Eucalyptocrinus decorus*, but of **Ichthyocrinus lævis**, Conrad, Sp. (R. P. W.)

229, 17. *Euephemerites affinis* ; *E. gigas ; E. primordialis ; E. simplex ;* described by Scudder in Mem. Bost. S. N. H. Vol. 3, 1885, p. 350, have been abandoned, as they are probably not cockroach wings but fragments of plants. (R. D. Lacoe.)

230, 1. Emmons' figure 394, here given, is not the Carboniferous gasteropod *Euomphalus catilloides* of Conrad ; but is the Lower Silurian cephalopod **Lituites undatus** of Conrad. (R. P. W.)

230, 34. Read **clymenioides**, and *clymenioides.*

231, 12. The figures here given are of a *Cyclonema.* (R. P. W.)——Read also *pervetustum.*

231. 34. Read **subrugosus**, Meek & Worthen, Illinois Report Vol. 5, p. 607, who found *rugosus* preempted by Sowerby in 1829 for quite a different European fossil. (J. C.; R. P. W.)

232, 14. Hall's *Straparollus rugosus* was preoccupied (as just said.) (R. P. W.)

233, 9. "This is a mistake which ought not to be perpetuated. The forms alluded to here are *fresh water species* and mostly undescribed." (I. C. W.) They must therefore be removed from **Euomphalus**, to other genera when studied.

233, 13. **Euphoberia anguilla**, Scudder. A myriopod found in a Mazon Creek nodule, Ill. See Mem. Bost. S. N. H. Vol. 3, 1882, p. 179, pl. 13, f. 5, 6. *Coal measures, XIII.*

Add reference to Amer. Jour. S. Vol. 46, 1868, p. 25. Also Goel. Sur. Ill. Vol. 3, p. 556, f. 3. This is Scudder's *E. granosa.*

233, 22. **Euphoberia carri**, Scudder. Mem. Bost. S. N. H. Vol. 3, 1882, p. 172, pl. 12, fig. 4, 9–12, 14–19, and pl. 13, fig. 16–18. Mazon Cr., Ill. *Coal measures, XIII.*

Euphoberia granosa, Scudder. Ditto, p. 168, pl. 12, fig. 22, 24–26 and pl. 13, fig. 13.

Euphoberia horrida, Scudder. Ditto, p. 158, pl. 13, fig. 11, 12, 14.

Euphoberia major, Meek & Worthen. See **Acantherpestes major**, Scudder.

233, 24. *Euproops* is not in use. This species should be called **Prestwichia colletti**, which I think is the same as *P. danæ.* (A. W. V.)

233, 34. Read Durkee's ferry. (J. C.)

234, 1. For **Euproops**, read **Prestwichia danæ**. (A. W. V.)

For **Bellinurus**, read **Belinurus**; See Koenig's Icones Fossilium Sectiles, London, 1820, pl. 18, fig. 230. Genus described by Bailey in Ann. Mag. Nat. Hist. Feb. 1863, p. 105. (A. W. V.)

234, 20. **Eurylepis**, Newb. a genus of *Palæonisceid* fishes, of which eight (8) species are found in a bed of cannel (Coal No. 7, of the Ohio series) at Linton, Ohio, near the Pennsylvania line; and never found elsewhere. See Pal Ohio, Vol. 1, pp. 255, 285, 347 to 355. (J. S. N.) *See Appendix.*

Zittell's figure very bad. (J. S. N.)

235, 39. For Coal era read "in the ages preceding the Coal." (G. F. M.)

236, 5. Read shrimp.

236, 10. Credit DeKay, before Vanuxem. (R. P. W.) *Eurypterus remipes* was described by Vanuxem as found near Waterville, N. Y., in strata holding the most easterly *gypsum hopper* seen by him in Middle New York. He made it therefore a fossil of the *Onondaga (Salina) salt group.* Subsequently it became known as a fossil characteristic of the *Waterlime* subdivision of the *Lower Helderberg* formation, and all Hall's plates give it that horizon.

Eurypterus described by DeKay Ann. Lyc. Nat. Hist., N. Y., Vol. 1, 1825, pl. 2, p. 375. (A. W. V.)

236, 19. *Favistella stellata* is a synonym for **Columnaria alveolata**, Goldfuss, 1826. (J. F. J.)

237, 38. For Manual read Manuel.

238, 3. Add to Perry Co. "and Stroudsburg, Monroe Co." (E. W. C.)

240, 1. **Fav. fibrosus** is not Hall's name. (R. P. W.)

240, 19. **Fav. gothlandicus**, Lamarck.

240, 24. *Favosites lycopodites* probably a *Monticulipora.* (J. W. D.)

240, 40. Read Frankfort.

245, 23. Read specimen 5–20, and erase the 2. (E. W. C.)

246, 1. **Filicites** ——— ? This is *Plumalina plumaria*, Hall, 30th An. Rt. 1877, pl. 4, fig 1 to 5. Also, *Ptilophyton vanuxemi*, Dawson; Coal Flora, III, p. 790; see Report on Devonian of Canada, 1882 (J. W. D.)

247, 23. Read *Hybodus.*

248, 9. Read Hybocladodus.

20. Read Rhadinichthys.

35. *Onchus clintoni*, a crustacean. (R. P. W.)

35. Erase 50 a 7. (E. W. C.)

249, 14. Read *XIII.*
33. Read scale and spine.
250, 13. Read *Permo-carboniferous, XVI.* (I. C. W.)
25. Read parenchyma.
32. This is the figure of a Silurian crinoid. (R. P. W.)
251, 14. Read Schodack.
16. Read **Rusophycus bilobatus.**
17. Read **Taonurus** for **Spirophyton.** (R. D. L.)
21. Insert Harlan, and read **Arthrophycus harlani**, Hall, for **Harlania halli**, Goepp. See Hall, Pal. N. Y. II, p. 5. (R. D. L.)
22. The same correction.
25. Read **graphicus.** (E. W. C.)
252, 4. The same correction.
7. Insert Harlan.
12. Read **Fucoides**—"Is not this *Scolithus?* (J. W. D.)
253, 1. Read (*ventricosa*).
12. *Fytolithus.* Erase the line. (E. W. C.)
30. Add: Mem. Bost. S. N. H. Vol. 3, 1885, p. 329, pl. 30, fig. 2, 3; specimen in Lacoe's collection at Pittston. (R. D. L.)
33. For (*Eoblattina?*) read: now **Etoblattina balteata.**
33. Insert **Genopteryx constricta**, Scudder; a hexapod insect found in a Mazon Creek nodule; Mem. B. S. N. H. Vol. 3, 1885, p. 327, pl. 29, fig. 4. *Coal measures.* Now in Lacoe's collection at Pittston. *XIII.*
33. The figure of **G. balteata** is upside down. (C. D. W.)
39. Read 1879. Vol. 3, p. 110, pl. 6, figs. 9, 10.
40. Insert **Gerablattina fascigera** (*Blattina*) Scudder. A cockroach from the base of the Conglomerate near Pittston; in Lacoe's collection. Mem. B. S. N. H. Vol. 2, 1879, p. 113, pl. 6, fig. 1, 2.—XII.
254, 4. Read *XII.* (I. C. W.)
5. Read *Gingko.*
Geralinura carbonarius; **Geraphrognus carbonarius**; **Gerapompus blattinoides**, **Gerapompus extensus**, **Gerarus danæ**, **Gerarus mazonus**, **Gerarus vestus**; and **Gerephemera simplex**: all insects described by Scudder will be found in the *Appendix.*
22. Read Junkin's farm. And for east read south. (E. W. C.)
255, 38. Erase 6. (E. W. C.)
39. Read *Cardiola speciosa.* (E. W. C.)
256, 1. Read **discoideus.**
10. Read *Leiorhynchus limitaris.* (R. P. W.)
257, 5. Read *crenistria.*
10. Read *ferratus.*
258, 23. Read interseptal.
37. Read *scitulus.* (E. W. C.)
259, 8. Erase 104-39, two. (E. W. C.)
260, 7. For **Gorgonia**, read **Dictyonema.** See Hall, Pal. N. Y. Vol. (R. P. W.)
24. Same correction.
32. Read *Gorgonia.*
261, 1. Read **Dictyonema.**
26. Read (*sphenomya cuneata.*)

262, 9. Erase 36 ; and on line 10 erase D, also 9.
34. Read *hannibalense.*
35. Read Shumard.
263, 27. Read (*Pentremites melo.*)
264, 6. Now **Diplograptus dentatus.** (J. W. D.)
10. Read *graptolites.*
17. Now **Didymograptus divaricatus.** (J. W. D.)
18. Read *Utica shale, III a.* (R. P. W.)
20. Same correction.
265, 2. Same correction.
4. Now **Dichograptus logani.** (J. W. D.)
266, 1. Read Levis.
3. Insert Hall before Walcott. (R. P. W.)
8. For *Loraine*, etc., read *Utica, II a.* (R. P. W.)
12. Same correction.
24. Read *Graptolithus.*
29. Read **Retiograptus.**
267, 10. Read **burlingtonense.**
268, 3. For Meyer, read C. S. White.
269, After 3 insert *Gyroceras expansum*, Sæman. See **Nautilus buccinum**, Hall. *VIII c.*
6. Read Vol. 1.
16. Read **Halonia tortuosa,** (and erase **H. tuberculata**) which is a good name. Lesq. Coal Flora., p. 413, pl. 61, fig. 1, 3. (R. D. L.)
40. "Lepidodendroid trees allied to *Lepidophloios*, and mostly decorticated. (J. W. D.)
271, 6. For **escharoides**, read **catenulatus**, the same as on page 270. (J. J. S. & R. P. W.)
22. Read Little Glace Bay.
25. Read (coleopterids.)
272, 6. Read **longipenne.** (E. W. C.)
7. For : under the, read, near the base of.
8. For 286, read 41, 157.—For *XI* read *XII.* Add. Proc. Am. Acad. Vol. 20, 1888, p. 172.
20. Read *Ptychoparia.*
273, 10. After *Niagara* add *Clinton.* (E. W. C.)
275, 14. Read Rafinesque.
281, 29. Read *Heliophyllum.*
33. Read *Aulopora.*
83. Insert **Hemeristia occidentalis.** *See Appendix.*
282, 1. For **Hemipronites** read **Streptorhynchus.** (R. P. W.)
31. Erase : and the same. (J. J. S.)
33. Read *XI.* "*No. X* has no observed fossils in Fayette and Westmoreland counties, except near the head of Redstone creek, and there they are *fish remains*, very indefinite." (J. J. S.)
282, 39. There is no *Hemipronites crenistria.* All unite in considering it the type of *Streptorhynchus.* (R. P. W.)
283, 4. Erase the comma after **Heterocrinus.**
19. Insert here (from page 298) *Hippurites*, &c.
32. Read *obliquus.*
284, 29. **Holoptychius americanus**, Leidy, is probably distinct from H. nobillissimus, the scales being only half as large. (J. S. N.)

286, 8. Holoptychius is closely allied to Sauripteris but not certainly identical. (J. S. N.)
287, 7. Read Recherches.
9. Read Scottish.
34. Erase 3, 7, 13. (E. W. C.)
288, 8. Read Silurian System founded on Geol., Researches, &c., London, 1839, pl. 7, figs. 1 *a*, 1 *b*. (A. W. V.)
288, 25. Erase 161, 13. (E. W. C.)
289, 8. Insert **Homothetus fossilis**, Scudder. *See Appendix.*
13. Read skull.
291, 4. Read *Hylonomus.*
7. Read Fundy.
8. Read (*Sigillariæ*).
34. Read *hildrethi.*
36. Read Kanawha.
291, 38. **Rhacophyllum expansum**, found at Olyphant, Lackawanna Co., Pa. Lesq. Coal Flora. *XIII.* (R. D. L.)
292, 3. Read **Sphenopteris hildrethi**, Lesq. Coal Flora, p. 283. (R. D. L.)
5. Read Kanawha.
293, 11. Read *L. C.* (G. F. M.)
12. Read **acadicus**.
16. Read *Lower Cambrian*, *L. C.* (G. F. M.)
23. Read *aculeata.*
294, 24. Read **carbonarius.**
295, 20 and 22. Read *Lower Cambrian*, *L. C.*
27. Read Hall and *Whitfield.* (R. P. W.)
296, 6 and 8. Read *Lower Cambrian*, *L. C.* (G. F. M.)
22. Read U. S. G. S.
297, 18 and 21. Read *Lower Cambrian*. *L. C.* (G. F. M.)
298, 3. Read *Hippurites* and transfer to page 283.
298, The long spine is that *Machæracanthus sulcatus*, Newb., the shorter ones, of *Machæracanthus major*, Newb. Pal. Ohio, Vol. 1, p. 304, pl. 25, fig. 2. (J. S. N.)
299, 5. Read cheek.
300, 24. Read (J. W. Dawson.)
39. Read contributions.
301, 3. Read Walcott.
301, 10. *Isotelus canalis*, should be *Asaphus canalis*. See Whitfield's excellent description of it in Ann. Mus. Nat. Hist., N. Y., Vols. 1, 2, especially plates 11 and 12. (A. W. V.)
11. For *Trenton & Hudson river*, read *Birdseye and below;* for *I. canalis* has not been found in New York State above the *Birdseye limestone;* never yet in *Trenton*, nor in *Hudson river*. (R. P. W.)
302, 1. For *Isotelus gigas* read **Asaphus platycephalus**, Stokes. (A.W.V.)
302, 33. Insert: Often found in the *Hudson river* (Cincinnati) formation in Ohio. (E. W. C.)
302, 40. Read *acicularis.*
305, 1. **Leaia tricarinata** has had here given to it, by mistake, the figures which belong to the trilobite **Phillipsia scitula**. The correct figures will be given in the *Appendix.*

11. A figure of *Leaia leidyi* will be found in the group of figures at the top of page 309, below, under the word **Leperditia okeni**.
14. After "above" add "all except the lower figure which represents a different and undescribed species." (R. P. W.)
28. Read **rostellata.**
34. Read **globuliforme.** (E. W. C.)
39. Erase 2. (E. W. C.)

306, 8. Read **limitare.**
19. Erase 1. (E. W. C.)
39. For 6 read 8 and for 7 read 9. (E. W. C.)

307, 1. For 51–3, 6, 8, read 53–8; and erase 45 and 48.
2. Read Junkin's. (E. W. C.)
3. Read Hartzler's. Also Losh. (E. W. C.)
5. Erase to 81. Also 1, 2, 7, 16; 92–2. (E. W. C.)
21. Read Lathrop's. Also read Q4. (I. C. W.)
26. Read **quardricostatum.** (E. W. C.)
27. Erase the whole line after Pa. The only specimen from Cedar run is a *Leperditia alta*. The ground is *Onondaga* [*Salina*]. (E. W. C.)
31. Read Wapwallopen.

308, 6. For S–6, read 6–22. (E. W. C.)
25. For X–4, read 4–1. (E. W. C.)
40. Read **argentea.**

309, 36. For **Leperditia** read **Aristozoa troyensis.** Am. J. S. Vol. 34, p. 193. (C. D. W.)

310, 9. The block of figures is upside down. Transfer (*Patella levettei*, White) from line 9 to line 10, inserting it before Collett's. (R. P. W.)
23. Read Randall's.
25. Read **bullata.**

311, 1. Instead of "fern" read "lycopod." (L. L. & R. D. L.) Also in line 20.
17. Read Jas. Clarkson.
20. For "fern" read "clubmosses." See *Glyptodendron eatonense.* (E. W. C.)
29. Read (222–1).
30. For "not numbered in the collection," read "from Cove Mountain." (E. W. C.)

312, 17. Read *caudata.*
Fig. 4 is the same as *L. distans*, on page 317; and *L. oculatum*, on page 319. (E. W. C.)

313, 6. *L. auriculum* is a species unknown to me. (R. D. L)
8. The figure block is upside down.

314, 1. Fig. 127, 2 is not rightly placed under *L. chemungense.* It is probably *L. gaspianum.* See page 318 below. (J. W. D.)
9. For (28–1) read (32–1). (E. W. C.)
34. Read *veltheimianum.*

315, 10. Read *cheilalloeum.* (E. W. C.)

316, 9. Fig. 2 is a very poor decorcated specimen. For better figure see Acadian Geology. The species is so important that a better figure should be given. (J. W. D.) The figures referred to by Sir James Dawson will be given in the *Appendix.*

317, 7. Read Lesquereux.
24. After "Arkansas" add "and Colchester, Ill." (R. D. L.)
33. Read *cheillallœum.* (E. W. C.)
318, 11. Same correction.
12. **L. gaspianum.** See note of page 314, line 1, above.
18. Erase *L. minutum.* (R. D. L.)
33. Read *megiston.*
40. Read *Inter conglomerate.* (I. C. W.)
319, 7. Read *Alethopteris.*
37. Figure of *L. oculatum*, wrongly placed under *L. aculeatum* on page 312, above. (E. W. C.)
39. For **elongatum**, read **ellipticum.** (R. D. L.)
321, 14. Read 1883.
39. Read **Lepidodendron.**
322, 10. Read Presl.; and for Koechl, read Roehl.
11. Read *Phytolithus.*
12. Read Steinhauer.
323, upper lines. "Divers species are mixed in this. *Lepidodendron giganteum.* (L. Lesq.)
31. Read 15 for 16.
33. Read "Rare. In the Archbald," &c. Also after *veins* insert, "and at."
324, 2. Read Goldenberg.
6. For Collett, read "Lesquereux in Collett's report.
10. Read S. A. Miller.
325, 6. Read *XII.*
22. Read Westmoreland.
24. Add: The figure represents a detached blade of *Lepidostrobus hastatus.* See page 326, where there are other figures among which this one belongs. (Lacoe.)
25. The figure is of *Lepidostrobus lanceolatus.* See Lesq. Coal Flora, page 436. (Lacoe.)
326, 11. *Lepidophyllum plicatum* is an abandoned species, having been founded on an imperfect, distorted specimen. (Lacoe.)
35. Erase *hastatum.* The cone is of an unknown species. (Lacoe.)
327, 1. Erase "456 and."
2. Read 10 *a*, and 11 in part. (Lacoe.)
25. After blades read: curved at the apex into the stone. (Lacoe.)
30. Read 163.
40. Read 443.
328, 8. Read **Lepidostrobus variabilis.** Lacoe refers to Coal Flora Pa. page 434, pl. 69, fig. 26.
20. *Leptæna deltoidea* is a **Streptorhynchus.** (R. P. W.)
21. For **depressa,** read **rhomboidalis.** (R. P. W.)
27. For *Strophodonta* read **Strophonella punctulifera,** Hall. (R. P. W.)
28. **Strophomena rugosa** is **S. rhomboidalis.** (R. P. W.)
329, 12. For 223, read S-24. (E. W. C.)
13. For 19, X read 37; from *Hudson River*, near Lewistown. (E. W. C.)
330, 2, 3, 4. An error. (J. J. S.)
9. For 223, read S-24, Logan's gap. (E. W. C.)
32. Read Stevenson.

331, 3. Erase the 1.
27. Read page 447, fig. 13.
332, 7. Read **paralelum**, new species.
12. An error. Pisgah hill is *Hamilton*. *L. potens* was not found in Perry Co., Pa. The fossil here referred to is probably **Actinodesma subrectum.** 59-9 of the Cat. is a brachiopod. (E. W. C.)
335, 1. **Lesleya grandis,** Lesq. has been omitted. See Geol. Sur. Pa., Coal Flora, page 143, plate 25, figs. 1, 2, 3. (L. Lesq.)
5. All the figures given under **Lichas boltoni** belong to **Lichas breviceps,** on page 337 further on. To their place here on page 335 must be transferred all the figs. on page 337, except fig. 12 which is of an unknown species. (R. P. W.)
9. For chin-piece read lip. (Matthew.)
336, 1. Read: probably an arachnid of the genus *Anthracomartis*, &c. (Scudder.)
4. Read 736, for 236.
5, Read *Platynotus*.—Note, that the printer has shaved off *both* sides of the figure to fit the page.
337, 1. All the figures here placed under *L. brevicens* belong to *L. boltoni*, except fig. 12, which Hall says is of an unknown species. (R. P. W.)
3. Read plate 36.—The text here relates to the figures on p. 335. (Matthew.)
339, 6 to 13. Figures omitted.
340, 35. Read Millerstown.
36. Erase 46-5. (E. W. C.)
37. Read Delville.
341, 1. Read **obsoletus.** (E. W. C.)
2. Read **rugistriata.** (E. W. C.)
20. **Limnæa humilis** should be transferred hither from page 351, where it has been mispelled **Linnæa.**
26. A blunder in proof reading Report T2. It should be **Dalmania limulurus.** (J. J. S.)
30. Read **Linguella acuminata,** and transfer the figures and text to that name on page 350. (Walcott; Matthew.)
342, 20. Read **Lingulella antiqua.** (Matthew.)
343, 2. Vanuxem. Fig. upside down.
344, 1. Read **Lingulella dawsoni,** Matthew. I follow Walcott in making it *Middle Cambrian*. Matthew would correct it to *Lower Cambrian*; and so other cases on page 345, 351.
345, 4. Read Bedford.
346, 13. Read 60-8.
24. Read concentric.
28. Read papillæ.
36. Read *acutirostra*. (E. W. C.)
40. Note.—This may be a rule, but there are more exceptions than otherwise. (R. P. W.)
347, 17. Read *Triarthrus*.
22. Read Monog. Scot. Carl Brach.; Ohio, &c.
31. Insert *Lingula spathata*, Hall, Pal. N. Y. Vol. 3, 1859, *Lower Helderberg;* three specimens of which were gathered by Claypole at station 40, at Shipping Rocks, west of Mexico P. O., Perry

Co., Pa. See Cat. OOO, p. 136, 11953, wrongly placed under *L. spatulata*. (E. W. C.)

38. Rectify the same error by erasing 840 (three).

348, 21. Read *Ling. leœna.*

350, 1. Figs 1, and 1*a*, are the only figures in this group which really belong to *Lingulella cœlata.* The rest belong to other groups. (R. P. W.)

17. Insert 1839 after "Conr." (Walcott.)

351, 6. Read **Limnæa**; and transfer the whole paragraph to its alphabetical place on page 341.

8, 9. Read **Linnarssonia.** (Walcott.)

10. Insert Angelin, after **aculeatus.**

15. Read : (glabella), no eye-ridges on the fixed cheeks, and rounded genal angles. (Matthew.) As to *Middle Cambrian* see note to page 344, 1, above.

19. Read **Conocephalites.**

23. Read Canad. Nat.

26. Read **Lithomylacris simplex.**

29. Read **Lithomylacris angustum.**

352. 7 & 9. Read **Lithomylacris.**

18. Read **fimbriata.** These two western (Utah) insects are given because in Mr. Lacoe's list of specimens in his cabinet at Pittston. There are a hundred more which might be given if desirable.

NOTE.—As I cannot get corrections for pages 353, and onward, in time for the issue of this volume, they must be given at the end of Vol. 2.

LIST OF

THE PUBLICATIONS

OF THE

GEOLOGICAL SURVEY OF PENNSYLVANIA.

FROM 1874 TO 1889.

ANNUAL REPORTS.

1885 ANNUAL. J. P. Lesley, State Geologist, 8°, 769 pp., with preface and index, accompanied by Atlas 8°, 8 pl., and maps, 1886, contains the following special reports:

1. Oil and Gas. John F. Carll.
2. Vegetable Origin of Coal. Leo Lesquereux.
3. Pittsburg Coal Region. E. V. d'Invilliers.
4. Wellersburg Coal Basin. J. P. Lesley and E. B. Harden.
5. Tipton Run Coal Basin. C. A. Ashburner.
6. Anthracite Coal Region. C. A. Ashburner.
7. Wyoming Valley Fossils. C. A. Ashburner and A. Heilprin.
8. Bernice Coal Basin. C. A. Ashburner.
9. Mehoopany Coal Field. F. A. Hill.
10. Cornwall Ore Mines. J. P. Lesley and E. V. d'Invilliers.
11. Delaware and Chester Kaolins. J. P. Lesley and C. A. Ashburner.
12. Quaternary Geology, Wyoming Valley. C. A. Ashburner, F. A. Hill, and H. C. Lewis.
13. Pressure, &c., of Rock Gas. J. P. Lesley.
14. Progress Geodetic Survey. Mansfield Merriman.

1886 ANNUAL. J. P. Lesley, State Geologist, 8°, in four parts, as follows:

i. Pittsburgh Coal Region. E. V. d'Invilliers.
ii. Oil and Gas Region. J. F. Carll, F. C. Phillips, B. S. Lyman.
iii. Anthracite Coal Region with Atlas. F. A. Hill.
iv. 1. The Lehigh River Cross Section. Arthur Winslow.
 2. Paint Ores along the Lehigh River. F. A. Hill.
 3. Iron Ore Mines and Limestone Quarries of the Cumberland-Lebanon Valley. E. V. d'Invilliers.
 4. Geology of Radnor township, Delaware co., &c. T. D. Rand. With an Atlas.

1887 ANNUAL. J. P. Lesley, State Geologist, 8°, pp. 105, with a map of the New Boston Anthracite basin.

1. Cave Fossils. Prof. Joseph Leidy.
2. Fossil tracks in the Trias. Atreus Wanner.
3. New Boston Anthracite Basin. Benj. Smith Lyman.
4. State Line Serpentine. Prof. F. D. Chester.

MISCELLANEOUS REPORTS.

A. A history of the FIRST GEOLOGICAL SURVEY of Pennsylvania, from 1836 to 1858, by J. P. Lesley. With the annual reports of the Board to the Legislature for 1874 and 1875. 8°, pp. 226, 1876.

B. Report on the MINERALS of Pennsylvania, by F. A. Genth; and on the hydro-carbon compounds, by S. P. Sadtler. With a reference map of the State. 8°, pp. 206, 1875.

B 2. Report on the MINERALS, by F. A. Genth, continued from page 207 to 238. 8°, in paper cover, pp. 31, 1876. (Bound with B.)

M. Report of CHEMICAL ANALYSES in 1874–5, in the Laboratory at Harrisburg, by A. S. McCreath. 8°, pp. 105, 1875.

M 2. Report of CHEMICAL ANALYSES in 1876–8, by A. S. McCreath; Classification of coals, by P. Frazer; Fire-brick tests, by F. Platt; Dolomitic limestone beds, by J. P. Lesley; Utilization of anthracite slack, by F. Platt; Determination of Carbon in iron or steel, by A. S. McCreath. With one folded, plate (section at Harrisburg) and four page plates. 8°, pp. 438, 1879.

M 3. Report of CHEMICAL ANALYSES in 1879–80, by A. S. McCreath. With a reference map of 93 iron ore mines in the Cumberland Valley. 8°, pp. 126, 1881.

N. Report on the LEVELS above tide of railroads, canal and turnpike stations, mountain tops, &c., in and around Pennsylvania, in 200 tables, by C. Allen. With a map. 8°, pp. 279, 1878.

O. CATALOGUE of specimens collected by the survey, (No. 1 to No. 4,264,) by C. E. Hall. 8°, pp. 217, 1878.

O 2. CATALOGUE (continued from No. 4,265 to No. 8,974); also catalogue of fossils, (pp. 231 to 239.) 8°, pp. 272, 1880.

O 3. CATALOGUE (continued from No. 8975 to No. 12872. Also Catalogue of special collections of fossils in stratigraphical order, from 201-1 to C 7-4-3; and Revised Catalogue of Randall's collection, from 9467 to 9625. 8°, pp. 260, 1889.

P. Report on the COAL FLORA of Pennsylvania and the United States. Vols. 1 and 2, (bound together,) by L. Lesquereux. 8°, pp. 694, 1880.

P. Report on the COAL FLORA of Pennsylvania and the United States Vol. 3, with 24 double page plates (lithographed) of coal plants, to accompany P., Vols. 1 and 2. 8°, pp. 283, 1884.

(P.) ATLAS of 87 double page plates (lithographed) of coal plants to accompany P., Vols. 1 and 2. 8°, 1879.

P 2. Report on Permo-Carboniferous plants from W. Va. and Greene county, Pennsylvania, by W. M. Fontaine and I. C. White. With 38 double page plates (lithographed). 8°, pp. 143, 1880.

P 3. Description of *Ceratiocaridæ*, by C. E. Beecher; and of *Eurypteridæ*, by James Hall. With 8 plates. 8°, pp. 39, 1884.

P 4. DICTIONARY OF FOSSILS found in Pennsylvania and elsewhere with electrotype illustrations of the various forms. In 2 volumes and an appendix, by J. P. Lesley. Volume I in press. Volume II, in preparation. 8°, pp. 800±, 1889.

X. GEOLOGICAL HAND ATLAS of the sixty-seven counties of Pennsylvania, with a short explanation of the geological structure of each county, embodying the results of the field work of the survey from 1874 to 1884, by J. P. Lesley. With 62 colored maps and a cross section. 8°, pp. cxii, 1885.

Z. Report on the TERMINAL MORAINE across Pennsylvania, by H. C. Lewis; including extracts from descriptions of the Moraine in New Jersey by G. H. Cook, and in Ohio, Kentucky and Indiana, by G. F. Wright. With a map of the State, 18 photographic views of the Moraine, and 32 page plate maps and sections. 8°, pp. lvi and 299, 1884.

GRAND ATLAS, Div. I, Pt. I, 1885, port-folio containing maps of 56 counties. and parts of counties (scale 2 miles to 1 inch) on 49 sheets (26″×32″.) These maps are duplicate prints on heavy paper of the county maps contained in the reports of progress.

Annual Report, 1886. Part IV.

ANTHRACITE REGION.

A 2. Report on the causes, kinds and amount of WASTE in mining anthracite, by F. Platt; with a chapter on METHODS of mining, by J. P. Wetherill, Illustrated by 35 figures of mining operations, a plan of the Hammond breaker, and a specimen sheet of the maps of the Anthracite coal fields. 8°, pp. 134, 1881.

AC. Report on MINING METHODS, &c., in the anthracite coal fields, by H. M. Chance. Illustrated with 54 plates and 60 illustrations in the text. 8°, pp. 574, 1883. With an ATLAS containing 25 plates illustrating coal mining.

AA. First report of progress of the anthracite survey; PANTHER CREEK BASIN, by C. A. Ashburner; with a determination of the latitude and longitude of Wilkes-Barre and Pottsville, by C. L. Doolittle; and a theory of stadia measurements, by A. Winslow. 8°, pp. 407, 1883.

AA. Second report of progress of the anthracite survey, Part I; Statistics of Production and Shipment for 1883 and 1884. Charles A. Ashburner, geologist in charge.

(AA.) ATLAS OF SOUTHERN anthracite field, Part I, containing 13 sheets; 3 geological and mine sheets, 3 cross section sheets, 3 columnar section sheets, 1 topographical map sheet, and 1 coal bed area sheet, relating to the PANTHER CREEK BASIN; 1 general map of the anthracite region, and 1 chart of anthracite production from 1820 to 1881. 8°, 1882. Charles A. Ashburner, geologist in charge; A. W. Sheafer and Frank A. Hill, assistant geologists.

(AA.) ATLAS SOUTHERN anthracite field, Part II, containing 13 mine sheets between Tamaqua and Tremont. 8°, 1889. Frank A. Hill, geologist in charge; A. DW. Smith, assistant geologist. In Press.

(AA.) ATLAS SOUTHERN anthracite field, Part III, containing 12 mine sheets between Tremont and the western end of the southern basin, and a general map of the anthracite fields showing the location of collieries. 8°, 1889. Frank A. Hill, geologist in charge; A. DW. Smith, assistant geologist. In Press.

(AA.) ATLAS SOUTHERN anthracite field, Part IV. In Press.

(AA.) ATLAS OF WESTERN MIDDLE anthracite field, Part I, containing 11 sheets; 4 geological and mine sheets between Delano and Locust Dale, 3 topographical sheets between Quakake Junction and Mount Carmel, and 4 cross section sheets. 8°, 1884. Charles A. Ashburner geologist in charge; A. W. Sheafer and Bard Wells, assistant geologists.

(**AA.**) Atlas of Western Middle anthracite field, Part II, containing 11 sheets; 4 geological and mine sheets from Mount Carmel to the western end of the coal field, and 7 columnar section sheets covering the entire field. 8°, 1887. Frank A. Hill, geologist in charge; Bard Wells, assistant geologist.

(**AA.**) Atlas of Western Middle anthracite field. Part III. In Press.

(**AA.**) Atlas of Northern anthracite field, Part I, containing 6 geological and mine sheets between Wilkes-Barre and Nanticoke, 3 cross section sheets and 4 columnar section sheets. 8°, 1885. Charles A. Ashburner, geologist in charge; Frank A. Hill, assistant geologist.

(**AA.**) Atlas of Northern anthracite field, Part II, containing 10 sheets; 4 mine sheets relating to that portion of the Wyoming-Lackawanna coal basin between Wyoming and Taylorville, and 2 topographical and mine sheets relating to the extreme western end of the Wyoming basin; 4 columnar section sheets of bore-holes, shafts and tunnels. 8°, 1887. Frank A. Hill, geologist in charge; William Griffith, assistant geologist.

(**AA.**) Atlas of Northern anthracite field, Part III, containing 8 sheets; 4 mine, and 4 columnar section sheets relating to that portion of the Lackawanna basin in the vicinity of Taylorville, Minooka, Scranton, Dunmore and Priceville. 8°, 1889. Frank A. Hill, geologist in charge; William Griffith, assistant geologist.

(**AA.**) Atlas of Northern anthracite field, Part IV, containing 8 mine sheets relating to that portion of the Lackawanna basin in the vicinity of Olyphant, Peckville, Jessup, Winton, Archbald, Jermyn, Glenwood, Carbondale, and Forest City in Lackawanna and Susquehanna counties. 8°, 1889. Frank A. Hill, geologist in charge; William Griffith, assistant geologist.

(**AA.**) Atlas of Northern anthracite field, Part V. In Press.

(**AA.**) Atlas Eastern Middle anthracite field, Part I, containing 8 sheets, 2 geological and mine sheets in the vicinity of Hazleton, Drifton and surrounding towns, 3 cross section sheets and 3 columnar section sheets. 8°, 1885. Charles A. Ashburner, geologist in charge; A. P. Berlin and Arthur Winslow, assistant geologists.

(**AA.**) Atlas of Eastern Middle anthracite field, Part II, containing 8 sheets; 6 mine, and 2 columnar section sheets relating to portions of the Lehigh basins in the vicinity of Upper Lehigh, Pond Creek, Sandy Run, Eckley, Weatherly, Buck Mountain, Beaver Meadow, Coleraine, Jeansville and Audenried, in Luzerne, Carbon, and Schuylkill counties. 8°, 1888. Frank A. Hill, geologist in charge; I. R. Moister, assistant geologist.

(**AA.**) Atlas Eastern Middle anthracite field, Part III, containing 13 sheets, 8 mine sheets, covering the entire western part of the field, 2 columnar section sheets and 3 cross section sheets. 8°, 1889. Frank A. Hill, geologist in charge; I. R. Moister, assistant geologist.

Grand Atlas, Div. II, Pt. I, 1884. Port-folio containing 26 sheets, (26″ × 32″), as follows: 13 sheets Atlas Southern Anthracite Field, Part I, 11 sheets Atlas Western Middle Anthracite Field, Part I, 1 sheet photo views of plaster models in Western, Middle and Southern Fields, and 1 specimen sheet, Report A 2.

GRAND ATLAS, Div. II, Pt. II, 1885. Port-folio containing 22 sheets, (26"× 32"), as follows: 13 sheets Atlas Northern Anthracite Field, Part I, 8 sheets Atlas Eastern Middle Anthracite Field, Part I, and one sheet containing a preliminary general map of the Anthracite Coal Fields and adjoining counties.

For Anthracite coal in SULLIVAN county, see G 2 and Annual Report, 1885.

For Conglomerate beds near Carbondale, Pittston, &c., see G 5, G 7.

For Utilization of anthracite slack, see M 2.

For General description anthracite region, Quaternary Geology of the Wyoming-Lackawanna Valley, &c., &c., see Annual Report, 1885.

Annual Report, 1886. Part III.

BITUMINOUS COAL FIELDS AND SURROUNDING AREAS.

H. First report on CLEARFIELD and JEFFERSON counties, by F. Platt. With 8 maps, 2 sections and 139 cuts in the text. 8°, pp. 296, 1875. (*For second report, see H 6, H 7.*)

H 2. Report on CAMBRIA county, by F. & W. G. Platt. With 4 maps and sections and 84 cuts in the text. 8°, pp. 194, 1877.

H 3. Report on SOMERSET county, by F. & W. G. Platt. With 6 maps and sections and 110 cuts in the text. 8°, pp. 348, 1877.

Atlas to Reports H² and H³ containing geological maps of Cambria and Somerset counties, with 2 sheets of columnar sections and 1 cross section; a revision and correction of the semi-bituminous coal section at Wellersburg, Somerset county, and notes on the new mines in Cambria county. 8°, 1889.

H4. Report on INDIANA county, by W. G. Platt. With a colored geological county map and 87 cuts in the text. 8°, pp. 316, 1878.

H 5. Report on ARMSTRONG county, by W. G. Platt. With a colored geological county map and 58 cuts in the text. 8°, pp. 338, 1880.

H 6. Second report on JEFFERSON county, (*See H above*), by W. G. Platt. With a colored geological county map and 57 cuts in the text. 8°, pp. 218, 1881.

H 7. Second report on CLEARFIELD county, (*See H above*), by H. M. Chance. With a colored geological county map, an outcrop map of the Houtzdale basin and 58 cuts in the text. 8°, pp. 197, 1884.

I. Report on VENANGO county, by J. F. Carll. The geology around Warren, by F. A. Randall. Notes on the comparative geology of N. E. Ohio, N. W. Pa., and W. New York, by J. P. Lesley. With one small map of the Venango oil region, one small map of the region south and east of Lake Erie, one long section of the rocks at Warren, and 7 cuts in the text. 8°, pp. 127, 1875.

I 2. Report of oil well records and levels in VENANGO, WARREN, CRAWFORD, CLARION, ARMSTRONG, BUTLER, &c., by J. F. CARLL. 8°, pp. 398, 1877.

I 3. Report on the VENANGO, WARREN, CLARION, and BUTLER OIL REGIONS; descriptions of rig, tools, &c.; survey of the Garland and Panama conglomerates, &c.; discussion of pre-glacial and post-glacial drainage, by J. F. Carll. With 23 page plates and an atlas. 8°, pp. 482, 1880.

(I 3.) Atlas of 22 sheets. Map of Venango county, colored geologically; map of lower oil field (Butler, Armstrong, and Clarion) in two sheets; 3 local contour maps at Franklin, Titusville and Spring Creek; two maps of N. W. Pennsylvania, showing the past and present drainage; long section across W. Pennsylvania; vertical section of the formations from the Upper

Coal measures down to the bottom of the Devonian; diagram map and section of Third sand; profile section from Meadville, S. W.; 5 sheets of grouped oil well sections; 5 sheets of working drawings for well boring, &c.; diagram of daily rate of drilling six wells at Petrolia.

I 4. Report on WARREN county, by J. F. Carll. With a colored geological county map, a map of the Warren oil region, and 2 sheets of oil well sections. 8°, pp. 439, 1883. *(Note—The first 147 pages of this book contain oil well records; see under Petroleum Fields below.)*

J. Report on the OIL REGION, by H. E. Wrigley; map and profile of line of levels through Butler, Armstrong, and Clarion, by D. J. Lucas; map and profile of Slippery Rock creek, by J. P. Lesley. 5 maps and sections, a plate and 5 cuts. 8°, pp. 122, 1875.

K. Report on GREENE and WASHINGTON counties, by J. J. Stevenson. With two county maps. (Showing the calculated local depths of the Pittsburgh and Waynesburg coal beds beneath the surface,) and 3 page plates of general sections. 8°, pp. 419, 1876. *(Note.—Since the publication of this book two colored geological county Maps have been published, and will be found in pocket of volume K 3 described below.)*

K 2. First report on FAYETTE, WESTMORELAND and S. E. ALLEGHENY counties, (*i. e.*, west of Chestnut Ridge,) by J. J. Stevenson. With 3 colored geological county maps and 50 cuts in the text. 8°, pp. 437, 1877.

K 3. Second report on FAYETTE and WESTMORELAND counties (the Ligonier Valley), by J. J. Stevenson. With 4 page plates and 107 cuts in text 8°, pp. 331, 1878. *(Note.—In a pocket in this volume will be found the colored geological maps of Greene and Washington counties alluded to above.)*

K 4. Report on MONONGAHELA RIVER COAL MINES, from the West Virginia State Line to Pittsburgh, (including some on the Youghiogheny and other streams), by J. Sutton Wall. With a map of the region in a pocket, 12 heliotype pictures, and 26 page plates. 8°, pp. 231, 1884.

L. Report on the YOUGHIOGHENY coke manufacture, by F. Platt; Notes on the coal and iron ore beds, by C. A. Young; Report on methods of coking by J. Fulton, (*See G* below); Report on the use of natural gas in the iron manufacture, by J. B. Pearse and F. Platt; The Boyd's Hill gas well at Pittsburgh, by J. P. Lesley. With a map of the coke region, two folded plates of coke ovens, and page plates and cuts in the text. 8°, pp. 252, 1876.

Q. Report on BEAVER, N. W. ALLEGHENY and S. BUTLER counties by I. C. White. With 3 colored geological county maps, and 21 page plates of sections. 8°, pp. 337, 1878.

Q 2. Report on LAWRENCE county, and special Report on Correlation of the Pennsylvania and Ohio coal beds, by I. C. White. With a colored geological county map and 134 cuts in the text. 8°, pp. 336, 1879.

Q 3. Report on MERCER county, by I. C. White. With a colored geological county map and 119 cuts in the text. 8°, pp. 233, 1880.

Q 4. Report on CRAWFORD and ERIE counties, by I. C. White. With two colored geological county maps and 107 cuts in the text. Also, a Report on a pre-glacial outlet for Lake Erie, by J. W. Spencer. With two maps of the Lake region. 8°, pp. 406, 1881.

R. Report on MCKEAN county, and its geological connections with Cameron, Elk, and Forest counties, by C. A. Ashburner. With 33 page plates of vertical and columnar sections, pictures of Rock city and Olean conglomerate, Wilcox and Kane spouting wells, map of Howard Hill coal field, &c., and an atlas of 8 sheets. 8°, pp. 371, 1880.

(R.) ATLAS for McKean county of 8 sheets :—Colored geological county map; three topographical maps; of Buffalo Coal Company tract, Alton coal basin, and Potato Creek coal basin: map of McKean oil district; one sheet of columnar sections between Bradford and Ridgway; and 2 diagram sheets of the Well account and Production account in the Bradford district.

R 2. Part II, report on township geology of CAMERON, ELK and FOREST counties, by C. A. Ashburner.

(R 2.) ATLAS for CAMERON, ELK and FOREST counties, of 11 sheets (*Published November, 1884, in advance of the report*) :—3 colored geological county maps; 1 anticlinal and synclinal map; 1 topographical map McKean county; 2 tract maps Forest and Elk counties; 1 map Straight Creek coal basin; 2 sheets oil well sections; and 1 sheet coal sections.

V. Report on N. BUTLER county; and (Part 2) special report on the Beaver and Shenango river coal measures, by H. M. Chance. With a colored geological map of N. Butler; a contour local map around Parker; a map of the anticlinal rolls in the 6th basin; a chart of the Beaver and Shenango rivers; profile section from Homewood to Sharon; Oil well records and surface sections; and 154 cuts in the text. 8°, pp. 248, 1879.

V 2. Report on CLARION county, by H. M. Chance. With a colored geological county map, a map of the anticlinals and oil-belt; a contoured map of the old river channel at Parker; 4 page plates, and 83 cuts in the text. 8°, pp. 232, 1880.

For the coal basins of BRADFORD and TIOGA counties, see report G.

For the coal basins of LYCOMING and SULLIVAN, see report G 2.

For the coal basins of POTTER county, see G 3.

For the coal basins of CLINTON county, see G 4.

For the coal in WAYNE county see G 5, and Northern Atlas, Part IV.

For the East Broad Top coal basin in HUNTINGDON county, see F.

For the mountain coals in BLAIR county, see T.

For the Broad Top coal measures in BEDFORD and FULTON counties, see T 2.

For the coal basins in CENTRE county, see T 4.

For coal analyses, see M, M 2, M 3.

For classification of coals, see in M 2.

For coal plants, see P, P 2.

For fossil crustaceans in coal slate, see P 3.

For Origin of Coal; Pittsburgh Region and Monongahela Valley; Wellersburg coal basin, Somerset county; and Tipton Run coal-beds, Blair county; see Annual Report, 1885, and Atlas H 2 and H 3.

Grand Atlas Div. III, Pt. I, 1885, port-folio containing 35 sheets (26″×32″) as follows: 32 sheets relating to portions of the Petroleum and Bituminous Coal Fields, and three sheets relating to the Quaternary period.

Annual Report, 1886. Part I.

PETROLEUM AND GAS.

See reports I, I 2, I 3, I 4, and J, under Bituminous Coal Fields.

See L, for the Pittsburgh gas well, and the use of gas in the iron manufacture.

See Q, Q 2, Q 3, Q 4, for references to oil rocks in Beaver, Lawrence, Mercer, Crawford, Erie, and S. Butler counties.

See K for the Dunkard Creek oil wells of Greene county.

See R, R 2, for descriptions of oil rocks in McKean, Elk, and Forest counties.

See V, V 2, for notes on the oil rocks of N. Butler and Clarion counties.

See H 2 for oil boring at Cherry Tree, Cambria county.

See G 5 for oil boring in Wayne county.

See Annual Report, 1885, for report of progress in the oil and gas region with special facts relating to the geology and physics of natural gas.

See Grand Atlas, Div. III, Pt. I, under Bituminous Coal Fields.

See Annual Report, 1886. Part II.

NORTH-EASTERN AND MIDDLE PENNSYLVANIA.

(*Palæozoic formations from the Coal Measures down.*)

D. First report on LEHIGH county iron mines, by F. Prime. With a contour line map of the ore region and 8 page plates. 8°, pp. 73, 1875.

D 2. Second report on LEHIGH county iron mines, by F. Prime. With a colored geological contour line map of the iron region, (in 4 sheets,) a colored geological contour line map of the Ironton mines, 4 double page lithograph pictures of Limestone quarries, and one page plate of *Monocraterion.* 8°, pp. 99, 1878.

D 3. Vol. I. Report on LEHIGH and NORTHAMPTON counties. Introduction by J. P. Lesley ; Slate belt, by R. H. Sanders ; Limestone belt and iron mines, by F. Prime ; South mountain rocks, by F. Prime and C. E. Hall. With 3 lithograph pictures of quarries, 4 pictures of triangulation stations, 14 page plates of sections, and an atlas of maps. 8°, pp. 283, 1883. (*Note.—For atlas see below.*)

D 3. Vol. II, Part I. Report on BERKS county, (*South mountain belt*) by E. V. d'Invilliers. With 10 page plates of sections and Indian relics, and 3 pictures of rock exposures. 8°, pp. 441, 1883. (*Note.—For atlas see below.*

(**D 3.**) ATLAS : One colored geological map of *Lehigh* and Northampton counties, (*one sheet;*) one colored geological contour line map of southern Northampton county, (*six sheets;*) a contour line map of the mountains from the Delaware to the Schuylkill, (*eighteen sheets;*) a colored geological contour line index map to the 22 sheets, (*one sheet;*) and 4 sheets of maps of iron mines.

(**D 5.**) ATLAS of colored geological county maps of CUMBERLAND, FRANKLIN, and ADAMS, (*three sheets;*) and first instalment of contour line map of the South mountains, Sheets A 1, A 2, B 1, B 2, (*four sheets;*) by A. E. Lehman.

F. Report on the JUNIATA RIVER district in MIFFLIN, SNYDER, and HUNTINGDON counties, by J. H. Dewees, and on the Aughwick valley and East Broad Top region in HUNTINGDON county, by C. A. Ashburner. With colored geological maps of East Broad Top R. R. and Orbisonia vicinity, (2 sheets;) Three Springs map and section, (2 sheets;) Sideling Hill Creek map and section, (2 sheets,) and Isometric projection at Three Springs, (1 sheet;) six folded cross sections and 22 page plates of local maps and columnar sections. 8°, pp. 305, 1878.

F 2. Report on PERRY county, (*Part 1, geology,*) by E. W. Claypole. With two colored geological maps of the county ; 17 geological outline township maps as page plates, and 30 page plate cross and columnar sections. 8°, pp. 437, 1884.

G. Report on BRADFORD and TIOGA counties, by A Sherwood ; report on their coal fields, (including forks of Pine creek in Potter county,) by F. Platt ; report on the COKING of bituminous coal, by J. Fulton. (*See L above.*) With two colored geological county maps, 3 page plates, and 35 cuts in the text. 8°, pp. 271, 1878.

G 2. Report on LYCOMING and SULLIVAN counties; field notes by A. Sherwood; coal basins by F. Platt. With two colored geological county maps (of Lycoming and Sullivan,) a topographical map (in two sheets) of the Little Pine creek coal basin, and 24 page plates of columnar sections. 8°, pp. 268, 1880.

G 3. Report on POTTER county, by A. Sherwood. Report on its COAL FIELDS, by F. Platt. With a colored geological county map, 2 folded plates and 2 page plates of sections. 8°, pp. 121, 1880.

G 4. Report on CLINTON county, by H. M. Chance, including a description of the Renovo coal basin, by C. A. Ashburner, and notes on the Tangascootac coal basin, by F. Platt. With a colored geological county map, 1 sheet of sections, local Renovo map, 6 page plates, and 21 sections in the text. 8°, pp. 183, 1880.

G 5. Report on SUSQUEHANNA and WAYNE counties by I. C. White. With a colored geological map of the two counties and 58 cuts in the text. 8°, pp. 243, 1881.

G 6. Report on PIKE and MONROE counties, by I. C. White. With two colored geological county maps, (1 sheet Pike and Monroe and 1 sheet Wyoming), a map of glacial scratches, and 7 small sections. Report on the Delaware and Lehigh Water Gaps, with two contoured maps and five sections of the gaps, by H. M. Chance. 8°, pp. 407, 1882.

G 7. Report on WYOMING, LACKAWANNA, LUZERNE, COLUMBIA, MONTOUR and NORTHUMBERLAND counties, (*i. e.*, the parts lying *outside* of the anthracite coal fields), by I. C. White. With a colored geological map of these counties (in two sheets), and 31 page plates in the text. 8°, pp. 464, 1883. (*Note.—The colored geological map of* WYOMING *county is published in G 6.*

T. Report on BLAIR county, by F. Platt. With 35 cuts in the text and an Atlas of maps and sections (see below). 8°, pp. 311, 1881.

(T.) Atlas of colored geological contour line map of Morrison's cove, Canoe valley, Sinking valley and country west to the Cambria county line (14 sheets); Index map of the same (1 sheet); colored sections (2 sheets). 8°, 1881.

T 2. Report on BEDFORD and FULTON counties, by J. J. Stevenson. With two colored geological maps of the two counties. 8°, pp. 382, 1882.

T 3. Report on HUNTINGDON county, by I. C. White. With a colored geological map of the county, and numerous sections. 8°, pp. 471, 1885.

T 4. Report on CENTRE county, by E. V. d'Invilliers; also special report, by A. L. Ewing, and extracts from report to Lyon, Shorb & Co., by J. P. Lesley. With a colored geological map of the county, 13 page plates of local maps and sections, and 15 cuts in the text. 8°, pp. 464, 1884.

For report on line of the Terminal Moraine, see Z.

GRAND ATLAS, Div. IV, Pt. I, 1885. Port-folio containing 43 sheets, as follows: 30 sheets relating to the Durham and Reading Hills and bordering valleys in Northampton, Lehigh, Bucks and Berks counties, and 13 sheets relating to the South Mountains in Adams, Franklin, Cumberland and York counties.

GRAND ATLAS, Div. V, Pt. I, 1885. Port-folio containing 35 sheets, as follows: 29 sheets relating to the Topography and Geology of the Palæozoic strata in parts of Cambria, Blair, Bedford, Huntingdon, Mifflin, Centre and Union counties, 5 sheets contain a map and geological cross section along the east bank of the Susquehanna river, Lancaster county, and 1 sheet contains cross sections of the Philadelphia belt of the Azoic rocks.

For report on Cornwall Iron Ore Mines, Lebanon county, and the Tipton Run coal beds, Blair county, see Annual Report, 1885.

For report on the Iron Ore Mines and Limestone Quarries of the Cumberland-Lebanon Valley, and Paint-ore along the Lehigh river, see Annual, 1886, Part IV.

SOUTH-EASTERN PENNSYLVANIA.

C. Report on YORK and ADAMS counties, by P. Frazer. With one folded map of a belt of York county through York and Hanover, 6 folded cross sections, and two page plate microscopic slices of dolerite. 8°, pp. 198, 1876.

(*Note.—The colored geological county map of* YORK *is published in the* ATLAS *to C 3*).

C 2. Report on YORK and ADAMS counties, (South Mountain rocks, iron ores, &c.), by P. Frazer. With one general map of the district, 10 folded cross sections, and 5 page plates. 8°, pp. 400, 1877. (*Note.—The colored geological county map of* ADAMS *is published in D 5*).

C 3. Report on LANCASTER county, by P. Frazer. With nine double page lithographic views of slate quarries and Indian-pictured rocks, one plate of impressions on slate, and one page plate microscopic section of trap, and an atlas. 8°, pp. 350, 1880.

(**C 3.**) ATLAS of 13 sheets: Colored geological map of York county; colored geological map of LANCASTER county; Susquehanna river section. (Sheets 1, 1A, 2, 2A, 3, 4); Lancaster section; Pequea section; Muddy run section; Chestnut Hill mines; Gap Nickel mine.

C 4. Report on CHESTER county; General description, pp. 214, by J. P. Lesley; Field notes in the townships, pp. 215–354, by P. Frazer. With a colored geological county map, a photographic view of contorted schists and 12 page plates. 8°, pp. 394, 1883.

C 5. Report on DELAWARE county, by C. E. Hall. With a colored geological county map; 30 photographic page plate views of granite quarries, kaolin pits, &c., and 4 page plates of altered mica. 8°, pp. 128, 1885. See Annual Report, 1885, for Kaolin report.

C 6. Report on PHILADELPHIA and the southern parts of MONTGOMERY and BUCKS counties, by C. E. Hall. With a colored geological map of the belt of country between Trenton and Delaware county (in 3 sheets), a sheet of colored cross sections and 24 cuts in the text. 8°, pp. 145, 1882.

(**C 7.**) ATLAS to report on Bucks and Montgomery counties, containing 12 sheets of topographical map of the Neshaminy, Tohickon and Perkiomen water basins by the Philadelphia Water Department on a scale of 1,600 feet to 1 inch, $\frac{1}{19600}$ of nature. 8°, 1887.—(Report C. 7. not ready for publication.)

E. Part I of (historical introduction to) a report on the AZOIC rocks, by T. S. Hunt. 8°, pp. 253, 1878.

For report on the kaolin deposits of CHESTER and DELAWARE counties, see Annual Report, 1885.

For report on the Serpentines of Radnor township, Delaware Co., &c., see Annual, 1886, Part IV.

See also GRAND ATLAS, Div. V., Pt. I, under North-eastern and Middle Pennsylvania.

July 1, 1889.