













TENTH ANNUAL REPORT

OF THE

*Cover as Regard*

REGENTS OF THE UNIVERSITY

OF THE

State of New-York,

ON THE

CONDITION OF THE STATE CABINET

OF

NATURAL HISTORY,

AND THE

HISTORICAL AND ANTIQUARIAN COLLECTION

CONNECTED THEREWITH.

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Made to the Senate, March 11, 1857.

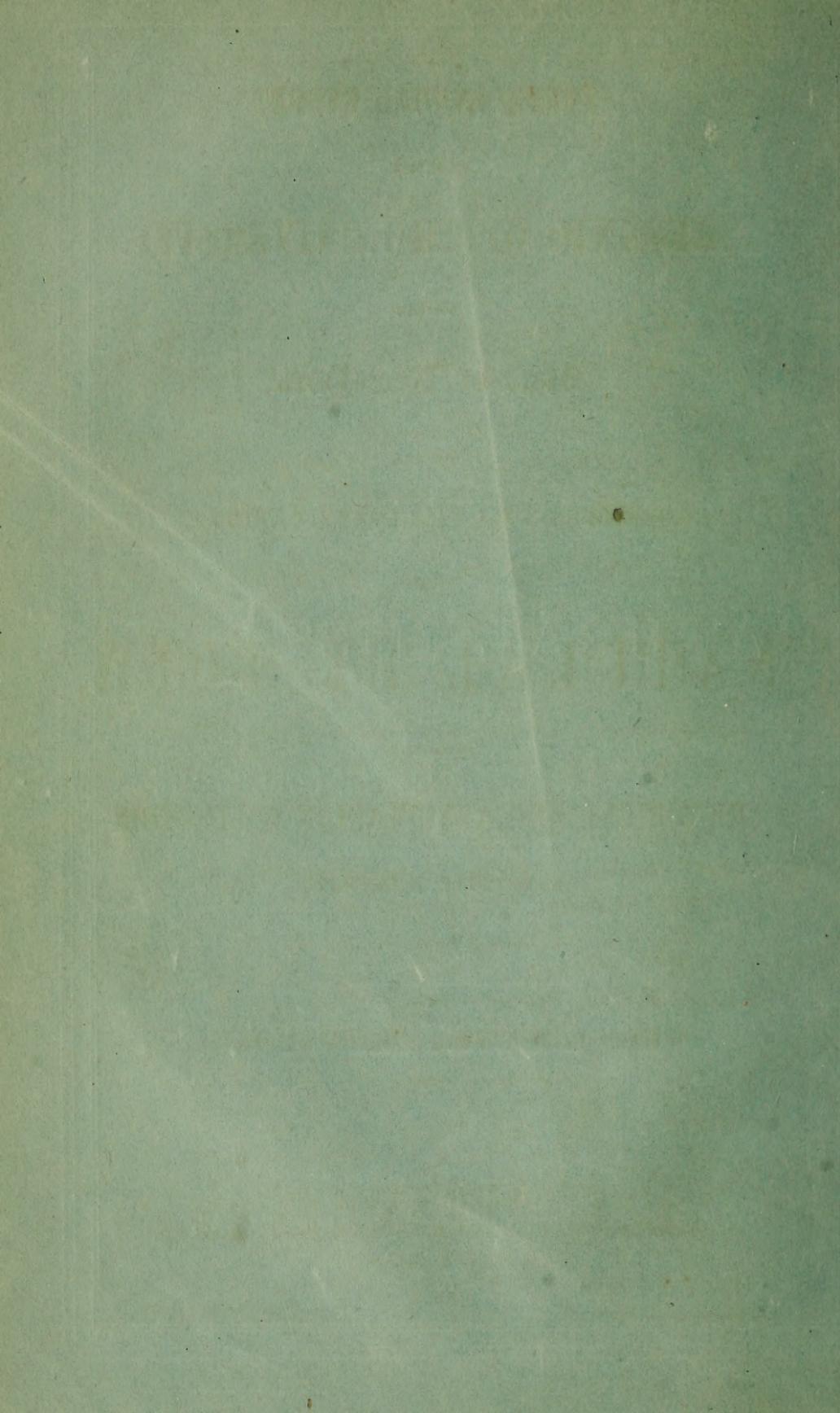
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ALBANY:

C. VAN BENTHUYSEN, PRINTER TO THE LEGISLATURE,

No. 407 Broadway.

1857.



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IN SENATE, MARCH 11, 1857.

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**TENTH ANNUAL REPORT.**

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TO THE HON. HENRY R. SELDEN,

President of the Senate.

SIR :

I HAVE the honor to transmit the Annual Report of the Regents of the University, on the State Cabinet of Natural History, and the Historical and Antiquarian Collection connected therewith.

I remain, very respectfully,

Your obedient servant,

G. Y. LANSING, *Chancellor.*

MARCH 5, 1857.



## REGENTS OF THE UNIVERSITY, 1857.

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GERRIT Y. LANSING, *Chancellor.*

JOHN GREIG, *Vice-Chancellor.*

JOHN A. KING, Governor, *ex officio.*

HENRY R. SELDEN, Lieutenant-Governor, *ex officio.*

JOEL T. HEADLEY, Secretary of State, *ex officio.*

VICTOR M. RICE, Superintendent of Public Instruction, *ex officio.*

GULIAN C. VERPLANCK, LL.D.

JOHN K. PAIGE.

ERASTUS CORNING.

PROSPER M. WETMORE.

JOHN L. GRAHAM.

JOHN M'LEAN.

GIDEON HAWLEY, LL.D.

DAVID BUEL.

JAMES S. WADSWORTH.

JOHN V. L. PRUYN, LL.D.

ROBERT CAMPBELL.

SAMUEL LUCKEY, D.D.

ROBERT G. RANKIN.

PHILIP S. VAN RENSSELAER.

JOHN N. CAMPBELL, D.D.

ERASTUS BENEDICT.

GEORGE W. CLINTON.

S. B. WOOLWORTH, *Secretary.*

# STANDING COMMITTEES OF THE REGENTS,

SPECIALLY CHARGED WITH THE CARE OF THE STATE CABINET.

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1856.

MYRON H. CLARK, *Governor.*  
JOEL T. HEADLEY, *Secretary of State.*  
ERASTUS C. BENEDICT.  
REV. DR. CAMPBELL.  
ERASTUS CORNING.

---

1857.

JOHN A. KING, *Governor.*  
JOEL T. HEADLEY, *Secretary of State.*  
REV. DR. CAMPBELL.  
ERASTUS CORNING.  
JOHN L. GRAHAM.

EZEKIEL JEWETT, *Curator.*  
JAMES A. HURST, *Taxidermist.*

# R E P O R T .

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TO THE LEGISLATURE OF THE STATE OF NEW-YORK,

The Regents of the University

RESPECTFULLY REPORT :

That since their last annual report, no progress has been made in rearranging the collections in Natural History. In the supply bill reported by the Committee of ways and means in April last, provision for cases and fixtures, and for some alteration in the plan of the building, was made ; but the unexpected adjournment of the Legislature without passing the bill, relieves this board, as the Curators of the Cabinet, from responsibility for its present condition.

It was a source of deep regret to the Regents, that on an occasion of great interest to the science of the country, when large numbers of the most eminent scientific men of the nation were gathered in the capital of the State, its collections could not be exhibited. The occasion had at an early day been designated as suitable for the inauguration of the new Geological Hall ; and, on full consultation, it was regarded expedient, notwithstanding the condition of the Cabinet, that the ceremonies of the inauguration should take place. An audience of some five thousand people filled a tent which had been erected in the Park of the Albany Academy, and listened with great interest to appropriate addresses from

Prof. LOUIS AGASSIZ, of Cambridge, Mass.;

Prof. CHESTER DEWEY, of Rochester ;

Pres. EDWARD HITCHCOCK, of Amherst, Mass.;

Pres. A. B. ANDERSON, of Rochester ;

Prof. CHARLES DAVIES, of Fishkill ;

Rev. Dr. COX, of Owego.

The Regents regret that they have not been able to secure copies of all these addresses : those of Prof. DEWEY, Pres. HITCHCOCK and Prof. DAVIES, are appended to this report.

The necessary means for the proper exhibition of the collections having been made by the present Legislature, the work will be entered on at the earliest practicable day ; and the Regents confidently hope to be able to make such arrangements of the Cabinet as will meet public expectation, and be a just pride to the citizens of the State.

The condition of the Cabinet requiring but little of the time of the Curator, he was directed to take the field for the purpose of collecting fossils in several of the geological formations which had not been fully explored, or in which the collections were deficient. He prosecuted the work with great zeal through the season, and his success has been highly satisfactory.

A catalogue of the fossils thus collected is appended : also descriptions of palæozoic fossils, chiefly from those constituting the third volume of the Palæontology of New-York, with others from the fourth volume, by Prof. JAMES HALL. Also a catalogue of miscellaneous contributions made during the year.

By Order of the Regents.

G. Y. LANSING, *Chancellor.*

S. B. WOOLWORTH, *Secretary.*

## ACCOUNT CURRENT.

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THE Regents of the University, in account current with the appropriation for preserving and increasing the "State Cabinet of Natural History, and the Historical and Antiquarian Collection annexed thereto," and for defraying the incidental expenses of the same.

### DR.

1856,	To balance at close of last account .....	\$119 72
	To balance of appropriation 1855-6 .....	600 00
		\$719 72

### CR.

1856,		
Jan. 24.	By cash paid for removing from the wing to basement of old State Hall, Dec. 1854; and for removing again to Academy, 1855 .....	No. 1, \$44 00
Feb. 5.	By ditto, rent of Mr. Hurst's room, Nov. 1855 to Feb. 1856 .....	No. 2, 21 00
March 3.	By ditto, Dexter & Nelligar, alcohol and camphor .....	No. 3, 18 02
March 6.	By ditto, Mr. Hurst's salary, Dec. '55 to March 1856 .....	No. 4, 50 00
April 28.	By ditto, to Mr. Hurst for assistance in removing collections .....	No. 5, 200 00
May 12.	By ditto, for rent of Mr. Hurst's room to May .....	No. 6, 21 00
May 17.	By ditto, for contingents .....	No. 7, 5 70
June 4.	By ditto, Mr. Hurst's salary to June .....	No. 8, 50 00
Sept. 1.	By ditto, Mr. Hurst's salary to September .....	No. 9, 50 00
Oct. 16.	By ditto, to Mr Hurst for removing collection .....	No. 10, 9 00
Dec. 1.	By ditto, for contingents .....	No. 11, 13 50
Dec. 1.	By ditto, Mr. Hurst's salary .....	No. 12, 50 00
Dec. 30.	By ditto, for contingents .....	No. 13, 7 72
		\$539 94
	Balance to new account .....	\$179 78

( COPY. )

ALBANY CITY BANK : *January 2, 1857.* I certify that there is a balance of one hundred and seventy-nine dollars and seventy-eight cents, standing to the credit of the State Cabinet of Natural History, on the books of this bank.

( Signed ) H. H. MARTIN, *Cashier.*

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On behalf of the Standing Committee on the State Cabinet, I have examined the above account, and find it correct. The payments are made by order of the standing committee, and are accompanied by proper vouchers.

**J. N. CAMPBELL.**

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- A. Addresses delivered at the Inauguration of the State Geological Hall,  
August 27, 1856 :
1. PROF. CHESTER DEWEY ;
  2. PRÉS. EDWARD HITCHCOCK ;
  3. PROF. CHARLES DAVIES.
- B. Catalogue of Fossils collected by EZEKIEL JEWETT, Curator of the  
Cabinet, 1856.
- C. Description of Palæozoic Fossils, by Prof. JAMES HALL.
- D. Miscellaneous.

APPENDIX.

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**A.**

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ADDRESSES

DELIVERED AT THE

INAUGURATION OF THE STATE GEOLOGICAL HALL,

August 27, 1856.



## PROF. DEWEY'S ADDRESS.

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MR. CHAIRMAN, LADIES AND GENTLEMEN :

WE have listened with unalloyed pleasure to the distinguished lecturer ( Prof. AGASSIZ), as he has shown us " Nature as an intelligent whole." Universal homage is paid to him, and his praise has been beaming from a thousand eyes. To him, in the wise arrangements of the committee, an hour, and more, was assigned, which he has admirably employed and filled. But several are to follow him ; and as time is short and flying, the same committee have kindly allotted to some of us fifteen minutes, to some ten, and to some five. Consider this, I pray you, ten minutes for a speech on this splendid occasion : ten minutes allotted to—what do you call him—an Old Fogie ? I accept the designation, for *more than ten minutes*. For, what is a Fogie ? I ask. As one of the Scientific Association, and on the authority of its " Linguical Committee," I answer for the advancement and diffusion of knowledge, a Fog-ie is one who has got out of the fog, and an old fogie has long been out of the fog. From the constitution of things, if there are old fogies, there must be young fogies. As it has been finely said that " the boy is father to the man," so the young fogie is father to the old fogie. The ladies will please to take this into special consideration.

Looking upon this brilliant scene in reference to the objects contemplated, the different state of things near the close of the last century seems hardly credible. Let us look at the facts, and briefly trace the history.

Then, only about half a dozen men in the Union understood even the elements of the geology of that day. Not a collection of minerals existed in any college or in private hands, and the very few which curiosity had picked up were unnamed and unknown.

Prof. SILLIMAN, who was graduated in 1796, carried, at a later day, the whole mass of the minerals at Yale for examination and study to Philadelphia, *in a candlebox*!! Most of the colleges in the Northern States possessed still fewer minerals. The science itself was in its very infancy, and books were not formed or circulated. The world of minerals was a petrifying blank before the inquiring eye. But the pioneers in Natural History had begun their beneficent course, and their names will be honored by this intelligent audience to-day.

Prominent among them for his zeal, and his patronage of the aspirants after knowledge, was WILLIAM MACLURE, author of the first geological map of the United States, a work of indefatigable effort; Dr. BENJAMIN WATERHOUSE of Cambridge University, who had directed the attention and enlightened the taste of the public on some parts of this subject; Dr. ADAM SEYBERT of Philadelphia, who, coming fresh from the school of WERNER in Saxony, was able greatly to extend the knowledge of the lovers of Nature's works; Dr. SAMUEL L. MITCHILL of New-York, an ardent student and patron of natural science, who was the author of the first geological report in our country\*; Dr. A. BRUCE of New-York, who published the American Journal of Mineralogy in 1810, the first work of the kind in the land; Col. GEORGE GIBBS, an ardent collector of minerals, and a zealous and patriotic amateur in the science: most of these brought into the country from Europe, in the first decade of this century, large collections of minerals and rich stores of geological knowledge. These have long since ceased from their honored labors. Two others remain, who belong to these pioneers of Natural Science.

PARKER CLEAVELAND, Professor in Bowdoin College, who conferred immense benefit upon our country by his excellent System of Mineralogy and Elements of Geology, the great text-book of this science for many years; and Professor SILLIMAN, perhaps the youngest of the pioneers, who had begun his noble course, the loved and honored Professor of Chemistry at Yale, who in a

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\* "The Society for promoting agriculture, arts and manufactures," incorporated in 1793, afterwards merged in the Albany Institute, appointed Dr. MITCHILL Commissioner to examine and report on the "Minerals of the State." His report was printed in the Medical Repository in 1798 and 1799, and treated chiefly of the rocks; but is the term *geology* used in it?

green old age gladdens our eyes and hearts to-day, the Emeritus Professor in the legitimate and full meaning of the term, *emeritus* in the minds of thousands besides the Yalenses. Fifty years ago last June, Prof. SILLIMAN returned from his tour in Europe, stored with the facts and principles of the first age of geology, but possessing a richer treasure for the country in that spirit of enterprise and communication of science demanded at that day. Within five years he saw the magnificent cabinet of Col. GIBBS deposited in Yale College, for practical use there, and for the advantage of the whole country. The impulse was given, and the impulse was felt. What a change those pioneers had wrought in the twenty years from SILLIMAN'S graduation!

Forty years ago commenced the career of Prof. AMOS EATON, in short courses of lectures on chemistry and botany, mineralogy and geology. After he had been for years a graduate of Williams College, and settled in this State in the honorable profession of the law, he spent several months attending the various lectures at Yale College, to fit him for the proposed effort. I have ever rejoiced that my humble influence brought him to his Alma Mater, where for months he gave lectures on natural history to the students. Commended by the Faculty of Williams College, he went forth to diffuse the elements of this science, and to rouse the attention of the people to this subject. Singular as he seemed to some, he was scientific, ardent and confident; and he exerted a vast influence on the minds of the young, and of the older also, and many received directly from him that impulse which has led to great results. Patronized by Gen. STEPHEN VAN RENSSELAER, of this city, so distinguished for his liberality, and so loved and honored by the great community, Mr. EATON made, among other works, his famous Survey of the Canal Rocks. This was published by the Patroon, who also placed Mr. EATON at the head of the Rensselaer Institute, only to act in a wider and more useful sphere. Prof. EATON was the first to assert, from his examination of the rocks of New-York and New-England, that the geologists of Europe would come to the United States to study their favorite science on a grander scale. This day, and in your hearing, has Prof. AGASSIZ announced to you that the prophecy is already fulfilled.

With this time of EATON arose the *second* set of pioneers, as they have been named ; active and enlightened, laborious and successful, in their efforts in this extensive field. Among them it was my privilege to act a humble part, making some tracks in the pathway of the science, or following the tracks of others. Many of them have followed the first pioneers to the grave ; but some remain, widely known on both sides of the Atlantic for their developments of natural science in our State, and in other States ; some of them to unite in this joyous festivity. Their familiar but furrowed faces need not designation by me.

In 1836, twenty years from the last era, another and numerous body of naturalists was spread over the land. For in twenty years of our history, a new set of colaborers in all the branches of natural science come to fill our horizon, while many of the preceding continue in full activity. For, among the great and efficient workers in our own State Survey were several from the school of EATON, or who had felt his influence, who have far outstripped their teacher ; but, to-day they find themselves surrounded with the active, energetic minds of a younger generation.

Geological surveys of several States had been begun, or were already completed. The earliest survey, under legislative authority, was of North-Carolina by Prof. OLMSTED, the excellent Report being printed in 1824-5.

In 1836 began the Geological Survey of the State of New-York, on a grander scale, and over a grander series of rocks. To-day, it is our privilege and joy to inaugurate the results in that noble, if not perfect, edifice, the GEOLOGICAL HALL. Appropriate is this designation, however numerous and important the departments in it. Let it not be called *Zoological Hall*, or *Mineralogical* or *Agricultural Hall*, but GEOLOGICAL HALL in the widest and truest sense ; since the objects in the several departments *form* the earth, or *spring* from the earth, or are *nourished* by the earth, or *operate* on the earth, or *support* the creatures of the earth, or *decorate* the earth, the mother of all : Geological Hall now, and Geological Hall forever !

By the statute for the Survey, the Legislature appropriated 26,000 dollars a year for four years of explorations ; amounting to 104,000 dollars for the survey, the collections, and the general

and annual reports. The Legislature afterwards extended the Survey for two years more, at the same rate. The whole country was astounded at the sum; an amazing, unheard of sum for the expense of the Natural History of the State! There became necessary, a Geologist for each of the four great districts of the State, a Mineralogist and Chemist, a Botanist, a Zoologist, with their assistants; a Surveyor of its agriculture, and a Palæontologist for its fossils. For the statute required a "Complete Geological Survey of this State," which was to "furnish a full and scientific description of its rocks, soils and minerals, and of its botanical and zoological productions, together with specimens of the same." There must be many workers; and they have not introduced an object which was not contemplated in the law. While the statute was framed with apparent wisdom and great care, it contemplated magnificent results. These it has produced, in the estimation of the scientific world.

Consider merely the points in the Survey, in connection with the results.

1. The general provisions in the law embraced all the three kingdoms of nature in this State.

2. The law required extensive collections of the objects. While the most important and extensive collection fills and adorns the Geological Hall, a large collection in mineralogy and geology was given to each college in the State, and to some other literary institutions.

3. It required descriptions of all the specimens, and figures especially of the new or rare.

4. It required a wide range of publications. Already the geological map of the State, and nineteen volumes quarto have been published. These have been spread among our citizens and literary institutions with generous liberality; and many copies have gone, in the true national spirit, to other States, or been given to the institutions of Europe. To the two volumes on palæontology, so highly illustrated by plates, three more are to be added to complete the Natural History of the State. The next volume is to appear early in 1857.

5. The Survey has been magnificent in its cost, already exceeding 600,000 dollars. Such has been the liberality and wise foresight

of the State of New-York in this expense, that every citizen is actually made richer by this bounty, and the whole crowned with glory in the admiring eyes of the civilized world. But, had the Legislature known the cost involved in the terms of the law, they would never have passed, or would have greatly modified, the statute. For science, this ignorance was most fortunate ; and for the glory of the State, most propitious.

But, you ask, how came this blessed ignorance? In the most natural way. The Legislature had no adequate conception of the amount of the objects of natural history in the State ; no means of knowing it. The naturalists were also in darkness on the subject. Take only the fossils for illustration. No geologist suspected, from publications of similar surveys, that more than three or four hundred species could be found in the State ; but, on examination, these “medals of creation,” resting in their secret habitations in the rocks, appeared in unthought of multitude. The first volume of the Palæontology contains 380 species, found in a few of the lowest series of the fossiliferous strata ; the second volume, 340 species in a few newer rocks : 720 species in less than half the series. The three coming volumes will contain from ten to twelve hundred, making in the whole near two thousand species of fossils. Hence it is that the work has so grown in the hands of the naturalists, altogether beyond their highest anticipations, and that unexpected appropriations have become necessary in carrying out the simple letter of the statute.

The expense for the collections, for the drawings, for the lithographs and engravings, for the coloring of plates, and for printing, binding and salaries, may be seen by a careful examination of the volumes already published. It is not surprising that the Legislature hesitated, and that the work had come to a temporary stand more than two years ago ; but so much labor had already been performed, and so great a sum already paid for results to appear in the coming volumes, that the stoppage of the work would involve too great a sacrifice. Consultation was needed, and consultation was had. A little of the light of the “Old Fog-ie” was called for, and it was cheerfully presented, and cordially accepted and adopted. It was felt and asserted in other States, as well as in our own, that the Empire State was committed, and her honor pledged before the

world. Her wise and patriotic citizens admitted the claim, and the obligation *to go forward*. In virtue of a statute in 1855, the completion of the Survey in three more volumes was settled, and the terms in due time arranged. In this arrangement, the late Secretary of the Regents of the University, an honored name, the *judicious* BECK, now sincerely mourned, gave his full soul and his strong arm to the then Secretary of State. These two were by law the commissioners. The work moved onward again. Favored by Divine Providence as she has been, the State will hold on in her steady, beneficent course to the end, so that the last shout of her glory shall be "EXCELSIOR!"

I have done. The light of history illumines our path. I rejoice in beholding this day and this splendid scene. In the GEOLOGICAL HALL you may behold the results : there are treasured up the lasting testimonials of this magnificent Survey, for your vision, improvement, and enjoyment. Born and educated a Yankee ; having dwelt fifty years in Yankee land, and for twenty years been called an adopted son of this Commonwealth, it is my honor to-day to present before you, in my humble way, that glory which is emblazoned by this History upon the Escutcheon of the Empire State.

## PROF. HITCHCOCK'S ADDRESS.

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MR. PRESIDENT :

THIS interesting occasion turns my thoughts irresistibly backward upon the early periods of those scientific enterprises, of which we have before us in this city some of the magnificent results. For this Geological Hall, which we meet to dedicate, would neither have been devoted to this purpose, nor supplied with specimens, had not a Geological Survey preceded it. Having been acquainted with the men who originated and executed this Survey, will you allow me to indulge in a few reminiscences concerning that work and its results in the few moments allotted me.

This, I believe, is the first example in which a State Government in our country has erected a museum for the exhibition of its natural resources : its minerals and rocks ; its plants and animals, living and fossil. And this seems to me the most appropriate spot in the country for placing the first Geological Hall erected by the Government : for the county of Albany was the district where the first geological survey was undertaken on this side of the Atlantic. This was in 1820, and was ordered by that eminent philanthropist, STEPHEN VAN RENSSELAER ; who, three years later, appointed PROFESSOR EATON to survey in like manner the whole region traversed by the Erie canal. This was the commencement of a work, which, during the last thirty years, has had a wonderful expansion ; reaching a large part of the States of the Union, as well as Canada, Nova-Scotia and New-Brunswick, and I might add several European countries, where the magnificent surveys now in progress did not commence till after the survey of Albany and Rensselaer counties. How glad are we, therefore, to find on this spot the first Museum of Economical Geology on this side of the Atlantic. Nay, embracing as it does all the departments of natural history, I see in it more than a European Museum of

Economical Geology, splendid though they are. I fancy rather that I see here the germ of a Cis-atlantic British Museum, or Garden of Plants.

North-Carolina was the first State that ordered a geological survey; and I have the pleasure of seeing before me the gentleman who executed it, and in 1824 and 5 published a report of 140 pages. I refer to Professor OLMSTED, who, though he has since won still brighter laurels in another department of science, will always be honored as the first commissioned State Geologist in our land.

South-Carolina commissioned Professor VANUXEM only a year later, to do for her what had been done in North-Carolina. This report, however, was never published save in the newspapers. After this there was a long hiatus in the State surveys. In 1828 I published a review of Professor OLMSTED's labors, in the hope of turning the attention of legislators to the subject, but in vain. In 1830, however, I was more successful. Pardon me if I tell you how. Being on my way to visit the Coal regions of Pennsylvania, the newspapers informed me that the State of Massachusetts had ordered a trigonometrical survey. I ventured to suggest to Gov. LINCOLN, how desirable it would be to have a geological survey connected with the enterprise. On my return, I found that he had recommended it, and that the Legislature had adopted it, and that a geological commission awaited myself.

It was not till three or four years later, that any other State moved in this enterprise: then followed Tennessee, Maryland, and New-Jersey. But in 1836 New-York entered upon the work, on a scale more liberal and with a plan more judicious than any other State before or since. She first obtained the opinion of scientific men as to the best mode of procedure, by a circular sent forth from the Hon. JOHN A. DIX, then Secretary of State: then she appropriated over \$100,000 to the survey; and now behold the magnificent result, or rather some of the results! For the nineteen splendid quartos already issued do not tell the whole story; since others are in reserve, which are looked for with deep interest by scientific men on both sides of the Atlantic. This survey has developed the older fossiliferous rocks with a fullness and distinctness unknown elsewhere. Hence European savans study the New-York

Reports with eagerness. In 1850, as I entered the Woodwardian Museum in the University of Cambridge in England, I found Prof. M'Cox busy with a collection of Silurian fossils before him, which he was studying with HALL's first volume of *Palæontology* as his guide ; and in the splendid volumes entitled *British Palæozoic Rocks and Fossils*, which appeared last year as the result of those researches, I find Prof. HALL denominated "the great American palæontologist." I tell you, Sir, that this survey has given New-York a reputation throughout the learned world, of which she may well be proud. Am I told that it will probably cost more than half a million ? Very well : the larger the sum, the higher will be the reputation of the people of New-York for liberality ; and what other half million expended in our country has developed so many new facts, or thrown so much light upon the early history of the globe, or won so world-wide and enviable a reputation ?

Allow me to add, that I have taken a deeper interest in this survey, because I was offered a commission by Governor MARCY to explore the first district, which I accepted, and actually entered upon the work ; but the magnitude of the undertaking, and a poor state of health, led me early to resign, and leave the place to be filled by Prof. MATHER. I confess, also, that I had a strong hope that I might have an opportunity to resurvey Massachusetts ; and finding Governor EVERETT in the chair of state, I offered my services anew ; and through his recommendation, always ready to be given for the promotion of learning, I obtained a new commission, and went over ground a second time, which I would gladly survey again, did life and health allow. Geologists who enter upon such a work with all the facilities now within their reach, can form but a faint idea of the difficulties we encountered who were early in the field.

In regard to this matter of geological surveys, I can hardly avoid making a suggestion here. So large a portion of our country has now been examined more or less thoroughly by the several State Governments, that it does seem to me the time has come when the National Government should order a Survey, geological, zoological and botanical, of the whole country, on such a liberal and thorough plan as the surveys in Great Britain and Austria are now conducted upon ; it being understood in the latter country, that at least

thirty years will be occupied in the work. Could not the distinguished New-York statesman, who was to have addressed us to-day, be induced, when the present great struggle in which he is engaged shall have been brought to a close by a merciful Providence, to introduce this subject and urge it upon Congress? And would it not be appropriate for the American Association for the Advancement of Science to throw a petition before the Government for such an object? Or might it not, with the consent of the eminent gentleman who has charge of the Coast Survey, be connected therewith, as it is with the Ordnance Survey in Great Britain?

But to return from this digression, another important result of the New-York Survey was the origination of the Association of American Geologists, which has gradually expanded into the American Association for the Advancement of Science. Many of us, who were engaged in the State surveys, were so isolated from one another, that we had few means of comparing views, or obtaining advice in our conclusions. Professor MATHER, I believe, through Professor EMMONS, first suggested the subject of a meeting to the Board of Geologists in November 1838, in a letter proposing several points for their consideration. I quote from that letter the following paragraph relating to the meeting. As to the credit he has here given me of having previously suggested the subject, I can say only that I had been in the habit for several years of making this meeting of scientific men a sort of hobby, in my correspondence with such. Whether others did the same, I did not then, and do not now, know. Were this the proper place, I could go more into details on this point; but I will merely quote Prof. MATHER's language to the Board\*.

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\* As this is a matter of some historical interest, it may not be arrogant or improper for me to add in a note, that in 1849 Prof. MATHER addressed a letter to me (dated Jackson, Ohio, Sept. 6), on this subject. A few extracts follow.

“ PROF. HITCHCOCK :

“ DEAR SIR—I received a few days since the Proceedings of the Am. Association for the Advancement of Science, 1st meeting, held in Philadelphia, Sept. 1848; and in it, page 91, I found a letter from Prof. HALL, and observed with some surprise the latter part of the sentence of the second paragraph (relating to Prof. VANUXEM), viz: ‘and to whom is due, above all others, the honor of being the first man to propose such an organization.’ Now I do not wish to detract at all from the merit due to Prof. VANUXEM; and perhaps Prof. HALL made the representation

“Would it not be well,” says he, “to suggest the propriety of a meeting of the geologists and other scientific men of our country at some central point next fall, say in New-York or Philadelphia. There are many questions in our geology, that will receive new light from friendly discussion and the combined observations of various individuals who have noted them in various parts of our country. Such a meeting has been suggested by Prof. HITCHCOCK, and to me it seems desirable. It would undoubtedly be an advantage not only to science, but to the several surveys that are now in progress, and that may in future be authorised. It will tend to make known our scientific men to each other personally; give them more confidence in each other, and cause them to concentrate their observations on those questions that are of interest either in a scientific or commercial point of view. More questions may be satisfactorily settled in a day by oral discussion, than in a year by writing and publication.”

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from memory only, or from hearsay, on the spur of the occasion; but that which belongs to the history of the Association of American Geologists ought, if stated where it will be referred to, to be stated accurately. *You* know that he was not the first to propose such an organization in 1838.

“In 1837, I received a letter from you on this subject; but it is lost, or I do not find it on my file of letters.

“On the 12th of Oct. 1838, you wrote me at Albany, and the letter was forwarded and reached me at Newburgh, in which you say: ‘And I had also hoped that ere this a meeting of American Geologists would be brought about in New-York or Philadelphia; but I feel that I am to be disappointed in this also.’

“On the 26th of October 1838, the day I received your letter at Newburgh, I answered it, and said: ‘It gives me much pleasure to see you express a wish to compare notes with others in relation to geological observations. I think it is much to be regretted that there is not a greater harmony of feeling, unity of action, and interchange of opinions and observations among our geologists.’ As I had to go west before the meeting of the Geological Board of N.Y., and which you had been invited by me and perhaps others to attend, I wrote to the Board some suggestions that seemed to me important, as follows:” (Then follows the letter containing the extract in the text. Prof. M. closes his letter to me with the following:)

“*You*, so far as I know, first suggested the matter of such an association. I laid the matter before the Board of Geologists of N.Y., specifying some of the advantages that might be expected to result; and Prof. VANUXEM probably made the motion before the Board in regard to it, which may have been all that Prof. HALL knew about it.

“We can each of us well dispense with the honor that might be awarded for originating the matter in one case, and putting in train for execution in the other: still, where the origin of an important society and association of scientific men for the advancement of science is recorded in its memoirs as historical fact, it ought to be stated *correctly*.”

Though the Board adopted the plan of a meeting, various causes delayed the first one till April 1840, when we assembled in Philadelphia, and spent a week in most profitable and pleasant discussion and the presentation of papers. Our number that year was only 18, because confined almost exclusively to the State geologists; but the next year, when we met again in Philadelphia, and a more extended invitation was given, about 80 were present, and the numbers have been increasing to the present time. But in fact those two first meetings proved the type, in all things essential, of all that have followed. The principal changes have been those of expansion, and the consequent introduction of many other branches of science, with their eminent cultivators. In 1842, we changed the name to that of the Association of American Geologists and Naturalists; and in 1847, to that of the American Association for the Advancement of Science. I trust it has not yet reached its fullest development, as our country and its scientific men multiply, and new fields of discovery open.

It may be thought that the New-York geologists, in their invitation, and the members of that first Philadelphia meeting, had no thought of extending their association beyond geologists; but Prof. MATHER's language just quoted speaks of "a meeting of the geologists and other scientific men of our country," thus showing what were his aspirations; and they were shared by all of us who had any thing to do with that first meeting. But we knew that only a short time previous, the American Academy of Arts and Sciences at Boston had directed a request to the American Philosophical Society, as the oldest of the kind in the country, that it would invite the scientific men of the land to such a meeting as the one we are now enjoying; but the distinguished men of that society declined, through fear that the effort would prove a failure. Surely then it did not become us to announce any such intentions or expectations; yet we did talk of them, and could not but hope that what might fail if attempted on a large scale at first, might be accomplished step by step. Had not the New-York geologists issued that modest invitation, and confined it at first to the State surveyors, probably even yet we might have been without an Association for the Advancement of Science.

Such are some of the results of this Geological Survey, that have

become matter of history : others, perhaps greater than these, belong to posterity, and need the ken of prophecy to describe. We may be quite sure, however, that this Hall will be a centre of deep interest to coming generations. Long after we shall have passed away, will the men of New-York, as they survey these monuments, feel stimulated to engage in other noble enterprises by this work of their progenitors ; and from many a distant part of the civilized world will men come here to solve their scientific questions, and to bring far off regions into comparison with this. New-York, then, by her liberal patronage of science, has not only acquired an honorable name among the living in all civilized lands, but has secured the voice of history to transmit her fame to far off generations.

REMARKS OF PROF. DAVIES.

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To one accustomed to speak only on the abstract quantities of number and space, this is an unusual occasion, and this an unusual audience. How is it possible for me to discuss the abstract forms of geometry, when I see before me, in such profusion, the most beautiful real forms that Providence has vouchsafed to the sight of man!

I propose to introduce and develop but a single train of thought, viz. the unchangeable connection between what in common language is called the theoretical and practical, but, in more technical phraseology, the ideal and actual.

The actual, or true practical, consists in the uses of the forces of nature according to the laws of nature; and here we must distinguish between it and the empirical, which uses or attempts to use those forces without a knowledge of the laws. The true practical, therefore, is the result or actual of an antecedent ideal. The ideal, full and complete, must exist in the mind before the actual can be brought forth according to the laws of science.

Who, then, are the truly practical men of our age? Are they not those who are engaged most laboriously and successfully in investigating the great laws? Are they not those who are pressing out the boundaries of knowledge into new and unexplored regions, where, perchance, yet may slumber some great principle of nature, corresponding in the simplicity of its laws, and the magnitude of its results, to that which gave birth to the steam engine or electric telegraph? Is not the gentleman from Massachusetts (Professor AGASSIZ) the most practical man in our country, in the department of natural history; not because he has collected the greatest number of specimens, but because he has laid open to us all the laws of the animal kingdom?

Are the formulas written on the blackboard by the gentleman

from Cambridge ( Professor PEIRCE) of no practical value, because they cannot be read by the uninstructed? A single line may contain the elements of the motions of all the heavenly bodies; and the eye of science, taking its standpoint at the centre of gravity of the system, will see in the equation the harmonious revolutions of all the bodies which circle the heavens. It is such labors and such generalizations that have rendered his name illustrious in the history of mathematical science.

Is it of no practical value that the Chief of the Coast Survey ( Professor BACHE), by a few characters written on paper at Washington, has determined the exact time of high and low tide in the Harbor of Boston, and can determine by a similar process the exact times of high and low water at every point on the surface of the globe? Are not these results, the highest efforts of science, also of the greatest practical utility? And may we not then conclude that *there is nothing truly practical which is not the consequence of an antecedent ideal?*

Science is to art, what the great fly-wheel or governor of a steam engine is to the working parts of the machinery: it guides, regulates, and controls the whole. Science and art are inseparably connected: like the Siamese twins, they cannot be separated without producing the death of both.

How, then, should we regard the superb specimens of Natural History which the liberality, the munificence and wisdom of our State have collected at the Capital? They are the elements from which we can here determine all that belongs to the natural history of the State; and may we not hope that science and genius may be brought here, and, striking them with a magic wand, cause the true practical to spring into immortal life!

APPENDIX.

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**B.**

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CATALOGUE OF FOSSILS

COLLECTED BY EZEKIEL JEWETT,

CURATOR OF THE CABINET,

1856.



CATALOGUE OF FOSSILS COLLECTED BY E. JEWETT,

CURATOR OF THE CABINET.

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BIRDSEYE LIMESTONE.

- 1 Slab PHYTOPSIS CELLULOSUM (large). Fort-Plain.

TRENTON LIMESTONE:

- 1 RETEPORA FENESTRATA. Sacket's-harbor.  
2 STICTOPORA ACUTA. Jacksonburgh.  
18 CHÆTETES LYCOPERDON. 2 species. Jacksonburgh.  
5 Slabs various corals. do.  
14 ORTHIS PECTINELLA. do.  
1 LEPTÆNA FILITEXTA. do.  
2 PLEUROTOMARIA BILIX. do.  
6 BELLEROPHON BILOBATUS. do.  
2 MURCHISONIA GRACILIS. do.

UTICA SLATE.

- 20 ORTHIS ? sp.? Utica.  
21 ATRYPA sp.? do.  
5 ORTHOCERATITES. do.  
1 Slab GRAPTOLITES SCALARIS. Fort-Plain.  
1 Slab GRAPTOLITES. do.  
1 Slab 11 CALYMENE BECKII. do.

CLINTON GROUP.

- 1 CANNAPORA JUNCIFORMIS. Rochester.  
1 HELOPORA FRAGILIS. do.  
2 PHÆNOPORA CONSTELLATA. do.  
5 Slabs GRAPTOLITES CLINTONENSIS. do.  
10 do FUCOIDES (various). New-Hartford.  
3 do Tracks of GASTEROPODA. do.  
1 do Tracks of BRACHIOPODA. do.  
1 do GLYPTOCRINUS PLUMOSUS. do.  
1 do EPSOMITES. Lockport.

1 Slab	CORALS (various).	New-Hartford.
5 Slabs	CYCLOLITES ROTULOIDES.	do.
5	LINGULA OBLONGA.	do.
12	AVICULA RHOMBOIDEA.	do.
8	AVICULA EMACERATA.	do.
12	MODIOLOPSIS sp.?	do.
20	ORTHIS TENUIDENS.	do.
12	ATRYPA GIBBOSA.	do.
10	ATRYPA EQUIRADIATA.	do.
20	LEPTÆNA SERICEA.	do.
2	LEPTÆNA CORRUGATA.	do.
1 Slab	ATRYPA CONGESTA.	Reynolds's Basin.
1 Slab	ATRYPA HEMISPHERICA.	Rochester.
8	PENTAMERUS OBLONGUS.	do.
2 Slabs	PENTAMERUS OBLONGUS.	do.
5 Slabs	TENTACULITES MINUTUS.	do.
1	ORTHO CERATITE (very large).	New-Hartford.
2	ORTHO CERATITES, sp.?	do.

#### NIAGARA GROUP.

150	STREPTELASMA CALICULA.	Lewiston.
11	CERAMOPORA IMBRICATA.	do.
5	ASTROCERIUM CONSTRICTUM.	do.
1	HELIOLITES ELEGANS.	Lockport.
1	STOMATOPORA CONCENTRICA.	do.
2	HELIOLITES PYRIFORMIS.	do.
4	POLYDILASMA TURBINATA.	do.
1 Slab	various corals.	do.
1 Slab	CLADOPORA SERIATA.	do.
1 Slab	CLADOPORA MULTIPORA.	do.
120	Various BRYOZOA.	Lewiston.
36	CARYOCRINUS ORNATUS.	do.
3	EUCALYPTOCRINUS DECORUS.	do.
80	STEPHANOCRINUS ANGULATUS.	do.
4	STEPHANOCRINUS GEMMIFORMIS.	do.
100	LEPTÆNA TRANSVERSALIS.	do.
42	LEPTÆNA DEPRESSA.	do.
4	LEPTÆNA SUBPLANA.	do.
4	LEPTÆNA STRIATA.	do.
25	ORTHIS ELEGANTULA.	do.
32	ORTHIS HYBRIDA.	do.

3	ORTHIS FLABELLULUM.	Lewiston.
20	SPIRIFER NIAGARENSIS.	do.
4	SPIRIFER BILOBUS.	do.
60	SPIRIFER CRISPUS.	do.
45	SPIRIFER SULCATUS.	do.
75	ATRYPA RETICULARIS.	do.
150	ATRYPA NODOSTRIATA.	do.
55	ATRYPA NITIDA.	do.
160	ATRYPA NEGLECTA.	do.
35	ATRYPA CUNEATA.	do.
4	ATRYPA CORALLIFERA.	do.
195	ATRYPA CARINOSA.	do.
5	ATRYPA OBTUSIPLICATA.	do.
26	ATRYPA RUGOSA.	do.
4	ATRYPA INTERPLICATA.	do.
45	PLATYOSTOMA NIAGARENSIS.	do.
7	ACROCLIA NIAGARENSIS.	do.
1	CALYMENE NIAGARENSIS.	Rochester.
7	BUMASTIS (imperfect).	Lewiston.
3	Slabs BEYRICHTIA SYMMETRICA, CYTHERINA SPINOSA, TENCACULITES NIAGARENSIS. ORBICULA SQUAMIFORMIS, Parts of TRILOBITES, CRINOIDAL COLUMNS, etc.	

## ONONDAGA-SALT GROUP.

1	Slab CYTHERINA, sp.?	Blackrock.
1	Slab ORTHIS, sp.?	Waterville.
1	EURYPTERUS REMIPES.	Blackrock.
1	Head of EURYPTERUS REMIPES.	do.
1	Fragment showing structure.	do.

## WATERLIME GROUP.

4	Slabs CORALS, sp.?	Litchfield, Herkimer county.
12	STREPTELASMA, sp.?	do.
1	Slab STREPTELASMA.	do.
54	TELLINOMYA, sp.?	do.
10	LEPTÆNA, sp.?	do.
6	SPIRIFER CRISPUS.	do.
1	Slab MODIOLOPSIS.	do.
80	ATRYPA SULCATA.	do.
1	ORTHO CERATITE, sp.?	Paris Hill.
7	LITTORINA ANTIQUA.	Litchfield.

6	MURCHISONIA, sp.?	Litchfield.
1	GOMPHOCERAS, sp.?	Paris Hill.
12	CYRTOCERAS.	Litchfield.
10	Slabs BEYRICHIA ( various).	Paris Hill.
3	Slabs SPIRORBIS, sp.?	do.

## PENTAMERUS LIMESTONE.

2	STOMATOPORA CONCENTRICA.	Litchfield.
2	FAVOSITE, sp.?	do.
1	Large slab various fossils.	do.
4	LEPTÆNA, sp.?	do.
16	LEPTÆNA, sp.?	do.
2	ORTHIS, sp.?	do.
4	AVICULA, sp.?	do.
6	ATRYPA, sp.?	do.
80	ATRYPA, sp.?	do.
10	ATRYPA RETICULARIS ?	do.
1	ASTROCRINITES PACHYDACTYLUS.	do.
4	Parts of ditto.	do.
1	Large slab 7 CRINOIDS, sp.?	do.
1	Large slab 8 LEPTOCRINITES GEBHARDI.	do.
1	Large slab CRINOIDS, 2 species : sp.?	do.
2	CYSTIDEANS, sp.?	do.
2	ACROCULIA, sp.?	do.
2	PLATYOSTOMA, sp.?	do.
4	BELLEROPHON, sp.?	do.
1	CONULARIA, sp.?	do.

## ONONDAGA LIMESTONE.

10	Slabs various corals.	Williamsville.
2	CYATHOPHYLLUM ( very large), sp.?	do.
1	Slab CORALS.	Buffalo.
22	PENTAMERUS ELONGATUS.	Williamsville.
6	ICHTHYODORULITES.	Blackrock.

## CORNIFEROUS LIMESTONE.

80	RETEPORA, sp.?	Buffalo.
85	FENESTELLA, sp.?	do.
1	Slab CORALS, sp.?	Babcock's Hill.
1	RETEPORA, sp.?	do.
1	Slab CORALS, sp.?	Blackrock.

1	CORAL, sp.?	Blackrock.
2	CHÆTETES, sp.?	Babcock's Hill.
25	STREPTELASMA, sp.?	do.
8	LEPTÆNA, sp.?	Sangersfield.
3	LEPTÆNA ACUTIRADIATA.	do.
16	LEPTÆNA.	do.
21	ORTHIS LENTICULARIS.	Eastman's, Sangersfield.
20	ORTHIS, sp.?	do.
10	ATRYPA, sp.?	do.
15	ATRYPA, sp.?	do.
20	ATRYPA RETICULARIS.	do.
4	SPIRIFER FIMBRIATA.	do.
9	SPIRIFER RUGOSA.	
1	PLEURORHYNCHUS TRIGONALIS.	Williamsville.
4	PENTAMERUS, sp.?	Sangersfield.
14	CRINOIDEANS, sp.?	do.
4	ORNITHICHNITES, sp.?	Williamsville.
23	ACROCLIA ERECTA.	do.
42	EUOMPHALUS ROTULOIDES.	do.
1	CRUSTACEAN ?	Blackrock.
1	Ditto, same species.	Schoharie.
6	CALYMENE BUFO.	Blackrock.

## MARCELLUS SHALE (Limestone stratum).

97 FOSSILS, and fourteen species undescribed. Leroy.

## HAMILTON GROUP.

12	STREPTELASMA RECTA.	Lake Erie Shore.
5	MADRIPORES, sp.?	do.
28	Various CORALS.	do.
1	CORALS, sp.?	do.
2	TERRESTRIAL PLANTS ?	do.
1	Ditto.	do.
9	CRINOIDEANS, sp.?	do.
32	CRINOIDAL COLUMNS, sp.?	do.
2	Slabs DILUVIAL SCRATCHES.	do.
2	Slabs various fossils.	Buffalo Creek.
4	AVICULA, sp.?	do.
32	AVICULA, various.	Delphi.
8	STROPHODONTA DEMISSA.	Lake Erie Shore.
10	CHONETES CARINATA.	do.

4	CHONETES, sp.?	Lake Erie Shore.
6	LEPTÆNA, largest sp.?	do.
2	LEPTÆNA, sp.?	do.
3	LEPTÆNA, sp.?	Delphi.
5	LEPTÆNA, sp.?	Darien.
24	ORTHIS, sp.?	Lake Erie Shore.
4	ORTHIS, sp.?	Darien.
36	ORTHIS UMBONATA.	do.
54	SPIRIFER MUCRONATA.	Lake Erie Shore.
16	SPIRIFER PUNCTILIFERA.	do.
6	SPIRIFER MEDIALIS.	do.
4	SPIRIFER FIMBRIATA.	do.
170	ATRYPA, sp.?	Darien.
12	ATRYPA, sp.?	do.
11	ATRYPA ROSTRATA.	Delphi.
7	ATRYPA, sp.?	do.
13	MODIOLOPSIS ?	do.
7	AMBONYCHIA ?	Lake Erie Shore.
3	MICRODON BELLISTRIATA.	Delphi.
7	GRAMMYSIA HAMILTONENSIS.	do.
8	MODIOLOPSIS ?	do.
2	ALLORISMA, sp.?	Lake Erie Shore.
5	BELLEROPHON, sp.?	do.
8	TURBO, sp.?	do.
3	TURBO, sp.?	Delphi.
8	PLEUROTOMARIA HAMILTONENSIS.	Lake Erie Shore.
2	PLEUROTOMARIA ?	Delphi.
35	PLEUROTOMARIA SULCOMARGINATA.	do.
4	LOXONEMA NEXILIS.	do.
8	LOXONEMA, sp.?	do.
3	ACROCULIA, sp.?	Buffalo Creek.
8	ACROCULIA, sp.?	Lake Erie Shore.
6	ACROCULIA, sp.?	Delphi.
1	CYRTOCERAS, sp.?	do.
2	GONIATITES, sp.?	do.
15	Slabs CYTHERINA, sp.?	Lake Erie Shore.
3	Slabs CYTHERINA, sp.?	Darien.
3	ORTHO CERATITES, sp.?	Lake Erie Shore.
2	ORTHO CERATITES, sp.?	do.
1	ORTHO CERATITE (very large).	do.

2	ORTHO CERATITES, sp.?	Delphi.
3	ORTHO CERATITES, sp.?	do.
2	DIPLEURA DEKAYI (heads).	Cazenovia.
1	PHACOPS BUFO.	Delphi.
4	CRYPHEUS CALLITELES.	Lake Erie Shore.
70	PHACOPS BUFO.	do.
1	ICHTHYODORULITE, with six teeth.	Darien.



APPENDIX.

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C.

DESCRIPTIONS

OF

PALÆOZOIC FOSSILS,

CHIEFLY FROM THOSE CONSTITUTING THE THIRD VOLUME  
OF THE

PALÆONTOLOGY OF NEW-YORK;

WITH OTHERS FROM THE FOURTH VOLUME, etc. etc.



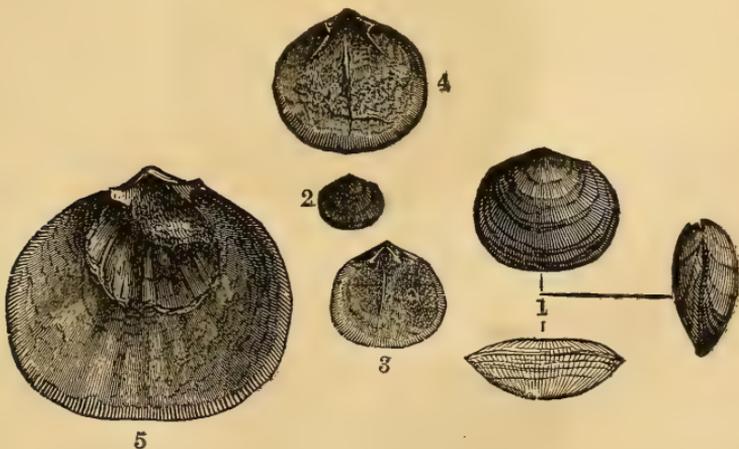
## PALÆOZOIC FOSSILS.

### ORTHIS OBLATA (new species).

Palæontology of New-York, Vol. iii, pl. 10, f. 1 - 14.

SHELL (in the young state) longitudinally subovate, and varying from circular to transversely oval in its stages of growth, resupinate : ventral valve convex at the beak, flattened in the middle, and convex towards the front ; dorsal valve very convex in the middle and towards the beak ; beaks of the two valves nearly equally elevated, that of the ventral valve pointed ; area very small ; foramen large. Surface finely striated ; striæ frequently bifurcating and curving towards the lateral and cardinal margins, concentrically marked by finer striæ and stronger lines of growth, which are numerous in the older shell.

*Locality.* Helderberg mountains.



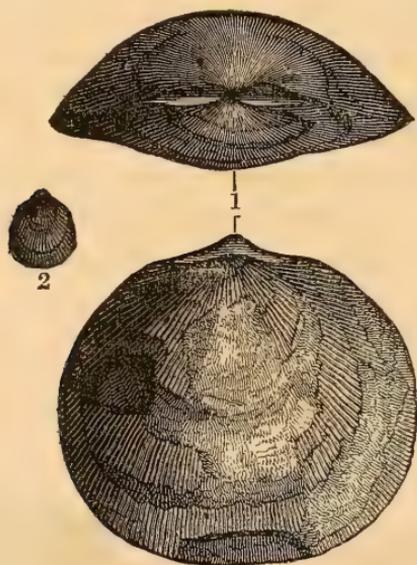
ORTHIS OBLATA.

ORTHIS EMINENS (n. s.).

Pal. N.Y. Vol. iii, pl. 11, f. 7 - 14.

**SHELL** circularly subquadrate, wider than high; ventral valve very convex near the beak, flattened or depressed towards the base; beak very prominent, projecting much beyond the opposite valve, pointed and slightly incurved: dorsal valve convex in the middle, and depressed almost equally towards the margins; beak rising but slightly above the hinge-line, with a central depression which is lost before reaching the middle of the valve: hinge-line less than the width of the shell; area large, extending to nearly two-thirds the entire width of the shell; foramen large and high. Surface finely striated with frequent bifurcations, and curving upwards to the hinge-margin.

*Locality.* Helderberg mountains.



ORTHIS EMINENS.



ORTHIS TUBULOSTRIATA (n. s.).

Pal. N.Y. Vol. iii, pl. 11, f. 1 - 6.

**SHELL** subcircular: valves nearly equally convex, depressed near the margin; ventral valve more prominent towards the beak,

which is sharply incurved over the area ; area narrow, length about half the width of the shell. Surface striated ; striæ somewhat tubular, prominent, fasciculate, increasing by implantation and bifurcation, extremely curved towards the margins, and presenting at somewhat regular intervals small tubular pore-like openings upon the surface ; radiating striæ, when not worn, crossed by prominent concentric striæ, and, rarely, by stronger lines of growth.

In the usual condition of the specimens, the concentric striæ are only visible in the depressions between the radiating striæ, and sometimes are imperceptible.

*Locality.* Helderberg mountains.

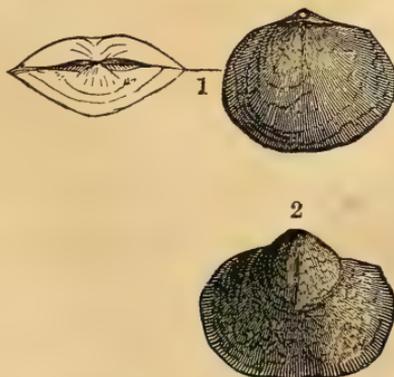


### ORTHIS SUBCARINATA (n. s.).

Pal. N.Y. Vol. iii, pl. 12.

SHELL somewhat transversely oval, plano-convex : ventral valve very convex, strongly elevated or subcarinate along the middle ; beak small, incurved : dorsal valve more or less flattened, with a distinct depression along the middle, which becomes wider towards the base, producing a sinus in the margin of the shell ; beak scarcely rising above the hinge-line ; area narrow, linear, one-half to two-thirds the width of the shell.

The depressed line along the middle of the dorsal valve, and the ridge upon the ventral valve, very frequently diverge from the central line, though the specimens do not appear to have suffered any distortion from pressure.



ORTHIS SUBCARINATA.

*ORTHIS PERELEGANS* (n. s.).

Pal. N.Y. Vol. iii, pl. 13.

SHELL transversely oval; valves nearly equally convex: ventral valve elevated along the middle from the beak towards the front, and sloping laterally; beak small, pointed, incurved, extending little beyond the other: dorsal valve subventricose, more or less depressed along the middle from near the beak to the front; beak small, not much elevated above the hinge-line: cardinal margin generally sloping a little from the beaks, rounding imperceptibly into the lateral margins; area narrow, nearly half the width of the shell; foramen broad triangular, extending nearly to the apex of the beak. Surface marked by fine, irregular, bifurcating, longitudinal striæ, crossed by concentric lines of growth.

Chiefly distinguished from the last by its more ventricose dorsal valve, and by the hinge-line sloping more from the beaks laterally; but more readily distinguished by the internal differences.



*ORTHIS PERELEGANS.*



*ORTHIS DEFORMIS* (n. s.).

Pal. N.Y. Vol. iii, pl. 14, f. 3.

SHELL suborbicular, lenticular: ventral valve more convex than the opposite, most elevated between the centre and beak; beak straight, often distorted in consequence of having been the point by which the shell was attached: dorsal valve depressed-convex, most elevated near the beak; beak not extending beyond the hinge-line; hinge-line straight, equalling about three-fourths

the width of the shell ; area broad, flat, sometimes nearly on a plane with the greater diameter of the shell ; foramen closed. Surface marked by prominent rounded striæ, which increase by implantation, and are crossed at intervals by distinct subimbricating concentric lines of growth.

This shell has much the general habit of *O. umbraculum* of the Carboniferous system, but is not resupinate.

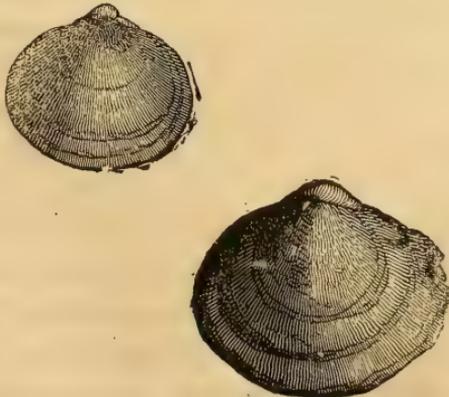


### ORTHIS MULTISTRIATA (n. s.).

Pal. N.Y. Vol. iii, pl. 15, f. 2.

SHELL circular or transversely suboval : ventral valve most convex near the beak, depressed so as to form a broad shallow undefined sinus, which sometimes gives to the front a submarginate aspect ; beak a little more prominent than the opposite, slightly incurved : dorsal valve more elevated, most convex between the middle and the beak ; beak rising above the hinge, obtuse and incurved ; hinge-line straight, about half the width of the shell ; area small ; foramen narrow, extending nearly to the apex. Surface marked by fine, crowded, nearly equal striæ, which increase chiefly by implantation, and are crossed by a few faint concentric lines of growth.

Closely related to the ventricose varieties of *Orthis resupinata*, and also to the *Orthis striatula* of D'ORBIGNY.



ORTHIS MULTISTRIATA.

ORTHIS STROPHOMENOIDES (n. s.).

Pal. N.Y. Vol. iii, pl. 14, f. 2.

SHELL transverse, somewhat semioval : ventral valve flattened convex, with a distinct narrow mesial elevation passing from beak to base ; beak scarcely distinct from hinge-line, straight : dorsal valve more convex than the opposite, most elevated between the middle and the beak, from which a distinct narrow depression extends towards the front ; beak more prominent than the opposite, obtuse, incurved : hinge-line straight, nearly equalling the greatest width of the shell ; area large, plane ; foramen apparently closed. Surface marked by coarse radiating striæ, which increase by implantation and bifurcation : several of those on the mesial elevation of the ventral valve appear to coalesce along the centre, before reaching the beak. In well preserved specimens, strong concentric striæ are visible in the depressions between the radiating striæ. Shell marked by a few strong concentric undulations of growth.

Resembles very nearly *O. fasciata* of the Niagara group.



ORTHIS MUSCULOSA (n. s.).

Pal. N.Y. Vol. iii, pl. 91, f. 1-3.

SHELL suborbicular, the length about nine-tenths as great as the width : ventral valve depressed-convex, sometimes slightly concave near the front ; beak prominent, equalling or extending a little beyond that of the opposite valve, pointed and slightly incurved : dorsal valve regularly and distinctly convex, most elevated in the central region, sometimes a little depressed towards the front ; beak prominent, triangular, pointed and incurved ; cardinal teeth and process strong ; hinge extremely short ; area triangular, scarcely extending beyond the foramen ; foramen large, partly occupied by the prominent cardinal process of the other valve, visceral impression large, fan-shaped, and strong. Surface marked by fine, distinct, radiating striæ, those nearest the cardinal margin being curved outwards from the beak ; concentrically marked by obscure lines of growth.

This species bears a general resemblance to *O. oblata* of the Delthyris shale; but it attains a larger size, is more ventricose, and never so distinctly resupinate. The beaks are more prominent and incurved, that of the dorsal valve curving beyond the hinge-line. The cardinal views of the two species also differ: the hinge-line of the present species arches upwards on each side of the beaks, while in the other it is straight. The area is also higher in the Oriskany species than in that from the Shaly limestone.

In the Oriskany sandstone of New-York, this species usually occurs in the form of casts. I have obtained fine specimens of the fossil entire, and of the separate valves, from Cumberland, Md.

*Geological position and locality.* Oriskany sandstone, Albany and Schoharie counties; Cumberland (Md.), etc.



### LEPTÆNA CONCAVA (n. s.).

Pal. N.Y. Vol. iii, pl. 18, f. 2.

SHELL concavo-convex, hemispherical: ventral valve regularly convex; umbonial region prominent; cardinal margin rounding from the beak towards the lateral extremities: dorsal valve deeply concave; hinge-line less than the greatest width of the shell; area of ventral valve broad, that of dorsal valve linear; foramen triangular, nearly closed by a thick callosity. Surface marked by very fine, close, radiating striæ, each fifth or sixth one a little more prominent than those between; crossed by fine regular concentric wrinkles, producing a beautiful subcancellate appearance.

*Geological position and locality.* In the shaly limestone of the Helderberg group, Albany county.



### LEPTÆNA NUCLEATA (n. s.).

Pal. N.Y. Vol. iii, pl. 94, f. 1.

SHELL semicircular: ventral valve extremely gibbous, abruptly depressed or flattened towards the lateral extremities; beak (internal cast) very abruptly incurved, and divided by a central groove (left by the mesial plate) which extends back nearly to the centre of the valve: dorsal valve unknown; hinge-line

equal to the greatest width of the shell, terminating in minute triangular extensions; area sublinear, incurved beyond the plane of the valves. Surface unknown.

Internal casts of the ventral valve of this little shell are common in the Oriskany sandstone; but no specimens have been met with, showing its external characters, nor have any specimens of the dorsal valve yet been recognized.

*Geological position and locality.* In the Oriskany sandstone, Albany county.

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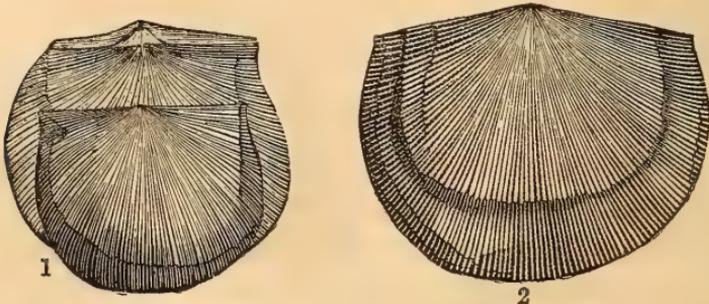
### STROPHOMENA WOOLWORTHANA (n. s.).

Pal. N.Y. Vol. iii, pl. 17, f. 1.

SHELL semielliptical, often extremely elongate: ventral valve concave towards the front and flat on the lateral margins, depressed convex near the beak; beak small, and scarcely rising above the edge of the valve; dorsal valve convex, most elevated near the front, and flattened near the umbo; beak not projecting: hinge-line straight, equal to the greatest width of the shell; area linear, conspicuous, partly common to both valves; foramen broadly triangular, partly or entirely closed. Surface finely striated; striæ rounded, crowded, simple, increasing by implantation; concentrically crossed by closely arranged striæ and a few distant lines of growth.

This species approaches in character to *Strophomena (Leptaena) subplana* (Palæontology of New-York. Vol. ii, pl. 53, f. 8, 9 & 10); but the shell is more robust, and the striæ more round and stronger than in that shell.

*Geological position and locality.* Shaly limestone of the Lower Helderberg, Albany and Schoharie counties.



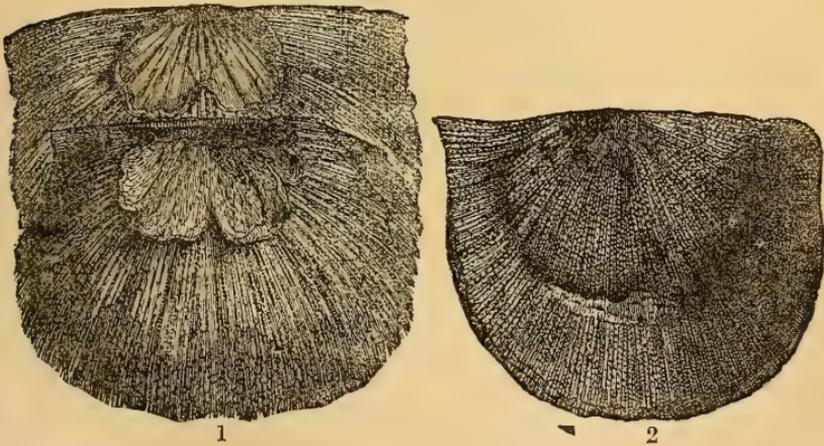
STROPHOMENA WOOLWORTHANA.

## STROPHOMENA (STROPHODONTA) HEADLEYANA (n. s.).

Pal. N.Y. Vol. iii, pl. 20, f. 1 &amp; 2.

SHELL nearly semicircular, about three-fourths as long as broad : ventral valve very concave especially near the front, sometimes depressed-convex at the beak ; beak scarcely distinct from the margins of the area : dorsal valve depressed at the umbo, and very convex towards the front ; beak not extending beyond the cardinal margin : hinge-line equalling the greatest width of the shell, crenulated ; area somewhat wide, and marked by transverse striæ produced by the continuation of the crenulations from the hinge-line across its surface ; foramen narrow, closed. Surface marked by coarse, sharply elevated striæ, which increase chiefly by implantation, and present a peculiar irregularly waved appearance.

*Geological position and locality.* Shaly limestone of the Lower Helderberg, Albany and Schoharie counties.



STROPHOMENA HEADLEYANA.

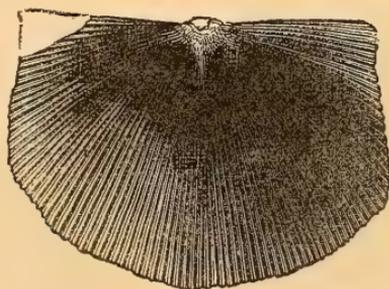
## STROPHOMENA RADIATA.

Pal. N.Y. Vol. iii, pl. 21, f. 8 & 9.

*Strophomena radiata*, VANUXEM, Report Third District N.Y., p. 122, f. 6.

SHELL nearly semicircular, about three-fourths as long as wide : ventral valve flat or subconcave, except near the umbo, where it is depressed-convex ; beak rising a little above the line of the cardinal margin : dorsal valve flat, or slightly concave near the beak and towards the extremities, very gibbous in the middle and towards the front ; beak not elevated above the cardinal margin ; hinge-line equalling the greatest width of the shell, apparently not crenulated. Surface marked by distinct radiating striæ, which increase by implantation and bifurcation, crossed by fine concentric striæ : interior indistinctly granulose.

*Geological position and locality.* Shaly limestone of the Lower Helderberg, Albany and Schoharie counties.



STROPHOMENA RADIATA.



## STROPHOMENA (STROPHODONTA) PUNCTULIFERA.

Pal. N.Y. Vol. iii, pl. 21, f. 4.

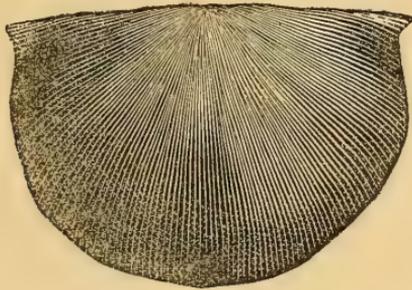
*Strophomena punctulifera*, CONRAD : Vanuxem's Report on the Third Geological District N.Y., p. 122, f. 5.

SHELL subsemicircular, about four-fifths as long as wide : ventral valve concave ; beak not projecting beyond the hinge : dorsal valve concave near the umbo, very convex near the middle ; beak not elevated above the cardinal margin ; sides somewhat

contracted below the extremities of the hinge ; hinge-line straight, nearly or quite equalling the greatest width of the shell, finely crenulated. Surface marked by distinct bifurcating striæ : interior granulose ; cast punctate.

This species is nearly related to the last, but differs in the crenulated hinge-line, and in having the internal surface more distinctly granulose ; in consequence of which, the surface of casts always presents a punctate aspect, from which it has received its name.

*Geological position and locality.* Shaly limestone of the Lower Helderberg, Albany, Schoharie, Herkimer and Oneida counties.



STROPHOMENA PUNCTULIFERA.

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STROPHOMENA (STROPHODONTA) CAVUMBONA (n. s.).

Pal. N.Y. Vol. iii, pl. 21, f. 1 - 3.

SHELL subsemicircular, from two- to four-fifths as long as wide, usually contracted below the extremities of the hinge-line ; cardinal border sloping a little from the beaks, nearly or quite equalling the greatest width of the shell : ventral valve concave in the umbonial region and near the hinge, very convex in the middle and towards the front : dorsal valve flat or concave ; beak very small, scarcely elevated above the cardinal margin : hinge-line straight, crenulated ; area linear, partly common to both valves, transversely striate on the ventral valve ; foramen small, narrow, closed. Surface marked by coarse irregular radiating striæ, which increase by implantation.

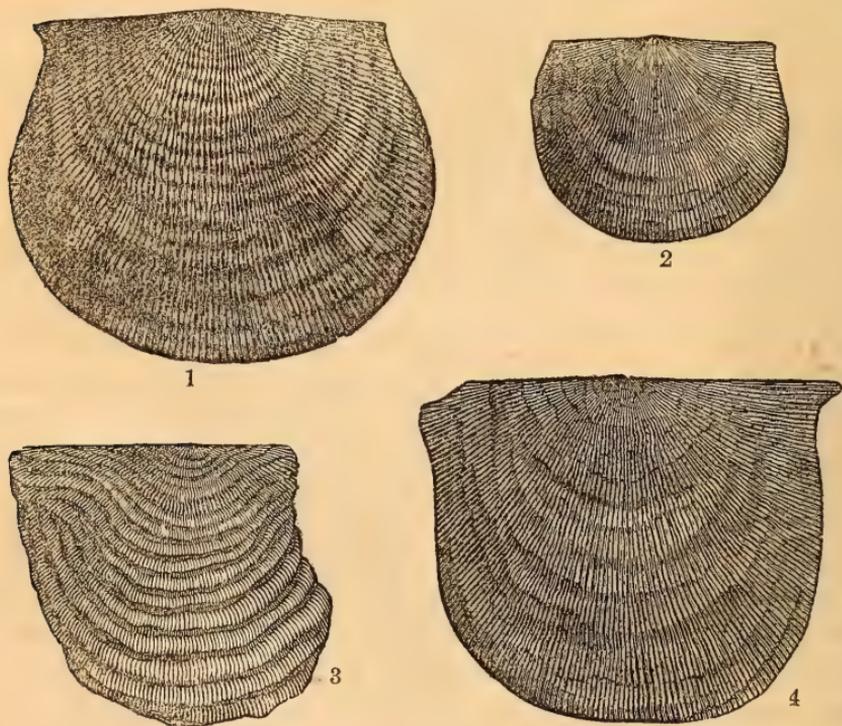
*Geological position and locality.* Shaly limestone of the Lower Helderberg, Albany and Columbia counties.

## STROPHOMENA (STROPHODONTA) BECKII (n. s.).

Pal. N.Y. Vol. iii, pl. 22, f. 1a - 1t.

SHELL subsemicircular or subquadrate; length sometimes equal to the width (though usually from two-thirds to three-fourths as great): ventral valve depressed-convex; beak very small: dorsal valve flat or a little concave near the hinge, slightly convex near the front: hinge-line crenulated, generally equal to the greatest width of the shell, but sometimes less; area linear, confined to the ventral valve; foramen small, open or closed. Surface marked with fine, regular, closely arranged, bifurcating, radiating striæ, crossed by fine obscure concentric lines, and small more or less regular concentric wrinkles which curve outwards on approaching the hinge.

This species is very closely allied to *Strophomena (Leptæna) sowerbyi* of BARRANDE (Sil. Brach. aus Böhmen, pl. 21, f. 1 & 2 a, b, c, e); but differs from those figures in being more coarsely striate, with the concentric



STROPHOMENA BECKII.

wrinkles stronger, especially near the beak : they are, also, generally more curved outwards near the hinge. The lateral margins of our shell are likewise, in most specimens, more contracted below the extremities of the hinge, than in the examples given by BARRANDE.

*Geological position and locality.* Shaly limestone of the Lower Helderberg, Albany and Schoharie counties.



STROPHOMENA (STROPHODONTA) LEAVENWORTHANA (n. s.).

Pal. N.Y. Vol. iii, pl. 21, f. 5 - 7.

SHELL subsemicircular, about three-fourths as long as wide, contracted below the extremities of the hinge; cardinal border sloping slightly from the beak : ventral valve flattened in the middle and cardinal margin, so as to form a semicircular inclined plane ascending from the hinge to beyond the middle of the shell; the front and lateral margins abruptly inflected, giving a deep concavity to the whole valve : dorsal valve flattened or slightly concave in the umbonial and central regions, very convex towards the front and lateral margins : hinge-line equal to the greatest width of the shell, crenulated; area linear, vertically striated; foramen small, triangular, closed in full-grown individuals. Surface marked by fine, obscure, closely arranged, radiating striæ, crossed on the depressed part of the valves by small regular concentric wrinkles.

This shell bears a general resemblance to *Strophomena depressa*. It differs, however, remarkably from that species, in its resupinate character, the convexity and concavity of the valves being in the opposite direction. The area of the ventral valve is also wider than in that species, and the cardinal margin is crenulated.

*Geological position and locality.* In the shaly limestone of the Lower Helderberg, Albany county.

## STROPHOMENA (STROPHODONTA) MAGNIVENTRA (n. s.).

Pal. N.Y. Vol. iii, pl. 92, f. 3.

SHELL subsemicircular varying to longitudinally suboval, variable; length usually two-thirds the breadth, sometimes equal or greater: ventral valve convex in the central and umbonial regions, flattened towards the extremities; beak slightly incurved; cardinal border sloping from the umbo: dorsal valve unknown, probably concave: hinge-line crenulated, equal to the greatest width of the shell, sometimes extended into mucronate points beyond the lateral margins of the shell; area of ventral valve very broad, slightly curved, distinctly marked by vertical striæ produced by the prolongation of the crenulations of the hinge; foramen large, triangular, apparently mostly closed. Surface marked by regular, rounded, slightly elevated, radiating striæ: interior scarcely granulose, strongly marked with a plicated flabelliform muscular impression, covering nearly two-thirds of its extent.

This species is recognized in the casts (its usual mode of occurrence in the Oriskany sandstone) by the large and strongly marked vascular impressions.

*Geological position and locality.* In the Oriskany sandstone in Albany and Schoharie counties.



## STROPHOMENA (STROPHODONTA) MAGNIFICA (n. s.).

Pal. N.Y. Vol. iii, pl. 93, f. 4; and pl. 95, f. 1.

SHELL very large, transversely suboval, somewhat semicircular, more or less rounded at the extremities of the hinge; length and breadth sometimes equal: ventral valve depressed-convex in the middle and umbonial regions, flattened near the lateral extremities; cardinal margin sloping slightly from the beak: dorsal valve slightly concave; hinge-line crenulated, usually a little less than the width of the shell; area broad, distinctly and regularly marked with transverse striæ produced by the pro-

longations of the hinge crenulations ; foramen very narrow, not closed. Surface marked by somewhat faint radiating striæ, which bifurcate regularly about two or three times at uniform distances from the beak.

This species is remarkable for the large size to which it sometimes attains ; a few individuals having been found measuring from  $3\frac{7}{8}$  to 4 inches in breadth, and from 3 to  $3\frac{5}{8}$  inches in length : being perhaps the largest brachiopod known in the rocks of this State.

*Geological position and locality.* In the Oriskany sandstone, Albany and Schoharie counties.



### STROPHOMENA (STROPHODONTA) LINCKLÆNI (n. s.).

Pal. N.Y. Vol. iii, pl. 93, f. 2 & 3; pl. 94, f. 2.

SHELL subsemicircular, more than three-fourths as long as broad ; lateral margins usually contracted near the extremities of the hinge-line : ventral valve convex in the central region and towards the front, somewhat flattened laterally : dorsal valve concave, deflected round the front and sides ; hinge-line crenulated, nearly or quite equal to the greatest width of the shell. Surface marked by fine, closely arranged radiating striæ, crossed by obscure concentric lines of growth : interior granulose, and more or less striate ; visceral impressions strongly marked.

Both internal and external casts of the dorsal valve of this species are quite abundant ; but no specimens of the ventral valve have yet been recognized. Consequently its form and character can only be inferred from those of the opposite valve.

*Geological position and locality.* Oriskany sandstone, Albany and Schoharie counties.



### STROPHOMENA DEPRESSA, var. VENTRICOSA.

Pal. N.Y. Vol. iii, pl. 94, f. 3.

SHELL transversely oblong, subsemicircular ; length and breadth sometimes nearly equal ; front often straight in the middle, and parallel to the hinge-line : ventral valve extremely ventricose,

scarcely geniculate in front : dorsal valve forming an inclined plane from the hinge towards the front, near which it is abruptly deflected, giving the valve a deep concavity : hinge-line equal to the greatest width of the shell ; lateral margins contracted, so as to leave small auricular extensions at the extremities of the cardinal border ; area sublinear, longitudinally striate : interior distinctly granulose ; muscular attachments strongly marked.

Internal casts, with fragments of separate valves of this shell have been seen : its general aspect is like that of *Strophomena depressa*, though its internal muscular attachments often deviate considerably from those of well-marked specimens of that species. The ventral valve is also more regularly arched and gibbous in outline than is usual in *S. depressa* ; and it has not the abrupt geniculation in front, so characteristic of that shell.

*Geological position and locality.* Oriskany sandstone, Albany county, and Cumberland ( Md.).



### CHONETES COMPLANATA ( n. s.).

Pal. N.Y. Vol. iii, pl. 63, f. 1.

SHELL nearly semicircular, compressed ? about two-thirds as long as wide : ventral valve flat or concave : dorsal valve unknown ; tubular spines of the cardinal margin directed obliquely outwards. Surface marked by fine, closely arranged ( bifurcating ? ) striæ, which appear to have been crenulated by closely arranged concentric striæ. Some of the specimens show distant imbricating concentric lines of growth : interior finely granulose ; viscera impression large, uniform, not strongly marked.

All the specimens seen of this rare species consist of internal and external casts of the ventral valve, from which it is impossible to make out a complete diagnosis. The few remaining impressions of the row of tubular spines along the cardinal margin are barely sufficient to show the presence of these appendages, without clearly indicating their number, length, curvature, etc. It may be recognized by its extreme flatness, finely striated surface, a few distant laminæ of growth, and great proportional width.

*Geological position and locality.* Oriskany sandstone of Albany and Schoharie counties.

## SPIRIFER VENTRICOSA (n. s.).

Pal. N.Y. Vol. iii, pl. 14, f. 1.

SHELL globose ; valves almost equally convex : ventral valve having a narrow sinus extending down the centre from beak to base ; beak projecting above the other, strongly incurved and pointed ( in many specimens the beaks are nearly equal ) : dorsal valve having a central depressed line, but less conspicuous than in the opposite valve ; area very small, concave ; surface marked by concentric lines of growth.

This species resembles *Spirifer pisum* of the Niagara group ; but the form is slightly more extended, the beak of the ventral valve more elevated and incurved, and the area more distinct.

*Geological position and locality.* Lower Helderberg limestone, Albany county.



SPIRIFER VENTRICOSA.



## SPIRIFER PERLAMELLOSA (n. s.).

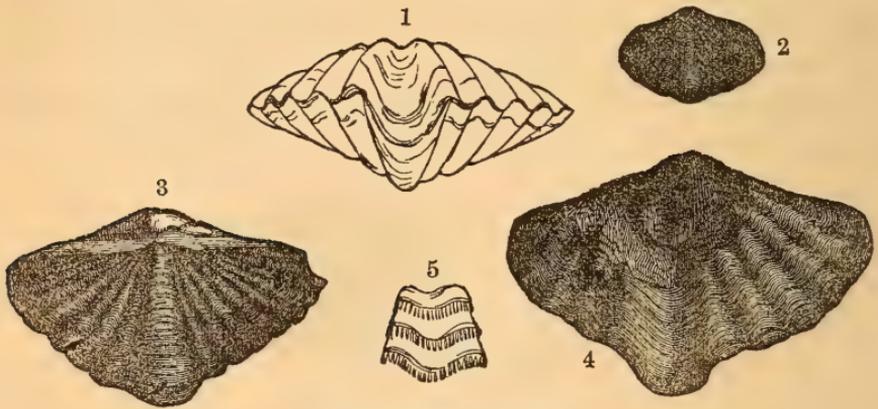
Pal. N.Y. Vol. iii, pl. 26, f. 1.

*Spirifer rugosa*, HALL, in Catalogue.

SHELL trigonal or semicircular, more or less extended on the hinge-line, the extremities varying from obtuse or rounded to extremely mucronate : ventral valve arcuate, the beak much extended beyond the opposite valve, and incurved at the apex ; sinus deep, gradually expanding, and produced in front into a linguiform extension : dorsal valve convex towards the middle, the mesial elevation very prominent, and the beak closely incurved against the area, or partially closing the foramen of the ventral valve ; area moderately wide, frequently much expanded, and becoming linear towards the extremities where the shell is much

extended. Surface marked by from four to six strong and abruptly elevated plications on each side of the mesial sinus and elevation, concentrically marked by strong imbricating lamellæ, which are abruptly arched in passing over the plications, giving an extreme roughness to the surface. In well preserved specimens, finer longitudinal lines mark the surface of these lamellæ : in ordinary specimens, the concentric lamellæ are more closely arranged and more distinctly imbricate towards the margin ; while near the beaks they are more distant, and are scarcely imbricate.

*Geological position and locality.* Lower Helderberg limestone, Albany county.



SPIRIFER PERLAMELLOSA.



### SPIRIFER CYCLOPTERA (n. s.).

Pal. N.Y. Vol. iii, pl. 25, f. 1.

SHELL semicircular ; extremities of the hinge-line more or less symmetrically rounded : ventral valve gibbous ; beak moderately elevated, more or less incurved ; sinus moderately deep, curved on the sides, and nearly flat in the middle : dorsal valve very convex towards the middle, the mesial fold abruptly elevated and very prominent ; beak little elevated above the hinge-line, and scarcely incurved ; area moderate, scarcely extending to the extremity of the hinge-line ; foramen large. Shell marked by five to seven rounded plications on each side of the mesial line, concentrically marked by fine close imbricate

cating lamellose striæ, which are more or less prominent, depending on the condition of preservation in the shell : surface of lamellæ ornamented by short fine vertical striæ or crenulations, which project in fimbriæ on the edge of the lamellæ.

This species resembles in its surface characters the *Spirifer crispus* of the Niagara group, but is much larger, has a greater number of plications and a narrower and longer area, while the valves are more nearly equal in size.

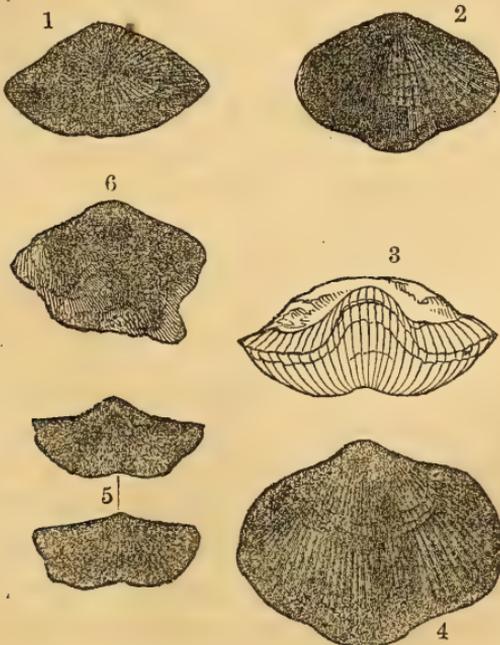
*Geological position and locality.* Lower Helderberg limestones, Albany county.



### SPIRIFER MULTISTRIATUS (n. s.).

Pal. N.Y. Vol. iii, pl. 24, f. 3.

SHELL transversely oval, or pentagonal with the angles rounded : ventral valve moderately convex towards the beak, with a broad (not sharply defined) sinus below, which often becomes obsolete before reaching the beak ; beak abruptly incurved over the beak of the opposite valve : dorsal valve more convex than the opposite, the middle elevated in a broad scarcely defined lobe ;



SPIRIFER MULTISTRIATUS.

beak closely incurved : hinge-line slightly declining on each side of the centre, and rounded at the extremities ; area narrow, strongly striated longitudinally. Surface marked by numerous fine striæ which bifurcate once or oftener between the beak and base of the shell, concentrically crossed by imbricating lamellæ.

The species is distinguished by its rounded extremities and numerous fine striæ, which bifurcate or increase by interstitial addition, chiefly near the middle of the shell, but often near the beak and base. A few of the striæ (six or eight) near the beaks are much stronger than the others.

*Geological position and locality.* Shaly limestone of the Lower Helderberg, Albany and Schoharie counties.



### SPIRIFER? PERFORATUS (n. s.).

Pal. N.Y. Vol. iii, pl. 27.

SHELL somewhat semicircular, with the hinge extremities rounded ; hinge-line slightly curved ; area very small : ventral and dorsal valves nearly equally convex ; beak of the ventral valve slightly incurved and perforate at the extremity ; dorsal valve with the beak strongly incurved, and filling the foramen of the opposite valve. Entire surface marked by sharp radiating striæ, which bifurcate once or twice before reaching the base, so as to present fascicles of two or three on the centre of the shell.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county and Hudson.



### SPIRIFER CONCINNA (n. s.).

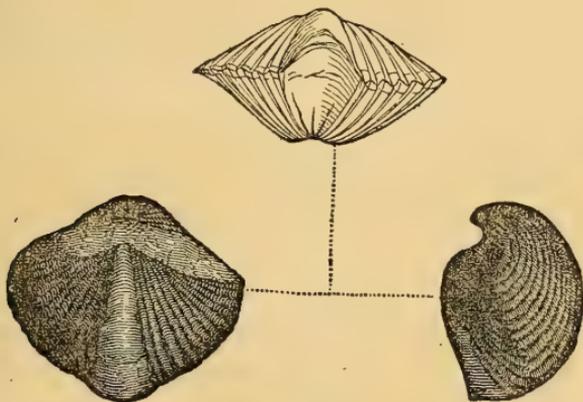
Pal. N.Y. Vol. iii, pl. 25, f. 2.

SHELL semicircular or semielliptical ; extremities rounded ; valves almost equally convex : ventral valve gibbous towards the beak ; beak more or less elevated above the hinge-line, and abruptly incurved at the apex ; mesial sinus subangular, and produced into an angular extension which is much elevated, and sometimes slightly incurved in front : dorsal valve very convex

in the centre ; beak scarcely incurved ; mesial elevation obtusely angular ; hinge-line equal to or a little less than the width of the shell ; area of medium size, well defined, and extending to the extremities of the hinge-line. Surface marked by from twelve to fourteen rounded, little elevated, simple costæ on each side of the lobe and mesial sinus ; concentrically marked by imbricating lamellæ, which are striated upon their surfaces and granular on the edges.

In many specimens there are faint indications of a fold on each side of the mesial sinus, and of several upon the corresponding mesial elevation : this character, however, is not constant in the specimens examined.

*Geological position and locality.* In the Shaly and Upper Pentamerus limestones of the Lower Helderberg group in Albany and Schoharie counties, Hudson, etc.



SPIRIFER CONCINNA.

SPIRIFER MODESTA (n. s.).

Pal. N.Y. Vol. iii, pl. 25, f. 1.

SHELL small, subglobose : ventral valve very gibbous near the middle and towards the beak, having a shallow undefined sinus extending from the beak to the front : dorsal valve depressed-convex, semicircular or subtriangular ; extremities rounded, sometimes an undefined elevation down the middle ; beak scarcely extending above the hinge-line, not incurved ; hinge-line very short and rounded at the extremities ; area triangular, faintly defined, less than the width of the shell, arcuate ; foramen

moderate, narrow triangular. Surface marked by faint concentric lines of growth.

This species resembles somewhat *S. ventricosa* of the Lower Helderberg shaly limestone, but has a much higher area. It still more resembles *S. lineatus* of the Carboniferous system, but differs in its surface markings and its narrower foramen.

*Geological position and locality.* Limestones of the Lower Helderberg group, Cumberland ( Md.).



### SPIRIFER OCTOCOSTATA ( n. s.).

Pal. N.Y. Vol. iii, pl. 28, f. 2.

SHELL subglobose ; valves nearly equally convex : ventral valve most elevated near the beak ; sinus extending nearly to the apex ; beak slightly incurved : dorsal valve most convex in the middle ; mesial elevation not prominent ; beak rising little above the hinge-line, slightly incurved ; hinge-line less than the width of the shell, rounded at the extremities ; area triangular, faintly defined, somewhat arcuate ; foramen very narrow. Surface having about four rounded, slightly prominent folds on each side of the mesial sinus and elevation ; concentrically marked by fine, regular, closely arranged striæ.

This species resembles *S. crispus* of the Niagara group, but is more globose in form, has a much shorter area, more rounded extremities, and less strongly marked plications. It appears to be intermediate between that species and *S. bicostatus* of the same group, but may be readily distinguished from either.

*Geological position and locality.* Limestones of the Lower Helderberg group, Cumberland ( Md.).



### SPIRIFER SUBMUCRONATUS ( n. s.).

Pal. N.Y. Vol. iii, pl. 100, f. 3.

SHELL semicircular, with the extremities mucronate ; valves equally and moderately convex : ventral valve regularly convex at

the lateral extremities; beak little elevated and scarcely incurved; mesial sinus shallow, and flat in the middle: dorsal valve depressed-convex in the middle and flattened laterally, often a little concave towards the extremities; mesial fold distinctly defined, equal in width to the two adjoining costæ, somewhat flattened in the centre; beak little elevated above the hinge-line, and scarcely incurved; area moderate; foramen somewhat large, often partially closed. Surface marked by ten to fourteen simple rounded and moderately elevated costæ; concentrically marked by imbricating lamellæ, which are usually almost obsolete or obliterated when the shell is silicified.

This differs from the preceding species in being a smaller and more delicate shell, with the extremities more distinctly mucronate. The surface is less strongly marked with concentric lamellæ.

*Geological position and locality.* Oriskany sandstone, Cumberland, Md.



### SPIRIFER CUMBERLANDLÆ (n. s.).

Pal. N.Y. Vol. iii, pl. 100, f. 4.

SHELL broadly semicircular; valves moderately and nearly equally convex: ventral valve regularly convex; mesial sinus narrow, shallow, and flat in the middle; beak gently incurved, and projecting slightly beyond the hinge-line: dorsal valve having a narrow flattened mesial fold, with a faint depression down the centre; beak scarcely incurved, and nearly in the same plane with the cardinal margin; hinge-line straight; extremities extended; area broad, nearly flat, parallel with the axis of the shell; foramen somewhat large, often partially or entirely closed. Surface marked by from fourteen to seventeen simple rounded costæ, which are crossed by concentric elevated lines or lamellæ.

In general form, this shell resembles *S. mucronatus*, but is conspicuously distinct in its wider area. It is usually broader, with the mesial sinus and elevation narrower.

*Geological position and locality.* Oriskany sandstone, Cumberland, Md.

## CYRTIA DALMANI.

Pal. N.Y. Vol. iii, pl. 24, f. 2.

SHELL trigonal; valves extremely unequal: ventral valve triangularly pyramidal: dorsal valve semicircular; mesial lobe flat, or with a slightly depressed line; beak scarcely defined, or rising above the hinge-line; hinge-line straight; area triangular, flat or slightly arcuate; foramen narrow, linear, usually closed in the lower part, with a semitubular opening above; concentric lamellæ strong, and often very conspicuous near the margin. Surface granulose-punctate.

This species differs from the *Cyrtia (Spirifer) pyramidalis* of the Niagara group; having the dorsal valve more uniformly convex, the mesial fold broader and more prominent; while the depressions are not so deep, the mesial sinus is broader, the plications bounding it are less conspicuous, and the concentric imbricating lamellæ are stronger in the species under consideration than in the Niagara species.

I have heretofore referred this species, with doubt, to the *C. heteroclitus* of Europe; for among the variety of forms referred to this species, it is difficult to know the typical one. It differs, however, from the Eifel species of that name.

*Geological position and locality.* Limestones of the Lower Helderberg group, Albany and Schoharie counties.



## CYRTIA ROSTRATA (n. s.).

Pal. N.Y. Vol. iii, pl. 100, f. 5.

SHELL semicircular or triangular: ventral valve much elevated at the beak, a distinct sinus extending from beak to front; beak simple, angular, not incurved: dorsal valve depressed-convex, semicircular; mesial fold moderately elevated, slightly flattened and marked with a faint longitudinal depressed line; beak scarcely elevated above the cardinal margin; hinge-line straight, equalling the greatest width of the shell; area broad triangular, plane, or rarely subarcuate; foramen narrow, extending to the apex of the beak of the ventral valve, partly closed above by a central plate. Surface marked by nine to eleven elevated angular costæ on each side of the middle, crossed by strong imbricating concentric lamellæ.

Resembles *Spirifer heteroclitus* of VON BUCH, but has more plications and a wider foramen, which appears to be never quite closed as in that species. The area is also generally less extremely elevated in our shell.

*Geological position and locality.* Oriskany sandstone, Cumberland, Md.

### RHYNCHONELLA SEMIPLICATA (n. s.).

Pal. N.Y. Vol. iii, pl. 29, f. 1.

SHELL (in the young state) compressed-ovate, becoming more gibbous and subtriangular : valves nearly equal ; ventral valve slightly more gibbous, most prominent in the middle, and having towards the front a more or less defined mesial sinus, in which there are from one to two plications, while from one to three lateral plications occupy the space on each side of the sinus ; beak closely incurved over that of the opposite valve : dorsal valve depressed-convex, having from two to four rounded plications on each side of the medial fold, which is itself bifid or trifid ; plications strongly marked in front, and usually becoming obsolete near the middle of the valve. Surface having traces of extremely fine radiating striæ, crossed by concentric undulations of growth.

*Geological position and locality.* Pentamerus limestone of the Lowe Helderberg group, Albany and Schoharie counties.



RHYNCHONELLA SEMIPLICATA.

RHYNCHONELLA ÆQUIVALVIS (n. s.).

Pal. N.Y. Vol. iii, pl. 29, f. 2.

SHELL ovate, somewhat compressed; sides sloping from the beaks at a little less than a right angle; front semicircular; valves nearly equally convex: ventral valve having sometimes towards the front a broad very faint depression or sinus; beak pointed and incurved. Surface ornamented by twenty-eight to thirty-two simple rounded plications, broader than the depressions between. On the dorsal valve the central depression is a little deeper than the others, extending quite up to the beak: fine concentric lines, which arch a little upwards, cross the plications.

This species may be compared with *Terebratula haidingeri* of BARRANDE, to some varieties of which it bears considerable resemblance: it is, however, generally less gibbous, and the beak of the ventral valve is much less prominent. The concentric undulations, marking the stages of growth, are likewise more faint than in BARRANDE'S species.

*Geological position and locality.* Pentamerus limestone of the Lower Helderberg group, Albany county.

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RHYNCHONELLA MUTABILIS (n. s.).

Pal. N.Y. Vol. iii, pl. 29, f. 4; and pl. 30, f. 1 & 2.

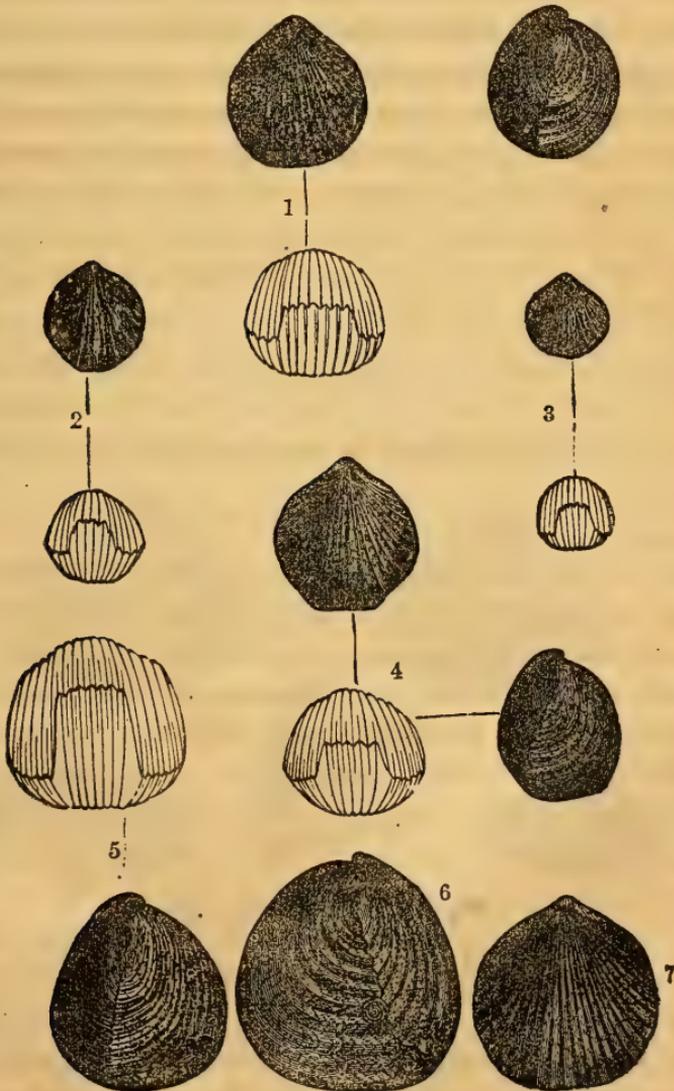
SHELL varying from ovate to spherical: ventral valve sometimes depressed, generally most convex in the umbonial region; beak small, pointed, closely incurved over that of the opposite valve: dorsal valve gibbous; beak incurved beyond the hinge-line; cardinal border on each side of the beak, concave. Surface marked by twenty to twenty-six depressed, rounded, simple plications, of which about six or eight are slightly raised towards the front of the dorsal valve into an indistinct mesial elevation; and five or six depressed near the front of the ventral valve, and extended into a short linguiform prolongation, fitting into a corresponding depression in the front of the opposite valve.

The plications on this shell are generally simple, though in a few specimens one or two of them are seen to bifurcate. The surface of perfect

specimens would probably show fine concentric lines; but those hitherto found, have such markings only near the margins of the valves. As is usual in this type of *Rhynchonella*, there is on each side of the plications on the front of the shell a faint longitudinal impressed line.

In form and general aspect this species varies greatly, being sometimes longitudinally ovate or oblong, in others globose to subpentagonal. The extremes of these varieties, without the intermediate forms, would appear to present well-marked specific differences; but a careful study of the series shows such an imperceptible gradation of form as to leave little doubt of their identity.

*Geological position and locality.* Pentamerus limestone of the Lower Helderberg group, Albany and Schoharie counties.



*RHYNCHONELLA MUTABILIS.*

## RHYNCHONELLA NUCLEOLATA (n. s.).

Pal. N.Y. Vol. iii, pl. 31, f. 1 & 2.

SHELL varying from spherical to spheroid-pentagonal or sub-pentagonal: ventral valve convex or depressed-convex, abruptly deflected towards the margins; beak small, depressed, closely incurved over that of the opposite valve, often subangular on its lateral margins: dorsal valve larger, sometimes very gibbous, often a little depressed towards the beak; beak never prominent. Surface marked by fifteen to twenty-three simple rounded plications, about four or five of which are slightly elevated towards the front of the dorsal valve into a mesial prominence, and three to five depressed on the ventral valve, so as to form a more or less distinct sinus, which never extends above the middle of the shell. These depressed plications are prolonged in front into a more or less distinct linguiform extension fitting into a corresponding sinus in the front of the opposite valve, and sometimes curved inwards beyond the plane of a right angle with the back of the valve.

This species is perhaps more nearly related to *Rhynchonella (Terebratula) wilsoni*, than any other species in the rocks of New-York. Indeed the analogy between this one and some of the forms referred to that species is so great, that until the limits of the variation to which it is subject are better defined, it is scarcely possible to point out characters by which they can always be distinguished.

The species under consideration differs from authentic specimens of *R. wilsoni*, from Dudley, England, in being uniformly more coarsely plicated, and usually more angular in outline. When compared with specimens of the same species from Bohemia, these differences are not so conspicuous.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.



## RHYNCHONELLA ABRUPTA.

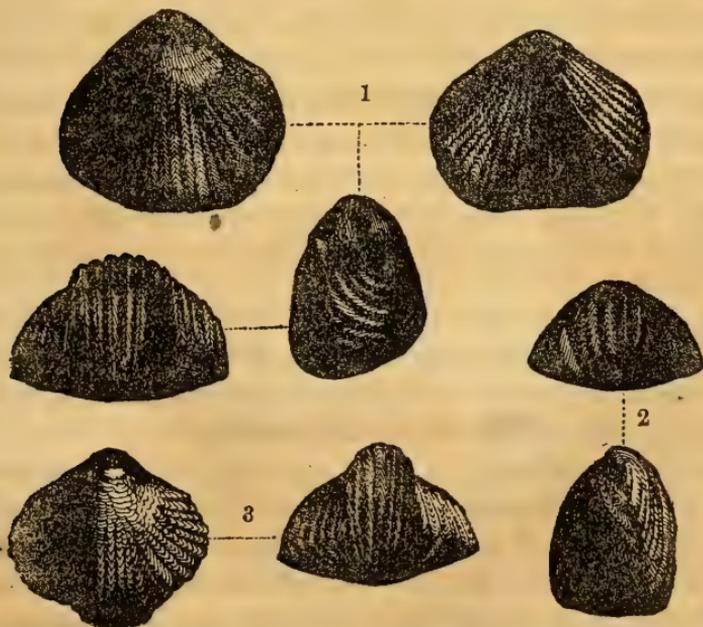
Pal. N.Y. Vol iii, pl. 31, f. 3.

SHELL transversely oval, subpentagonal: ventral valve depressed-convex, very abruptly deflected towards the opposite valve on the lateral margins; beak small, depressed on the outside and

subangular along its lateral slopes, closely incurved over that of the opposite valve : dorsal valve much the larger, very prominent in front, obliquely declining towards the beak ; beak depressed, incurved. Surface ornamented by from twenty-five to thirty-three simple subangular plications, seven or eight of which are elevated towards the front of the dorsal valve into a somewhat distinct mesial prominence ; and from six to eight of those on the middle of the ventral valve are depressed so as to form a broad undefined sinus, which scarcely extends beyond the centre of the valve towards the beak, but is prolonged in front, and abruptly bent upwards nearly at right angles to the dorsal valve into a distinct linguiform extension. The plications are marked in front by the usual longitudinal depressed line along the centre of each, and extremely fine regular zigzag lines corresponding to the sharp interlocking edges of the front and lateral margins of the valves. These fine striæ doubtless represent lines of growth, which have become wholly obsolete on other parts of the shell.

In this species the two plications bounding the sinus of the ventral valve, and the mesial elevation of the dorsal, sometimes bifurcate towards the beak or middle of the valves, one becoming obsolete on the front.

It resembles some of the Bohemian forms which are considered varieties



1: RHYNCHONELLA ABRUPTA.

2, 3: RHYNCHONELLA VELLICATA.

of *R. wilsoni*, but is a larger and relatively broader shell, the mesial elevation is more distinct, and the general form is less rotund. It is possible that more extensive collections may prove this species to be an extreme variety of the preceding.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany and Schoharie counties.



### RHYNCHONELLA PYRAMIDATA.

Pal. N.Y. Vol. iii, pl. 32, f. 1 & 2.

SHELL pyramidal, subpentagonal; outline subtriangular: ventral valve nearly flat or depressed-convex, more or less abruptly deflected at the margins towards the other valve; beak prominent, flattened, and closely incurved over that of the opposite valve: dorsal valve very gibbous, declining from near the front towards the beak; beak angular, incurved, flattened: lateral slopes with a distinctly impressed suboval space beneath the beaks, which is bounded by an angular fold extending from the beak downwards to the valves at the first strong plication. Surface marked by from thirteen to twenty-two simple strong subangular plications, four to six of which are more or less elevated towards the front of the dorsal valve into a mesial prominence, and three to five depressed on the ventral valve so as to form a shallow sinus, and produced in front into a distinct linguiform projection.

The plications on the front of this shell have but very faint traces of the longitudinal depressed lines so common in this type of *Rhynchonella*, though occasionally remains of very fine closely arranged zigzag striæ are seen crossing them near the margins of the valves.

In some of its varieties, this species approaches the *R. nucleolata* (pl. 31, f. 1 & 2), but differs conspicuously in being usually larger, and in its more angular outline and much stronger plications. The beaks are also more prominent in this species, and the dorsal valve is more extremely elevated near the front: there are also differences in the visceral impressions.

This species belongs to the type of *R. wilsoni*, and may be said to be one step farther removed from that species than *R. nucleolata*; or, in other words, bearing about the same relation to the latter species, which that one does to *R. wilsoni*.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.

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### RHYNCHONELLA VELLICATA.

Pal. N.Y. Vol. iii, pl. 33, f. 1 a to h.

SHELL varying from transversely oval to subtriangular : ventral valve depressed-convex ; beak somewhat prominent, depressed, closely incurved over the opposite : dorsal valve more gibbous ; beak incurved, not prominent. Surface marked by twenty-four to thirty-six plications, six to eight of which are elevated in front of the dorsal valve so as to form a rather distinct mesial prominence, rarely extending beyond the middle of the valve. On the ventral valve, five to seven of the plications are depressed, towards the front, into a more or less distinctly defined sinus, and prolonged, forming a mesial projection, which is more or less elevated in the front of the other valve. Near the junction of the valves in front, very fine closely arranged lines of growth are visible.

This shell approaches very nearly, in some of its characters, the *Rhynchonella abrupta* : there are, indeed, some forms which it is difficult to distinguish. In the well-characterized specimens of this species, it differs from *R. abrupta* in its smaller and more numerous plications, and in being proportionally less ventricose, as well as in the narrower and deeper sinus of the ventral valve. The general aspect of the shells is usually quite distinctive.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany and Schoharie counties.

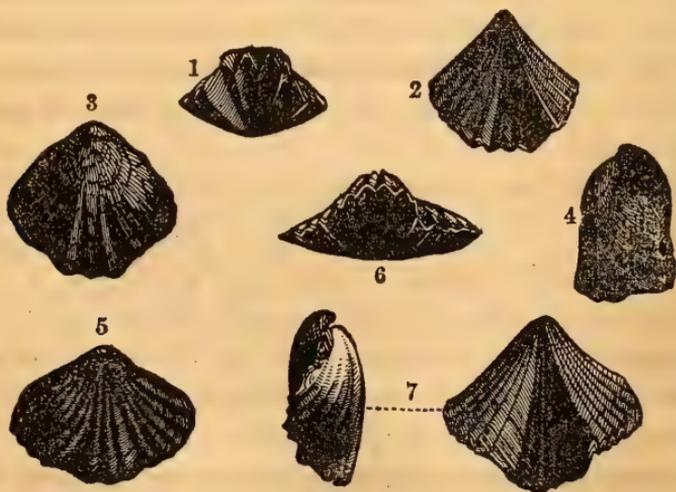
## RHYNCHONELLA ALTIPLICATA.

Pal. N.Y. Vol. iii, pl. 33, f. 2.

SHELL subtrigonal, more or less gibbous : ventral valve depressed-convex ; beak pointed, arched or nearly straight : dorsal valve the larger, most elevated in the middle, declining with a curved outline towards the beak and margins ; beak incurved ; foramen triangular, extending to the apex of the beak. Surface marked by from ten to about nineteen simple, strongly elevated, sharply angular plications on each valve ; two to four of which are elevated on the dorsal valve into a more or less distinct mesial prominence extending nearly to the beak, and from one to three depressed on the middle of the ventral valve into a distinct sinus, which widens regularly and somewhat rapidly from near the beak to the front, where it is prolonged into a short projection, filling a corresponding sinus in the front of the opposite valve : shell traversed by fine concentric lines of growth.

Along the lateral slopes of the cardinal margin, on each side of the beaks, there is generally an oval space of greater or less extent, not plicated. This, although sometimes slightly concave, is never so distinctly impressed as often in species of the type of *R. wilsoni*.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany and Schoharie counties.



1, 2, 3, 4 : *R. ALTIPLICATA.* 5, 6 : *R. TRANSVERSA.* 7 : *R. ACUTIPLICATA.*

## RHYNCHONELLA ACUTIPPLICATA.

Pal. N.Y. Vol. iii, pl. 33, f. 3.

SHELL subquadrangular, compressed : ventral valve depressed-convex, most prominent near the beak : dorsal valve slightly larger than the ventral, most prominent in the middle, declining with a gentle curve towards the beak and margins ; beak incurved. Surface ornamented by about twenty-seven simple, moderately elevated, acutely angular or subcarinate plications on each valve, about five of which are elevated on the dorsal valve into a mesial prominence, which dies out before reaching the beak, and widens rapidly towards the front. On the ventral valve, four of the plications are depressed so as to form a broad rather shallow mesial sinus, with sloping sides, extending about two-thirds of the way to the beak. Shell marked by fine very regular subimbricating concentric lines of growth.

A distinguishing feature of this species is the sharply angular or subcarinate plications : in this character, however, it approaches the last described species ; but its general form is much more compressed, proportionally more elongate, with more numerous and finer plications.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group.



## RHYNCHONELLA ? BIALVEATA.

Pal. N.Y. Vol. iii, pl. 33, f. 1, 2, 3 &amp; 4.

SHELL small, triangular or triangular-ovate, sometimes compressed : valves nearly equally convex ; beak of dorsal valve incurved ; beak of ventral valve almost straight and subangular ; foramen narrow triangular, and continued to the apex of the beak. Surface ornamented by from twelve to fourteen simple angular plications on each valve ; the two central of which, on the dorsal valve, die out a little before reaching the beak, near which they are somewhat depressed, but towards the front they become slightly elevated above the others, so as to form an indistinct mesial prominence : the middle plication on the ventral valve is smaller than the others, and depressed near the front

so as to produce a faint sinus, which extends about two-thirds of the way to the beak, at which point the valve is most convex : the two plications bordering the sinus are larger and more prominent than those on each side of them, and become obsolete before reaching the beak. A few faint imbricating lines of growth are visible near the junction of the valves in front.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.



### RHYNCHONELLA INUTILIS.

Pal. N.Y. Vol. iii, pl. 34, f. 7 & 8.

**SHELL** subtriangular, subglobose; beak of ventral valve small, closely curved upon the opposite : dorsal valve a little larger; beak incurved. Surface ornamented by eighteen or nineteen simple sharply elevated plications, about four or five of which are elevated on the dorsal valve so as to form a more or less distinct mesial fold, which extends to about the middle of the valve; while three or four of those on the middle of the ventral valve are depressed towards the front into a sinus, which is faint and broad in some specimens, and narrow and more distinctly defined in others. A few strong imbricating zigzag lines of growth near the margins of the valves.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.



### RHYNCHONELLA TRANSVERSA.

Pal. N.Y. Vol. iii, pl. 34, f. 9 - 14.

**SHELL** subtriangular, wider than long, tapering abruptly to the beak : ventral valve depressed-convex, most prominent near the the beak; beak arched : dorsal valve a little larger, most elevated near the front; beak incurved; foramen narrow, continued up to the apex of the beak. Surface ornamented by about fourteen or fifteen sharply elevated plications on each valve, of

which from three to four are elevated near the front into a rather faint mesial fold, and from two to three depressed on the ventral valve so as to form a faint sinus in the front. Somewhat strong zigzag lines of growth mark the surface of the valves near the margin in front.

There is another shell associated with the above, which agrees so very nearly with it, that I am unwilling, without a better series of specimens for comparison, to regard as distinct, though it differs somewhat in the number of plications (See f. 17 - 19, same plate).

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.



### RHYNCHONELLA RUDIS.

Pal. N.Y. Vol. iii, pl. 34, f. 21.

SHELL triangular, wider than long; lateral margins abruptly tapering to the beak: ventral valve much depressed or flattened; beak unknown: dorsal valve the larger, most elevated in front, declining towards the beak, which is slightly incurved. Surface marked by about ten rather distant plications on each valve, three of which are elevated near the front of the dorsal valve into a prominent mesial fold, and three depressed in the front of the other valve.

The surface of this shell was doubtless marked by concentric striæ; but the only specimen I have seen is not sufficiently well preserved to retain them.

*Geological position and locality.* Upper calcareous part of the Shaly limestone of the Lower Helderberg group, Hudson.



### RHYNCHONELLA PLANOCONVEXA.

Pal. N.Y. Vol. iii, pl. 34, f. 2.

SHELL subcircular or transversely oval: ventral valve depressed-convex, most prominent near the beak: dorsal valve larger, regularly convex. Surface marked by about twenty-four sharply

elevated bifurcating plications on each valve, about six of which are very slightly elevated near the front of the dorsal valve, so as to form a broad flat indistinct mesial prominence, corresponding to a faint shallow sinus in the opposite valve.

A single imperfect specimen only of this species has come under my observation. The regularly arched dorsal valve, ( very slightly elevated ), flattened mesial fold, depressed ventral valve, and bifurcating striae will probably serve to distinguish it from all the allied forms found in our rocks.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.



### RHYNCHONELLA SULCOPLICATA.

Pal. N.Y. Vol. iii, pl. 35, f. 1.

SHELL subtriangular, wider than long, compressed : valves nearly equal ; beak of the ventral valve prominent, attenuated, acutely pointed and arched ; beak of the dorsal valve incurved. Surface marked by about sixteen simple longitudinally grooved plications, four of which are very faintly elevated towards the front of the dorsal valve, forming an indistinct mesial-fold, corresponding to a sinus in the opposite valve which is occupied by three plications.

A marked peculiarity of this species is the longitudinal groove along the centre of each of the plications. Of the four plications elevated on the dorsal valve, the two central ones are less prominent than the others, and separated by a deeper and wider depression which continues quite to the apex of the beak.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.



### RHYNCHONELLA FORMOSA.

Pal. N.Y. Vol. iii, pl. 35, f. 6.

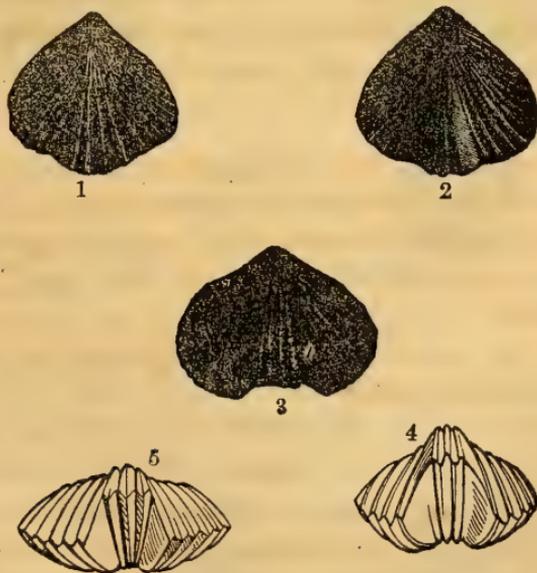
SHELL subtriangular or transversely oval ; lateral margins forming an angle at the beak of about 90° to 110° ; ventral valve some-

what more depressed than the opposite; beak prominent, arched, not strongly incurved: dorsal valve larger, declining with a gentle curve towards the margins; beak incurved. Surface marked by twenty to twenty-four simple angular plications on each valve, from two to four of which in the middle are coarser and depressed in the ventral, having a corresponding number abruptly elevated upon the dorsal valve.

This handsome species may be recognized by the neatly rounded outline of the latero-basal margins, the abrupt sinus, and the stronger central plications.

A single specimen from the same position as the above, shows a less distinctly defined sinus and mesial elevation, with five plications on the latter and four in the former, and only six on each side. I am disposed to regard this as only a variety of the above, though future collections may prove it to be distinct. Figure 2 *a, b, c* and *d* of the same plate are given to illustrate this form. Figures 3 and 4 *a, b, c, d, e, f*, of the same plate, illustrate specimens with from two to four plications on the mesial elevation, and from four to six on each side.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, and the Upper Pentamerus limestone of Albany and Schoharie counties.



RHYNCHONELLA FORMOSA.

### RHYNCHONELLA EMINENS.

Pal. N.Y. Vol. iii, pl. 37, f. 2.

SHELL abruptly ovoid or depressed subglobose : dorsal valve the larger, elevated near the front into a flattened mesial prominence, from which it declines gently towards the beak and more abruptly towards the lateral margins, which are deflected towards the opposite valve ; beak incurved : ventral valve flattened, very abruptly deflected at the margins towards the opposite valve, having a broad well defined sinus reaching from near the middle to the front, which is prolonged into a linguiform extension. Surface marked by about twenty-six rounded or scarcely subangular plications, about six of which are on the mesial fold and five in the opposite sinus ; the whole crossed by fine undulating or zigzag lines of growth near the front of the valves.

Sometimes the plications bounding each side of the mesial fold in this species bifurcate, and one of them becomes obsolete before reaching the front, as in *R. abrupta* and *R. vellicata*. From both of these species, it may be distinguished by its more rounded plications and more prominent mesial fold.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.



### RHYNCHONELLA VENTRICOSA.

Pal. N.Y. Vol. iii, pl. 43, f. 1.

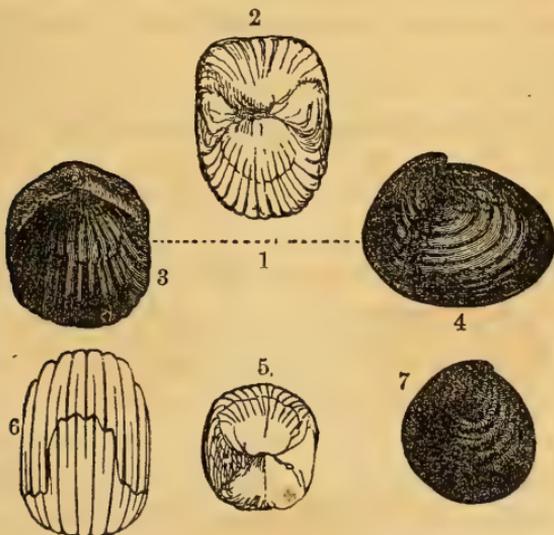
SHELL varying from spheroidal to vertically ovoid, extremely ventricose ; depth of the valves often nearly double that of the breadth ; valves nearly equal : dorsal valve sometimes a little depressed in the umbonial region ; beak incurved ; cardinal region on each side of the beak elevated : ventral valve having a long linguiform extension ; beak rather small and obtuse, closely incurved upon the opposite, subangular along its lateral slopes. Surface marked by fourteen to twenty rounded plications, three or four of which are sometimes very slightly elevated

on the middle of the dorsal valve, so as to form an extremely obscure mesial fold, and two or three as much depressed on the ventral valve : plications on the front marked with a longitudinal depressed line, and remains of much finer closely arranged zigzag lines of growth.

This species belongs to the type of *R. wilsoni*, and is one of those forms which are often referred to that species. In some of its varieties it resembles *R. pyramidata*, but is more angular on the sides, and never so abruptly sloping to the beaks. In some of its phases it more nearly resembles the *R. nucleolata* in form, but the plications are stronger.

Among many hundreds of individuals of the preceding species collected from the Shaly limestone, I have not seen one of this species, and it appears to be restricted to a bed in the upper part of the group.

*Geological position and locality.* Upper Pentamerus limestone of the Lower Helderberg group, Schoharie and Carlisle.



RHYNCHONELLA VENTRICOSA.



RHYNCHONELLA CAMPBELLANA.

Pal. N.Y. Vol. iii, pl. 43, f. 2.

SHELL longitudinally oval, ovate or oblong, laterally compressed, two-thirds as broad as long, length and height about equal : dorsal valve the larger, elevated near the front into a broad

undefined mesial fold, declining near the beak and curving down abruptly at the sides; beak incurved: ventral valve compressed, abruptly deflected towards the opposite valve at the lateral margins, depressed into a broad rounded sinus which occupies almost the entire breadth of the narrow front; front margin curving upward, and extended into a triangular prolongation. Surface marked by twenty-two or twenty-four simple rounded subangular plications, five or six of which are elevated on the mesial fold, and four or five occupy the sinus of the ventral valve. Fine zigzag lines of growth are seen on the front of the shell, near the junction of the valves.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, and in the succeeding "*Scutella limestone*" of the same group, Albany county.



### RHYNCHONELLA NOBILIS.

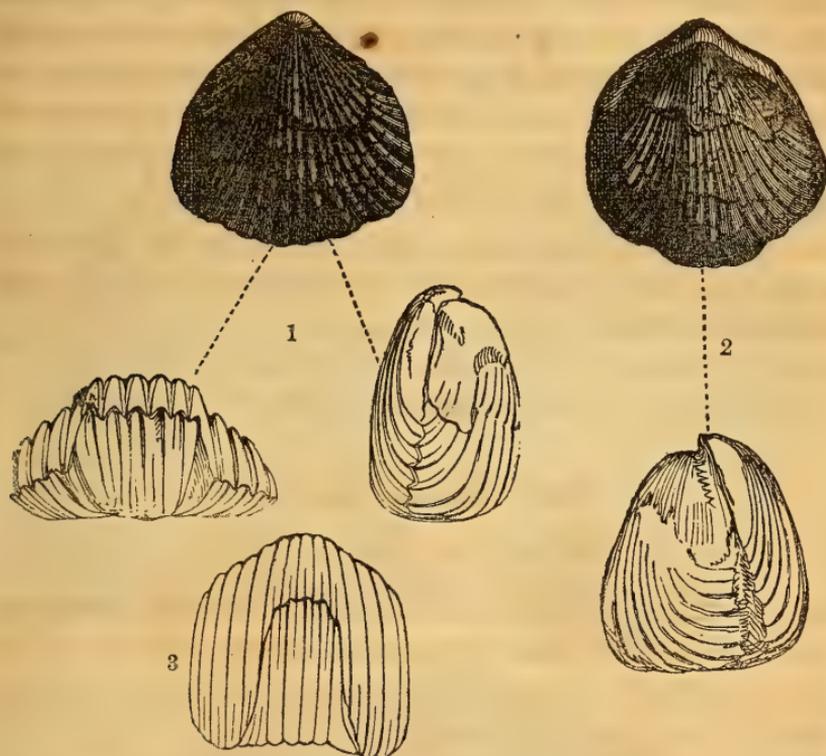
Pal. N.Y. Vol. iii, pl. 43, f. 3.

SHELL varying from compressed-ovate to subrhomboidal, becoming in adult specimens broad-ovate and much more gibbous: dorsal valve the larger, elevated in front into a somewhat rounded mesial prominence which rarely extends beyond the middle of the shell, declining laterally with an abrupt curve to meet the inflected edges of the opposite valve; beak incurved: ventral valve depressed, (in old specimens) abruptly deflected at the margins towards the opposite valve, depressed towards the front into a shallow rounded mesial sinus, sometimes prolonged into a vertical extension with nearly parallel sides; beak small, not prominent, incurved. Surface marked by twenty six to thirty-two elevated angular plications, six to eight of which are elevated on the mesial fold of the dorsal valve, and five to seven depressed in the sinus of the other valve. Fine closely arranged zigzag lines of growth may be seen near the margins of the valves in front.

This species holds an intermediate position between *R. abrupta* and *R. subcontracta*: it is, however, always more elongated than the first, and

not so much so as the latter. It also resembles *Terebratula eucharis* of BARRANDE (Silur. Brach. aus Böhmen, pl. 17, f. 2); but is more gibbous in old specimens, and more elevated in front, as well as more finely plicated.

*Geological position and locality.* Upper Pentamerus limestone, Albany and Schoharie counties.



RHYNCHONELLA NOBILIS.

RHYNCHONELLA SPECIOSA.

Pal. N.Y. Vol. iii, pl. 103 A, f. 1.

SHELL longitudinally ovoid, vertically flattened on the sides, higher than wide, abruptly rounded or subtruncate in front; sides nearly parallel; no sinus in either valve: dorsal valve extremely elevated, abruptly deflected on each side towards the opposite valve; beak incurved; cardinal margin on each side of the beak profoundly sinuate, for the reception of the prominent rounded dental laminae of the opposite valve; anterior and lateral mar-

[ Senate No. 109.] 6

gins uniting by sharp prominent interlocking notches : ventral valve flattened or much the less convex, forming a regular elliptical arch from beak to front, and abruptly deflected upwards at the sides so as to form distinct angles along the lateral margins, the whole front forming a broad truncated projection ; beak somewhat obtuse, incurved. Surface marked by strongly elevated, subangular plications, each of which on the front and sides of the shell has a fine depressed line along the centre, crossed by fine regular concentric zigzag lines of growth.

This beautiful shell is remarkable for its regular ovoid form, and vertically compressed sides. It differs from any other species of equal size known to me, by the entire absence of a sinus in either valve. Adult specimens appear to have been generally higher than wide, though younger individuals were doubtless more compressed. It is decidedly the most beautiful *Rhynchonella* known to me in all our American formations.

*Geological position and locality.* Oriskany sandstone, Maryland.



### RHYNCHONELLA BARRANDI.

Pal. N.Y. Vol. iii, pl. 103, f. 3 - 8.

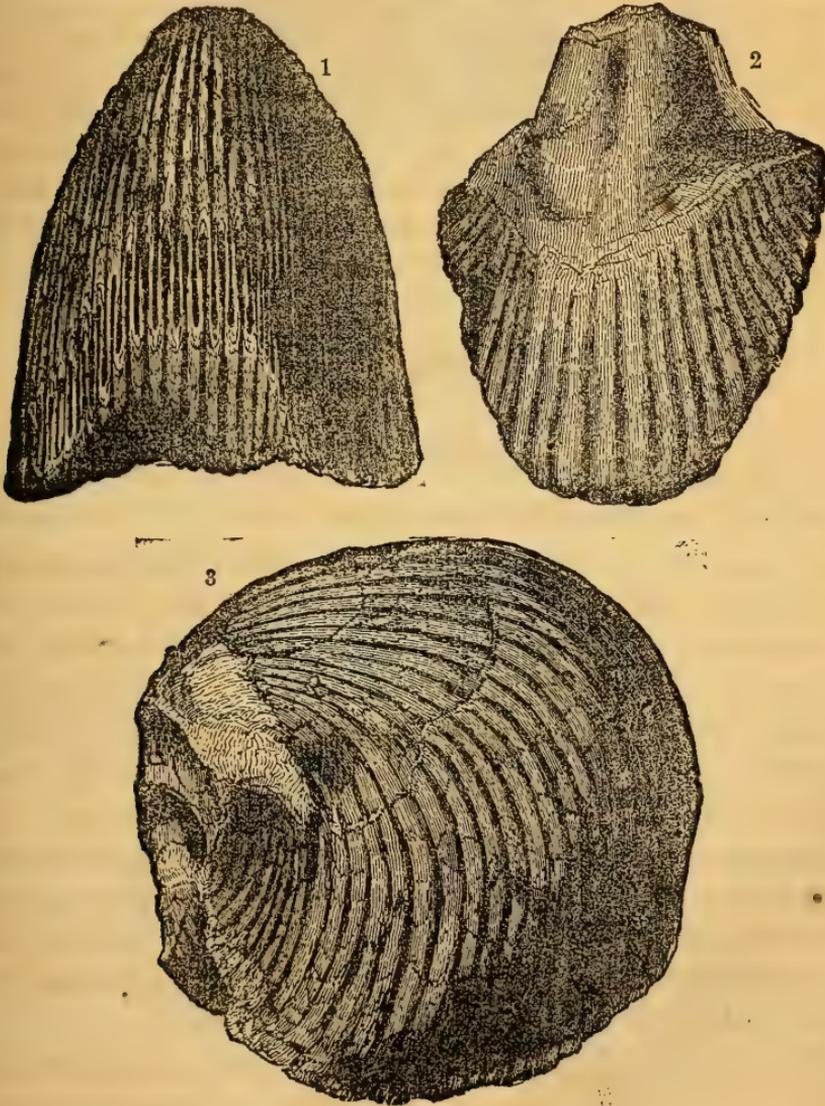
SHELL very large, ovoid or subglobose ; full-grown specimens higher than wide, vertically flattened on the sides : dorsal valve very convex, often extremely elevated ; beak incurved ; cardinal border on each side of the beak profoundly sinuate, for the reception of the thick, strongly projecting laminae of the opposite valve : ventral valve much the smaller, strongly arcuate longitudinally, having a broad shallow rounded sinus towards the front, abruptly deflected upwards at the lateral margins which are distinctly angular, prolonged in front into a subtriangular vertical projection. Surface marked by forty to forty-six simple (rarely bifurcating) strongly elevated [ angular? ] plications on each valve.

This species, the largest of the genus known to me in the rocks of this country, we have yet only met with in the condition of more or less distorted internal casts. The large size, however, of the shell, together with its form and the well-defined internal characters usually so strongly im-

pressed upon the casts, will prevent it from being confounded with any other species found in our rocks.

In many respects it resembles *R. speciosa*, which may be regarded as a representative form in the Maryland rocks : it is, however, distinguished from that shell by its larger size, its more elevated dorsal valve and relatively broader form, and its broad shallow rounded sinus near the front of the ventral valve.

*Geological position and locality.* Oriskany sandstone, Albany and Schoharie counties.



RHYNCHONEILA BARRANDI.



RHYNCHONELLA BARRANDI.

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RHYNCHONELLA PRINCIPALIS.

Pal. N.Y. Vol. iii, pl. 106, f. 4.

SHELL large, longitudinally ovate : dorsal valve unknown : ventral valve depressed-convex, forming a low elliptical arch from beak to front, most prominent along the middle, flattened or somewhat concave near the lateral margins which are abruptly deflected upwards towards the opposite valve ; beak somewhat prominent and moderately incurved ; front slightly concave, but not distinctly sinuate. Surface ornamented by about eighty regular rounded plications, which occasionally bifurcate, and are crossed by indistinct lines of growth.

This species is closely related to *R. barrandi* ; and having but a single ventral valve, I cannot readily decide how far it may differ in its entire characters. The casts of the preceding species are all proportionally broader when not compressed, have a more distinct sinus in front, and fewer plications. With the knowledge at present possessed, this species may be considered as holding a place intermediate between the very well-marked *R. speciosa*, and the equally well-marked *R. barrandi*.

*Geological position and locality.* Oriskany sandstone, Auburn ( N.Y.).

## RHYNCHONELLA FITCHANA.

Pal. N.Y. Vol. iii, pl. 103, f. 1.

SHELL longitudinally oval or ovate : dorsal valve convex ; beak slightly incurved ; cardinal margin excavated on each side of the beak for the reception of the broad dental laminæ of the other valve : ventral valve depressed-convex, most elevated in the umbonial region, flattened towards the lateral margins and depressed in front, forming a faint broad and undefined sinus. Surface ornamented by about seventy-five angular plications, which occasionally bifurcate.

This species differs from the last, which it nearly approaches in general form, in being more distinctly sinuate, and in having sharper and less numerous plications, while the beak is more pointed and less incurved.

*Geological position and locality.* Oriskany sandstone, Carlisle ( N.Y.).



## RHYNCHONELLA MULTISTRIATA.

Pal. N.Y. Vol. iii, pl. 102, f. 5 (3 on plate); and pl. 106, f. 3.

SHELL subcircular, transversely suboval-depressed : ventral valve depressed-convex, most elevated in the umbonial region, flattened towards the lateral margins and slightly depressed in front, forming a broad, very shallow, undefined sinus : dorsal valve unknown. Surface marked by numerous fine regular bifurcating striæ, which are well defined nearly to the apex of the beak.

This species may be distinguished from the foregoing by its transversely oval form, and more numerous as well as much finer striæ or plications.

*Geological position and locality.* Oriskany sandstone, Helderberg mountains.

## RHYNCHONELLA OBLATA.

Pal. N.Y. Vol. iii, pl. 102, f. 2.

SHELL subcircular, somewhat compressed : dorsal valve the larger, depressed-convex, declining with a gentle curve towards the lateral margins, rising slightly in front into a broad round undefined mesial fold ; beak somewhat incurved : ventral valve much compressed, slightly convex in the umbonial region, depressed into a broad shallow undefined sinus in front. Surface marked by seventy-five to eighty coarse striæ which occasionally bifurcate.

Internal casts of this species only have been observed, but its general form appears to be sufficient to distinguish it from any of the preceding species.

*Geological position and locality.* Oriskany sandstone, Carlisle (N.Y.).



## RHYNCHONELLA PLEIOPLEURA.

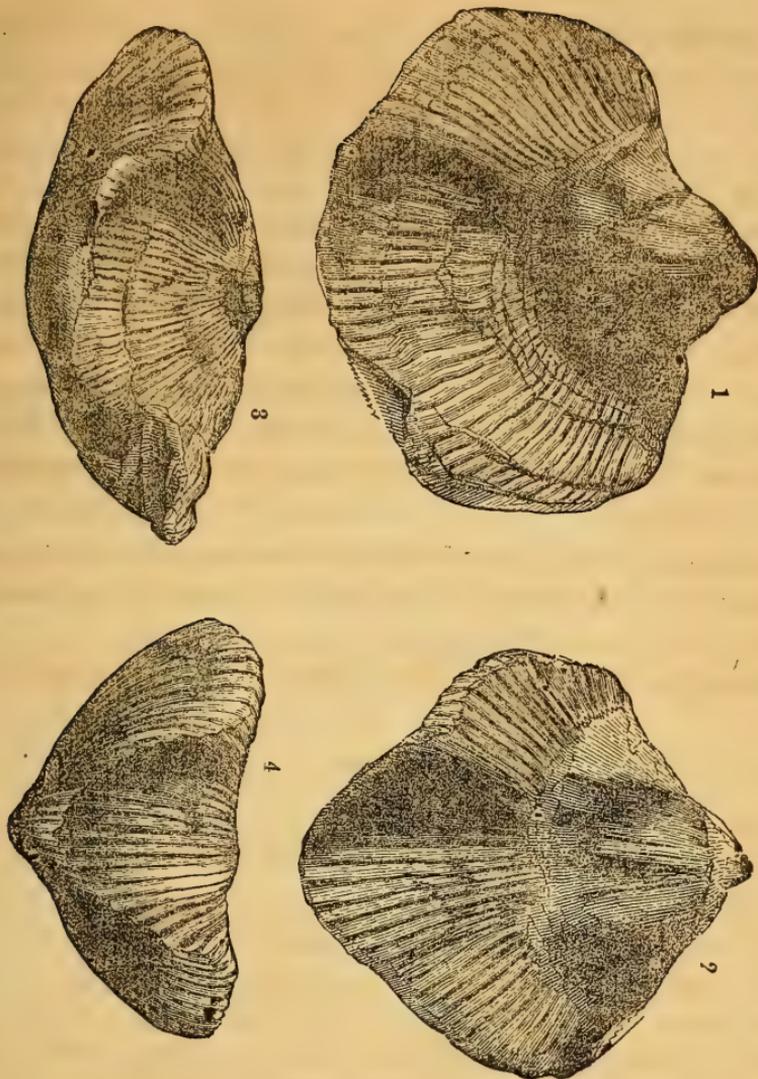
Pal. N.Y. Vol. iii, pl. 102, f. 3 a - c and 4 a - e.

*Atrypa pleiopleura*, CONRAD : An. Report Pal. N.Y. p. 55.

SHELL transversely oval : dorsal valve the larger, somewhat gibbous, having a round or sloping mesial fold ; beak incurved ; cardinal border excavated on each side of the beak, for the reception of the dental laminae of the opposite valve : ventral valve nearly flat, most elevated near the beak, having a somewhat deep, broad, rounded sinus near the front margin, which is prolonged into a rounded or subtriangular projection. Surface ornamented by from sixty-four to seventy rather angular bifurcating striæ or plications.

This shell has been found in casts only : it differs from the last species in being more gibbous, more distinctly sinuate, the striæ stronger, and impressions of the adductor muscles larger and more prominent.

*Geological position and locality.* Oriskany sandstone, Schoharie.



*RHYNCHONELLA PLEIOLEURA.*



*WALDHEIMIA GLOBOSA.*

Pal. N.Y. Vol. iii, pl. 36, f. 1.

**SHELL** subglobose, oval : ventral valve a little larger than the opposite one, most gibbous in the umbonial region ; beak prominent, rounded and arched, perforate at the extremity by a round aperture, one side of which is formed by a deltidium : dorsal

valve shorter than the ventral ; beak incurved. Surface marked by twelve to sixteen somewhat angular plications on each valve, two or three of which are slightly depressed on the middle of both valves, so as to produce sometimes a faint emargination in front ; the depressed plications smaller than the others, and often becoming obsolete before reaching the beak.

The globose form and slightly elevated plications of this shell, as well as its more distinctly imbricating lamellæ, will serve to distinguish it from another species in the same rock.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.

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### WALDHEIMIA FORMOSA.

Pal. N.Y. Vol. iii, pl. 36, f. 2.

**SHELL** longitudinally ovate : ventral valve tapering towards the beak ; beak prominent, rounded, arched or incurved, truncated at the apex by a round perforation, one side of which is formed by the deltidium : dorsal valve convex, sometimes most prominent near the umbo ; beak incurved. Surface marked by eighteen to twenty-two or twenty-three simple angular or somewhat rounded plications, two or three of which are much smaller and slightly depressed on the middle of each valve, so as to form a faint narrow sinus extending nearly or quite to the apex of the beaks, and giving a slight emarginate outline to the front. Shell marked by fine imbricating concentric lines of growth.

This species differs from the preceding in its more elongate form, larger size of full-grown individuals, and less rugose imbricating lines of growth. The plications are less strongly developed and more numerous, and the central ones become obsolete or nearly disappear before reaching the beak.

There are rarely individuals, as fig. 2 of pl. 36, which approach more nearly in character to the preceding species ; but they are always less rotund in form, and the beak larger.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.

## WALDHEIMIA RECTIROSTRA.

Pal. N.Y. Vol. iii, pl. 36 A.

SHELL longitudinally ovate, tapering towards the beak at an angle of about  $45^{\circ}$ , slopes on each side of the beaks, flattened and not plicated; beak of ventral valve straight, extending beyond the opposite, truncated at the apex by a round perforation partly formed by the deltidium; beak of dorsal valve incurved. Surface marked by twelve or thirteen prominent subangular plications, the two central of which, on the ventral valve, are slightly smaller than the others, and a little depressed. These two plications coalesce before reaching the beak: the central plication of the dorsal valve is smaller and a little more depressed than the others, and becomes obsolete before reaching the beak.

This well-marked species may be at once distinguished from either of the preceding by its less ventricose form, and the more attenuated and straight beak of the ventral valve.

*Geological position and locality.* Oriskany sandstone, Maryland.



## WALDHEIMIA DEWEYI.

Pal. N.Y. Vol. iii, pl. 36, f. 3.

SHELL depressed-subglobose, sometimes subquadrilateral with the sides curving, moderately compressed; valves nearly equal: ventral valve a little the most prominent towards the umbo, having a narrow faint sinus from near the beak to the front, where it sometimes produces a slight sinuosity; beak apparently not perforate, extending a little beyond the opposite beak, upon which it is closely incurved: dorsal valve symmetrically arched. Surface marked by about forty regular simple rounded striæ, crossed by indistinct lines of growth, and, near the front, occasionally by stronger imbricating concentric marks indicating interrupted stages of growth.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.

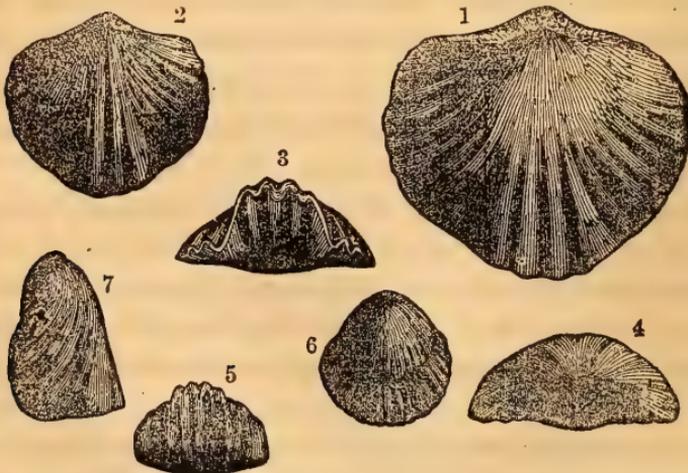
## EATONIA MEDIALIS.

*Atrypa medialis*, VANUXEM.

Pal. N.Y. Vol. iii, pl. 37, f. 1.

SHELL transversely oval, suborbicular or subquadrate; hinge nearly straight, and forming a very obtuse angle at the beaks: dorsal valve much larger than the ventral, greatly elevated in the middle (especially near the front), declining with a gentle curve laterally and towards the hinge: ventral valve flat or concave, depressed in front so as to form a broad and profound mesial sinus; beak very small, pointed but not prominent, incurved, perforate at the extremity. Surface marked by from twelve to sixteen broad rounded rarely bifurcating plications, four of which usually occupy the summit of the mesial fold of the ventral valve, and about three the bottom of the sinus in the dorsal valve: lines of growth obscure. The visceral impression in the ventral valve moderately large, ovate, very distinctly defined by a prominent border, and marked by longitudinal slightly radiating plications: near its centre is the small cordiform longitudinally striate impression of the adductor muscle.

Associated with this species are a few forms, which, although differing materially from it, I am at present inclined to regard as merely extreme varieties of the same species. Some of these are given on the same plate (See fig. 1 a, b, c, d, e, f, g). In some instances (such as 1 c, d, f & g),



EATONIA MEDIALIS.

the plications are nearly entirely obsolete, and the valves are compressed together around the front and lateral margins.

*Geological position and locality.* Shaly limestone of the Lower Helderberg, Albany and Schoharie counties.



### EATONIA SINUATA.

Pal. N.Y. Vol. iii, pl. 101 A, f. 2.

SHELL circular or longitudinally oval : ventral valve concave, except in the umbonial region, from which point, as well as from the lateral margins, it slopes generally into the broad deep sinus without defined margins : dorsal valve convex, rising in front into a broad undefined mesial prominence, often nearly as high as the highest part of the central region of the valve ; beak incurved. Surface marked by thirty-six to forty strong elevated rounded or subangular plications on each valve. Visceral impressions large, broad, and marked with radiating plications towards the margin, strongly defined by an elevated border : impression of the adductor muscles cardiform, small, located in the middle of the visceral impression, longitudinally striate.

The two middle plications on the dorsal valve are separated by a wider depression than between those on other parts of the shell, which continues quite up to the beak : in this depression there is sometimes near the front a slender plication, which becomes obsolete before reaching the beak.

The surface of this shell was doubtless also marked by fine concentric lines of growth, but none of the specimens coming under my observation are in a condition to have preserved them.

This species differs from *C. medialis* in being proportionally more elongate, having more plications, and a broader and less distinctly defined sinus in the ventral valve. The two plications bordering the sinus and mesial fold of the former species are also proportionally much broader than in this one.

*Geological position and locality.* Oriskany sandstone, Cumberland, Md.

## EATONIA EMINENS.

Pal. N.Y. Vol. iii, pl. 37, f. 2.

SHELL somewhat depressed-globose or subquadrilateral, deeply sinuate and abruptly elevated in front : ventral valve sloping from the beak and sides into a broad undefined sinus, and abruptly extended in front with a regular curve into a large subtriangular prolongation, which lies nearly at right angles to the plane of the valve near the beak : dorsal valve much the larger, extremely elevated in front, and declining abruptly towards the beak and sides ; mesial elevation with four plications, the two middle ones much more prominent. (The specimen a cast.)

This species differs from the two preceding, to which it is related, in the much greater prominence of the mesial fold in front, the plications broader than in the first, and not nearly so many in the last. It also presents notable differences from *C. medialis*, in the characters of the internal impressions.

*Geological position and locality.* Lower Helderberg limestone, Tennessee.



## MERISTA BELLA (n. s.).

Pal. N.Y. Vol. iii, pl. 40, f. 1.

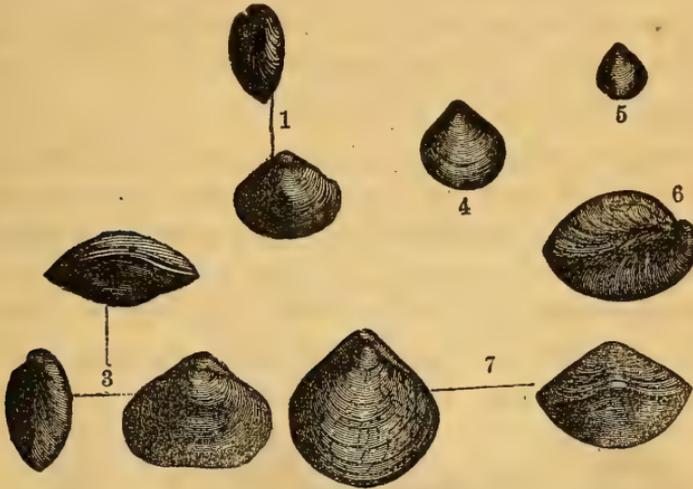
SHELL varying from subcircular or subquadrilateral to transversely oval, usually somewhat broader than long, rather gibbous : ventral valve a little the larger, most convex near the umbo ; beak somewhat prominent and closely incurved : dorsal valve convex ; both valves marked with a small sublinear mesial sinus, that of the ventral valve stronger than the other, the two often giving a distinct emarginate outline to the front. Surface smooth, or marked by faint concentric lines of growth.

This species is characterized by its symmetrical form and the distinctly emarginate character of the front, caused by the meeting of the small mesial depressions of the two valves. The sinus on the front of the ventral valve is always broader and deeper than that on the other, giving a waved outline to the margins of the valves. Some of the specimens appear to have a small open foramen in the point of the beak, but which may be accidental.

It is closely related to *Terebratula compressa* (MURCHISON), but attains a larger size than any of that species figured, and is almost always more gibbous, especially the ventral valve near the beak.

A single specimen, apparently of this species (pl. 40, f. 2 c, d, e & f), is much more compressed than the others, and less distinctly sinuate on the middle of the valves, and consequently nearly destitute of the emargination in the front : this, however, is only a single exception to the general characters of the species.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.



MERISTA BELLA.

MERISTA SUBQUADRATA (n. s.).

Pal. N.Y. Vol. iii, pl. 40, f. 3.

SHELL subquadrate : ventral valve the larger, gibbous in the middle and umbonal region ; beak prominent, incurved, apparently not perforate : dorsal valve depressed-convex ; front slightly elevated, forming a small undefined mesial prominence immediately on the margin ; beak well defined, incurved. Surface smooth, or marked with many indistinct concentric lines of growth.

The most marked characters of this species are its obliquely subquadrate form, and the slight elevation of the front margin of the dorsal valve, without any traces of a corresponding sinus in the opposite valve.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.

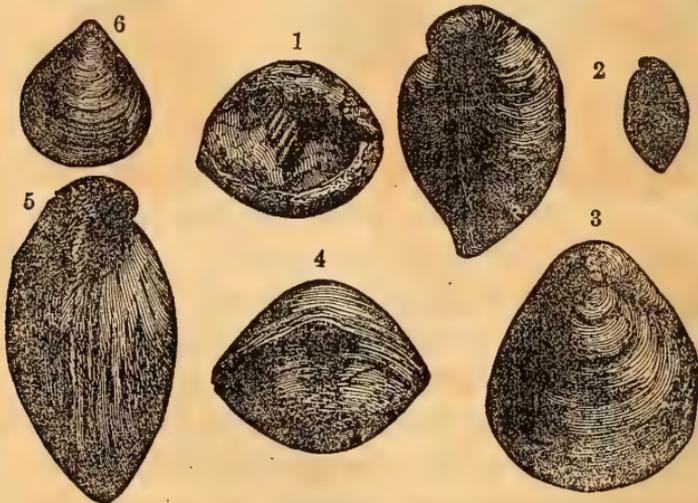
## MERISTA LÆVIS (Vanuxem).

Pal. N.Y. Vol. iii, pl. 39, f. 3.

SHELL ovate, thin, somewhat ventricose : ventral valve the larger, most gibbous in the centre and umbonial region, having a small mesial sinus extending from the front more than half way to the umbo ; beak prominent, ventricose, incurved, not perforate : dorsal valve regularly convex, rounded in the middle, but without a defined mesial fold ; beak incurved. Surface smooth, or only marked by obscure concentric lines and occasional stronger concentric wrinkles of growth.

Some varieties of this species, especially the adult shell, often resemble *Merista bella*, but differ in being proportionally longer, and are never marked by a sinus on the dorsal valve. Young shells are sometimes comparatively much more compressed, and often destitute of any trace of a sinus on either valve.

*Geological position and locality.* Shaly and compact limestones of the Lower Helderberg group : Albany, Schoharie and Herkimer counties.



MERISTA LÆVIS.

**MERISTA ARCUATA (n. s.).**

Pal. N.Y. Vol. iii, pl. 41, f. 1.

SHELL broad-ovate, sometimes transversely oval : ventral valve longitudinally arcuate, gibbous in the central and umbonial region, having in front a shallow rounded depression scarcely reaching the middle of the valve ; front margin (in old specimens) elevated, and fitting into the broad rounded sinus of the opposite valve : dorsal valve often abruptly elevated along the middle and sloping laterally, having no distinct mesial fold ; beak incurved. Surface smooth, or marked by faint concentric lines and occasional stronger wrinkles of growth.

Some varieties of this species bear considerable resemblance to the last : they are, however, always ventricose and proportionally broader. The ventral valve is also more arcuate longitudinally, more distinctly sinuate, and elevated at the front. The dorsal valve is likewise more compressed in this species, especially near the lateral margins.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany and Schoharie counties,

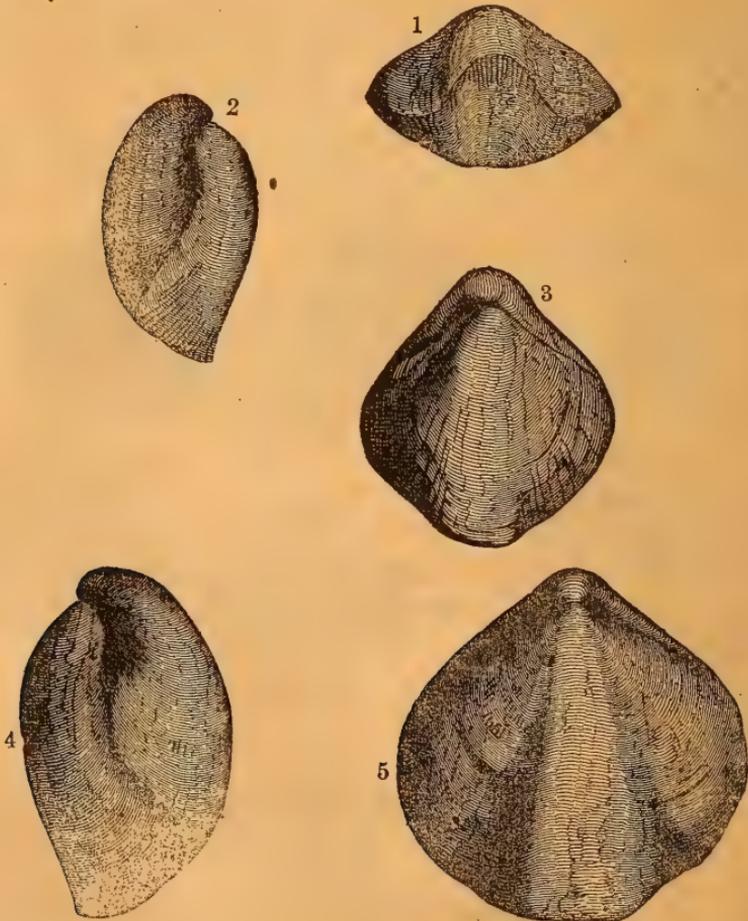
**MERISTA ARCUATA.****MERISTA PRINCEPS (n. s.).**

Pal. N.Y. Vol. iii, pl. 44, f. 1-5.

SHELL ovate ; sides sloping towards the beaks at an angle of about 30° : ventral valve more or less profoundly arcuate longitudi-

nally, most ventricose near the central and umbonial region, depressed and having a broad shallow flat or subangular mesial sinus in front, terminating (in old specimens) in a linguiform extension : dorsal valve elevated and rounded along the middle, declining laterally, having (in old specimens) a strong rounded mesial fold in front; beak incurved. Surface marked by obscure traces of very fine radiating striæ, which are crossed by indistinct concentric lines of growth.

This fine large species differs considerably in the form and depth of the mesial sinus, as well as in the greater or less extension of the mesial prolongation of the anterior border of the ventral valve. In some of the specimens the sinus is very shallow and flattened within, while in other instances it is more impressed and angular in the middle : other specimens present intermediate grades of difference in this respect, the sinus being nearly flat within, and marked by a narrow, nearly linear, deeper depression



MERISTA PRINCEPS.

along its middle. Young individuals are almost entirely destitute of a sinus, though the front of the dorsal valve in such cases is usually slightly elevated.

*Geological position and locality.* Upper Pentamerus limestone of the Lower Helderberg group, Carlisle and Schoharie.



### MERISTA MEEKI.

Pal. N.Y. Vol. iii, pl. 44, f. 6.

SHELL cordate-ovate, very gibbous, sloping from below the middle towards the beaks at an angle of about  $80^{\circ}$ : ventral valve profoundly arcuate from the beak to the anterior margin, where it terminates in a prominent abruptly tapering mesial prolongation, having a broad angular sinus from near the beak quite to the termination of the anterior prolongation; beak flattened on the outside, subangular on its lateral slopes, closely incurved upon that of the opposite valve: dorsal valve elevated along the middle, sloping laterally with an abrupt curve, very gibbous in the umbonial region; beak incurved. Surface smooth, or marked by faint concentric lines of growth.

The shorter and more globose form of this species, as well as the deep angular sinus and flattened umbo of its ventral valve, are sufficient to distinguish it from all the preceding species.

*Geological position and locality.* Limestone of the age of the Lower Helderberg, Tennessee.



### MEGANTERIS MUTABILIS.

Pal. N.Y. Vol. iii, pl. 45, f. 2.

SHELL ovate varying to elliptic and obovate, not sinuate on either valve; old specimens sometimes very gibbous, but generally compressed towards the anterior border in young individuals; valves nearly equally convex: ventral valve most elevated

near the middle and towards the umbo; beak pointed, sub-angular along the lateral slopes, arched or closely incurved; foramen narrow, and extending nearly or quite to the apex of the beak: dorsal valve slightly less elevated and a little shorter than the opposite; beak not projecting, incurved. Surface marked by twelve to twenty-eight coarse obscure radiating striæ, crossed by fine indistinct lines of growth, and sometimes near the border by a few strong concentric undulations. The radiating striæ are usually obsolete on the upper half of the shell.

This species varies considerably in form, as well as in other characters. Young individuals are generally more compressed near the front, and the beak is more nearly straight; while older specimens are often quite gibbous, and sometimes marked by very strong concentric undulations: in the latter case, the beak of the ventral valve is generally closely incurved.

*Geological position and locality.* Higher part of the Shaly limestone, and more compact beds just beneath the Upper Pentamerus limestone of the Lower Helderberg group, Albany and Columbia counties.



### MEGANTERIS ELLIPTICA.

Pal. N.Y. Vol. iii, pl. 45, f. 4.

**SHELL** elliptical, rather gibbous; valves nearly equally convex; front rather sharply rounded; no trace of a sinus on either valve: dorsal valve most elevated near the middle, rounding laterally, and having a semielliptical outline from the front to the beak, which is incurved: ventral valve curving from the middle towards the lateral margins, and forming longitudinally a semielliptic curve; beak rather gibbous, closely incurved and extended over that of the other valve. Surface marked by fine indistinct radiating striæ, which are crossed by obscure remains of concentric lines and faint undulations of growth.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.

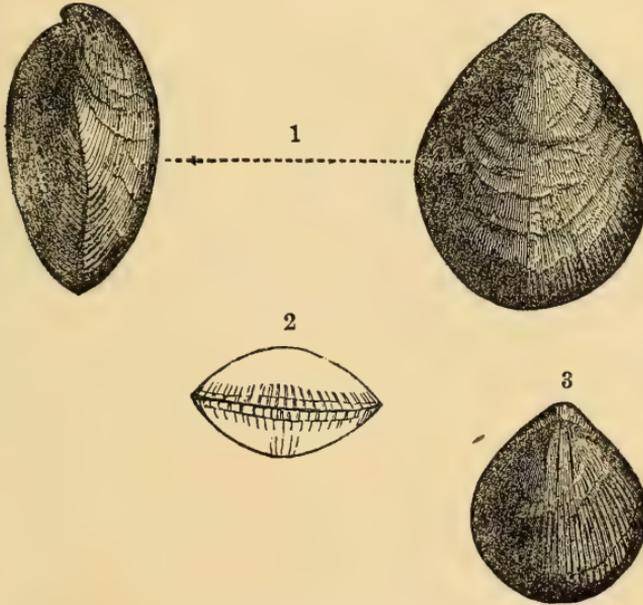
## MEGANTERIS ÆQUIRADIATA.

Pal. N.Y. Vol. iii, pl. 45, f. 4.

*Atrypa æquiradiata*, CONRAD : Jour. Acad. Nat. Sc. Phil., Vol. 8, p. 266;  
pl. 16, f. 17.

SHELL elliptical or subovoid ; valves nearly equal ; surface marked by simple regular radiating striæ ; beak of the ventral valve moderately incurved, scarcely gibbous ; margins of valves not sinuous.

*Geological position and locality.* Upper Pentamerus limestone of the Lower Helderberg group, Schoharie.



MEGANTERIS ÆQUIRADIATUS.



## MEGANTERIS LÆVIS.

Pal. N.Y. Vol. iii, pl. 40, f. 2.

SHELL broad oval or subquadrate, not sinuate : ventral valve the more convex, most prominent along the middle and towards the beak, which is pointed and arched so as to rise above the hinge-line, but not closely incurved ; foramen narrow, extending quite

to the apex of the beak : dorsal valve flat or depressed-convex. Surface smooth, or only marked by very obscure lines of growth.

The plano-convex form and smooth surface of this species will at once distinguish it from all its known congeners in the rocks of this State. It is possible there may be very fine obscure radiating striæ on perfectly preserved specimens of this species, though the only individual I have yet seen appears to have been smooth.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.



### MEGANTERIS SUESSANA.

Pal. N.Y. Vol. iii, pl. 106 A, f. 1.

SHELL longitudinally obovate, varying to oval or subelliptical, somewhat compressed; valves nearly or quite equal; no traces of a sinus on either valve; front narrowly rounded; lateral margins very abruptly inflected : ventral valve depressed convex, most prominent along the middle, sloping very gradually towards the sides; beak pointed, small, very angular along its lateral borders, incurved, rising above the hinge-line but not touching the other valve, perforate in the apex by a small round aperture partly completed by the two small deltidial pieces, which, together with the thickened dental apophyses of the opposite valve, close the triangular foramen below : dorsal valve symmetrically depressed-convex, sloping very gradually from near the middle laterally and towards the front, rounding a little more abruptly towards the beak, which is pointed and scarcely incurved : hinge-line nearly straight, or sloping from the beak at a very obtuse angle, much less than the width of the shell. Surface usually appearing to be smooth, but, on well-preserved specimens, remains of very faint simple radiating striæ may be seen towards the margin, which always become obsolete above.

*Geological position and locality.* Oriskany sandstone, Maryland.

## MEGANTERIS OVALIS.

Pal. N.Y. Vol. iii, pl. 106, f. 2.

SHELL longitudinally oval, compressed, lateral margins subtruncate and abruptly inflected; front rather narrowly rounded: ventral valve slightly the more elevated, most prominent along the middle, sloping gradually towards the sides; beak pointed, arched so as to bring the apex above the hinge-line, but not touching the opposite valve, angular along the lateral slopes: dorsal valve regularly depressed-convex; beak incurved, Surface marked by very faint simple radiating striæ, which become obsolete on the upper part.

Casts and much-worn specimens of this species only have come under my observation. None of these have the apex of the beak entire, nor do they show the character of the foramen. It is evidently very near the last species, but differs, however, in being larger, more compressed, and often proportionally broader. Casts of this species also resemble those of *Terebratula archiaci* of DE VERNEUIL (DUNKER und VON MEYER, Palæontologie, dritter band, 4, pl. xxvii, f. 2); which species, I infer from the reference, is the type of SUESS'S Genus MEGANTERIS\*.

*Geological position and locality.* Oriskany sandstone, Helderberg and Schoharie.



## MEGANTERIS CUMBERLANDIÆ.

Pal. N.Y. Vol. iii, pl. 106 A, f. 2.

SHELL oval, ovate or elliptical; valves nearly equal, somewhat acutely rounded in front; no trace of a sinus in either valve; lateral margins abruptly inflected: ventral valve rounded and most convex along the middle, sloping laterally and forming a broad semielliptical curve from front to beak, a little more gib-

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\* At the time of writing this description, I have seen the name of MEGANTERIS only in a catalogue of the genera given by DAVIDSON in the Annals and Magazine of Natural History for December 1855.

bous above than below the centre; beak prominent, slightly arched; extremity perforate; perforation generally connected with the broad triangular foramen below, but probably often separated by the deltidial pieces, which, with the thickened dental apophysis, nearly or quite close the foramen: dorsal valve depressed-convex, slightly the smaller; beak scarcely incurved. Surface apparently smooth, or marked only by obscure concentric lines and faint wrinkles of growth.

The specimens examined are silicified, and it is probable that fine radiating striæ may have existed on the original shell, which have been obliterated by the change.

This species may be distinguished from *M. suessana*, which it most resembles, by its more elongate form and the more prominent beak of the ventral valve. The cardinal margin of the ventral valve, on each side of the beaks, is also more prominent, and that of the other valve more excavated, so as to impart a waved outline to the line of junction of the two valves from the beaks along the lateral slopes.

*Geological position and locality.* Oriskany sandstone, Maryland.

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### MEGANTERIS OVOIDES.

Pal. N.Y. Vol. iii, pl. 104 & 105, f. 1.

*Terebratula ovoides*, EATON (1832): Geol. Text-book, p. 45. (Not Sowerby, 1812.)

*T. perovalis*, EATON (1832): Geol. Text-book, p. 45. (Not Sowerby, 1825.)

*Atrypa elongata*, CONRAD: An. Rep. N.Y. 1839, p. 65.

Not *Meganteris elongata* (*Pentamerus elongatus*) of the Onondaga limestone, VANUXEM: Geol. Rep. 1842, p. 132, f. 1.

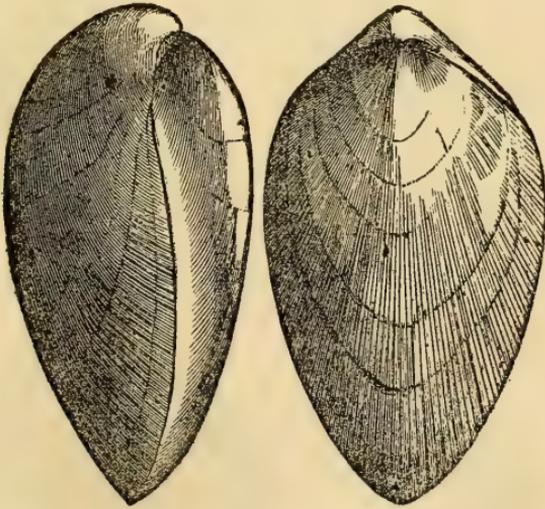
SHELL elongate-ovate or elliptical-ovate, gibbous or compressed, broadest above the middle, abruptly rounded towards the cardinal end, narrowing to the front, which is often depressed and rounded or subtruncate; no traces of a sinus in either valve: in gibbous specimens, the sides are sometimes vertically flattened or a little concave, often slightly contracted near the front: ventral valve the larger, most gibbous in the umbonial region; beak (in old specimens) somewhat obtuse, closely incurved upon the opposite: dorsal valve depressed-convex, less elevated than the other, most prominent along the middle or a little

above it, forming a low semioval or semielliptical arch from beak to front, sloping very gradually to the sides, which (in old specimens) are often so abruptly deflected, or even inflected, as to form a distinct angular ridge extending from near the beak two-thirds of the way to the front; beak obtuse, scarcely incurved. Surface marked by regular simple radiating striæ, sometimes crossed near the borders by distinct concentric wrinkles.

This species varies greatly in form; some individuals being very gibbous and distinctly ovate, while others are more or less compressed and very elongate-ovate or narrow elliptical: the first variety was EATON'S *T. ovoides*, and the latter his *T. perovalis*. After studying a large collection of these forms, I am satisfied that they are varieties of the same species, rather than distinct types.

I have some fine specimens from Cumberland (Md.), apparently identical with this one; but they are usually smaller than those found in New-York, and appear to be a little more finely striated.

*Geological position and locality.* Oriskany sandstone, Helderberg and Schoharie.



MEGANTERIS OVOIDES.

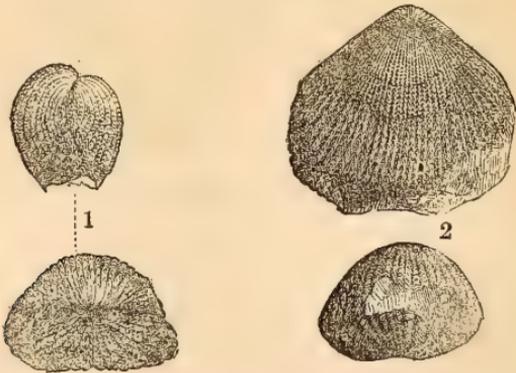
## PENTAMERUS VERNEULLI.

Pal. N.Y. Vol. iii, pl. 48, f. 1.

SHELL subglobose ; transverse diameter generally greater than the height : ventral valve more depressed than the opposite, having a distinct sinus, commencing near the beak and regularly widening and deepening to the front, where it terminates in a short truncated extension fitting into a corresponding depression in the front of the other valve ; beak shorter than the opposite, perforated by a triangular foramen, which is generally covered by the strongly gibbous incurved beak of the other valve : dorsal valve very much elevated ; beak extremely gibbous and incurved. Surface marked by from twenty-four to thirty sharply angular elevated plications, which increase by interstitial addition and bifurcation : from four to six of the plications on the ventral valve usually occupy the sinus ; while from five to eight of those on the dorsal valve are very slightly elevated, so as to form a flat rather indistinct mesial fold.

This beautiful species is unlike any form known to me in our rocks : it bears an analogy to *Atrypa interplicata* of the Niagara group, which is probably a *Pentamerus*, though its internal characters have not yet been seen. This species will, however, be easily distinguished from that, by its larger size and more globose form, as well as more numerous and sharper plications.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany and Schoharie counties.



PENTAMERUS VERNEULLI.

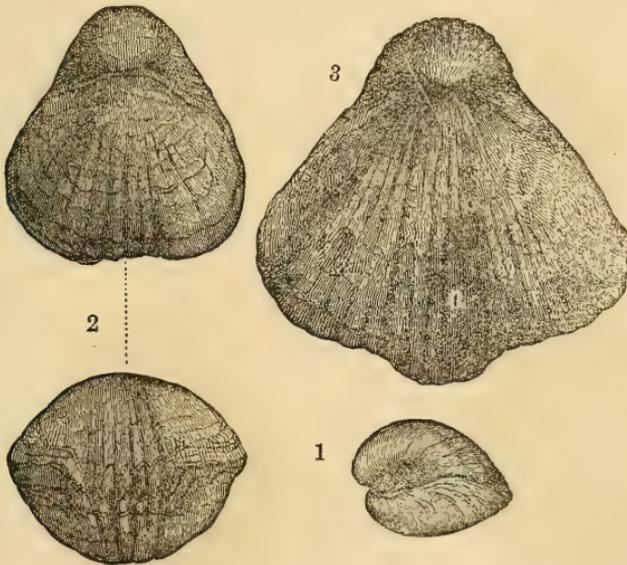
## PENTAMERUS GALEATUS.

Pal. N.Y. Vol. iii, pl. 46 &amp; 47.

This widely distributed species is characteristic of the compact limestones at the base of the Lower Helderberg group, and is known to occur in the same position as far south as Tennessee.

It presents a great variety of form and surface markings. In New-York, the extremely young specimens are always smooth, so far as I have observed. In the various stages of growth, they present every possible degree of development in the plications; some individuals of nearly full size remaining smooth, while others are strongly plicated before reaching half the full size. Some individuals present plications only on the mesial fold and sinus. The plications are sometimes bifurcate, as shown in a single individual on plate 46 and another on plate 47.

The illustrations upon plate 46 show a few of the varieties of form and marking to which this species is subject.

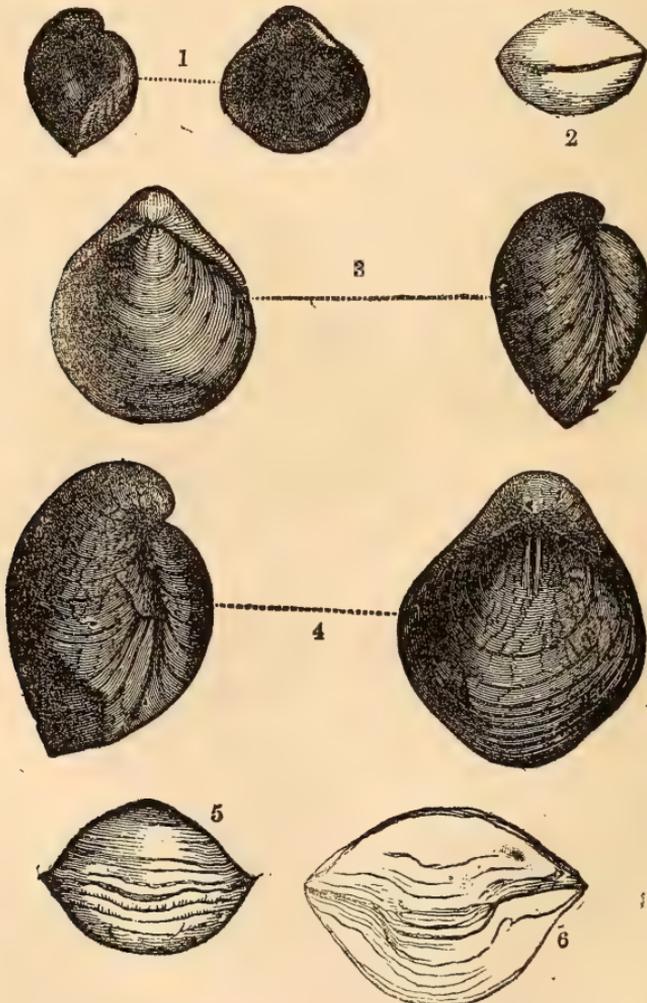


PENTAMERUS GALEATUS.

## PENTAMERUS PSEUDOGALEATUS.

Pal. N.Y. Vol. iii, pl. 46, f. 2.

SHELL longitudinally ovate : ventral valve extremely convex, especially in the umbonial region ; beak very prominent and strongly gibbous, incurved, and projecting far beyond that of the other valve ; front margin in adult shells sometimes having a faint mesial prominence : dorsal valve subcircular, or much shorter and more compressed than the opposite ; beak incurved ; front obliquely flattened, or very slightly depressed so as to form sometimes an indistinct sinus, often a little produced into a short



PENTAMERUS PSEUDOGALEATUS.

truncate or rounded extension. Surface smooth, or marked by faint concentric lines of growth.

Young specimens of this species might be mistaken for the young of *P. galeatus*, which are, like this, destitute of plications. Its form, however, is much more elongated, and the beak more extended than in *P. galeatus*.

*Geological position and locality.* Upper Pentamerus limestone of the Lower Helderberg group, being the fossil which characterizes the higher compact beds of the group, as *P. galeatus* does those of the lower beds of the same.

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### LEPTOCÆLIA CONCAVA.

Pal. N.Y. Vol. iii, pl. 38, f. 1 to 7.

SHELL ovate or suborbicular : ventral valve convex, elevated along the middle into a mesial prominence, which extends to the umbo ; beak small, incurved beyond the hinge-line : dorsal valve near the lateral margins, depressed in the middle, forming a shallow undefined sinus which is deeper in the centre than at the front, and rapidly diminishes towards the umbo ; beak straight : area small ; foramen triangular and extending to the apex of the beak, sometimes closed below by a deltidium. Surface marked by fourteen to seventeen striæ, which sometimes bifurcate : the one on the middle of the mesial fold of the ventral valve is generally smaller than the others, giving a slightly grooved appearance along its centre quite up to the beak.

The sinus in the dorsal valve of this shell widens so rapidly from the beak towards the front, and is so much deeper in the centre than near the beak and at the front of the shell, that it gives in some instances a marked concavity to this valve.

This species may be considered a representative of *Terebratula duboisi* of DE VERNEUIL (Géologie de la Russie, pl. x, f. 16) ; from which it differs in its more rotund outline, and in the greater concavity of the dorsal valve.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.

## LEPTOCÆLIA IMBRICATA.

Pal. N.Y. Vol. iii, pl. 38, f. 8 to 12.

SHELL longitudinally semielliptical or suborbicular : ventral valve convex, most prominent along the middle, and sloping laterally ; beak small, incurved at the apex and perforated by a very small round aperture, one side of which is formed by the deltidium : dorsal valve flattened or depressed-convex ; beak scarcely elevated above the hinge ; hinge sloping from the beaks at an angle of about 150°, rounded at the extremities, nearly equal to the greatest width of the shell ; area narrow, shorter than the hinge. Surface marked by ten to twelve plications on each valve, of which the two on the middle of the ventral valve are larger and more elevated than the others, and separated by a wider and deeper depression than between those on each side. The central plication on the dorsal valve is larger than the others near the front, but usually dies out before reaching the beak. Shell marked by strong imbricating concentric lamellæ of growth.

This species resembles *Leptocalia (Atrypa) disparilis* of the Niagara group, but is generally larger, has more plications and a straighter hinge ; its dorsal valve also differs, in being slightly convex instead of concave. It also bears a general resemblance to *Terebratula lepida* (GOLDFUSS) and *T. sublepida* (DE VERNEUIL), but has a wider hinge than either of these, and differs likewise from them in other obvious and essential characters.

*Geological position and locality.* Shaly limestone of the Lower Helderberg group, Albany county.



## LEPTOCÆLIA PROPRIA.

Pal. N.Y. Vol. iii, pl. 106, f. 1.

SHELL somewhat semicircular, varying to suborbicular or transversely oval, generally broader than long : ventral valve convex, most prominent along the middle, declining laterally ; beak incurved, with a small round perforation in the extremity, which is completed on the lower side by the two deltidial pieces :

dorsal valve flat ; beak straight : hinge sloping from the beaks at an angle of  $110^{\circ}$  to  $160^{\circ}$ , rounded at the extremities. Surface marked by twelve or thirteen simple angular plications ; two of which, on the middle of the ventral valve, are a little larger and slightly more prominent than the others : between these, there is a third smaller depressed plication, forming an indistinct sinus. On the dorsal valve the two middle plications are a little closer together, and slightly more prominent near the front, than the others ; while the depressions separating them from these, each side, are a little wider and deeper than those between the other plications.

This species presents some varieties of form, apparently due to age ; the hinge-line of younger or smaller individuals being more extended and more nearly straight. The silicified condition of the specimens has obscured the finer surface markings. Many of the specimens appear to retain remains of fine radiating striæ ; while more distinct concentric lines, and occasional stronger undulations of growth, are visible in most of them.

Along the hinge-line, in many specimens of this species, there is a peculiar fimbriated appendage apparently coming from between the valves, and anchylosing them firmly together. I have noticed this appendage in so many instances, that I am inclined to believe that it had some connexion either directly with the animal, or with the cardinal apparatus.

*Geological position and locality.* Oriskany sandstone : New-York, Maryland and Canada.



### ORTHIS ÆQUIVALVIS.

Pal. N.Y. Vol. iv.

SHELL subcircular, compressed ; hinge about three-fourths the width of the shell : dorsal valve depressed-convex : ventral valve flattened, much depressed or concave towards the front, slightly elevated in the umbonial region ; foramen of medium size ; area moderately high, extending to the extremities of the hinge. Surface marked by numerous small radiating striæ, which bifurcate two or three times between the beak and the margins.

*Geological position and locality.* Limestone of the Upper Helderberg, Williamsville, N.Y.

## ORTHIS PROPINQUA.

Pal. N.Y. Vol. iv.

SHELL transversely oval, rather gibbous; hinge straight, equalling about one half the greatest breadth of the shell : dorsal valve the larger, gibbous especially in the umbonial region; beak equalling or sometimes extending a little beyond that of the opposite valve, incurved; dorsal area incurved : ventral valve depressed-convex, somewhat prominent towards the beak, having a broad faintly defined depression near the anterior margin, giving it a straight or somewhat emarginate outline; foramen narrow; area broad, triangular, arcuate. Surface marked by numerous fine irregular striæ, apparently increasing chiefly by interstitial additions, and crossed by fine indistinct concentric lines and a few stronger wrinkles of growth.

This species approaches so closely *O. multistriata* of the Pentamerus limestone, that it is very difficult to distinguish them, the form and surface characters being generally almost precisely the same. Sometimes, however, the beak and area of the ventral valve of this species is a little more arcuate than in *O. multistriata*, and that of the dorsal valve is usually more gibbous, while internally they present some well-marked differences. In this shell, the vascular impressions bifurcate once, twice, or even three times, before reaching the border; while those of *O. multistriata* appear to pass down the front without bifurcation.

ORTHIS TULLIENSIS, of the Tully limestone, is also another form very difficult to distinguish from this : it is, however, generally more gibbous, and presents internal differences; the divisions of the vascular impressions pass down the front of the dorsal valve nearly parallel to each other, or slightly converging; while those of the species under consideration, as well as of *O. multistriata*, diverge distinctly.

*Geological position and locality.* Limestone of the Upper Helderberg group, New-York and Ohio.

## STROPHOMENA ( STROPHODONTA ) CRENISTRIA.

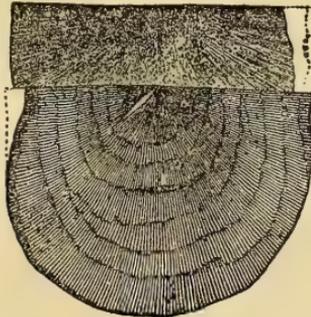
Pal. N.Y. Vol. iv.

*Strophomena crenistria*, HALL : Rep. Geol. 4th Dist. New-York, pa. 171,  
pl. 35, f. 3 & 4.

SHELL somewhat semicircular, much compressed; length from two-thirds to three-fourths as great as breadth; hinge crenulated, nearly or quite equal to the greatest width of the shell, and sometimes having small salient angles at the extremities: dorsal valve unknown: ventral valve much compressed. Surface marked by fine striæ, increasing by bifurcation and interstitial addition; crossed by fine closely set concentric lines of growth and a few indistinct wrinkles, giving a subcrenulate aspect to the radiating striæ: interior granulose; granules on each side of the fan-shaped vascular impression, larger than those nearer the margins.

This shell has much the form and general aspect of *Leptæna pluristriata* (CONRAD) from the Hamilton group, but has rather coarser and more rounded striæ, which are not so sharply crenulated.

*Geological position and locality.* Limestone of the Upper Helderberg group, Williamsville, N.Y.



STROPHOMENA CRENISTRIA.



## STROPHOMENA ( STROPHODONTA ) AMPLA.

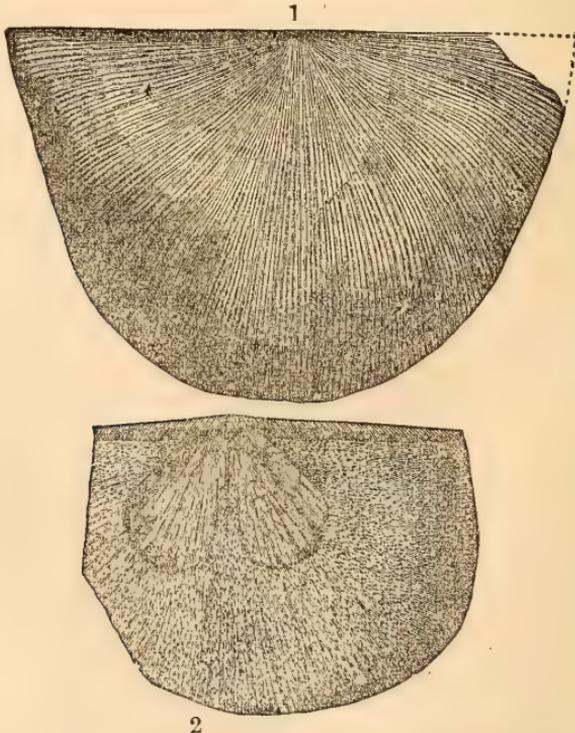
Pal. N.Y. Vol. iv.

SHELL large, transverse, nearly semicircular; hinge-line crenulated, equal to the greatest width of the shell: dorsal valve prominent

in the middle, sloping towards the front and lateral margins, depressed or concave near the umbo : ventral valve deeply concave, except at the beak ; foramen narrow, closed ; area wide, vertically striate. Surface marked by strong, somewhat unequal radiating striæ, which bifurcate three or four times between the umbo and the margin.

This shell is allied to *S. woolworthana* of the Lower Helderberg shaly limestone, but differs in being more strongly resupinate, and in the character of its striæ ; those of *S. woolworthana* being more irregular, and increasing generally by abrupt implantation, while those of the present species usually bifurcate very regularly ; in consequence of which, those at the margin are smaller than those near the umbo. It is also nearly related to a species in the Schoharie grit, *S.* ?

*Geological position and locality.* Limestone of the Upper Helderberg group, Albany and Schoharie counties ; and along the outcrop of the same formation as far as Erie county, N.Y.



STROPHOMENA AMPLA.

## STROPHOMENA (STROPHODONTA) HEMISPHERICA (n. s.).

Pal. N.Y. Vol. iv.

SHELL subcircular or semicircular; hinge crenulated, nearly or quite equal to the greatest width of the shell, terminating in small distinct ears: dorsal valve extremely gibbous, almost hemispherical: ventral valve concave, sometimes geniculated on the front and lateral margins; dental apophyses prominent, and extending beyond the hinge-line. Surface marked by fine, closely arranged radiating striæ; about every fourth, fifth, or sixth one of which is a little larger than the others: extremely fine, nearly obsolete concentric striæ mark the surface in the other direction: sometimes very small indistinct concentric wrinkles are visible, especially in the umbonal region. Interior of the shell granulose.

*Geological position and locality.* Corniferous limestone, N.Y., and in the same rock at the falls of the Ohio, and at many other western localities.



## STROPHOMENA (STROPHODONTA) INEQUIRADIATA (n. s.).

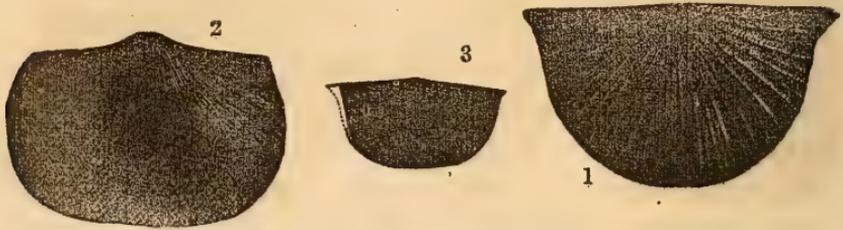
Pal. N.Y. Vol. iv.

SHELL nearly semicircular; length about two-thirds the breadth; hinge-line crenulated, equalling the greatest width of the shell: dorsal valve concave, distinctly incurved near the hinge: ventral valve convex, forming a distinct arch from beak to front, sloping to the sides; beak and area strongly incurved. Surface marked by somewhat coarse distant radiating striæ, which increase by interstitial addition: the spaces between these larger striæ are occupied by extremely fine closely arranged parallel lines, which are crossed by finer, regular, close concentric striæ, so as to present, under a good magnifier, a delicate cancellate surface. Interior finely granulose; granules arranged in irregular radiating rows.

This species is closely related to *Leptæna haueri* of BARRANDE (Brach. aus Böhm; HAIDINGER, Naturwissenschaftliche Abhandlungen, pa. 242,

pl. xxiii, f. 2 & 3). The general form and the finest details of the surface markings are almost exactly the same : the difference is in the more strongly incurved beak and area in our shell, and the finer intermediate and concentric striæ. Some varieties of this species show, in addition to these surface markings, fine interrupted concentric wrinkles in the umbonal region, which give it somewhat the character of *Strophomena patersoni*.

*Geological position and locality.* Limestone of the Upper Helderberg group, New-York.



STROPHOMENA INEQUIRADIATA.



STROPHOMENA (STROPHODONTA) PATERSONI (n. s.).

Pal. N.Y. Vol. iv.

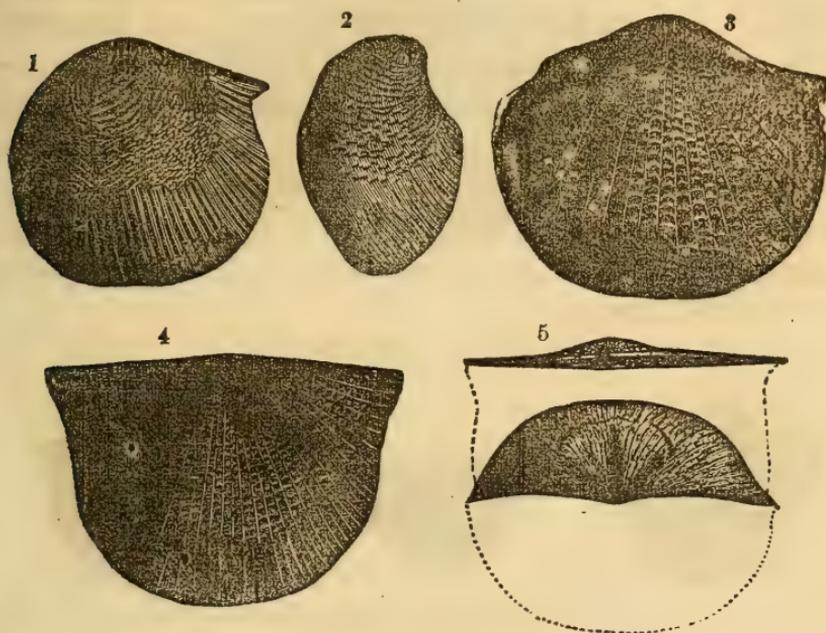
SHELL semioval : ventral valve very convex, gibbous in the middle, somewhat abruptly deflected at the sides and front, sometimes marked by a few radiating undulations which affect both ventral and dorsal valves towards the front ; hinge-line straight, often slightly salient. Surface marked by distant elevated radiating lines ; the intermediate spaces marked by fine radiating striæ, and crossed by short abruptly arching wrinkles which are interrupted by the strong radiating striæ : finer radiating striæ, from twelve to twenty, between the stronger ones ; area unknown.

This shell varies, in the convexity of the ventral valve, from moderately convex to very gibbous ; some specimens being abruptly bent or geniculate towards the front. The vascular impression is bilobed, of moderate size, and the cast presents a closely punctate surface.

This species is related to *Leptæna stephani*, BARRANDE (Brach. aus Böhmen, taf. 20, f. 7 ; HAIDINGER, Naturwissenschaftl. Abhandlungen), but is never so extended in the hinge-line nor so arcuate as the representatives of that species ; the vascular impression is larger, and the concentric wrinkles are always arched in well-preserved specimens of our species.

This species likewise bears considerable resemblance to *Orthis* (*Leptaena*) *corrugata* of PORTLOCK, but is a larger shell as it usually occurs in our rocks. It is not *Strophomena corrugata*, CONRAD ( Jour. Acad. Nat. Sci. Phil. 1842; Pal. N.Y. Vol. ii, 1852, pa. 59, pl. 21, f. 2).

*Geological position and locality.* In the limestone of the Upper Helderberg group, Albany and Seneca counties.



STROPHOMENA PATERSONI.

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### STROPHOMENA CONCAVA (n. s.).

Pal. N.Y. Vol. iv.

SHELL large, triangular-hemispherical; hinge-line equalling the greatest width of the shell: dorsal valve unknown: ventral valve profoundly concave, extremely gibbous in the umbonal region, from which a prominent rounded mesial lobe extends quite to the narrow rounded front; beak strongly incurved. Surface marked by numerous distinct, irregular, bifurcating, subangular striæ.

The most marked characters of this species are the deep concavity, strongly incurved beak, and triangular form of its ventral valve; which presents also the somewhat unusual character of a prominent ridge down the middle, with indications of smaller ones on each side.

*Geological position and locality.* Limestone of the age of the Upper Helderberg, Western New-York.

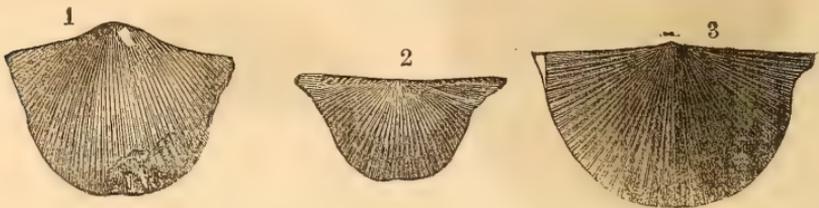
### CHONETES HEMISPHERICA (n. s.).

Pal. N.Y. Vol. iv.

SHELL transverse, semicircular, greatest width being along the hinge-line; ears extending beyond the body of the shell, and distinct from it, but not flattened: dorsal valve unknown: ventral valve extremely ventricose, forming, without the ears, nearly a hemisphere; umbonal region gibbous, and projecting a little beyond the hinge. Surface marked by numerous regular rounded, radiating, occasionally bifurcating striæ.

The distinguishing features of this shell are its hemispherical form, prominent gibbous umbonal region, and regular rounded striæ about equalling the intermediate grooves.

*Geological position and locality.* Schoharie grit.



CHONETES HEMISPHERICA.



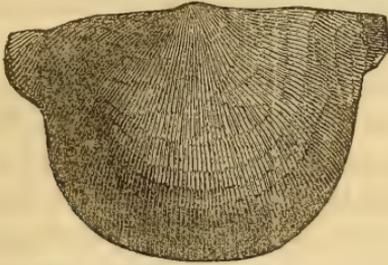
### CHONETES ARCUATA (n. s.).

Pal. N.Y. Vol. iv.

SHELL semicircular, greatest width being along the hinge-line, which terminates in short, slightly depressed, triangular ears, extending a little beyond the body of the shell: dorsal valve profoundly concave, corresponding very nearly with the curvature of the opposite valve: ventral valve ventricose, forming an elevated arch from beak to front, sometimes having a faint depression in the middle from near the umbo to the anterior margin; umbonal region prominent; beak incurved, and rising a little above the hinge-line. Surface marked by numerous fine regular striæ, which increase both by bifurcation and implantation, and are crossed by very fine obscure concentric lines.

This species is larger, and not quite so gibbous as the last. The most marked difference between the two species consists in the much finer striæ of the latter; sixteen occupying the space of one-fifth of an inch, while only half that number can be counted in the same space on *C. hemispherica*.

*Geological position and locality.* Corniferous limestone.



CHONETES ARCUATA.



### CHONETES ACUTIRADIATA (n. s.).

*Strophomena acutiradiata*, HALL : Geol. Rep. 4th Dist. N.Y. 1843, p. 171, f.3.

This species is a true *Chonetes*, with strong diverging cardinal spines. The surface of well-preserved specimens is marked by strong equal rounded striæ, which bifurcate irregularly towards the margin. Some specimens show a distinct sinus down the centre of the ventral valve; and rarely the striæ are narrow and acute, with wider interstices. It is probable that the original described was an extreme specimen of this kind. Well preserved specimens of the same shell from the original locality have the striæ rarely acute, though strong and rather abruptly rounded.



### CHONETES GLABRA (n. s.).

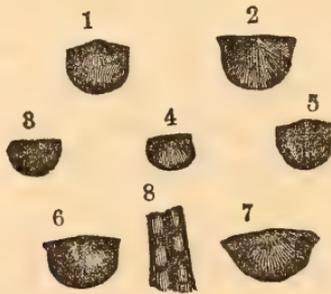
SHELL semioval in outline, ventricose, hemispheric; hinge-line about equal to the greatest width of the shell: surface of the ventral valve marked by obscure or slightly elevated rounded striæ, a few of which are more prominent near the beak; striæ increasing by bifurcation and interstitial addition, and numbering from fifty-four to sixty or more upon the margin of the shell, concentrically marked by fine closely arranged striæ,

which produce a faint reticulated appearance under the magnifier. Surface of the shell, when well preserved in limestone, smooth and shining. Cast strongly and deeply punctate, particularly towards the margins : spines small and nearly vertical to the hinge-line ; number unknown.

The striæ do not extend to the angles of the cardinal extremities ; a considerable space being left smooth, or marked only by concentric striæ. In this respect it resembles *Chonetes pusilla*, from which it is readily distinguished by its finer and more numerous striæ. This species is also distinguished from *C. yandellana* of the limestone at the Falls of the Ohio, by its finer and less distinctly defined striæ, which do not reach the cardinal extremities, while in that species they are very distinct and well defined on that part of the shell. From *C. scitula*, this species is distinguished by its smaller size and less elevated striæ, and more gibbous or hemispheric form, and less proportional width.

This species is usually regarded as the *C. nana* ; from which it is distinguished by its more gibbous form and much greater number of striæ, as well as, frequently, its greater size, though many individuals are not larger than the figures of that species.

*Geological position and locality.* In the higher beds of limestone of the Upper Helderberg at Oneida falls ; between Jamesville and Manlius, Onondaga county ; in Seneca county ; and on the Indian reservation a few miles southeast of Buffalo.



CHONETES GLABRA.

CHONETES YANDELLANA (n. s.).

SHELL semioval, more or less gibbous ; hinge-line equalling the greatest width of the shell ; cardinal spines four or five on each side of the beak, apparently nearly vertical to the hinge-line. Surface distinctly striated ; striæ somewhat equal, bifur-

cating and increasing by interstitial addition, so that the margin of the shell presents from sixty to seventy (or perhaps a greater number in large specimens) : striæ distinct, rounded, and the depressions between them sharply defined ; area narrow, linear. Interior striate papillose.

The striæ extend over the entire surface of the shell, and are as distinct on the latero-cardinal extremities as elsewhere upon the surface.

This species is about the same size and general form as the *Chonetes pusilla* ; but the striæ are much finer, and, when no exfoliation has taken place, are well defined, extending to the cardino-lateral margins, while in that species a considerable space at the angles is plain. It is a smaller and more rotund species than *Chonetes scitula* ; resembling *C. glabra* in form and proportions, but differing in the character and distribution of the striæ.

This shell has usually been referred to *Chonetes nana* ; but its surface presents about double the number of striæ which that species possesses according to the original description of M. E. DE VERNEUIL, thirty-five to forty-five being the number of striæ upon the margin.

The *Chonetes nana* has been cited by M. DE VERNEUIL as occurring at the Falls of the Ohio, but I have not seen it among my collections from that locality.

*Geological position and locality.* In the upper beds of the limestone of the age of the Upper Helderberg, at the Falls of the Ohio.



### CHONETES LATICOSTA (n. s.).

SHELL small, subhemispherical ; hinge-line a little shorter than the greatest width of the shell : dorsal valve with a narrow linear area and prominent dental process : ventral valve with a wider area ; cardinal margin garnished by four or five tubular spines on each side of the beak, which diverge very abruptly, making a low angle with the hinge-line. Surface marked by about ten or twelve strong rounded striæ near the beak, which increase to about twenty or twenty-four near the margin ; bifurcations of the striæ strongly marked and divergent. Shell concentrically marked by fine close striæ and more distant somewhat squamose lamellæ. The surface of the shell, when partially exfoliated, presents a peculiar striato-punctate appearance.

This species, in its general characters, resembles *C. subhemispherica*; but all the individuals I have seen are smaller, the radiating striæ or plications are less prominent and more broadly rounded, proportionally stronger and fewer in number and more divergent, and remarkable in their divergent bifurcation. In a single small specimen which preserves, almost entire, two of the spines, the outer one is nearly as long as the whole length of the hinge-line.

In its diverging spines, this species resembles *C. koninckiana*, PRATTEN & NORWOOD; but that species has double the number of striæ, and half as many cardinal spines. The specimens present some variation in different localities, but all agree in the principal characteristics.

I have specimens which are essentially undistinguishable from this species, in a hard limestone from the "Devil's Bake-oven," Illinois. The striæ are, however, slightly less divergent, though corresponding in number. Of two specimens among these, showing the spines imperfectly, both are divergent in the same manner as in the New-York specimens. In the western locality it is associated with *Chonetes carinata*, *C. pusilla* and *Strophomena laticosta*, as well as other fossils characteristic of the Hamilton group.

*Geological position and locality.* In limestone a few miles southeast of Buffalo, associated with *Chonetes glabra*, and in shales of the Hamilton group on Canandaigua lake. In limestone, as cited above from Illinois, of the age of the Hamilton group.

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### PENTAMERUS ARATUS.

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*Atrypa arata*, CONRAD : 1841, Ann. Rep. Pal. N.Y. p. 55.

*Atrypa octocostata*, CONRAD : Idem.

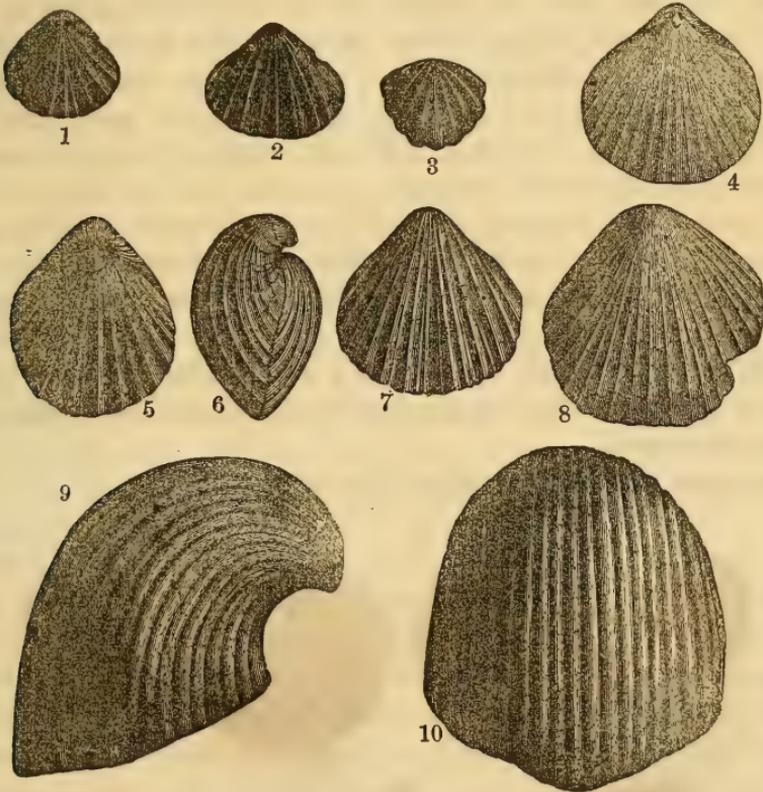
SHELL arcuate-ovoid : dorsal valve much the smaller, depressed-convex : ventral valve extremely elevated, forming almost a semicircle from beak to front; beak strongly incurved; foramen large, triangular. Surface marked by somewhat strong unequal angular plications, which bifurcate very irregularly.

A well-marked peculiarity of this species, in its mature condition, is the extremely elevated arcuate ventral valve, giving it much the aspect of a *Productus*. Of the other valve, little is known, further than that it is much depressed.

This species bears some resemblance to *P. knighti* of SOWERBY, and may be regarded as the nearest representative of that shell in our rocks : it differs, however, in its smaller size, and in having stronger and much less regular plications.

The young individuals of this species bear a close resemblance, in general form and character, to *Rhynchonella (Atrypa)*, and two varieties have been thus described by Mr. CONRAD as distinct species. There are still some intermediate gradations wanting, to show the relations of figs. 4 and 6 with 9 and 10, of which I have fragments. A specimen more recently obtained, of the dimensions of fig. 6, shows the internal structure of *Pentamerus* in the most perfect manner.

*Geological position and locality.* Schoharie grit, Albany and Schoharie counties ; and Onondaga limestone of the Upper Helderberg group, Erie county, etc.



PENTAMERUS ARATUS.

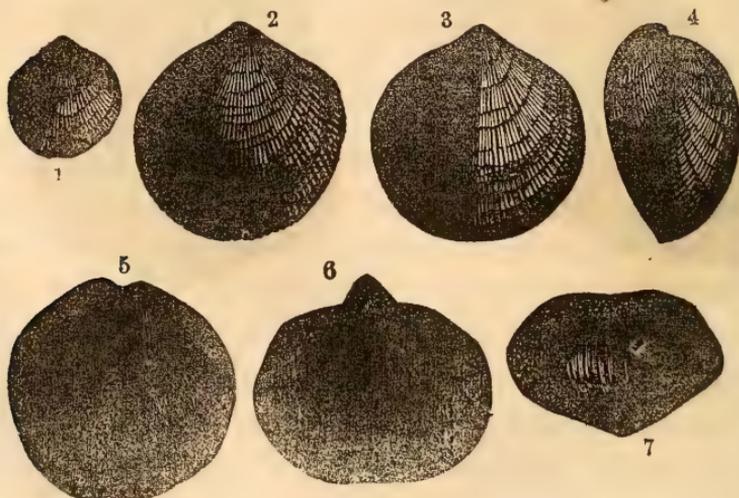
*ATRYPA IMPRESSA* (n. s.).

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SHELL longitudinally obovate or oval : dorsal valve the larger, very gibbous, most elevated above the centre, often having a ridge in the middle, along which is generally a faint sulcus ; dorsal margin excavated on each side of the beak, for the reception of the dental laminae of the opposite valve ; beak distinctly incurved : ventral valve depressed-convex, most prominent in the umbonal region and along the middle ; beak closely incurved upon the opposite. Surface marked by numerous small bifurcating radiating striæ, which are crossed by distinct, crowded, concentric, imbricating lamellose lines of growth.

This shell resembles very closely the well-known *A. reticularis*, and has heretofore been referred to that species. I have long been satisfied, however, that it is a distinct species. It may always be distinguished from the *A. reticularis* by the prominent, broad, flattened space down the middle of the dorsal valve, which is bounded by obtusely angular margins, and often depressed in the centre upon the exterior shell, and always in the cast. Owing to this character, the front is usually truncate or emarginate, a feature not well represented in the accompanying illustrations. The ventral valve is convex along the middle quite to the front, instead of being depressed or sinuate as in *A. reticularis*. In a few instances, the front of the ventral valve, though not sinuate, is slightly produced into a short rounded projection. There are also internal differences between this shell and *A. reticularis*.

*Geological position and locality.* Schoharie grit.



*ATRYPA IMPRESSA.*

## MEGANTERIS SUBTRIGONALIS (n. s.).

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SHELL subtriangular, broadest above the middle, rounded at the lateral extremities, sloping towards the front, which is somewhat narrowly rounded : dorsal valve the smaller, depressed-convex, most elevated a little above the middle; front slightly depressed; beak incurved : ventral valve most elevated along the middle, gibbous a little above the centre, sloping laterally and towards the front, where it is sometimes depressed. Surface smooth, or marked by faint lines of growth.

*Geological position and locality.* Limestone of the Upper Helderberg group, Erie county ( N.Y.).



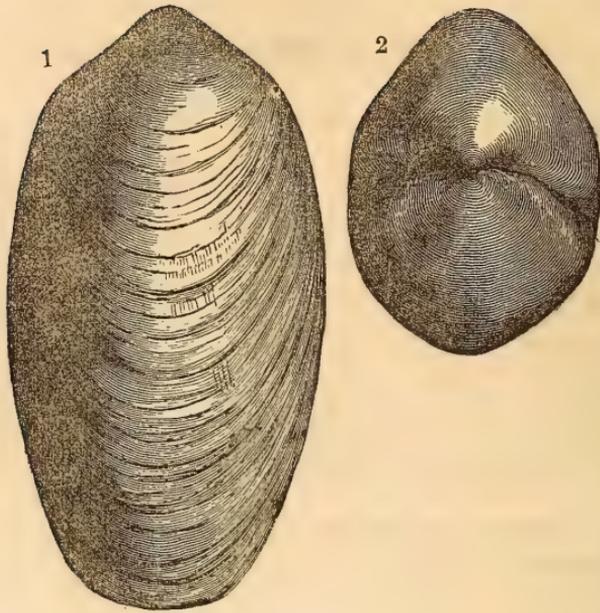
## MEGANTERIS ELONGATUS.

Pal. N.Y. Vol. iv.

*Pentamerus elongatus*, VANUXEM : Rep. 3d Geol. Dist. N.Y. p. 132.

This species, which has usually been referred to the Genus *Pentamerus*, is a true *Meganteris*. Fragments of it are not unfrequent in the Onondaga limestone, but perfect specimens are rarely met with. It has much the form of the elongated varieties of *M. ovoides* of the Oriskany sandstone, but appears to have been nearly destitute of radiating striæ, or preserving only faint traces of them, although the concentric wrinkles of growth are sometimes quite distinct. It resembles yet more closely *Terebratula caiqua* ( See DUNKER und VON MEYER, Paläont. u.s.w. dritter band, 4, tab. 26, f. 5 ); but instead of a round perforation in the beak of the ventral valve, it appears to have been provided with a triangular foramen. This character, however, may depend on the state of preservation or perfection of the specimen.

*Geological position and locality.* Onondaga limestone of the Upper Helderberg group, Onondaga and Ontario counties.



MEGANTERIS ELONGATUS.



## RHYNCHONELLA? ALVEATA (n. s.).

Pal. N.Y. Vol. iv.

SHELL longitudinally oval or subrhomboidal, much longer than wide, sloping from near the middle towards the prominent beak at an angle of about  $70^\circ$  : dorsal valve trough-shaped, or having a sinus so large as to involve its entire breadth below the middle ; lateral margins along the upper half curving down, and occupying broad undefined sinuosities on each side of the beak in the cardinal border of the other valve : ventral valve transversely arcuate, and almost wholly included in the prominent rounded mesial fold, from which it slopes rather abruptly to the lateral margins ; beak extending beyond the opposite beak, nearly straight. Surface smooth.

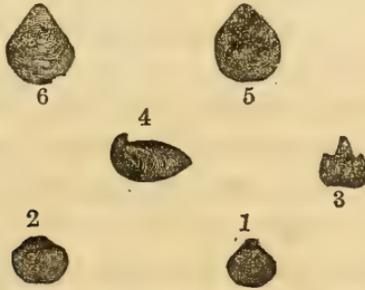
*Geological position and locality.* Onondaga limestone,

### RHYNCHONELLA GLANS-FAGEA (n. s.).

Pal. N.Y. Vol. iv.

SHELL broad ovate or subquadrate; sides sloping from near the middle to the beaks at an angle of about  $85^{\circ}$ ; front rounded: dorsal valve the shorter, transversely arcuate or sloping from the sides towards the middle, forming a shallow sinus involving nearly the whole width of the shell; beak not incurved: ventral valve much the larger, very prominent and forming an elliptic arch along the middle from beak to front, sloping at an angle of about  $80^{\circ}$  towards the lateral margins; beak extended beyond the opposite, arched or incurved so as to bring the apex above the plane of the centre of the other valve. Surface smooth, or with faint concentric lines of growth.

*Geological position and locality.* Schoharie grit, Albany and Schoharie counties.



RHYNCHONELLA GLANS-FAGEA.

### RHYNCHONELLA UNISULCATA.

Pal. N.Y. Vol. iv.

*Atrypa unisulcata*, CONRAD: Ann. Rep. Geol. Surv. N.Y. 1841, p. 56.

SHELL subquadrangular, broader than long: dorsal valve rising in the middle into an undefined mesial fold, along which a distinct longitudinal sulcus extends quite to the apex of the beak; from this elevation the valve slopes laterally at an angle of about  $90^{\circ}$  quite to the anterior lateral extremities in front, but near the cardinal margin it again curves upwards at the extremities

of the hinge ; beak incurved : ventral valve convex, having two prominent ridges extending at an angle of about  $90^{\circ}$  from the beak to the anterior and lateral margins : the space between these ridges is occupied by a very broad, deep, sloping mesial sinus extending from the beak to the front, where it terminates in a broad triangular extension ; beak closely incurved. Surface smooth, or marked by faint lines of growth.

This remarkable shell differs so widely from any other species hitherto found in our rocks, as to be at once recognized merely by its form. I have placed it provisionally in the Genus *Rhynchonella*, not having yet had an opportunity of seeing its internal characters.



### RHYNCHONELLA INEQUPLICATA (n. s.).

Pal. N.Y. Vol. iv.

SHELL subquadrilateral, broader than long ; hinge and area unknown, apparently rounded at the lateral extremities : dorsal valve the larger, convex, rising in the middle into an undefined mesial fold ; entire surface marked by about twelve or thirteen irregular bifurcating plications, three or four of which occupy the mesial elevation ; beak distinctly incurved : ventral valve most prominent near the umbo, depressed in the middle into a shallow undefined sinus, which is occupied by three or four smaller plications, and terminates in a short subangular projection. Finer surface markings unknown.

Of this rare species, I have yet only seen a single and somewhat mutilated specimen. It appears to be quite distinct from all the other forms known in our rocks.

*Geological position and locality.* Limestone of the age of the Upper Helderberg group, Western New-York : particular locality unknown.

## SPIRIFER GREGARIA.

*Spirifer gregaria*, Dr. CLAPP in MSS.

Pal. N.Y. Vol. iv.

SHELL irregularly subglobose, longitudinally or transversely a little oval; hinge equalling the greatest width of the shell, angular or slightly rounded: dorsal valve the smaller, somewhat semicircular, length about two-thirds the width, rising along the middle into a prominent mesial fold, on each side of which there are five to nine simple rounded plications; mesial elevation slightly flattened, or marked with a faint longitudinal depressed line; beak rising a little above the hinge, more or less incurved: ventral valve subquadrilateral, having a distinct subangular sinus extending from the beak to the front, where it terminates in a short subtriangular projection (fitting into a corresponding depression in the front of the opposite valve); on each side of the sinus, there are about six to ten rounded plications; beak rising far above the hinge, extremely gibbous and strongly incurved; foramen somewhat narrow triangular; area rather broad, sublinear, extending to the extremities of the hinge line, distinctly arcuate. Surface ornamented by regular subimbricating zigzag lamellæ or lines of growth.

*Geological position and locality.* In the limestone of the Upper Helderberg, rarely in Eastern New-York: common in Genesee and Erie counties, and in Ohio and Kentucky, in the same geological position.



## SPIRIFER GRIERI (n. s.).

Pal. N.Y. Vol. iv.

SHELL transversely oval or subrhomboidal; length about five-sixths the breadth; valves nearly equal, more or less gibbous; hinge less than the greatest width of the shell, rounded at the extremities: dorsal valve with a prominent angular mesial fold extending from the beak to the front, marked with indistinct plications, about three originating near the beak and bifurcating once or twice before reaching the front, having on each side about nine rounded simple plications; beak rising a little above

the hinge : ventral valve most prominent near the umbo, having about ten simple rounded plications on each side of the sinus, in which are four to seven smaller bifurcating plications ; beak projecting above the opposite one, incurved ; foramen triangular ; area short, broad, triangular, strongly arcuate. Surface marked by regular, strongly undulating, subimbricating lines of growth, which are crossed by fine radiating striæ, giving the edges of the lamellæ a fimbriated appearance.

This species is distinguished from most of the allied forms by its simple strong plications on each side of the mesial fold and sinus, while those occupying the same are smaller and bifurcating. Sometimes the middle plication on the summit of the mesial fold is simple, in which case the fold is quite angular ; while in other instances it bifurcates, leaving a longitudinal depressed line on the middle, giving it a more rounded outline. It is only on specimens which have suffered no injury by wearing or exfoliation, that the fimbriate appearance of the concentric markings is visible.

*Geological position and locality.* Gray limestone of the age of the Upper Helderberg group, near Columbus, and also near Sandusky, Ohio.

I am indebted to Judge GRIER of Dayton, Ohio, for this and other specimens.

### SPIRIFER MANNI ( n. s. ).

Pal. N.Y. Vol. iv.

SHELL triangular-semioval, very gibbous ; hinge straight, equal to the greatest width of the shell, angular at the extremities : dorsal valve nearly semicircular, convex, having a distinct mesial fold which is depressed or faintly grooved along the middle, giving the lateral margins great prominence ; on each side of the mesial elevation, about ten or eleven simple rounded plications ; beak and narrow area strongly incurved : ventral valve extremely prominent at the umbo and sloping laterally, having about eleven simple rounded plications on each side of the deep smooth mesial depression ; beak not incurved ; foramen narrow ; area very wide, slightly arcuate. Surface unknown.

A single specimen of this species, from Columbus, Ohio, is much exfoliated; the plications are more rounded, and the mesial fold less depressed in the centre, than in specimens of similar general character from New-York. The species has doubtless been originally marked by fine radiating striæ and concentric lines of growth.

In many respects this shell resembles *S. eurutines* of OWEN, but has a greater convexity of the dorsal valve, with beak more prominent and incurved; and it likewise has a narrower foramen, and only about half the number of plications of that species.

*Geological position and locality.* Upper Helderberg limestone of Western New-York? and near Columbus, Ohio. Dr. MANN.



### SPIRIFER OWENI (n. s.).

Pal. N.Y. Vol. iv.

SHELL transversely oval, moderately gibbous; length about three-fourths the breadth; valves nearly equal; hinge nearly or quite equal to the greatest width of the shell, angular or a little rounded at the extremities; front nearly straight, sometimes a little concave at the termination of the sinus: dorsal valve transversely oblong, somewhat semicircular, having a smoothly rounded mesial fold marked by a longitudinal depression down the middle, sloping gently to the anterior and lateral margins, but flattened a little near the extremities of the hinge, having on each side of the mesial elevation about fifteen simple subangular plications; beak rising somewhat above the hinge-line, incurved; area incurved: ventral valve most prominent near the umbo, having sixteen or seventeen plications on each side; mesial sinus somewhat deep, rounded, reaching from the beak to the front, where it terminates in a short rounded extension; beak prominent, projecting beyond the opposite, arched but not incurved; area high, arcuate, extending obliquely beyond the beak of the dorsal valve. Surface retaining traces of very fine radiating striæ, which are crossed by stronger concentric lines of growth.

This species is abundant at Louisville and other western localities. It

has generally been referred to *S. lævicosta*, LK. sp. (*Terebratulites ostiolatus*, SCHLOT.), from which it differs in being less gibbous, and having a depressed line along the mesial elevation of the dorsal valve. It may be easily distinguished from *S. eurutines* of OWEN, with which it is associated, by its narrower and much more arcuate area and less angular plications. Some specimens show remains of a faint impressed line along the centre of each plication.

*Geological position and locality.* Limestone of the age of the Upper Helderberg : Falls of the Ohio, and vicinity.



### SPIRIFER VARICOSUS (n. s.).

Pal. N.Y. Vol. iv.

SHELL subsemicircular, length less than half the width; hinge equalling the greatest breadth of the shell, and terminating in salient angles : dorsal valve marked on each side of the narrow somewhat prominent mesial fold by about ten elevated, simple, angular plications; mesial elevation abruptly elevated at the sides, flattened or slightly depressed along the middle; beak projecting little beyond the hinge, and, together with the narrow area, slightly incurved : ventral valve much the more convex, most prominent at the umbo, having ten or twelve plications on each side of the sinus, in the centre of which is sometimes a faint indication of a single plication; sinus distinctly defined to the apex of the beak, which is pointed and slightly arched; area somewhat high and extending to the extremities of the hinge, slightly arcuate; foramen narrow triangular. Surface marked by regular distinct imbricating lines of growth, which sometimes give a subnodose character to the plications.

This species differs from *S. eurutines* of OWEN, in being smaller and more transverse, with more angular plications and stronger concentric lines of growth; also in the greater prominence of the two plications bounding the dorsal sinus of the present species, as well as the abrupt and angular mesial fold.

*Geological position and locality.* Limestone of the age of the Upper Helderberg : Falls of the Ohio, and Charleston landing, Indiana.

## SPIRIFER SEGMENTUS (n. s.).

Pal. N.Y. Vol. iv.

SHELL transversely semioval, less than half as long as broad; hinge equalling the greatest width of the shell, terminating in salient angles: dorsal valve depressed-convex; beak projecting slightly beyond the hinge, scarcely incurved; mesial fold narrow depressed and rounded, not plicated: ventral valve the more convex, most prominent at the beak, which is scarcely elevated above the margin of the area and not incurved; sinus shallow, rounded and extended quite to the apex of the beak; area high, nearly flat and slightly inclined towards the front, transversely striate; foramen narrow triangular. Surface ornamented by twenty or more simple rounded plications on each side of the mesial sinus and fold, the lateral ones of which do not reach the beak, but run out along the margin of the area. Faint lines and occasional stronger wrinkles of growth mark the shell concentrically.

This species is associated with the last, and may be distinguished from that by its less elevated, smoother, and more numerous plications, and more depressed and rounded mesial fold. It is also proportionally more transverse, and has a flatter area as well as less distinct marks of growth.

This species may be confounded with *S. oweni*; but the area inclines forward, instead of being vertical or slightly arcuate as in that species, and the number of plications in a much smaller individual is fully equal or greater than in the full-grown specimens of that species.

*Geological position and locality.* In limestone of the age of the Upper Helderberg group: Falls of the Ohio and Charleston landing, Indiana.



## SPIRIFER ARCTISEGMENTUS (n. s.).

Pal. N.Y. Vol. iv.

SHELL transversely semioval, length less than one-third the breadth; hinge equalling the greatest width of the shell, and terminating in mucronate points: dorsal valve depressed convex, having about eight simple elevated angular plications on

each side of the small mesial fold; beak scarcely elevated above the cardinal border, and, together with its linear area, incurved: ventral valve the more convex, most prominent at the umbo, from which it slopes regularly to the anterior lateral borders, marked by about nine angular plications on each side of the sinus, the lateral plications not reaching the beak, but coalescing with a marginal ridge along the border of the area; mesial sinus angular, and rather sharply defined quite to the apex of the beak; area flat, rather high, transversely striated, obliquely inclined from the hinge; foramen very narrow; beak scarcely elevated above the margins of the area, not incurved. Surface ornamented by fine undulating concentric lines of growth.

This shell may be distinguished from the last, as well as from other somewhat allied forms, by its larger and more angular as well as less numerous plications, and in having a distinct linear ridge along the margin of the area of the ventral valve. Its foramen is likewise narrower, and the sinus deeper and more angular than in *S. segmentus*.

*Geological position and locality.* Limestone of the Upper Helderberg: Stafford, Genesee county.



### SPIRIFER MACROTHYRIS.

Pal. N.Y. Vol. iv.

SHELL large, transversely semioval, about twice as broad as long; hinge nearly or quite equalling the greatest width of the shell, angular or somewhat rounded at the extremities: dorsal valve convex, rising in the middle into a narrow rounded mesial fold, with eleven or twelve simple broadly rounded and slightly elevated plications on each side; beak extending but little beyond the hinge, together with its narrow area distinctly incurved: ventral valve the more depressed, plicated like the other, and having a distinct somewhat broad mesial sinus, which becomes much broader and deeper in front, imparting a sinuous outline to the shell; beak comparatively small, incurved; area narrow, somewhat abruptly arcuate above; sides parallel, extending to the extremities of the hinge; foramen large, broad triangular. Surface marked by fine regular concentric lines of growth.

This is a fine robust species, remarkable for its comparatively narrow area, broad triangular foramen, and extended hinge. Some of the specimens show traces of an indistinct plication in the middle of the mesial sinus of the ventral valve, which would indicate the presence of a small longitudinal depression on the mesial fold of the other valve; but the only specimens I have yet seen are much worn, and the shell more or less exfoliated. There were probably fine radiating striæ, though no traces of them remain on any of the specimens coming under my observation.

*Geological position and locality.* In limestone of the Upper Helderberg group at Williamsville, Erie county, N.Y.; and in the same limestone near Columbus, Ohio. Dr. MANN.



### SPRIFER DIVARICATUS.

Pal. N.Y. Vol. iv.

SHELL somewhat semicircular, breadth nearly double the length; hinge equalling the greatest width of the shell, abruptly angular at the extremities: dorsal valve imperfectly known: ventral valve convex; mesial sinus broad, deep, becoming undefined at the margins towards the front, rapidly narrowing and more distinctly defined as it approaches the beak, ornamented by numerous irregular bifurcating somewhat angular plications, not more than one-half or one-third of which reach the beak; area moderately wide, extending to the hinge extremities, arcuate, transversely striate; foramen broad triangular; beak small, incurved. Surface marked by fine obscure closely arranged concentric striæ.

This species has come under my observation only in the condition of casts, or specimens so much exfoliated as to leave much doubt in regard to the details of the finer surface markings. It occurs in the same locality with the last described species, from which it may at once be distinguished by its more gibbous form, less extended hinge, broader area, and smaller as well as bifurcating plications, which are as distinctly marked in the sinus as upon the sides; a character preserved even in the casts.

*Geological position and locality.* In the limestone of the age of the Upper Helderberg group at Williamsville, Erie county,

## SPIRIFER MACRA.

Pal. N.Y. Vol. iv.

SHELL transverse : ventral valve presenting a subquadrangular outline ; hinge-line greatly extended, terminating in mucronate points ; sides nearly straight and sloping abruptly to the mesial sinus in front, the beak much elevated : dorsal valve smaller, somewhat semicircular, convex in the middle, flattened or concave towards the extremities, having a narrow abruptly elevated mesial fold, on each side of which there are about six or seven simple plications ; beak scarcely incurved or elevated above the hinge-line : ventral valve most prominent near the umbo, having a narrow and very distinct mesial sinus terminating in a short round projection in front ; plications about seven or eight on either side, those bounding the sinus very prominent ; beak and upper part of the area arcuate, and projecting beyond the cardinal margin of the opposite valve ; area moderate, and sloping gradually from the beaks to the cardinal extremities. Surface markings unknown.

*Geological position and locality.* In the limestones of the Upper Helderberg group, Erie county.



## SPIRIFER DISPARILIS.

Pal. N.Y. Vol. iv.

SHELL small, semicircular, length more than half the width ; hinge a little less than the greatest breadth of the shell, rounded at the extremities : dorsal valve much the more depressed, marked by five or six broad rounded plications, the middle one smaller than those contiguous, and separated from them on each side by a larger depression than those between the others ; beak scarcely incurved : ventral valve much the more convex, most prominent at the umbo, marked by about five large plications, of which one on each side of the sinus is larger and more elevated ; beak arcuate ; area moderate, sloping from the beaks to the lateral extremities ; foramen conspicuous. Surface unknown.

*Geological position and locality.* In limestones of the Upper Helderberg group, Erie county.

## SPIRIFER ACUMINATUS.

*Delthyris acuminatus*, CONRAD : Annual Geological Report of New-York, 1839, p. 65.

*Spirifer cultrijugatus*, F. RÖMER in Das Rheinische Uebergangsgebirge, 1844, pa. 70, pl. iv, f. 4 a, b, c.

This well-marked and widely distributed American species has been recognized by M. DE VERNEUIL and Dr. RÖMER as identical with *S. cultrijugatus* of Europe. The species was, however, described by Mr. CONRAD five years before the European one.

This species was designated by the late Prof. A. EATON as *Spirifer alternatus*; but I have not been able to find any published description of it.

It occurs in the Upper Helderberg limestone, throughout, in New-York and Ohio, and in Indiana and Kentucky in the continuation of the same beds. It likewise occurs in the Hamilton group (See *Spirifer prora*).

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 ORGANIC REMAINS OF THE HAMILTON GROUP.
 

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## ORTHIS VANUXEMI (n. s.).

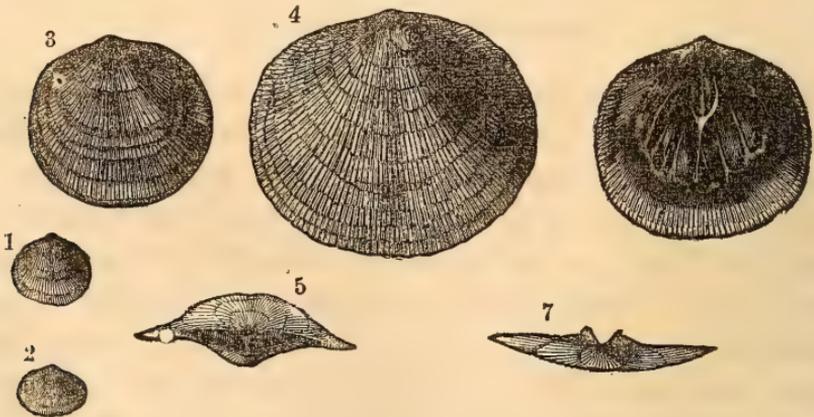
SHELL circular or transversely a little oval, compressed; hinge-line very short; margins of the valves crenulated within; interior minutely punctate: dorsal valve depressed-convex; beak scarcely distinct from the cardinal border, not incurved; teeth and dental process prominent: ventral valve nearly flat, or a little concave towards the front, slightly convex in the umbonal region; beak small, extending little beyond that of the other valve, arched but not incurved; area very small, scarcely equalling more than one third the greatest breadth of the shell, arcuate; foramen comparatively large, triangular, and partly filled by the dental process of the other valve; teeth prominent. Surface ornamented by fine, closely arranged, radiating tubular striæ, which are perforate at intervals and increase both by

implantation and bifurcation, crossed by very fine indistinct concentric lines and occasional more distinct concentric imbricating marks of growth; entire surface granulate or punctate under a magnifier.

This species is so nearly like *O. michilina* of LEVEILLE, that it is very difficult to point out characters by which they may be distinguished, especially until that species is better defined. From the figures of that species, ours presents considerable differences in the vascular impression and dental processes. The minute granulations or punctæ upon the exterior surface present characters which are not noticed in the descriptions and figures, so far as I have observed.

The minutely tubular striæ are characteristic of so many species of *Orthis*, that it appears to me this character can be of no value in distinguishing species, unless its peculiarities are pointed out. A single European specimen of *Orthis michilina*, from the Carboniferous rocks of Belgium, in my cabinet, presents a more elongated and less gibbous form, a flattening along the centre of the dorsal valve, and a proportionally more extended area.

*Geological position and locality.* In the shales and shaly sandstones of the Hamilton group in Eastern and Central New-York, and more abundantly in the western part of the State. It likewise occurs in the soft sandstones of the age of the Chemung group in Eastern Ohio. Some small and poorly developed specimens of *Orthis* in the shales of the Hamilton group in Iowa closely resemble this species; but the rotund and gibbous forms never appear there, and the identity of the two is not determined.



ORTHIS VANUXEMI.

## ORTHIS PERVERSA (n. s.).

SHELL unsymmetrically subelliptical in outline, much wider than long; valves unequally convex; area large and confined to the ventral valve, extending to the hinge extremities; hinge-line shorter than the greatest width of the shell: dorsal valve most convex near the umbo or above the centre of the shell, and sloping somewhat abruptly to the hinge-line; extremities rounded: ventral valve most convex at the beak, which is slightly arcuate and often distorted, depressed below; area nearly vertical; foramen closed. Surface marked by distant elevated striæ, which bifurcate several times before reaching the margin, as well as increase by interstitial addition; concentrically marked by closely arranged undulating lines of growth.

This shell is of the type of *Orthis umbraculum*, and presents the irregularities of form common on that shell. Among the specimens examined, there are no symmetrical forms; both valves showing some slight degree of distortion, which appears to have been the normal condition of the shell. The species is readily distinguished among other species of the Hamilton group, even by fragments of the shell from the unsymmetrical form, the distant radiating striæ, and the concentric striæ, which are closely arranged, abruptly undulating between the strong radiating striæ.

*Geological position and locality.* In the shales of the Hamilton group, Erie county, N.Y.



## STROPHOMENA (STROPHODONTA) DEMISSA.

*Strophomena demissa*, CONRAD: Jour. Acad. Nat. Sci. Phil. 1842, Vol. viii, pa. 258, pl. 14, f. 14.

SHELL semielliptical, usually wider than high (length and breadth often nearly equal); hinge-line equal to, greater or less than the width of the shell, abruptly contracted below the hinge extremities which are often auriculate: ventral valve very regularly convex, sometimes gibbous, greatest elevation nearly central: dorsal valve moderately concave, rarely following the convexity of the opposite valve; area conspicuous, wide, sublinear, that of the ventral valve arcuate, that of the dorsal valve convex

and often divided into two equal parts by an elevated line along the centre; entire area strongly striated transversely, and more slightly in a longitudinal direction; inner edges strongly crenulated. Surface marked by numerous crowded striæ, about nine or ten of which are much stronger and more elevated near the beak of the ventral valve, with finer ones between and on either side; striæ frequently increasing by interstitial addition and bifurcation, until they become very numerous and much finer at the margin; striæ of dorsal valve similar to those of the ventral valve. In well preserved specimens, fine concentric striæ mark the entire surface, but the greater number of specimens do not preserve these markings.

The interior of the ventral valve presents a double foliate vascular impression without dividing ridge between; ligamental pits of the adductor muscles strongly marked, and situated close under the arch of the hinge, and separated by a smooth space from the vascular impressions: hinge, upon the under side of the projecting area, and in the place of the foramen, furnished with a double dental process which articulates with the teeth of the other valve: dorsal valve with the pits of the adductor muscles near the hinge-line, and just below the inner margin of the hinge furnished with a double tooth, somewhat crescent-shaped, with the horns enlarged and indented at the extremities.

This process of articulation would leave a small circular space between the projecting portions of the teeth of the two valves, but the margins of the valves in well preserved specimens are absolutely close and continuous. I have seen, in some specimens, evidence of a minute pore at the apex of the ventral valve, but in many well preserved specimens this does not appear.

The character of the vascular impression, and the mode of articulation of the hinge, and absence of foramen, in this species, are all so different from the typical forms of *Strophomena*, that I proposed in 1850 the name of *Strophodonta*.

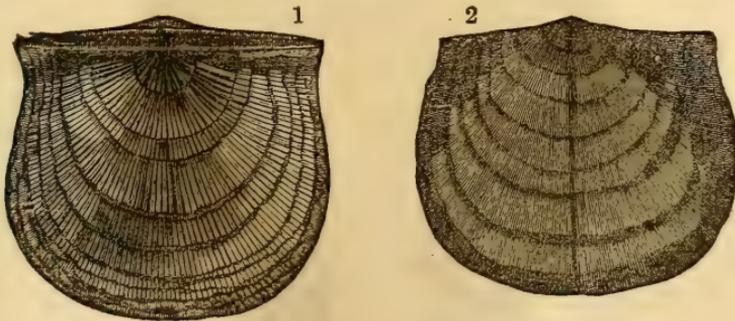
At the time of writing the description originally, I had had no opportunity of knowing fully the character of the interior of the valves as here shown in the typical species. I am now satisfied that a crenulated hinge-line, alone, is not sufficient to distinguish the species of this genus; but when we have, united with that character, the entire area and absence of foramen,

with the structure of hinge here described, it seems to me sufficient ground for separation. I should not omit to mention, that in far the larger number of specimens of the *S. demissa*, the centre of the area of the ventral valve with the dental process is broken; and though I have a large number of specimens in which the two valves are united, and also many separate valves, it is only in one or two specimens that these dental processes of the ventral valve are perfectly preserved. This fractured condition of the area may produce the impression that a foramen has once existed, from its analogy with shells having that character.

In two or three other species having entire areas, I have found internal characters corresponding so nearly with those of *S. demissa*, that I can have no doubt of their relations; and in the absence of better means of determination, I have placed all species having the area without visible foramen, or deltidium, in this genus.

In the descriptions of preceding species, it is quite possible that some true *Strophomena* have been included under the generic designation of STROPHODONTA, and the language has not always been sufficiently definite; the foramen being spoken of as closed when none has existed. For the present the name of STROPHODONTA is given as a subgenus, but which I regard as corresponding in value to either of the other subdivisions, LEP-TÆNA or STROPHOMENA.

*Geological position and locality.* This species occurs abundantly in the Hamilton group of Western New-York, and at Rock Island, Illinois; New-Buffalo, Iowa, and at other localities in the same neighborhood. The specimens from Iowa and Illinois are always much less convex than those of New-York, many of them being depressed and nearly plano-convex in form.



STROPHOMENA DEMISSA.

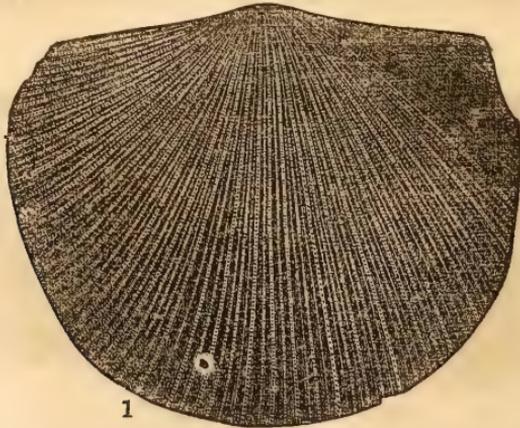
## STROPHOMENA (STROPHODONTA) CONCAVA (n. s.).

SHELL large, concavo-convex, hemispherical ; hinge crenulated, generally less than the greatest breadth of the shell : dorsal valve regularly and profoundly concave : ventral valve strongly convex ; area broad linear ; margins nearly parallel, strongly striate vertically, a little arcuate ; foramen none. Surface ornamented by rather abruptly angular distant elevated radiating striæ, which always increase by implantation, and are crossed by fine regular closely arranged elevated concentric lines. Where worn or partly exfoliated, the shell is finely punctate.

This species resembles somewhat *S. demissa*, with which it is associated ; but differs in being more deeply concave, and in generally having the hinge shorter in proportion to the breadth of the shell : the striæ are also proportionally smaller and much more distant, especially near the beaks. When well preserved, the striæ are abruptly prominent upon the body of the shell, and sharply crenulated by the concentric lines, which are less conspicuous in the spaces between the striæ.

The shell varies much in its convexity, and is often somewhat irregularly ridged or plicated in the direction of the striæ.

*Geological position and locality.* Seneca lake, Moscow, York, and many other localities in Western New-York.



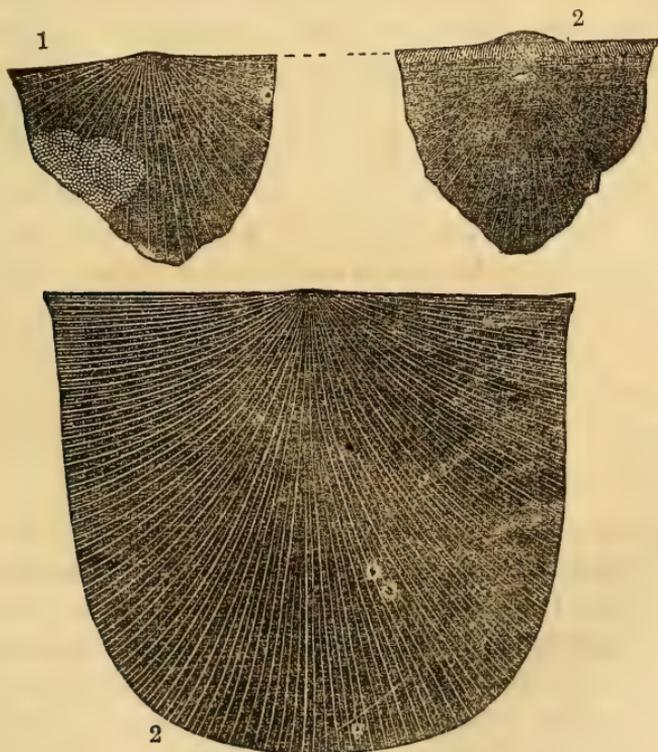
1  
STROPHOMENA CONCAVA.

## STROPHOMENA (STROPHODONTA) TEXTILIS (n. s.).

SHELL very thin, semioval, sometimes longer than wide, much compressed; hinge about equal to the greatest breadth, nearly rectangular at the extremities: dorsal valve scarcely concave: ventral valve flat, or very slightly convex; area linear, striated vertically, and marked by a narrow linear callosity in place of the foramen. Surface marked by slender distant elevated radiating striæ, which increase by interstitial addition: spaces between the striæ marked by extremely fine radiating lines, which are crossed by minute closely arranged concentric striæ.

This shell differs from the preceding in its nearly flat ventral valve and less prominent radiating striæ, while the concentric striæ are very conspicuous on the surface between the coarser ones. There are from four to twelve finer radiating striæ between the coarser ones, which become less conspicuous towards the beak.

The alternations of the striæ are not unlike those of *Strophomena interstitialis* (PHILLIPS), and *S. inequistriata* (CONRAD); but the flattened



STROPHOMENA TEXTILIS.

form and large size of the shell are sufficient to distinguish it from these species.

*Geological position and locality.* In the Hamilton group : Eighteen-mile creek, Seneca and Canandaigua lakes, etc.

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### STROPHOMENA ( STROPHODONTA ) INEQUISTRIATA.

*Strophomena inequistriata* [?] CONRAD: Jour. Acad. Nat. Sci. Phil. 1842, Vol. viii, pa. 254, pl. 14, f. 2.

*Strophomena inequistriata*, HALL: Geol. Rep. 4th Dist. 1843, pa. 200, f. 4.

Compare *Orthis interstitialis*, PHILLIPS: Pal. Fossils, 1839, pa. 61, pl. 25, f. 103, a, b, c, d.

SHELL semicircular or semioval in outline; hinge-line extended beyond the width of the shell, acute, sometimes auriculate: dorsal valve moderately concave: ventral valve more or less gibbous in the middle, abruptly arched towards the hinge-line, and often depressed-convex at the summit or umbo, more gradually sloping towards the base and abruptly contracted at the cardinal extremities; beak small, scarcely prominent on the hinge-line; area narrow, linear, extending to the extremities of the hinge-line, striated vertically with the inner margins crenulate; foramen none, a slight linear elevation extending across the area; area of dorsal valve scarcely more than half as wide as the other, and having, in very perfect specimens, a narrow elevated ridge crossing it in continuation of that of the opposite valve. Surface of the entire shell marked by slender distant elevated striæ, which are increased by interstitial addition, and the spaces occupied by much finer closely arranged striæ, which are scarcely visible to the naked eye; transversely marked by fine concentric striæ.

This species bears such close resemblance to the figures of Professor PHILLIPS cited above, that in my Report on the Fourth Geological District of New-York, I regarded the two as identical. I have, however, some doubts of the propriety of this reference. It is indeed somewhat uncertain whether the identification with Mr. CONRAD'S species is correct. His description mentions "sharp radii alternating in size;" and the figure represents the striæ as alternately larger and smaller, but without any indication of fascicles of finer striæ between the stronger ones. I am there-

fore in doubt as to the correctness of the original reference of this shell.

This species differs much in the convexity of the ventral valve; being sometimes extremely gibbous, and in other individuals very moderately convex. The area is subject to some slight variations in width, perhaps owing to compression. The general character of the surface of the convex valve is much like that of good specimens of *Strophomena alternata* of the Trenton limestone, but it does not appear to be subject to such extreme variations in respect to the striæ. It resembles very closely, in its surface markings, the *S. textilis*; but is always a smaller shell, has a more extended hinge-line, and is never so flat as that species.

*Geological position and locality.* In the shales of the Hamilton group: Shores of Seneca and Cayuga lakes, Canandaigua lake, Moscow, Geneseo, etc.

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### STROPHOMENA (STROPHODONTA) FRAGILIS (n. s.).

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SHELL semioval; hinge-line often extended beyond the width of the shell; margins a little contracted below the hinge extremities: dorsal valve scarcely concave: ventral valve very slightly convex, or nearly flat; area very narrow, linear, almost entirely formed by the ventral valve, striated vertically, and crenulate on the inner edges throughout the entire length; foramen none. Surface covered by minute closely arranged radiating striæ; and these are crossed by fine concentric lines, which become very prominent on the radiating striæ of the ventral valve, giving a minutely nodulose or granulate character to the entire surface when well preserved. The radiating striæ of the dorsal valve are more evenly rounded, and increase mainly by bifurcation (while those of the opposite valve increase by interstitial additions), and are crossed by even, raised, concentric lines which produce no granulations upon the surface. The dorsal valve is frequently marked by faint concentric undulating wrinkles; while the ventral valve often presents some short oblique folds just below the hinge-line, and very rarely a few short interrupted scarcely perceptible undulations upon the general surface.

Vascular impressions of the ventral valve double, foliate, without central dividing ridge, margined by a slightly elevated ridge on each side for a short distance below the hinge-line.

This shell may be recognized by its excessive tenuity and the extremely narrow space between the two valves, which seems scarcely greater than the thickness of the shell. There is no appearance of a foramen in the ventral valve, or of the closing of one by a deltidium; but in place of it are two prominent dental processes on the inner side. Numerous separate ventral valves have been seen, but, up to the present time, we do not know the interior of the dorsal valve. From the character of the area, absence of foramen, and form of vascular impressions, it seems strictly referable to the Genus *Strophodonta*.

*Geological position and locality.* In the shales of the Hamilton group in Central and Western New-York; and also in considerable numbers in the shales of the same age at Rock island, Illinois, and at New-Buffalo in Iowa.



### STROPHOMENA (STROPHODONTA) NACREA (n. s.).

SHELL small, semicircular, having a brilliant metallic (or coppery nacreous) lustre; hinge crenulated, equalling the greatest breadth, and terminating in more or less distinct angles: dorsal valve concave: ventral valve convex, flattened at the extremities, depressed-convex in the umbonal region, and abruptly arched towards the front; beak very small and depressed; area rather narrow, having no foramen. Surface apparently smooth, but showing under a lens very faint concentric lines of growth, with sometimes obscure traces of radiating lines: whole interior, excepting the muscular impressions, studded with prominent scattering granules or papillæ. The crenulations of the hinge-line are rather distant, but quite conspicuous.

Fragments, even, of this species may be always distinguished from its associates, by the peculiar metallic lustre.

This species bears some resemblance to *Orthis lepis* of BRONN; but is much less distinctly striated than well-preserved specimens of that shell, and the crenulations of the hinge-line are less numerous, as well as the hinge-line less proportionally extended. The generally smooth surface and strong lustre of the two, in specimens before me, give a similar external appearance, which is not confirmed by a comparison of the details.

*Geological position and locality.* Hamilton group: Town of Darien, Genesee county.

## STROPHOMENA (STROPHODONTA) SUBDEMISSA (n. s.).

SHELL, when young, semicircular, having the hinge equal to the greatest breadth, and terminating in distinct angles; in older individuals the form is subcircular, with the hinge less than the greatest breadth, and obtusely angular or rounded at the extremities : dorsal valve regularly and distinctly concave; area rather wide : ventral valve regularly convex; beak very small, and scarcely distinct from the cardinal margin; area broad, arcuate and considerably inclined over the hinge, marked by rather strong radiating striæ, which probably form crenulations along the hinge-line; no distinct foramen. Surface ornamented by radiating striæ, which are distinct near the beak, and bifurcate so frequently as to diminish in size towards the border; they also increase in number by implantation : these are crossed by distant concentric wrinkles of growth. There were doubtless also fine concentric striæ, which have been obliterated by wearing on the only specimens I have seen.

Very much like *Strophodonta demissa*, but has a wider area and the striæ less distinct near the beak : it may be only a variety of that species.

*Geological position and locality.* Hamilton group : Shore of Lake Erie, Maumee river.



## CHONETES GIBBOSA (n. s.).

SHELL semicircular; hinge equalling the greatest breadth, and nearly rectangular at the extremities : dorsal valve unknown : ventral valve very convex in the middle and umbonal regions, compressed at the extremities of the hinge; beak incurved; cardinal margins having (three?) long slender spines on each side of the beak, which are directed outwards (almost in a line with the hinge?). Surface ornamented by distinct, round, closely arranged striæ, which increase both by implantation and bifurcation; of these, about forty-two to forty-four may be counted at the border : fine undulating lines of growth traverse the shell in the other direction.

In some respects this shell resembles *C. nana*, but the striæ are more regular and stronger : in the only specimens I have seen showing the spines, these appendages are directed outwards almost at right angles to the longitudinal axis of the shell. It is barely possible, however, that this may be due to accident. In the oblique direction of the spines, it resembles *C. koninckana* of NORWOOD and PRATTEN ; but it differs remarkably from that shell, in the greater convexity of the ventral valve : it also has more numerous striæ, etc. A rare species.

*Geological position and locality.* Hamilton group : York, Livingston county.

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### CHONETES CORONATA.

*Strophomena carinata* (Scr. *coronata*), CONRAD, 1842 : Jour. Acad. Nat. Sci. Phil. Vol. viii, p. 257.

Not *S. carinata*, CONRAD : Rep. Pal. N. Y. 1839, p. 64.

Compare *C. tuomeyi*, NORWOOD and PRATTEN, Jour. Acad. Sci. Phil., Vol. iii, new ser., pa. 30, pl. 2, f. 9.

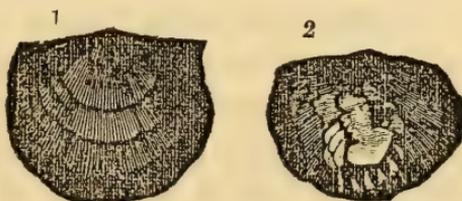
SHELL transversely oval or nearly semicircular ; hinge not quite equalling the greatest breadth, obtusely angular at the extremities : dorsal valve concave ; area narrow and inclined obliquely towards the front of the shell, having in the middle a small but projecting dental process : ventral valve convex, most gibbous in the central and umbonal regions, depressed at the extremities, sometimes faintly sinuate down the middle ; beak small, and scarcely projecting beyond the cardinal margin ; area rather narrow, distinctly arcuate ; foramen small, broadly triangular, generally closed by a convex deltidium, and occupied below by the prominent dental process of the other valve ; cardinal margin having five tubular spines on each side of the beaks, the lateral of which is removed from the extremity of the hinge, and those nearest the beak are very small or mere granules. Surface ornamented by distinct elevated striæ, of which about fourteen may be counted near the beaks, but which bifurcate as they approach the front, so that the number is increased to about one hundred at the border (on large specimens) : crossed by extremely fine closely arranged concentric striæ.

This species agrees exactly with CONRAD'S figure and description of

*Strophomena carinata*, and some of the specimens before me are from the same locality and position as those investigated by him. I am inclined to think there must have been a typographical error in printing the name of this species in the Journal of the Academy, both because there is no carina about the shell, and because Mr. CONRAD had previously (1839) applied that name to a shell supposed to belong to the same genus.

I am much inclined to think our shell is identical with *C. maclurea* of NORWOOD and PRATTEN. Their figures and description agree very nearly with specimens of this species of the same size as those they figure, excepting that their shell appears to have had one spine more on each side of the beaks.

*Geological position and locality.* Hamilton group : Seneca lake shore, Moscow, etc.



CHONETES CORONATA.

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 CHONETES SCITULA (n. s.).

SHELL small, semicircular ; hinge not quite equalling the greatest breadth, obtusely angular at the extremities : dorsal valve concave ; area narrow, inclined forwards from the hinge-line, having a small projecting dental process in the centre : ventral valve convex in the middle, depressed at the extremities ; beak small, slightly convex ; area narrow and arcuate, having five tubular spines along the margin on each side of the beak, of which the two or three inner ones are very small or mere granules, while the outer two are larger and a little removed from the extremities of the hinge ; foramen small, broad triangular, closed above by a convex deltidium, and below by the strongly projecting dental process of the other valve. Surface ornamented by distinct abruptly rounded striæ, of which twelve to eighteen may be counted near the beaks ; but from the bifurcation and intercalation of others between these, the number is increased on the margin to about fifty or sixty. Traces of concentric striæ are obscurely visible on all the specimens before me, and in some instances they may be quite conspicuous.

This species resembles the *C. coronata* very much, but is smaller, and scarcely ever shows any traces of a sinus on the ventral valve. It is also very near *C. nana*, with which it has been considered identical : it differs, however, from that species as described by DE VERNEUIL, in having one or two more spines on each side of the beak, and the greater inequality of the areas of the two valves, that of the dorsal or concave valve of our shell being not more than half as broad as that of the ventral valve. The much greater number of striæ is also a distinguishing feature.

*Geological position and locality.* Hamilton group : Cayuga lake, and other localities in Western New-York.

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CHONETES LEPIDA ( n. s.).

SHELL very small, nearly semicircular ; hinge equalling the greatest breadth, rectangular at the extremities : dorsal valve concave ; area linear, leaving a small projecting dental process in the middle : ventral valve convex in the central regions, depressed at the extremities ; area rather narrow, arcuate ; foramen closed above by a convex deltidium, extending about half way down, occupied below by the prominent dental process of the other valve. Surface ornamented by distinct, rather strong striæ, of which about ten or eleven may be counted near the beaks, but the number is augmented chiefly by intercalation, so that about twenty may be counted round the margin : no concentric striæ visible. Two of the striæ on each side of the centre near the beak of the ventral valve are larger and more prominent than the others ; the space between them is depressed, and occupied by two or three smaller striæ, which are given off from the larger ones on each side. The larger striæ are more prominent near the beak than on any other part of the valve, and give almost a bicarinate aspect to the umbo, with a distinct sinus between, which becomes obsolete near the base of the shell.

This species can be readily distinguished by the small size, the two larger striæ and the sinus in the middle. Three or four tubular spines may be counted on each side of the beak, the outer ones of which are nearly vertical to the hinge line.

*Geological position and locality.* Hamilton group : Shore of Cayuga Lake.

## CHONETES DEFLECTA (n. s.).

SHELL subhemispherical; hinge rather less than the greatest breadth, obtusely angular, or a little contracted at the extremities: dorsal valve concave; area linear, and having in the middle a small projecting process: ventral valve convex, gibbous over the central and umbonal regions, depressed at the extremities; area of medium breadth, arcuate, and extending obliquely upwards; foramen narrow, triangular, partly or entirely closed by its pseudo-deltidium and the dental process of the other valve; cardinal margin garnished by four or five tubular spines. Surface ornamented by distinct and prominent radial striæ which number about fifteen to twenty near the beak, but which increase by intercalation and bifurcation to about thirty to thirty-two at the border: extremely fine closely arranged concentric striæ may be seen by the aid of a good lens. Surface near the lateral extremities smooth or with slight radiating undulations, with more distinct concentric striæ, which are likewise often more conspicuous on the concave than on the convex valve.

Resembles *C. gibbosa*, but is not so convex on the umbo of the ventral valve, and is less strongly arched: it is also less extended on the hinge, and has fewer and more elevated striæ. The bifurcation and implantation of striæ usually take place upon the upper half of the shell, and the striæ are often quite simple below the first third of the shell. The hinge extremities are not unfrequently bent downward or toward the umbo of the ventral valve.

This species, in its general aspect, resembles the young shells of *Tropidoleptus carinatus*; but the striæ are more numerous.

*Geological position and locality.* In the shales of the Hamilton group: Canandaigua lake shore.



## CHONETES PUSILLA (n. s.).

SHELL small, nearly semicircular; hinge about equalling the greatest breadth, rather obtusely angular at the extremities: dorsal valve concave; area unknown: ventral valve gibbous

in the central and umbonal regions, compressed at the extremities; area unknown. Surface ornamented by indistinct rounded radiating striæ, which are obsolete near the extremities; of these striæ about twelve to fifteen may be counted near the beaks, but in passing towards the front they occasionally bifurcate, and others are implanted between, so that at the border the whole number amounts to near thirty. Extremely fine and very obscure concentric striæ are also visible under a lens, on unworn parts of the shell.

This little *Chonetes* has generally been referred to *C. nana*, which it resembles very nearly in size and form; but it differs in averaging from about ten to fifteen striæ less than we usually see on that species; the striæ are also much more depressed and rounded than those of *C. nana*. Unfortunately none of the specimens I have seen give a clear idea of the spines. I have as yet seen but two remaining bases of spines on each side of the beak, though there may have been one or two more. The striæ usually bifurcate near the beak or on the upper half of the shell, so that they appear at first view to be simple; and in some specimens there is no bifurcation or interstitial addition of striæ below the upper third of the shell, so that it presents the aspect of a shell with simple rounded striæ.

*Geological position and locality.* In the limestones of the age of the Hamilton group, associated with *C. coronata* and *Tropidoleptus carinatus*: Devil's Bake-oven, Illinois.



### CHONETES SETIGERA.

*Strophomena setigera*, HALL : Geol. Rep. 4th Dist. N.Y. 1843, p. 180.

This species occurs in the Marcellus shale and Hamilton group of New-York, in great numbers. It occurs in various states of preservation, sometimes extremely flattened in the thinly laminated dark shale, and more convex in the calcareous portions of the group. The specimens preserve from thirty-two to forty striæ on the borders of the shell, and some individuals perhaps a few more. The cardinal tubular spines are nearly vertical to the hinge-line, and in well preserved specimens are equal in length to half the height of the shell or even longer.

This species is often referred to *Chonetes nana* of DE VERNEUIL, and corresponds more nearly with that species than any other known to me in the State of New-York.

The original specimens of this species are in a thinly laminated black shale, and much compressed. Other specimens in more calcareous shales are more convex, and sometimes gibbous. There are also gradations in size and number of striæ, which incline me to regard this species as possibly identical with *C. scitula*, notwithstanding the wide differences of character in many individuals. A large number of individuals are required for the determination of this question.

*Geological position and locality.* In the black shales (Marcellus shales) at the base of the Hamilton group, and in the higher shale of the same, and in the Genesee slate which succeeds that group.



### TROPIDOLEPTUS CARINATUS.

*Strophomena carinata*, CONRAD : Ann. Geol. Rep. 1839, p. 64.

*Leptæna laticosta*, HALL, 1843.

*Leptæna laticosta* of OWEN and others.

SHELL transversely oval; hinge straight, not crenulated, generally a little less than the greatest breadth of the shell, rounded or very obtusely angular at the extremities; sides broadly rounded; basal margin slightly sinuous: dorsal valve concave, having a shallow mesial sinus, which is broad in front but continues above the middle of the shell as a narrow groove, not larger than those between the other costæ; beak very small, projecting beyond the hinge-line, straight or curving slightly outward; dental process extended beyond the hinge-line: ventral valve convex, slightly flattened and contracted toward the extremities, gibbous above the centre and in the umbonal region; beak obtuse and truncated by the foramen; area distinct, variable in width, extending to the cardinal extremities, longitudinally striated, limited entirely to the ventral valve; foramen very broad, reaching to the beak and having a semicircular outline above, more or less closed by the prominent dental processes of the opposite valve. Plications usually simple and rounded, about eighteen to twenty on each valve, the middle one on the ventral valve being larger and more elevated than the others, so as to form a small mesial fold or carina. Surface ornamented by very fine distinct concentric striæ, presenting under a magnifier a very fine textile style of ornament: substance of the shell punctate throughout.

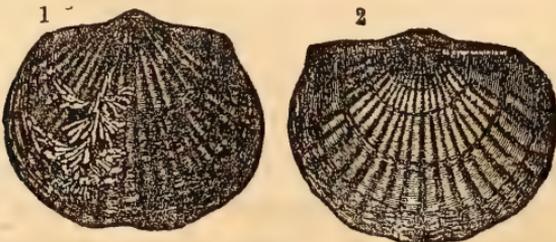
In some instances the costæ bifurcate, and the central one on the ventral valve more frequently presents this character. Specimens from certain localities show a scarcely perceptible difference in the size of the costæ, and no central carination.

This species is quite peculiar, having no representative as far as at present known in any of our formations, and may be regarded as the type of a distinct genus. It is likewise very closely allied to those forms which I have designated under the name of *Leptocalia*.

This species has been described by several authors as *Leptæna laticosta*, and accredited to Mr. CONRAD. This name was originally proposed by the writer, to obviate the confusion arising from the circumstance of two species having been described by Mr. CONRAD under the name of *Strophomena carinata*: the first in the Annual Geological Report of New-York, 1839; and the second in the Journal of the Academy of Natural Science, in 1842. Among some original drawings and manuscripts recently received from Mr. CONRAD, I find the latter designated under the name *S. coronata*, and the name *S. carinata* is simply a typographical error as I had always suspected. This species proves to be a *Chonetes* (*C. coronata*), and the original *Strophomena carinata* of Mr. CONRAD will form the type of the Genus TROPIDOLEPTUS.

This species has been recognized in Europe, and is published under the name of *Leptæna laticosta* in the Bulletin de la Soc. Géol. de France, Tome iv, pa. 325, pl. 3; but it is there represented as having about thirty-two plications, a number much greater than any of our specimens, and it may not unlikely prove a distinct species of the same generic type.

*Geological position and locality.* In the Hamilton group in Schoharie county, and at Eighteen-mile creek on Lake Erie; upon the shores of Seneca, Cayuga and Canandaigua lakes, extending in fact throughout the entire breadth of the State from near the Hudson river on the east, to Lake Erie on the west. It likewise occurs in rocks of the same age in Illinois and Iowa.



TROPIDOLEPTUS CARINATUS.

## SPIRIGERA SPIRIFEROIDES.

*Terebratula spiriferoides*, EATON : Silliman's Journal, 1831, Vol. xxi, p. 137; Geol. Text-book, p. 46, 1832.

*Atrypa concentrica*, CONRAD (not *T. concentrica*, BRONN) : Ann. Rep. N.Y. 1838, p. 111, 112.

*A. concentrica* : Final Rep. 4th Dist. N.Y., p. 198, f. 5.

SHELL varying from transversely oval to suborbicular; young individuals rather compressed, adult specimens gibbous; hinge nearly straight, but rounded at the extremities: dorsal valve generally a little more convex than the other, most prominent near the middle, elevated in front into a broad rounded undefined mesial fold, which is usually indistinct, but sometimes strongly elevated near the border; beak and umbonal region not extending much above the hinge line: ventral valve most convex near the beak, depressed in front into a shallow rounded sinus, which is sometimes faintly indicated nearly to the beak, and occasionally very deep at the border; beak small, not projecting far beyond that of the other valve, lying close against it but scarcely incurved, perforated by a small round aperture. Surface marked by distinct concentric imbricating lamellæ of growth.

This species has generally been referred to *Terebratula* (*Spirigera*) *concentrica* of BRONN, from which it differs in the straightness of its hinge and much less prominent beak. It also presents other slight but constant differences of form, the broadest part being almost always a little above the middle, while in *S. concentrica* it is generally a little below it. The lamellæ are likewise more distinctly imbricated in our shell than in *S. concentrica*. A comparison of the European specimens with American ones has shown the propriety of separating them, and of adopting the name given by Prof. EATON in 1831.



SPIRIGERA SPIRIFEROIDES.

*Geological position and locality.* In the shales of the Hamilton group: rarely in Eastern New-York, more common in the central and very abundant in the western part of the State, and particularly on the shore of Lake Erie at Eighteen-mile creek.

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SPIRIFER FORMOSA (n. s.).

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SHELL somewhat semicircular, two-thirds to four-fifths as long as broad, moderately ventricose; hinge equal to the greatest width of the shell, slightly salient at the extremities; valves about equal: dorsal valve regularly convex, having a flattened mesial fold, on each side of which there are from fifteen to seventeen rounded plications; beak incurved: ventral valve most prominent near the umbo; mesial sinus shallow, flat in the middle, and distinctly limited by the adjacent plications; beak somewhat prominent, arched or incurved; area moderately high, arcuate, sloping from the beak to the extremities of the hinge; foramen distinct, wider than high. Surface marked by fine regular concentric striæ, which arch upwards in crossing the mesial fold: faint traces are sometimes seen of extremely fine radiating striæ.

This is a neat symmetrical species, with a gracefully curved outline and salient angles. In profile, the beak of the ventral valve projects but little beyond that of the dorsal valve. The mesial fold, which is usually flat in the middle and lower part of the shell, is distinctly grooved along the centre in the upper part, and this depression sometimes continues to the base.

*Geological position and locality.* In limestone of the age of the Hamilton group: Illinois.

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SPIRIFER FORNACULA (n. s.).

Pal. N.Y. Vol. iv.

SHELL (dorsal side) nearly semicircular, from two-thirds to three fourths as long as wide; hinge equalling the greatest width of

the shell, angular at the extremities : dorsal valve convex, but much more compressed than the opposite ; mesial fold narrow, abruptly elevated, flattened or slightly grooved in the middle ; beak unknown : ventral valve very prominent at the umbo, from which it slopes abruptly to the margins ; mesial sinus narrow, deeply impressed ; sides sloping ; base flat ; beak unknown ; area high, triangular, slightly arcuate ; foramen narrow, finely striate longitudinally and transversely. Surface ornamented by about eighteen to twenty simple, regular, rounded plications on each side of the mesial fold and sinus, concentrically marked by fine closely arranged lines of growth.

The specimens of this species in my possession are somewhat imperfect ; a single individual with both valves attached has the beaks imperfect. The beak of the dorsal valve projected beyond the plane of the area of the opposite valve : the high area of the ventral valve is slightly arched near the beak.

There is much general resemblance between this species and the *S. eurutines* of OWEN, but the beak of the ventral valve is more arcuate, the plications finer, and the mesial sinus and fold more angular.

*Geological position and locality.* In limestones of the age of the Hamilton group : Illinois.



### SPIRIFER FORNAX ( n. s. ).

Pal. N.Y. Vol. iv.

SHELL semicircular, width a little more than twice the length ; hinge equalling the greatest width of the shell, angular at the extremities : dorsal valve depressed-convex, having a narrow depressed rounded mesial fold, sloping from the beak very abruptly with a slight curve to the front and sides : ventral valve having the sinus moderately broad, shallow and rounded ; beak scarcely arched ; area high, slightly arcuate, and inclined a little backwards over the hinge-line ; foramen somewhat narrow. Surface marked by fifteen to eighteen simple rounded plications on each side of the mesial fold and sinus.

I have seen this species only in the form of casts, or with a portion of the shell adhering. It resembles *S. fornacula*, from the same geological position; but it is a much larger shell, with fewer plications and a more shallow and less angular sinus. The area of the present species is proportionally less elevated. In general form it bears a resemblance to *S. macronota*, but the plications are stronger and fewer than in that species, and the area is proportionally higher and more arcuate.

*Geological position and locality.* Limestones of the age of the Hamilton group: Illinois.

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### SPIRIFER WORTHENI (n. s.).

Pal. N.Y. Vol. iv.

SHELL transversely oval, very gibbous, length more than two-thirds the width; hinge equalling the greatest breadth of the shell; extremities salient: dorsal valve semicircular, gibbous, distinctly arcuate longitudinally, rising in the middle into a very prominent rounded fold; beak and area incurved: ventral valve very convex in the region of the umbo, having a deep rounded sinus extending from beak to front, where it terminates in an obtuse triangular projection; beak arched, and projecting beyond that of the other valve; area high, strongly arcuate, transversely and longitudinally striate; foramen large, forming an equilateral triangle: about sixteen or seventeen simple rounded or subangular plications on each side of the mesial fold and sinus. Surface marked by fine radiating striæ, which are crossed by undulating lines of growth.

This fine Spirifer seems to be intermediate in form between *S. acuminata*, CONRAD (*S. cultrijugatus*, RÖMER), and *S. granulifera* of the Hamilton group, but differs from both by obvious characters. The area is much wider, and the hinge extremities more salient, than in *S. acuminata*, while the mesial fold is somewhat less elevated and much less acute; and the plications are likewise simple.

This species is more angular in outline, the valves less rotund and more unequal in size, the area larger, and the sinus and fold more angular than in *S. granulifera*.

*Geological position and locality.* In limestone of the age of the Hamilton group: Calhoun county, Illinois. From Mr. A. H. WORTHEN.

## SPIRIFER EATONI (n. s.).

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SHELL transversely oval, one-half to two-thirds as long as wide ; hinge equalling the greatest width of the shell, obtusely angular at the extremities : dorsal valve very convex in the middle, nearly semicircular, rising into a moderately prominent rounded or slightly flattened mesial fold ; beak and narrow area distinctly incurved : ventral valve the more convex, most prominent near the beak ; mesial sinus moderately rounded ; beak small, somewhat abruptly arcuate ; area high, slightly arcuate just below the beak ; foramen narrow, partly closed above by a pseudo-deltidium. Surface marked by about nineteen simple rounded plications on each side of the mesial fold and sinus, and crossed below the middle of the shell by imbricating laminæ of growth.

This shell differs from *S. granulifera* in the following characters : It is smaller, with a higher and much less arcuate area, and has no distinct longitudinal depression on the mesial fold ; the mesial sinus is also smaller and more angular at the margins, while the beak of the ventral valve is less arched and prominent.

The only specimens I have seen of this species are somewhat exfoliated ; so that I have no means of determining positively the character of the finer markings of the surface, but it was probably granulated as in *S. granulifera*.

In form and in the number of plications, this species approaches *S. eurutines* of OWEN ; but it differs in having the beak and area of the ventral valve more arched, the lateral slopes of the area more rounded, the dorsal valve more convex, and the shell generally thinner.

*Geological position and locality.* Hamilton group, Erie county ; and shores of Seneca lake.



## SPIRIFER CLINTONI (n. s.).

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SHELL semicircular, gibbous in the central region, much compressed at the extremities of the hinge, width nearly twice the length ;

hinge equalling the greatest breadth of the shell, and terminating in salient angles : dorsal valve convex ; mesial fold prominent, rounded, marked along the middle by a distinct narrow sulcus ; beak incurved : ventral valve convex, most prominent at the umbo, sloping somewhat abruptly with a convex curve to the front and anterior lateral margins ; mesial sinus angular, extending from the beak to the front, where it terminates in a rounded projection ; beak pointed, slightly arched ; area moderately high, vertically and transversely striate, arcuate, and sloping from the beak to the extremities of the hinge with a concave curve. Surface marked by nineteen or twenty simple rounded plications on each side of the mesial sinus and fold, and crossed by fine regular concentric lines of growth.

This species may be distinguished by its general neatness and symmetry of form, and the distinct sulcus along the middle of the smoothly rounded mesial fold of the dorsal valve, as well as by the angular character of the sinus of the ventral valve. Sometimes the sloping sides of the ventral sinus show very faint indications of an obtuse flattened fold on each side of the much more distinct angular depression down the middle, so as to give to the sinus, when viewed in some lights, a subplicate appearance. This latter character is, however, often very obscure, and may be overlooked.

*Geological position and locality.* In the shales of the Hamilton group at Eighteen-mile creek, Erie county, N. Y.



### SPIRIFER MARCYI\* ( n. s. ).

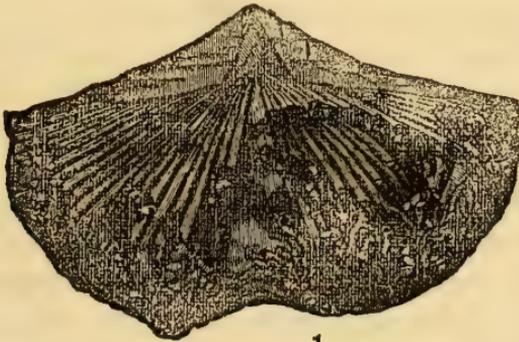
Pal. N. Y. Vol. iv.

SHELL semicircular, width about twice the length ; hinge equalling the greatest breadth of the shell, and terminating in more or

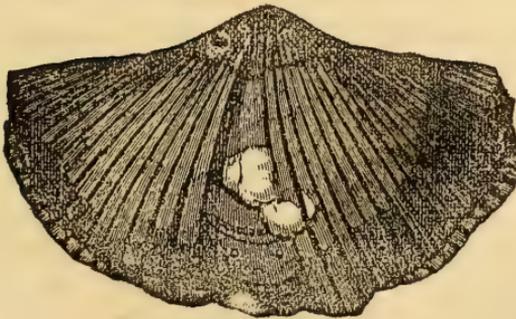
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\* NOTE. At the same time that I receive this proofsheets from the printer, I also learn of the sudden death of Ex-Governor MARCY, to whom I had dedicated this species as a very slight tribute of my profound respect and esteem, though an entirely inadequate expression of the obligations due from science to this eminent statesman, to whom the State of New-York is indebted for the liberal and impartial organization of her Geological Survey ; to which, it may be said without prejudice to others who have since done nobly, is mainly due many of the most valuable results to modern science, and the high character acquired by the State for the scientific achievements her generous patronage has called forth.

less salient angles : dorsal valve moderately convex ; mesial fold narrow above and somewhat expanded in front, depressed and scarcely rounded, extending to the apex of the beak, and marked along the middle by a faint linear depression which is sometimes obsolete ; beak and narrow area scarcely incurved : ventral valve the more convex, most prominent in the umbonal region, from which it slopes with a regular convex curve to the front and anterior lateral margins ; beak somewhat vertically compressed, arched ; sinus well defined, shallow, flat in the bottom ; area moderately broad, extending quite to the ends of the hinge, sharply angular along the margins between the beak and the extremities, slightly arcuate backwards beyond the hinge-line ; foramen of medium size, narrow triangular ; lateral slopes of the valves marked by about twenty-three to twenty-five simple rounded plications on each side of the mesial fold



1



1

SPIRIFER MARCYI.

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It is twenty years since the writer was commissioned by Governor MARCY to the charge of the Fourth Geological District of New-York, including that part of the State west of Cayuga lake ; and since that time, has had the satisfaction of knowing him as a true and personal friend.

and sinus. Surface marked by very fine obscure radiating striæ, which are crossed near the borders by small, closely arranged, subimbricating lines of growth. Fine distant granules are distributed over the whole surface, and most conspicuously in the sinus and between the plications.

This shell may be readily distinguished from *S. granulifera*, with which it is associated, by its less gibbous form, shallower sinus, more depressed mesial fold, and much less distinctly arcuate beaks. Under a magnifier, the granulations of the surface are always seen to be much more scattered than on *S. granulifera*; while the plications are narrower and more numerous, and more abruptly elevated above the general surface.

This species is among the finest of the Hamilton spirifers, and superior in size and beauty to all except the *S. granulifera*.

*Geological position and locality.* In shales of the Hamilton group: Covington, Genesee county.

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### SPIRIFER CORTICOSA (n. s.).

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SHELL semicircular, more than half as long as broad; hinge nearly or quite equalling the greatest width of the shell: dorsal valve unknown: ventral valve convex; sinus deep and well defined, extending from the apex of the beak to the front, where it terminates in a short rounded projection; beak incurved; area narrow and arcuate; foramen small; plications simple and rounded, numbering about ten to twelve on each side of the sinus. Surface ornamented by very fine closely arranged concentric striæ, and stronger more distant imbricating marks of growth.

This is a rare species, of which I have yet seen no perfect individuals. In its narrow area, it resembles *S. mucronata*; but the beak is more arched, the sinus deeper, the plications stronger and less numerous, while the concentric lamellæ are equally strong but less sharply arched over the plications. Single valves may be distinguished by the absence of a slight elevation along the centre of the sinus, which marks the well-preserved specimens of *S. mucronata*.

*Geological position and locality.* In the shales of the Hamilton group, near Darien, Genesee county.

## SPIRIFER ARATA (n. s.).

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CAST of interior transversely oval or oblong, gibbous ; valves nearly equal ; hinge nearly or quite equalling the greatest width, rectangular at the extremities ; front broadly sinuate in the middle : dorsal valve convex, rising gradually into an indistinct mesial fold, which is marked along the middle by a profound sulcus from near the beak to the front ; beak incurved : ventral valve very convex at the umbo ; mesial sinus broad subangular, not strongly defined at the margins, extending from the beak to the front, where it terminates in a broad rounded projection ; beak elevated (?) ; area high, sloping from the beak to the extremities, slightly arcuate and inclined back beyond the hinge ; foramen large, having the form of an equilateral triangle ; lateral slopes of the valves marked by about fifteen flattened or depressed plications, which are separated by small linear depressions. A few strong imbricating wrinkles of growth mark the valves near the margins.

This species bears some general resemblance to *S. granulifera*, but is smaller than that species usually occurs, is less elevated in front with a proportionally broader sinus, and is well marked by the strong groove down the mesial fold : the plications are also more flattened, and separated by linear grooves. These characters, with others, seem quite sufficient to distinguish the species, even in the form of casts.

This species corresponds in some respects with *Spirifer (Delthyris) duplicata*, CONRAD (Jour. Acad. Nat. Sci. Phila., Vol. viii, pa. 261, pl. 14, f. 16) ; but the superior valve is more gibbous or ventricose, and the ribs are not angulated. Since no allusion is made to the ventral valve or area, it is probable that Mr. CONRAD described his species from a single valve.

*Geological position and locality.* In the shales of the Hamilton group, Otsego county.

## SPIRIFER TENUIS (n. s.).

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SHELL very thin and fragile, transversely oval, two-thirds to three-fourths as long as broad; hinge about equalling the greatest width of the shell, obtusely angular at the extremities: dorsal valve convex; mesial fold broad, rounded (?), and marked the whole length by a strong sulcus: ventral valve the more convex, most prominent near the umbo; mesial sinus broad, giving a sinuous outline to the anterior border, undefined at the margins, and having along the middle a deep groove, and on each side several indistinct folds; beak unknown; area high, longitudinally and transversely striate, arcuate, and extending obliquely beyond the hinge-line; foramen moderately large; lateral slopes of the valves ornamented by about eighteen or nineteen very obtuse simple plications on each side of the mesial sinus and fold: those on the dorsal valve more distinct than those on the ventral, which do not reach the margin of the shell. Surface marked by fine nearly obsolete radiating striæ, which are raised at intervals into granulations or papillæ: these are crossed by stronger, closely arranged, irregular, concentric lines of growth.

This species, in general form, agrees with the last (*S. arata*); but is less rotund, and the shell less elevated by the sinus in front. The longitudinal furrow along the centre of the mesial fold corresponds to that species; but the plications are more rounded with broader spaces between them, and they are scarcely conspicuous on the ventral margin of the dorsal valve, and on the ventral valve are scarcely distinct below the middle of the shell. The sinus is undefined at the margins, and the concentric lines very closely arranged, giving the surface rather the aspect of *Spirigera* or *Merista* than of *Spirifer* proper.

*Geological position and locality.* In the shales of the Hamilton group: Cumberland, Maryland.

## SPIRIFER PERTENUIS (n. s.).

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SHELL extremely fragile, transversely oval, gibbous, about three-fourths as long as broad; hinge equalling the greatest width of the shell, more or less angular at the extremities according to age: dorsal valve regularly convex; mesial fold of medium breadth, rounded and somewhat depressed above, sometimes having a faint depression along the middle: ventral valve the more convex, most prominent at the umbo, from which it slopes abruptly with a slight convex outline to the front and lateral margins; mesial sinus shallow, rounded, with faint indications of plications; beak unknown; area moderately high, more or less arcuate; foramen higher than wide. Shell marked by about twenty-three simple depressed and rounded plications on each side of the mesial fold and sinus. Surface ornamented by faint traces of fine irregular radiating striæ, which are studied with fine granulations, and crossed by very fine, regular, undulating, concentric lines of growth, arching gently upwards on the mesial fold.

This species is remarkable for the extreme tenuity of the shell. It differs from the preceding species (*S. tenuis*) in the more conspicuous as well as more numerous plications, and the less conspicuous concentric lines of growth. The mesial sinus is more distinctly defined at the margins, and the slight depression on the mesial fold differs extremely from the broader and deeper one of the preceding species. In the last-named character, as well as in its more numerous plications and more strongly defined mesial sinus and fold, it differs very conspicuously from *Spirifer arata*.

*Geological position and locality.* In the shales of the Hamilton group near Cumberland, Maryland.



## SPIRIFER GRANULIFERA.

*Delthyris granulifera*, HALL: Geol. Rep. 4th Dist. N.Y. 1843, p. 207, f. 1.

*Delthyris congesta*, HALL: Idem.

An examination of a large number of specimens of the *S. granulifera*, in various phases of preservation, has convinced me of the identity of this

species with *S. congesta*. The specimen from which the latter was described is a very symmetrical and rotund form, in which the depression on the mesial fold is scarcely marked; while the surface has been in a slight degree worn and exfoliated, so that the little granules or bases of spines are nearly obliterated, leaving a striated surface, which is in some parts cancellated by concentric lines.

The figures 1 and 1 *a* represent two views of a specimen having the granulations preserved upon the shell.

Fig. 1 *b* is from a specimen with more extended hinge-line.

Fig. 2 *a* and 2 *b* are views of the specimen designated *S. congesta* as above.

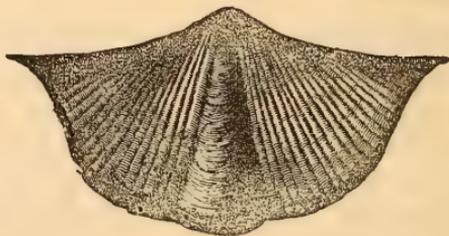
These figures, reduced in size and beautifully executed, appear in MARCOU'S Explanatory Text, etc., pl. 3, f. 7, as *S. heteroclitus*, DEFRANC. It is scarcely necessary to say that this species has very little resemblance to *S. heteroclitus*.



### SPIRIFER MEDIALIS.

*Delthyris medialis*, HALL: Report, 4th Geol. Dist. N.Y. 1843, p. 208, f. 8.

The figure below is of the dorsal valve entire at the extremities.



SPIRIFER MEDIALIS.



### SPIRIFER ANGUSTA (n. s.).

SHELL extremely transverse; lateral extremities very attenuated; hinge-line about four times as long as the width of the dorsal valve: dorsal valve with a simple mesial fold, and about fourteen or fifteen simple narrow plications on each side; beak and cardinal margin incurved: ventral valve about two-thirds as wide as the dorsal valve, with a sharp well defined

mesial sinus; plications on each side very oblique; area equaling or exceeding the ventral valve, receding from the hinge-line towards the front of the shell, and thus narrowing the exterior area of the ventral valve.

This is a well marked species, the most conspicuous feature of which is the very narrow ventral valve, which, in the specimen figured is less than the area in width; while the dorsal valve is much wider in the middle, and curves somewhat gradually towards the extremities.

*Geological position and locality.* In shales of the Hamilton group: Covington, Genesee county.



SPIRIFER ANGUSTA.



CYRTIA BIPLICATA (n. s.).

Pal. N.Y. Vol. iv.

SHELL triangular pyramidal, about twice as broad as long; hinge not quite equalling the greatest width of the shell, subangular or a little rounded at the extremities: dorsal valve unknown: ventral valve extremely prominent at the beak, from which it declines abruptly to the sides and front, having a moderate sinus extending to the apex of the beak, and bounded on each side by a single ridge or plication; beak attenuate and pointed, not arched, removed from the hinge by the intervening high, slightly arcuate, triangular area; foramen very narrow and closed. Surface apparently smooth.

The specimen examined is not entire; but so far as can be determined it presents the remarkable characteristic of a single sharply angular plication upon each side of the sinus. If other plications existed, they probably extended but little beyond the margin of the shell.

*Geological position and locality.* In limestones of the Up<sup>elder-</sup>berg group, Erie county, N.Y.

## CYRTIA HAMILTONENSIS (n. s.).

Pal. N.Y. Vol. iv.

SHELL more or less obliquely triangular pyramidal ; hinge equaling the greatest breadth, and obtusely angular at the extremities : dorsal valve depressed, nearly flat ; beak scarcely elevated above the hinge-line ; mesial fold small, bounded on each side by deeper and wider grooves than those between the plications, with sometimes a faint narrow longitudinal depression in the middle : ventral valve very convex, most prominent near the beak, which is very variable in elevation, and either straight or a little arched from the hinge, sometimes twisted on one side ; sinus distinct, rounded or angular ; area variable, triangular, generally high, often wider than high, arcuate or plane, finely striate in both ways, the vertical striæ scarcely visible ; foramen very narrow, usually perforate above by an oval or narrow ovate aperture, and has at its base a small transverse arcuate slit. Surface ornamented by six to eight simple rounded plications on each side of the mesial fold and sinus, and marked by very fine concentric lines of growth. Under a good lens minute granules may be seen on all parts of the exterior except the area and deltidium : interior minutely punctate.

This species may be distinguished from the *C. dalmani* of the Lower Helderberg limestones, by never showing the strongly imbricating lamellæ of growth which mark that species. It is, however, more nearly related to *Cyrtia (Spirifer) heteroclitus*, VON BUCH ; and until we know the limits of the variation in that species, it will be very difficult to point out characters by which our shell can be distinguished from it.

*Geological position and locality.* In the shales of the Hamilton group : Seneca lake, Moscow, York, Darien, and Eighteen-mile creek.



CYRTIA HAMILTONENSIS.

## ORTHIS UMBONATA.

*Orthis umbonata*, CONRAD : Journal Acad. Nat. Sci. Philadelphia, Vol. viii, 1842, pa. 264, pl. 14, f. 21.

SHELL semielliptical in outline, with a prominent beak, plano-convex : dorsal valve slightly concave below, convex at the umbo : ventral "valve profoundly ventricose, with a narrow longitudinal sulcus;" umbo extremely elevated; beak abruptly incurved; hinge-line greater than the width of the shell below, slightly rounded at the extremities.

*Geological position and locality.* In the shales of the Hamilton group : at Moscow, Darien, shore of Lake Erie, at Eighteen-mile creek, and generally distributed in Western New-York.



ORTHIS UMBONATA.



## ORTHIS PRÆUMBONA (n. s.).

SHELL plano-convex : dorsal valve slightly convex, much shorter than the opposite, height and width about as three to four, rounded at the cardinal extremities : ventral valve extremely gibbous and highly arcuate; umbo rising much above the hinge-line; beak small, strongly incurved; mesial portion often flat and sometimes depressed beneath the umbo. In some specimens, a narrow slightly depressed line extends from near the beak to the base of the shell. Surface marked by fine radiating and concentric lines, which, under a magnifier, give it a finely cancellate appearance.

This shell has a general resemblance in form to *Orthis umbonata*; but it is a much larger species, has the beak proportionally more slender, the cardinal extremities rounded, and the mesial sinus of the ventral valve (a marked feature in *O. umbonata*) rarely defined and never conspicuous.

*Geological position and locality.* In the dark shales of the Hamilton group : Shores of Seneca lake below Lodi.

ORTHIS SUBUMBONA (n. s.).

SHELL somewhat plano-convex : dorsal valve nearly flat ; cardinal extremities rounded : ventral valve very convex, gibbous, length and height nearly equal ; hinge-line scarcely equal the greatest width of the shell ; beak little extended above the hinge-line, abruptly incurved. Surface concentrically striated.

This shell resembles the *Orthis præumbona* ; but is much smaller, less elongated, the length and width being nearly equal, and the beak much shorter and more abruptly acute.

*Geological position and locality.* In calcareous layers in the shales of the Hamilton group : Shores of Seneca lake and of Lake Erie.

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ATRYPA ASPERA.

*Atrypa (Terebratula) aspera*, SCHLÖTHEIM : Petrefactenkunde, pa. 263, pl. xviii, f. 3.

*Atrypa spinosa*, HALL : Geol. Rep. 4th Dist. 1843.

There is probably no specific difference between the European species and those from the Hamilton group of New-York. Specimens from the shales of the Hamilton group in Iowa present some variation in form and characters from those of New-York, while they approach more nearly the European specimens in my collection.

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ATRYPA HIRSUTA (n. s.).

SHELL somewhat depressed orbicular in the young state, becoming trilobate and more gibbous in older specimens ; sinus and mesial elevation strongly marked towards the front ; valves nearly equally convex ; beak of ventral valve perforated. Surface marked by from thirty-six to forty simple well defined radiating striæ or plications, which are crossed by fine concentric striæ and a few distant imbricating lamellæ of growth. Entire surface covered by extremely fine hair-like spines, which, on removal, leave a finely granulated surface.

The shells are usually denuded of the spines, and present the general appearance of young individuals of *A. reticularis* ; but the plications are

finer, and under a magnifier they present the granulated surface which sufficiently distinguishes them from all other species in our strata.

*Geological position and locality.* Shales of the Hamilton group : Moscow, Livingston county ; and Darien, Genesee county.

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## SPIRIFERÆ OF THE CHEMUNG GROUP.

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### SPIRIFER TEXTUS (n. s.).

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SHELL large, somewhat thin, semicircular or sub-semicircular, one-third to one-half as long as broad ; height often greater than the length ; hinge equalling the greatest width of the shell, and terminating in more or less salient angles at the extremities : dorsal valve convex, most prominent near the front, rising in the middle into a rounded mesial fold, which diminishes regularly and somewhat rapidly from the front ; beak, together with the narrow area, distinctly arched : ventral valve much more convex, very prominent at the umbo, from which it slopes at an angle of about  $100^{\circ}$  towards the lateral margins, and more abruptly to the front ; mesial sinus deep, rapidly increasing from beak to front, where it occupies about one-fourth of the anterior margin, terminating in a broad projection with a rounded extremity ; beak angular, far removed from the hinge by the high intervening area, nearly straight or slightly arched towards the extremity ; area very large and high, plane below ; foramen large triangular, about two-thirds as broad as high. Surface marked by about twenty simple depressed and rounded plications on each side of the mesial fold and sinus : plications crossed by fine irregular undulating concentric lines of growth. Entire surface delicately and beautifully marked by minute elongated pits, so disposed as to present under a magnifier the appearance of twilled cloth.

This fossil has been regarded as identical with *S. cuspidatus* of MARTIN ; but the much greater number of plications, as well as the peculiar surface

character, not mentioned in the description of that species, are sufficient to entitle this one to rank as a distinct species.

If we may rely upon the figures and descriptions of the best European authorities, our specimens have as many as eighteen or twenty more plications than *S. cuspidatus*.

*Geological position and locality.* In the fine-grained sandstone of the age of the Chemung group, at the "Knobs," near New-Albany, Indiana.

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### SPIRIFER CARTERI (n. s.).

Pal. N.Y. Vol. iv.

SHELL somewhat semicircular, generally more than half as long as wide; extremities nearly rectangular, in young individuals more salient: dorsal valve convex; mesial fold smoothly rounded, sometimes marked by a faint longitudinal depression along the middle; beak and area incurved: ventral valve the more convex, most prominent a little below the beak; mesial sinus rather deep, rounded, and extending quite to the apex of the beak; area high, arcuate, longitudinally and transversely striated; foramen large, triangular; beak obtusely angular and arched: lateral slopes of the valves marked by about nineteen or twenty simple rounded somewhat depressed plications on each side of the mesial fold and sinus; plications crossed by concentric lines of growth.

This species is known to me only in casts, and as impressions of the exterior shell. Some of the specimens show, under a magnifier, in addition to the surface markings mentioned above, faint traces of a peculiar ornamentation resembling very nearly in character that of the *S. textus*.

This fossil differs from that just named, in having comparatively a much smaller, less elevated, and more arcuate area: the beak is more arched, and the lateral slopes of the area less angular. The impression left in the matrix indicates it to have been a thinner shell than *S. textus*.

*Geological position and locality.* In the Waverly sandstone of the age of the Chemung group: Licking county, Ohio.

## PRODUCTI OF THE HAMILTON AND CHEMUNG GROUPS.

The number of species of *Productus* in the shales and shaly sandstones of the Hamilton and Chemung groups is greater than usually supposed. The following, with one or two exceptions, have been in my collection for many years, awaiting the completion of the fourth volume of the Palæontology of New-York. Among these are several forms which have externally the characters of *Strophalosia*; but I have been unable to discover any cardinal area in any of them, while in several species it is quite certain that no such area could have existed. Several of these species have a wide geographical distribution, but the larger number are very restricted in their range so far as at present known.

These forms are interesting, as being the earliest representatives of that type of Brachiopoda which so peculiarly marks the Carboniferous period; and we shall probably yet find that the number of species marking each of these groups is scarcely less than the number marking each of the subordinate divisions of the Carboniferous limestone.

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*PRODUCTUS TRUNCATUS* (n. s.).

Pal. N.Y. Vol. iv.

SHELL small; hinge-line usually equalling the greatest width of the shell: dorsal valve concave near the margin, elevated in the middle, and abruptly depressed or truncate towards the beak: ventral valve ventricose, most elevated just below the umbo, and sloping abruptly to the front; beak incurved, truncate (often impressed) at the extremity; margin near the hinge marked by a few strong wrinkles gradually becoming obsolete on the body of the shell, which is crossed by undulating striæ of growth, and sometimes apparently with radiating striæ. Surface ornamented with several interrupted rows of

spines; a single row just below and parallel to the hinge margin.

This little shell is very abundant in the calcareous shales, where the ventral valve is preserved, while I have seen but a few imperfect specimens of the dorsal valve. The abruptly gibbous form, and truncated or impressed beak and umbo, are characteristic features. In some larger specimens with truncated beaks, from other localities, there are a few elongated spiniferous ridges near the base. It is possible that these may be distinct species.

*Geological position and locality.* In the calcareous shales near the base of the Hamilton group : Schoharie and Onondaga counties, and shore of Lake Erie above Buffalo, New-York.

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### PRODUCTUS ———.

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*Strophomena pustulosa*, HALL : Rep. 4th Geol. Dist. N.Y. 1843, p. 180, f. 4.

This small species of productus is scarcely larger than the *P. truncatus*, but the surface characters and extension of the hinge-line give the shell a very different aspect.

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### PRODUCTUS NAVICELLA ( n. s.).

Pal. N.Y. Vol. iv.

SHELL subelliptical, length greater than the width; hinge-line less than the width of the shell : ventral valve extremely gibbous in the middle, abruptly bent downwards in front; beak extremely incurved; umbo projecting beyond the hinge-line nearly one-third the entire length of the shell. Surface marked by concentric undulating striæ and interrupted longitudinal ridges, which are garnished with small, round, abruptly projecting spines, and sometimes with spines between the ridges.

The distinguishing features of this species are the elongated form, short hinge-line, and extremely incurved beak and umbo. The spines are small and rigid, rising abruptly from the surface, and not always upon the short interrupted ridges, though usually so.

In general form and elevation of the beak and umbo, this species is not

unlike the variety of *P. undiferus* figured by DE KONINCK (*Recherches sur les Animaux fossiles*, pl. xi, f. 5 a, b, c); but the hinge-line is less extended, and the surface exhibits no regularly radiating costæ as in that species.

*Geological position and locality.* Shales of the Hamilton group : Moscow, N.Y.

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### PRODUCTUS SPINULICOSTÆ (n. s.).

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SHELL semiorbicular, width and length about equal; hinge-line generally a little less than the greatest width of the shell : dorsal valve marked with spiniferous ridges, which are sometimes continuous from the middle to the base of the shell : ventral valve extremely gibbous in the middle; beak incurved. Surface marked by fine concentric lines, which are sometimes crowded and wrinkled on the body of the shell, ornamented with several rows of short radiating interrupted ridges, each one of which is furnished with a small spine : a row of four or five spines along the hinge-line below the margin, which are often continued along the sides of the shell, and sometimes along the front, entirely or partially independent of the spiniferous ridges.

The distinguishing characters of this species are the nearly semiorbicular form, and somewhat regular alternating distribution of the radiating elongated spiniferous tubercles. The length and breadth is from one-half to three-fourths of an inch.

This species bears some resemblance to the smaller forms of *P. murchisonianus* given by DE KONINCK (pl. xvi, f. 3 d, e); but I regard it as distinct. The *Strophomena membranacea* of VANUXEM, referred by DE KONINCK to the same species, is entirely distinct from the one under consideration. The figures of DE VERNEUIL (Russia and the Ural Mountains, Vol. ii, pl. xviii, f. 4) are much more like a species found in the shales and limestones of the Hamilton group in Illinois, Missouri, etc., and which I regard as quite distinct from those of New-York. The present species bears some resemblance to fig. 99, pl. xxv, PHILLIPS, Pal. Fossils, but not to the other figures of that author cited by DE KONINCK.

*Geological position and locality.* In calcareous bands in the Hamilton group : Shores of Cayuga lake, etc.

PRODUCTUS EXANTHEMATUS (n. s.).

Pal. N.Y. Vol. iv.

SHELL semioval; hinge-line scarcely equalling the greatest width of the shell : dorsal valve one-third wider than high, slightly concave, entire surface pustulose.

A single valve only of this species has fallen under my observation; but the characters are so distinct from either of the other species, that I cannot hesitate to separate it from them.

A specimen from Bakeoven, Illinois, occurring in limestone of the age of the Hamilton group, is very similar if not belonging to this species. I presume it to be the one referred by Messrs. NORWOOD and PRATTEN to *P. subaculeatus*; while another form, with elongated pustulose ridges, is probably the one referred by the same authors to *P. murchisonianus*. The spiniferous ridges in the latter species are often continuous for more than half the length of the shell above the base, in which character it is similar to *P. spinulicostæ*; but the absence of an area, as well as other characters, render it impossible to regard either of these as identical with *P. murchisonianus*.

*Geological position and locality.* Shales of the Hamilton group : Shore of Seneca lake, Ontario county.

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PRODUCTUS SUBALATUS.

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*Productus subalatus*, HALL : Iowa Geol. Report, 1857.

SHELL semielliptical, with the cardinal extremities alate : ventral valve gibbous in the middle, depressed in front, and much expanded laterally towards the cardinal extremities; beak abruptly incurved, the umbo projecting above the hinge-line; the cardinal margin marked by more or less distinct folds or wrinkles, becoming obsolete on the middle of the shell, which is crossed by irregular or undulating concentric striæ. In some individuals, indistinct longitudinal striæ are visible. Surface ornamented by numerous strong rounded tubular spines, the bases of which remain irregularly distributed. Some well preserved specimens show a distinct row of spines near the cardinal margin, while

those nearest the beak are small, and actually upon the edge of the shell, as in *Chonetes*.

The characteristic features of this species are the great expansion on the hinge-line, and the auriculate or alate cardino-lateral margins; also the strong, round spines, without ridges or tubercles.

In some specimens, the spines near the beak and umbo are distributed somewhat regularly in radiating lines. The number of spines varies from ten or twelve to thirty or forty; and it is only in rare instances that they are preserved near the beak.

*Geological position and locality.* Shales of the age of the Hamilton group : Rock Island, Illinois, and various localities in Iowa.

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### PRODUCTUS HIRSUTUS (n. s.).

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*Strophomena membranacea*, VANUXEM : Rep. 3d Geol. Dist. N. York, p. 178,  
f. 4 and 5.

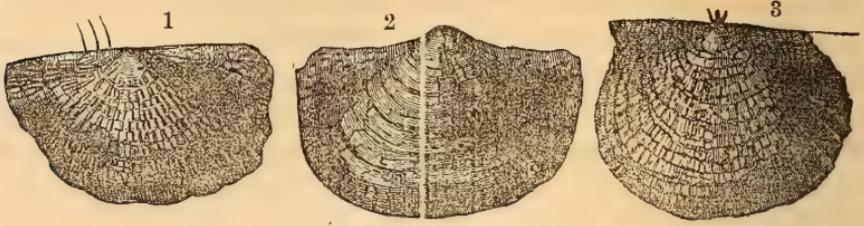
Not *Productus membranaceus*, VON BUCH.

*Leptæna membranacea*, PHILLIPS.

SHELL semielliptical, often oblique; hinge-line usually a little longer than the greatest width of the shell: ventral valve moderately gibbous, with cardino-lateral extremities not distinctly separated from the body of the shell, expanded with a marginal or submarginal row of strong spines. Surface concentrically striated and covered by closely arranged, delicate, hair-like spines, except a small space on each side of the umbo, which is sometimes destitute of these appendages.

This species has the ears less distinctly separated from the body of the shell than *P. lachrymosa*, and the hinge-line more extended. It was identified by Mr. VANUXEM with the european *P. membranacea*; and the shell, with the spines removed and preserving the strong concentric striæ, has a membranaceous texture. In its slender spines it resembles *P. murchisonia*, but the greater extension of the hinge-line, absence of area and more closely arranged spines are marked differences. The interior of the ventral (dorsal) valve differs most extremely from the figure given by DE KONINCK.

*Geological position and locality.* Shales of the Chemung group : Allegany and Chemung counties, New-York.



PRODUCTUS HIRSUTUS.



PRODUCTUS SPECIOSUS (n. s.).

Pal. N.Y. Vol. iv.

SHELL semiglobose, hinge-line less than the greatest width of the shell, extremities rounded or obtusely angular : dorsal valve very regularly concave, flattened somewhat at the hinge extremities, and the ears marked by a few concentric wrinkles; hinge furnished with a small bifurcate dental process : ventral valve ventricose, extremely arcuate, regularly and symmetrically diminishing from the base to the beak, which is incurved beyond the hinge-line; ears not flattened, narrow, scarcely distinct from the body of the shell; basal margin sinuate, but the shell without a mesial depression. Surface marked by fine concentric striæ and thickly studded with regularly arranged, small, somewhat elongated, spiniferous tubercles. Casts of the shell finely and closely punctate.

This species is distinguished from all its associates by the symmetrical form and extremely ventricose character of the ventral valve, its regular convergence from front to beak and the sinuate basal margin. The spiniferous tubercles were doubtless furnished with slender, bristle-like spines.

*Geological position and locality.* Calcareous bands in shaly sandstones of the Chemung group : Chautauque county, N.Y.

## PRODUCTUS LACHRYMOSUS.

Pal. N.Y. Vol. iv.

*Strophomena lachrymosa?* CONRAD : Jour. Acad. Nat. Sci. Philadelphia, 1842.

SHELL semielliptical : ventral valve moderately gibbous, flattened along the middle; cardinal extremities abruptly depressed and flattened, ornamented with one or more rows of spines; beak elevated above the hinge-line. Surface marked by very elongated spiniferous tubercles, which sometimes have an appearance of bifurcation.

This is the only species known to me, which I am able to refer to the description and figure of Mr. CONRAD. In a single well preserved specimen, the centre of the shell is moderately gibbous, a little depressed in the centre, with the ears abruptly flattened, not salient, the sides straight, etc. This species being from the same locality as that described by Mr. CONRAD, I have presumed that it may be the same, notwithstanding the want of strict agreement with his figure and description.

*Geological position and locality.* In the arenaceous shales of the Chemung group : Chemung Narrows, N.Y.



## PRODUCTUS ARCTIROSTRATUS (n. s.).

Pal. N.Y. Vol. iv.

SHELL somewhat elliptical : dorsal valve deeply concave; ears broad, with a few strong concentric wrinkles, irregularly marked towards the margin of the shell by strong radiating striæ, which are furnished with delicate spines : ventral valve very gibbous or ventricose and arcuate; beak attenuate, much elevated and curved over the hinge-line; a broad, shallow mesial depression extends from the most prominent part of the umbo to the base; ears abruptly separated from the body of the shell, contracted and somewhat deflected. Surface marked by strong radiating striæ or plications, crossed by fine concentric lines, and garnished as in the other valve by numerous fine bristle like spines.

This shell in its delicate spines bears some resemblance to *P. hirsutus*; but the hinge-line is proportionally shorter, the beak much more attenuate, the umbo narrower, more ventricose and much more incurved; while the surface is strongly striated longitudinally.

*Geological position and locality.* Calcareous sandstone of the Chemung group : Steuben county, N.Y.

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### PRODUCTUS RARISPINÆ (n. s.).

Pal. N.Y. Vol. iv.

SHELL semielliptical, length and height nearly equal; hinge-line about equalling the greatest width of the shell : ventral valve extremely gibbous or ventricose; lateral extremities abruptly deflected, and marked by two or three strong concentric folds which become obsolete upon the body of the shell; mesial region broadly flattened or slightly depressed. Surface marked by fine concentric striæ, and sometimes apparently by fine radiating striæ, the cardino-lateral margins or ears having a few strong spines irregularly disposed : a few scattered spines also mark the mesial depression.

This species differs from the last in the greater gibbosity of the ventral valve, the deflected cardinal extremities, the broad flattened or depressed mesial region and the scattered spines. It bears some resemblance to DE KONINCK'S figures of *P. orbignianus*, but it has fewer spines and no defined sinus.

*Geological position and locality.* Shales of the Chemung group : Allegany county, N.Y.



PRODUCTUS RARISPINÆ.

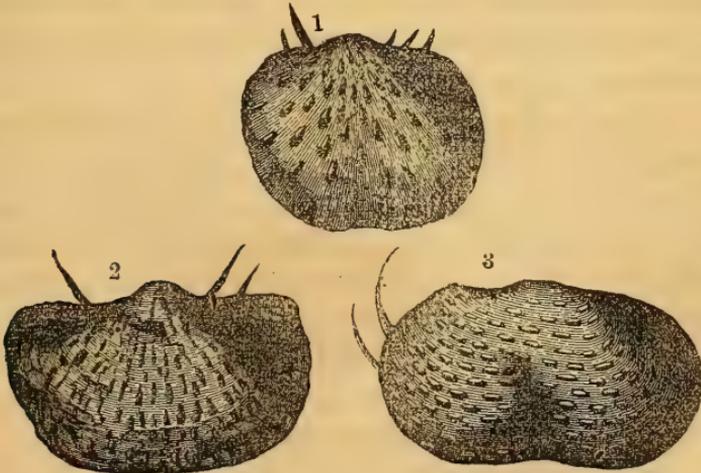
PRODUCTUS BOYDII (n. s.).

Pal. N.Y. Vol. iv.

SHELL varying from semielliptical to transversely broad-oval; hinge-line usually shorter than the width of the shell, and rounded at the extremities : ventral valve ranging from moderately convex to gibbous in the middle and umbonal regions, marked down the centre by a shallow and sometimes well-defined sinus. Surface concentrically striated and ornamented by numerous radiating lines of tubercles, which in perfect specimens are surmounted by strong curved spines; cardinal and lateral margins garnished with a row of strong curved spines; vascular impression bilobed, deeply striated, reaching to the middle of the shell : surface of cast finely punctate.

This species is readily distinguished by the strong, rather distant spiniferous tubercles, which are often arranged in distinct radiating lines; by the shallow mesial sinus in the ventral valve, short hinge-line and strong curving spines. Although in form the proportions of height and width vary extremely, the general surface characters are always reliable, and there are no gradations which pass to other species.

*Geological position and locality.* Shaly sandstones of the Chemung group : Allegany county, N.Y.



PRODUCTUS BOYDII.

### PRODUCTUS NEWBERRYI (n. s.).

SHELL semielliptical in outline, somewhat contracted at the cardinal extremities : dorsal valve moderately concave, a little more depressed just below the beak ; surface marked by fine closely arranged concentric striæ and numerous spiniferous ridges arranged in radiating lines, which are sometimes continuous on the lower half of the valve : ventral valve regularly convex, gibbous, not strongly arched ; beak small, projecting little beyond the hinge-line ; surface marked as in the dorsal valve.

This shell reaches the dimensions of one and a half to two inches in width, with a height about two-thirds as great. It approaches in character the *P. lachrymosa* of CONRAD, but is a larger shell, with more closely arranged spiniferous ridges, and more contracted hinge extremities as well as other differences.

*Geological position and locality.* In shaly sandstone and calcareous sandstone of the age of the Chemung group : Medina county, Ohio.

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### PRODUCTUS CONCENTRICUS.

Iowa Geological Report, 1857.

SHELL small, semielliptical in outline : dorsal valve deeply concave, sometimes almost geniculate in front ; hinge extremities slightly contracted ; upper half of surface marked by strong concentric wrinkles, and somewhat distant spiniferous tubercles : ventral valve unknown.

This species is distinguished by the strong concentric wrinkles which mark the upper part of the shell. The spiniferous ridges are not unlike those of *P. spinulicosta* of the Hamilton group, but they are stronger and somewhat more distant. The deeply concave character of the dorsal valve, and consequent gibbosity of the ventral valve, are characters differing from all the others with this form and surface marking.

*Geological position and locality.* In the argillaceous sandstone of the age of the Chemung group : Burlington, Iowa.

TO BE CONTINUED.

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[ The continuation of this paper will be given in the succeeding Report of the Regents of the University upon the State Collections of Natural History for 1857.]

## ON THE GENUS TELLINOMYA, AND ALLIED GENERA;

WITH ILLUSTRATIONS :

BY PROFESSOR JAMES HALL.

[ From the Canadian Naturalist and Geologist : Conducted by E. BILLINGS.]

In the investigations of palæozoic fossils, it often happens that the most important parts for the determination of the generic characters are obscured or entirely hidden by the adhering stony matter : this is particularly true of the Gasteropoda and Lamellibranchiata, and the generic characters are often necessarily derived from the external features of the shell. It is not always possible to make these determinations with such accuracy that further discoveries will not show the necessity of some modification. Were the descriptions of the genera and species of the lamellibranchiate shells of the palæozoic rocks left until the hinge and teeth, the pallial and muscular impressions, could be determined, comparatively few would be described.

In the first volume of the Palæontology of New-York, several new genera were proposed, and among them the Genus TELLINOMYA, which is the subject of the present notice. This genus was constituted to include several species, supposed to be related to each other from external characters : these characters were suggestive of *Tellina* and of *Mya*, and the name adopted accordingly.

In the specimens known to me at that time there were no visible teeth or crenulations in the hinge-line, and this fact was stated in the description. Subsequently I obtained some specimens which suggested other relations than those indicated by the generic name. No opportunity has occurred of correcting the original description ; while in the mean time the species have been referred by palæontologists to other genera, and in some instances to those of very different character\*.

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\* M. D'ORBIGNY refers the species of *Tellinomya*, described in the first volume of the Palæontology of New-York, to the Genus *Lyonsia* of TURTON, a modern shell belonging to a very different family ; and to add still more to the confusion, the same author has placed the species *Modiolopsis* also under the Genus *Lyonsia*. In this reference he has been followed by one American author, who, " for a corrected

More recently the extensive collections of the Canada Geological Survey have furnished some beautiful examples, showing in a most perfect manner the structure of the hinge, and the muscular impressions of several species of this genus.

In the mean time, a specimen taken to London by SIR WILLIAM E. LOGAN has been noticed as a new genus by Mr. SALTER, under the name of *Ctenodonta*.

The shell upon which Mr. SALTER founded this genus is a species of *Tellinomya*, closely allied to the *T. nasuta* of the Trenton limestone. Mr. WOODWARD, in his "Treatise," places the Genus *Ctenodonta* as synonymous with *Isoarca* of MUNSTER; while according to PICTET, it would be placed under the Genus *Nucula*.

The character of the hinge of *Tellinomya nasuta*, and of *T. dubia*, represented in the accompanying figures, shows that it bears a close relation to *Nucula*, and that it is identical with *Ctenodonta*.

The shells referable to this type have not the ventricose character, large and often subspiral beaks, of *Isoarca*; nor is the beak uniformly anterior, as in that genus. The species of *Tellinomya*, so far as known, are never cancellated, or otherwise ornamented, beyond the ordinary concentric lines of growth.

Having had an opportunity of examining the hinge, and the internal characters of at least six species, the following characters are deduced therefrom :

### TELLINOMYA.

GENERIC CHARACTERS. Shell equivalve, equilateral or subequilateral, closed, smooth or marked by lines of growth; ligament external; hinge-line curved, sometimes subangular, with a continuous series of small curved transverse teeth, which diminish from the extremities to the beak, beneath which they are much smaller; muscular impressions double, two anterior and two

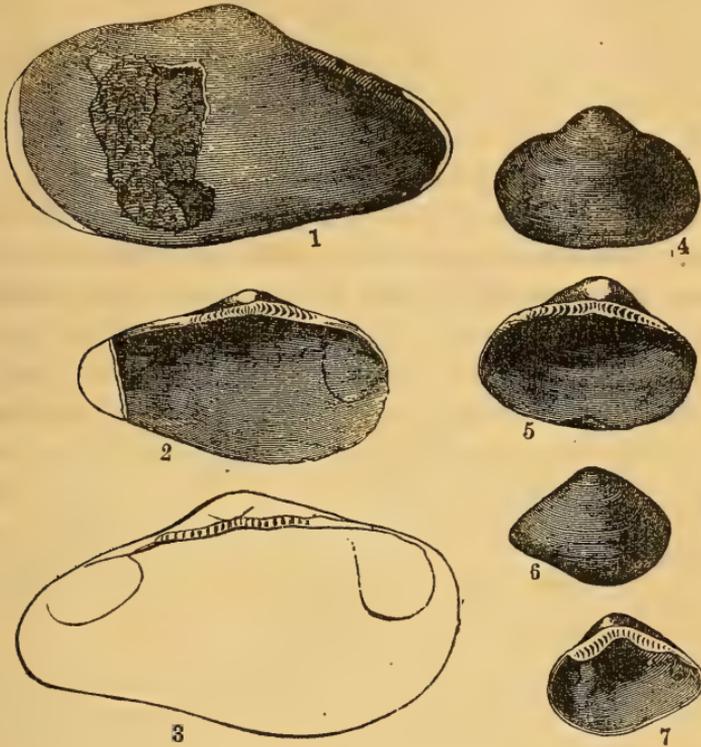
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list of fossils belonging to the Lower Silurian," is in a great measure indebted to M. D'ORBIGNY!

I may mention here that the collections of the Canada Survey furnish some beautiful exhibitions of the hinge of *Modiolopsis*, which I hope to have the privilege of illustrating at no distant period.

M. D'ORBIGNY places *Nucula levata* under the Genus *Leda*, while he leaves the *N. donaciformis* under *Nucula*. Both these shells belong to the Genus *Tellinomya*.

posterior, one large and strongly impressed, the other smaller, lying above and between the larger one and the hinge-line; pallial impression simple.



1, 2, 3 : *Tellinomya nasuta*.      4, 5 : *T. dubia*.      6, 7 : *T. cuneata*.\*

In the larger species known, the hinge-line is only slightly arcuate; while among the other species we find many variations in the curvature, and it sometimes becomes distinctly angular, as in *T. cuneata*. In some species the teeth on either side of the beak curve outwards from it, and in others inwards towards the beak on both sides. The teeth are often very minute immediately beneath the beaks.

The shells of this genus vary from elliptical to ovate and subtriangular forms, many of them being contracted on the posterior side; they are usually of moderate thickness, though one species is very thick and strong. Some of the species have a distinctly impressed lunule. The lesser muscular impression is often a small pit placed directly beneath the hinge-line, and between it and the large muscular impression. The beaks are usually of medium size, pointed, rarely ventricose, approximate or in contact, never subspiral.

\* The specimens above figured were collected at Pauquette's Rapids on the Ottawa River, in beds lying at the junction of the Trenton and Black-river limestones. F. B.

The relations of this shell are among the *Arcadae*, and approximate to the *Nuculae* in their general character, and to which genus they have usually been referred. They differ from that genus, however, in the absence of the ligamentary pit beneath the beak, and in the presence of an external ligament and double muscular impressions.

It is probable that most of the palæozoic species referred to the Genus *Nucula* belong to *Tellinomya*, except those of the Genus *Nuculites* of CONRAD, *Cucullella* of M'COY, which is distinguished by the presence of a septum in the anterior part of each valve. The place of *Tellinomya* may be regarded as between *Nucula* and *Nuculites*. In external characters it may prove difficult to separate *Tellinomya* from *Nuculites*, but the presence of the septum affords nearly the same degree of difference as that between *Cucullella* and *Arca*.

This species of the Genus *Cucullella* of M'COY are cited from Upper Ludlow rocks ; and the species of the Genus *Nuculites* of CONRAD are, with one exception\*, from the Hamilton group, or rocks of the same age. We may therefore infer, with some reason, that the shells having crenulate hinge-lines, with the internal septum, occur in rocks of later date ; or, in other words, that they do not begin their existence before the Upper Silurian or perhaps the Devonian period, while the *Tellinomyæ* occur among the earliest forms of lamellibranchiate shells.

For the purpose of comparison with *Tellinomya*, and as exhibiting in some degree similar characters with that genus, as well as to show the marked identity of description in these two genera, I give below the generic characters of *Nuculites* and *Cucullella*, from the descriptions respectively of Mr. CONRAD and Professor M'COY :

### NUCULITES.

CONRAD, 1841, Geol. Rep. of N. York, p. 49.

“ Equivalved ; hinge with cardinal teeth as in *Nucula*, but apparently uninterrupted beneath the apex ; an interior rib like that of *Solecrtus*, but narrower, extends from the apex, either direct or slightly oblique, towards the base, never passing much beyond the middle of the valve.”

“ These shells have much the exterior aspect of *Nucula*, but the deep sinus in casts of some of the species, left by the interior rib, constitutes about the same amount of difference between the two genera as between

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\* This exception has been found to be destitute of teeth in the hinge.

*Solen* and *Solecurtus*; especially, as I believe to be the case, that the series of cardinal teeth is uninterrupted by a fosset, which in *Nucula* is a prominent character. This genus, so constituted, is restricted to the Silurian, and perhaps to the Carboniferous system."

### CUCULLELLA.

M'COY, Ann. Nat. History, 2d series, vol. vii, p. 50; British Pal. Fossils, p. 283, 1855.

"GENERIC CHARACTERS. Subrhomboidal, inequilateral, subequivalve; margin even; hinge-line entirely crenulated; muscular impressions two, with a simple pallial scar between them; a strong internal septum extends from before the beaks to the posterior margin of the adductor muscle, forming a deep slit in the casts; surface generally smooth, or nearly so."

"These palæozoic shells have been confounded with *Nucula* (Sow., PHIL. &c.), from which they differ in the absence of the ligamentary pit in the hinge, and in the anterior internal septum: they have also been confounded with *Cucullea*, from which they differ in wanting the hood-like plate of the posterior adductor, and having the septum in the anterior end; and with *Clidophorus* (Geol. Surv. of Great Britain), from which they differ in having the hinge crenulated as in *Arca*."

The Genus *Lyrodesma* of CONRAD was constituted to receive a small shell which occurs in the shales of the Hudson-river group, and which, but for certain restrictions in the generic description, might include those here referred to *Tellinomya*.

### LYRODESMA (CONRAD).

GENERIC CHARACTERS. "Equivalved, inequilateral; hinge-line with eight diverging prominent cardinal teeth, transversely striated."

Mr. CONRAD remarks that he "was fortunate enough to obtain two fine casts of this bivalve, with the teeth remarkably well represented." The figure given by Mr. CONRAD, to illustrate this fossil, shows the hinge-line with a continuous series of eight teeth. The typical species is *L. plana*.

I have referred to this genus a small shell from the Utica slate, which is nearly equilateral, with equally rounded extremities, and a few distinct teeth on each side of the beak. This shell, *L. pulchella*, does not differ

from *Tellinomya*, to which it must be referred\*. The shells of the Genus *Tellinomya* are shown to differ from *Nucula*, *Isoarca*, *Nuculites*, and *Cucullella*.

In addition to the species described under this genus in the first volume of the Palæontology of New-York, may be added *T. (Nucula) levata*, *T. (Nucula) donaciformis*, *T. (Lyrodesma) pulchella*; and also the following species, described by Professor PHILLIPS (Memoirs Geological Survey of Great Britain, vol. 2): *Tellinomya (Nucula) coarctata*, *T. (Nucula) deltoidea*, *T. (Nucula) lingualis*, *T. (Nucula) rhomboidea*.

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\* Since the publication of this article in the Canadian Naturalist and Geologist, a note from Mr. CONRAD informs me that he never supposed the Genus *Lyrodesma* to be related to *Nucula*, the teeth being quite different from those of that genus. My reference, therefore, of *L. pulchella* was evidently erroneous, and is here corrected.

## APPENDIX D.

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### MISCELLANEOUS.

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#### HISTORICAL NOTICE.

In the Transactions of the Society for the Promotion of Agriculture, Arts and Manufactures, instituted in the State of New-York, Part iv, 1799, is a Sketch of the Mineralogical History of the State of New-York,

BY SAMUEL L. MITCHELL,

the Commissioner appointed to make a tour through the State of New-York, in the vicinity of Hudson's River.

It is deemed proper, in this connection, to record such an exploration of a part of the State at so early a day, as an interesting fact in the history of science. The volume which contains the report may be found in the New-York State Library.

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#### DONATIONS OF MISCELLANEOUS ARTICLES.

1. GRANULAR GYPSUM, containing selenite, from Grand Rapids, Mich.

Presented by G. J. S. CHESEBRO.

2. INDIAN RELIC found on the farm of Edward Riggs, Esq., Argyle, Washington county.

Presented by J. S. M'CLAURY, Walton, Delaware Co.

3. INDIAN RELIC found in excavating Second-street, Albany, April 1856, five feet below the surface.
4. WOOD FROM HALL OF INDEPENDENCE, Philadelphia, erected in 1714 : this piece taken out during repairs in 1855.  
Presented by R. W. DAVIS, Philadelphia.
5. WOOD FROM THE CHARTER OAK, Hartford, Conn., which fell Aug. 21, 1856. Presented by E. A. SELKIRK, Albany.
6. PIECE OF A BOMB SHELL, found at Fort William Henry, about three feet below the surface, Nov. 1, 1856.  
Presented by A. MELIUS, Albany.
7. A GUN, presented by Gen. PHILIP SCHUYLER to JOHN HENRY CLOCK, grandfather to CHRISTOPHER CLOCK of St. Johnsville, Montgomery county, N.Y., and has remained one hundred years in the CLOCK family. Its length is 7 feet  $5\frac{1}{2}$  inches, and its weight  $16\frac{1}{2}$  lbs. The inscription P. D. S. 1728, is supposed to be the initials of the father of Gen. SCHUYLER, and the date the time he received it. Presented by CHRISTOPHER CLOCK to LEANDER FOX, who presents it to the State of New-York for the Historical Collections, as a relic of olden times. March 31, 1856.
8. TWO LARGE SPECIMENS OF SULPHURET OF MERCURY, from the New Almedan Mine, California.  
Presented by R. H. BACON, San Francisco.



The Regents are indebted to the following gentlemen for their assistance in procuring the remains of a fossil elephant, exhumed near Chittenango, in excavating the canal :

- To JAMES STEWART, Esq., of Amsterdam, for a tusk, tooth, vertebræ, ribs, and bones of the foot.
- To H. C. MERRICK, Esq., Civil Engineer of Cortland, for a tusk and ribs.
- To Prof. A. K. EATON, of Clinton, for ribs, etc.
- To CHARLES VAN EPPES, Esq., of Sullivan, for a tooth.
- To JAMES COLEMAN, of Sullivan, for a tooth and ribs.
- To Mr. ROBERT WILSON, of Chittenango, for a part of the underjaw.

## DONATIONS TO THE NATURAL HISTORY LIBRARY.

FROM PROFESSOR JOSEPH HENRY,

Secretary of the Smithsonian Institution.

- OWEN'S GEOLOGICAL SURVEY of Wisconsin, Iowa and Minnesota.
- FOSTER AND WHITNEY'S REPORT on the Geology of the Lake Superior Land District.
- ANNUAL REPORTS of the Regents of the Smithsonian Institution, from 1849 to 1856.
- NATURAL HISTORY of the Freshwater Fishes of North America : By CHARLES GIRARD.
- INVESTIGATIONS, Chemical and Physiological, relative to certain American Vertebrata : By JOSEPH JONES, M.D.
- FLORA AND FAUNA within Living Animals : By JOSEPH LEIDY.
- SYNOPSIS of the Marine Invertebrata of Grand Manan : By WILLIAM STIMPSON.
- CATALOGUE of North-American Reptiles in the Museum of the Smithsonian Institution, Part I, Serpents : By S. F. BAIRD.
- REPORT to the Secretary of the Smithsonian Institution on the Fishes of the New-Jersey Coast : By S. F. BAIRD.
- SERPENTS OF NEW-YORK : By S. F. BAIRD.
- CATALOGUE of the Described Coleoptera of the United States : By FREDERICK ERNST MELSHEIMER.
- NOTES on New Species and Localities of microscopic organisms : By Prof. J. W. BAILEY.
- MICROSCOPICAL Observations made in South-Carolina, Georgia and Florida : By Prof. J. W. BAILEY.
- MICROSCOPICAL Observations of the Soundings made by the Coast Survey : By Prof. J. W. BAILEY.
- RESEARCHES on the Ammonia-Cobalt Bases : By WOLCOTT GIBBS and F. A. GENTH.
- OBSERVATIONS on the *Batis mantinea* of Linneus : By JOHN TORREY.
- ON THE *Darlingtonia californica*, a new pitcher-plant from North-California : By JOHN TORREY.
- PLANTÆ FREMONTIANÆ ; or Descriptions of Plants collected by Col. J. C. FREMONT in California : By JOHN TORREY.

- OBSERVATIONS on Mexican History and Archeology, with Special Notice of Tapotec Remains : By BRANTZ MAYER.
- ABORIGINAL MONUMENTS of the State of New-York : By E. G. SQUIER, A.M.
- ANTIQUITIES of Wisconsin as surveyed and described : By J. A. LAPHAM.

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FROM HON. W. H. SEWARD.

- THE EXPLORATION of Valley of the Amazon, Parts 1 and 2 : Lieuts. HARNDEN and GIBBON, U. S. N.
- REPORTS of an Expedition down the Zuni and Colorado rivers : Capt. SITGREAVES, U. S. A.
- EXPLORATION of the Red River : Capt. MARCY, U. S. A.
- RECONNAISSANCE of the Routes from San Antonio to El Paso.
- UNITED STATES Naval and Astronomical Expedition to the Southern Hemisphere : Lieut. J. M. GILLIS, U. S. N. 2 vols.
- EXPEDITION to Japan : Com. PERRY. 2 vols.

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DONATIONS :

FROM ROBERT HOWELL, ESQ., OF NICHOLS, TIOGA COUNTY.  
A LARGE BOX OF FOSSILS of the Chemung group.

FROM J. P. WALTERS, ESQ., OF ALBANY.  
A FINE PAIR OF MOOSE HORNS.

FROM H. C. MERRICK, ESQ., OF CORTLAND.  
TUSK of a fossil elephant.

FROM S. CHAMBERLAIN, ESQ., OF LEROY.  
A BOX OF CORNIFEROUS FOSSILS.

FROM LORING ELLSWORTH.  
*Astrocrinites pachydactylus*, from the Pentamerus limestone of Litchfield, Herkimer county.

ELEVENTH ANNUAL REPORT

OF THE

REGENTS OF THE UNIVERSITY

OF THE

State of New-York,

ON THE

CONDITION OF THE STATE CABINET

OF

NATURAL HISTORY,

AND THE

HISTORICAL AND ANTIQUARIAN COLLECTION

CONNECTED THEREWITH.

~~~~~  
Made to the Assembly, March 16, 1858.  
~~~~~

ALBANY:

C. VAN BENTHUYSEN, PRINTER TO THE LEGISLATURE.

No. 407 Broadway.

.....  
1858.



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.....  
1858.



# STATE OF NEW YORK.

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No. 163.

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IN ASSEMBLY, MAR. 16, 1858.

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## ELEVENTH ANNUAL REPORT.

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TO THE HON. THOMAS G. ALVORD,

Speaker of the Assembly.

SIR:

I HAVE the honor to transmit the Annual Report of the Regents of the University, on the State Cabinet of Natural History, and the Historical and Antiquarian Collection connected therewith.

I remain, very respectfully,

Your obedient servant,

G. Y. LANSING, *Chancellor.*

MARCH 10, 1858.



## REGENTS OF THE UNIVERSITY, 1858.

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GERRIT Y. LANSING, *Chancellor.*

JOHN GREIG, *Vice-Chancellor.*

JOHN A. KING, Governor, *ex officio.*

HENRY R. SELDEN, Lieutenant-Governor, *ex officio.*

GIDEON J. TUCKER, Secretary of State, *ex officio.*

HENRY H. VAN DYCK, Superintendent of Public Instruction, *ex officio.*

GULIAN C. VERPLANCK, LL.D.

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PROSPER M. WETMORE.

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ISAAC PARKS.

LORENZO BURROWS.

SAMUEL B. WOOLWORTH, *Secretary.*

# STANDING COMMITTEES OF THE REGENTS.

SPECIALLY CHARGED WITH THE CARE OF THE STATE CABINET.

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1857.

JOHN A. KING, *Governor.*

JOEL T. HEADLEY, *Secretary of State.*

REV. DR. CAMPBELL.

ERASTUS CORNING.

J. LORIMER GRAHAM.

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1858.

JOHN A. KING, *Governor.*

HENRY R. SELDEN, *Lieutenant-Governor.*

GIDEON J. TUCKER, *Secretary of State.*

REV. DR. CAMPBELL.

J. LORIMER GRAHAM.

# REPORT,

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TO THE LEGISLATURE OF THE STATE OF NEW-YORK,

The Regents of the University

RESPECTFULLY REPORT :

That the alterations in the Geological Hall, authorized by the law of 1857, have been made, and the cases for the various collections of the cabinet have been completed. The building is now regarded by all who have visited it as well adapted to its purposes; and is believed, in the elegance of its interior and the convenience of its arrangements, to be unexcelled by any other erected for a similar purpose.

The zoological collections which occupy the entire upper story are completely arranged. The mammalia and birds of the State are appropriately placed together in the central and wall cases in the west end of the room. It has been the purpose to gather here those animals which annually pass through the State, as well as those which make it their habitat. There are a few still wanting to make the collection complete, and we are admonished that the rapid removal of the primeval forests and the advance of civilization are constantly increasing the difficulty of obtaining them. It is proposed soon to issue a catalogue of these deficiencies, and it is presumed that many may be supplied without expense by bringing them to public notice. While the primary object of this part of the Cabinet has been to collect the animals of the State, it has never been proposed to limit it to these. The De Rham Collection which occupies one of the two large central cases, contains many foreign specimens of great beauty. It is respectfully submitted to the consideration of the Legislature, whether valuable means of exchange may not be

obtained by securing animals which are hunted for the bounty offered by the State, and by appealing to the generosity and state pride of sportsmen. There are many cabinets in Europe which are deficient in the animals of our forests, rivers and lakes, from which valuable specimens might be obtained by a system of mutual exchange.

The department of conchology has never been full, and has hitherto been but imperfectly arranged. We are indebted to Dr. WILLIAM NEWCOMB of this city for its beautiful arrangement, and for more than two hundred specimens from his own extensive collections. A large addition is expected, through the influence of Dr. NEWCOMB, from Mr. CUMING of England, who holds the largest collection that has ever been gathered.

The arrangement of the departments of geology and mineralogy will soon be completed. The advancing progress of discovery is constantly adding new species of fossils to those which were before known. The zeal of the present curator has supplied many deficiencies; and the provision which is made for collecting fossils for description in the fourth and fifth volumes of the Palæontology of the State, will, on the completion of that work, make the collections of this State of great fullness and value. In this department our system of exchange will bring rich returns, and will furnish to the student the most valuable means of comparing the formations of our own State with those of other parts of the world.

Within a few months, a large collection, gathered in the Geological Survey of Great Britain, has been received from Sir RODERICK MURCHISON, the eminent head of that survey. We hope soon to be able fully to reciprocate this liberality, by sending in return duplicates of the fossils of this State.

The Regents have been greatly desirous of obtaining the means of exhibiting the natural resources of the State, in their application to economical purposes. It is believed that persons engaged in converting materials found in the earth into objects of utility and beauty, will readily contribute whatever may be desirable; and that at small expense a collection in economic geology may be made, which will so exhibit our natural resources as to be a just subject of pride to the citizens of the State.

The Regents, as Curators of the State Cabinet, will continue to apply the means placed at their disposal by the liberality of the Legislature, for its preservation and increase, so as to make it both in a scientific and economic view, an honor to the State, and a means for the increase of knowledge and the advancement of science.

The following documents accompany this Report :

1. Catalogue of Geological Specimens from England.
2. Catalogue of Shells, presented by Dr. NEWCOMB.
3. Miscellaneous Contributions.

By Order of the Regents.

G. Y. LANSING, *Chancellor.*

S. B. WOOLWORTH, *Secretary.*

## ACCOUNT CURRENT.

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The Regents of the University, in account current with the appropriation for preserving and increasing the "State Cabinet of Natural History, and the Historical and Antiquarian Collection annexed thereto," and for defraying the incidental expenses of the same.

### DR.

1857.	To balance at the close of the last account (See Senate Doc. 1857, No. 109, p. 9) .....	\$179 78
Jan. 31.	To appropriation received from the Comptroller .....	800 00
		\$979 78

### CR.

1857.		
Feb. 2.	By cash paid sundry persons.....	No. 1, \$10 15
Feb. 2.	By cash paid Mrs. L. C. Beck for the Herbarium of the late Dr. LEWIS C. BECK.....	No. 2, 400 00
Feb. 26.	By cash paid J. A. Hurst, salary to March 1, 1857.....	No. 3, 50 00
Feb. 26.	By cash paid for contingents .....	No. 4, 13 75
Mar. 9.	By cash paid E. Jewett, curator, expenses in collecting fossils,	No. 5, 70 22
May 6.	do do do do	No. 6, 25 55
May 11.	do do do do	No. 7, 75 00
June 4.	By cash paid J. A. Hurst, salary to June 1, 1857.....	No. 8, 50 00
June 12.	By cash paid E. Jewett, expenses in collecting.....	No. 9, 50 00
June 29.	By cash paid for contingents.....	No. 10, 21 50
July 6.	do do .....	No. 11, 12 88
Aug. 1.	do do .....	No. 12, 7 48
Sept. 1.	By cash paid J. A. Hurst, salary to date.....	No. 13, 50 00
Sept. 16.	By cash paid W. C. Little, Silliman's Journal, 1857.....	No. 14, 5 00
Oct. 1.	By cash paid J. A. Hurst, salary to date .....	No. 15, 16 66
Oct. 1.	By cash paid Wells & Co., quarterly account .....	No. 16, 17 87
Balance to new account .....		103 72
		\$979 78

CATALOGUE OF GEOLOGICAL SPECIMENS FROM ENGLAND.

MANY of the Silurian Specimens having been labelled for several years, some changes in the nomenclature are necessary, as well as in the names of the formations to which the species are assigned. Instead of relabelling them, the following list is subjoined, to apply to those species marked with an \*. The names will be found for the most part to agree with MORRIS'S Catalogue, 2d edition, 1854, to which reference is made for the authorities.

† The Llandeilo flags are now ascertained to be everywhere *below* the *Caradoc* or *Bala* rocks ("Lower Silurian" in lists).

*LINGULA PHILLIPSII (mss.),	Llandeilo (not Lingula) flags.	3
	Abercidly bay, Pembrokeshire.	
*BELLEROPHON PERTURBATUS,	Llandeilo flags.	1
	Abercidly bay.	
*ORTHIS FLABELLULUM, var.	Lower Silurian (Bala or Caradoc).	2
	Llynn-Ogwen, Snowdon.	
* — VESPERTILIO,	do	
* — ACTONIAE,	do	
	Ireland.	
*LEPTÆNA SERICEA,	do	
* — TENUICINCTA (M'Coy),	do	
*STROPHOMENA EXPANSA,	do	
* — ANTIQUATA (Sowerby),	Lower Llandovery rocks.	
	Haverford-west, Pembrokeshire.	
*ATRYPA MARGINALIS,	Lower Silurian (Bala limestone).	
	Ireland.	
*SERPULITES, tubes of ;	do	

- \*NIDULITES FAVUS (Salter), Lower Llandovery rocks.  
Haverford-west.
- \*TRINUCLEUS SETICORNIS, Lower Silurian, Caradoc or Bala.  
North of Bala.
- \* — ORNATUS (now *concentricus*  $\beta$ ), Llandeilo flags.  
Mydrion, Carmarthenshire.
- \*CALYMENE BREVICAPITA, Lower Silurian, Bala beds.  
Near Snowdon.
- \*HOMALONOTUS BISULCATUS, do  
Near Bala.
- \*OTARION (probably *Cyphaspis*, sp.), do  
Ireland.
- \*CYTHERE UMBONATA, do
- \*PETRAIA SUBDUPLICATA, Lower Llandovery.  
Haverford-west, Pembrokeshire.
- \*ORTHIS ELEGANTULA, Lower Silurian, Bala beds.  
Bodnan.
- \*SIPHONOTRETA MICULA, Llandeilo flags.
- \*PETRAIA ELONGATA, Llandovery beds (formerly Upper  
Caradoc, which is the same bed).
- \*TENTACULITES ANGLICUS (Salter), do
- \*LEPTÆNA TRANSVERSALIS, do
- \*ALVEOLITES REPENS (Linnæus), regarded as the *Favosites oculatus*  
(GOLDFUSS), by M'COY.
- \*SERPULITES LONGISSIMUS, Upper Ludlow.  
Malvern and Woolhope.
- \*ILLÆNUS BARRIENSIS, Wenlock limestone.
- \*ORTHONOTA TRIANGULATA, (would be *Grammysia*, De Verneuil).
- \*RHYNCHONELLA SALTERII (now *Retzia*): it has calcareous spires.
- \*PROTASTER MILTONI (Salter), &c. These three new starfish are to be  
shortly published in the *Décades*: the genera are noticed in the British  
Association Reports, 1856.

## UPPER SILURIAN.

- GRAPTOLITHES PRIODON, Wenlock shale. 2  
Woodhouse, and S. of Lanbadara fawr.
- FAVOSITES ALVEOLARIS, Wenlock limestone. 1  
Dormington wood.
- HELIOLITES INTERSTRUCTUS, do 2  
Dormington wood.
- CŒNITES JUNIPERINUS, do 2  
Dormington wood.
- \*ALVEOLITES SERIATOPOROIDES, do 1  
Dormington wood.

HALYSITES CATENULATUS, Dormington wood.	Wenlock limestone.	2
STROMBODES TYPUS, Dormington wood.	do	1
THECIA EXPATIATA, May hill.	do	1
OMPHYMA TURBINATA, Wenlock edge.	do	4
CYATHOPHYLLUM ARTICULATUM, Dormington wood.	do	2
CROTALOCRINUS RUGOSUS, Wenlock edge.	do	1
*SERPULITES LONGISSIMUS, Welch Court and Coomb Hill.	Upper Silurian.	2
CORNULITES SERPULARIUS, W. of Kilbury Camp.	Upper Ludlow.	1
PHACOPS CAUDATUS (central part of head & tail), Ledbury.	Wenlock limest.	2
PHACOPS CAUDATUS, — — (head and tail), Dog's hill and Vennal hill.	} Wenlock shale & L. Ludlow. {	} 2 1
— DOWNINGIÆ, Pound.		
CALYMENE BLUMENBACHII (whole animal & tail), Dudley.	Wenlock limest.	1
— TUBERCULOSA (whole animal), Burrington.	Wenlock shale.	1
PROETUS LATIFRONS, Ledbury and Aukbridge P.	Wenlock limestone.	2
<i>Fish Remains</i> , Ludlow.	Bone bed.	2
*ILLÆNUS BARRIENSIS, Ledbury.	Upper Ludlow.	1
ENCRINURUS VARIOLARIS, Wenlock edge.	Wenlock limestone.	1
SPIRIFER ELEVATUS, Walsall.	do	3
— Plicatellus, var. radiatus, Marloes bay E.	Wenlock limestone.	1
— Plicatellus, var. radiatus, Wenlock edge and Longhope.	do	2
— PISUM, Wenlock edge and Longhope.	Wenlock limestone.	6
ATHYRIS TUMIDA, Rock farm.	do	2

ATRYPA RETICULARIS, Marloes bay E.	Wenlock.		1
— RETICULARIS, Wenlock edge and E. of Camwood.	Wenlock limestone.		8
— MARGINALIS, Wenlock edge.	do		2
RHYNCHONELLA BOREALIS, Wenlock edge.	do		6
* — SALTERII, Wenlock edge.	do		3
— NUCULA, Walsall.	do		2
— DEPRESSA, Malverns.	Woolhope limestone.		2
— WILSONI, Goldhill farm and	Wenlock limestone. Wenlock edge.		3
PENTAMERUS GALEATUS, Wenlock edge.	do		2
ORTHIS RUSTICA, Wenlock edge.	do		2
— ELEGANTULA, Slate mill.	do	1 slab.	
— HYBRIDA, Wenlock edge.	do		4
STROPHOMENA DEPRESSA, Rock farm and Dudley.	do		3
— EUGLYPHA, Usk.	Upper Silurian.		1
— EUGLYPHA, Maltley.	Wenlock limestone.		1
— FILOSA, Slate mill.	do		2
PTERINEA RETROFLEXA, Kendal.	Upper Ludlow.		1
AVICULA DANBYI, Kendal.	do		1
*ORTHONOTA TRIANGULATA, Kendal.	do		1
— AMYGDALINA, SE. of Llandeilo.	Ludlow and List.		1
*PROTASTER MILTONI, — LEPTOSOMA,	Lower Ludlow. do	2 slabs. 1 slab.	} 4
PALÆOCOMA MARSTONI, Leintwardine.	do	1 slab.	
EUOMPHALUS RUGOSUS, Wenlock edge.	Wenlock limestone.		4

EUOMPHALUS DISCORS, Wenlock edge.	Wenlock limestone.	2
— FUNATUS, Wenlock edge.	do	3
CAPULUS HALIOTIS, Wenlock edge.	do	3
ORTHO CERAS IBEX, Kendal.	Upper Ludlow.	1
— IMBRICATUM OR BULLATUM,	do	1
— SUBUNDULATUM, S. of Lanbadara fawr.	Wenlock shale.	2
<i>Annelide Tracks</i> , Braunton near Barnstaple.	Upper Devonian.	1 slab.
CYATHOPHYLLUM CÆSPITOSUM, Plymouth.	Devonian.	2
ATRYPA DESQUAMATA, Newton Bushell.	do	1
RHYNCHONELLA CUBOIDES, Newton and Hope.	do	2
STRINGOCEPHALUS BREVIROSTRUM, Plymouth.	do	1
PRODUCTUS PRÆLONGUS, RHYNCHONELLA, STROPHALOSIA CAPARATA, Near Barnstaple.	} Lower Carboniferous.	2
TRIGONOCARPUM, Peel quarry near Worsley.		
MICHELINIA MEGASTOMA, Kendal.	Carboniferous limestone.	1
— TENUISEPTA, Kendal.	do	1
WOODOCRINUS MACRODACTYLUS, Yorkshire.	do	1
ACTINOCRINUS AMPHORA, Ballenaleek and Florence court.	do	2
PLATYCRINUS LÆVIS, Ballenaleek.	do	2
— RUGOSUS, Ballenaleek and Florence court.	do	
ARENICOLA CARBONARIA, Near Sheffield.	Carboniferous sandstone.	1 slab.
SPIRIFER STRIATUS, Dovedale and Longnor.	Carboniferous limestone.	2
— DECORUS, Longnor.	do	4
— DUPLICOSTATUS, Longnor.	do	2

SPIRIFER GLABER,	Carboniferous limestone.	3
Poolvash, Isle of Man.		
RHYNCHONELLA ANGULATA,	do	3
Dovedale, Derbyshire.		
ORTHIS RESUPINATA,	do	8
Longnor and Poolvash.		
— RESUPINATA, <i>var.</i> GIBBOSA,	do	1
Poolvash.		
STROPHOMENA CRENISTRIA,	do	2
Ronaldsway and Longnor.		
ATHYRIS AMBIGUA,	do	1 slab.
Kildren, Tyrone.		
LEPTÆNA DISTORTA,	do	2
Longnor.		
STROPHALOSIA STRIATA,	do	3
Longnor.		
PRODUCTUS FIMBRIATUS,	do	2
Longnor and Kendal.		
— PUNCTATUS,	do	2
Longnor.		
— GIGANTEUS,	do	2
Longnor and Ticknall.		
— MARTINI,	do	3
Longnor.		
— SCABRICULUS,	do	2
Longnor.		
CONOCARDIUM ALIFORME,	do	3
Longnor.		
PARELLA RETRORSA,	do	2
Longnor.		
METOPTOMA PILEUS,	do	2
Longnor.		
EUOMPHALUS DIONYSII,	do	3
Longnor.		
BELLEROPHON APERTUS,	do	3
Longnor.		
GONIATITES CRENISTRIA,	do	4
Longnor.		
— TRUNCATUS,	do	2
Longnor.		
— VITTIGER,	do	2
Longnor.		
— LISTERI,	Coal measures.	3
Oldham.		

## LOWER SILURIAN.

*LINGULA PHILLIPSII,	Lingula flags.	3
Aberciddy bay.		
*BELLEROPHON PERTURBATUS,	do	1
Aberciddy bay.		
DIDYMOGRAPHUS PERSCULPTUS,	Lower Silurian ( Bala beds?)	1 slab.
Gogofan.		
ORTHIS CALLIGRAMMA, var. VIRGATA,	do	1
Anglesea.		
* — FLABELLULUM,	Llandeilo flags.	2
Llyn Ogwen.		
* — VESPERTILIO,	do	2
Bala.		
* — ACTONIAE,	Lower Silurian.	1
Chair of Kildare.		
*LEPTÆNA SERICEA,	Llandeilo flags.	2
Bala.		
— sp. 1,	do	2
Cerrig y druiddon.		
* — OBLONGA,	Lower Silurian.	2
Chair of Kildare.		
STROPHOMENA EXPANSA,	do	3
Bala.		
— SPIRIFEROIDES,	do	3
Bala.		
* — sp. 1,	do	2
Haverford west.		
*TEREBRATULA MARGINALIS,	do	1
Chair of Kildare.		
SPIRIFER BIFORATUS,	do	2
Chair of Kildare.		
*SERPULITES sp. 1,	Llandeilo flags.	2
Bala.		
*NITIDULUS FAVUS,	do	1
Haverford-west.		
POLYZOA,	Lower Silurian.	2
Chair of Kildare.		
RETEPORA,	do	2
Chair of Kildare.		
OGYGIA BUCHII,	Llandeilo flags.	4
Rhiw Rhewyeh Pencerrig, Trecoed and Carneddau Buihth.		
AMPYX NUDUS,	Llandeilo flags.	3
Pencerrig and Buihth.		
ASAPHUS TYRANNUS,	do	( 1 cast in plaster). 4
Llandeilo, Dynevor park.		

TRINUCLEUS FIMBRIATUS,	Llandeilo flags.	2
Trecoed, Builth.		
* — SETICORNIS,	do	1
Near Cerrig y druidion.		
— LLOYDII,	do	1
Llangaddoc.		
* — ORNATUS,	do	1
Mydren.		
CALYMENE BLUMENBACHII,	Lower Silurian.	1
Near Cerrig-y-druidion, North Wales.		
* — BREVICAPITATA,	Lower Silurian.	1
Llyn Ogwen.		
— DUPLICATA,	Llandeilo flags.	2
Wellfield Builth and Trecoed.		
ILLÆNUS BOWMANNI,	Lower Silurian.	1
Chair of Kildare.		
— DAVISII,	do	3
Rhewlas.		
*HOMALONOTUS BISULCATUS,	Llandeilo flags.	2
Moel y Garnedd.		
LICHAS LAXATUS,	Lower Silurian.	2
Chair of Kildare and Wexford.		
*OTARION sp.	do	1
Chair of Kildare.		
*CYTHERE? UMBONATA,	Llandeilo flags.	1
E. of Bala lake.		
DIPLOGRAPSUS PRISTIS,	Lower Silurian.	1
Conway.		
*PETRAIA SUBDUPLICATA,	Llandeilo flags.	1
Gas-works Haverford-west.		
HALYSITES CATENULITUS,	do	3
Taynor factory.		
LICHAS HIBERNICUS,	Lower Silurian.	1
Portrane, Dublin.		
CHEIRURUS SPECIOSUS,	do	1
Portrane, Dublin.		
CARYOCYSTITES LITCHI,	do	1 & cast.
Sholeshook.		
SPHÆRONITES BALTICUS,	do	2 casts.
Sholeshook.		
ACANTHOLEPIS JAMESII,	do	1 cast.
Wexford.		
*ORTHIS ELEGANTULA,	do	2
Bodnan.		
*SIPHONOTRETA MICULA,	Llandeilo shales.	1
Builth.		

ORTHOCEPHAS, Chair of Kildare.	Lower Silurian.	1
PALÆOPYGA RAMSAYI, Church Stretton.	Lower Cambrian. 1 plaster cast.	
OLDHAMIA ANTIQUA, Wicklow.	Cambrian.	2
— RADIATA, Wicklow.	do	1

## LLANDOVERY ROCKS OR PENTAMERUS BEDS.

PENTAMERUS LENS, Tre coed Builth.	Pentamerus beds, or Upper Caradoc.	2
— OBLONGUS, Tre coed Builth.	Pentamerus beds.	1
— UNDATUS, Llandovery.	do	2
ORTHIS ELEGANTULA, <i>var.</i> PARVA, Llandovery.	do	2
RHYNCONELLA ANGUSTIFRONS, N. of Maescefnfyfordd.	do	1
FAVOSITES ALVEOLARIS, Llandovery.	do	2
LEPTÆNA TRANSVERSALIS, Llandovery.	do	1
ATRYPA RETICULARIS, Llandovery.	do	2
ORTHIS ELEGANTULA, Llandovery.	do	3
*PETRAIA ELONGATA, Malverns.	Upper Caradoc.	a
— SUBDUPLICATA, Malverns.	do	2
— — <i>var.</i> CRENULATA, Malverns.	do	1
— BINA, Malverns.	do	2
FAVOSITES ALVEOLARIS, Malverns.	do	1
CORNULITES SERPULARIUS, Malverns.	do	1
Slab containing NUCULA sp., RHYNCHONELLA DECEMPPLICATA, CORNULITES SERPULARIUS and *TENTACULITES ANNULATUS, Obelisk lane, Malverns.	} Upper Caradoc sandstone.	1

ENCINURUS PUNCTATUS, Gunwick hill, Malverns.	Upper Caradoc.	1
PENTAMERUS LIRATUS, Malverns.	do	4
— OBLONGUS, Malverns.	do	1
— LENS, Malverns.	do	3
STROPHOMENA PECTEN, Malverns.	do	1
— ARENACEA, Malverns.	do	2
ATRYPA RETICULARIS, Malverns.	do	2
— — <i>var.</i> ORBICULARIS, Malverns.	do	2
ORTHIS CALLIGRAMMA, Malverns.	do	1
*LEPTÆNA TRANSVERSALIS, Malverns.	Caradoc shale.	1
RHYNCHONELLA DECEMPPLICATA, Cowley Park and Plas Madoc.	Upper Caradoc sandstone.	2

## PERMIAN.

<i>Fossil Wood</i> , Ashby de la Zouch.	Permian.	1
TEREBRATULA ELONGATA, Humbleton.	do	4
CAMAROPHORIA GLOBULINA, Tunstall.	do	4
— MULTIPLICATA, Humbleton.	do	2
— SCHLOTHEIMI, Humbleton and Tunstall.	do	4
STROPHALOSIA MORRISIANA, Humbleton and Tunstall.	do	4
PRODUCTUS HORRIDUS, Humbleton.	do	3
BAKEWELLIA ANTIQUA, Humbleton.	do	2
MYALINA ACUMINATA, Silksworth.	do	2
VOLTZIA, Near Market Drayton.	New Redsandstone.	1 mass.

ESTHERIA MINUTA, Newent.	New Redsandstone.	1 slab.
NAIADITES ACUMINATA, Near Bristol.	Lower Lias.	2
DIADEMA MINIMUM, Cheltenham.	do	2
RHYNCHONELLA RIMOSA, Stonehouse.	do	6
— MOOREI, Gloucestershire.	do	5
OSTREA LÆVIUSCULA, Chipping Camden.	do	2
PECTEN SINGULATUS? Chipping Camden.	do	2
CRENATULA? VENTRICOSA, Chipping Camden.	do	1
LIMA GIGANTEA jun. Frethern.	do	2
— PECTINOIDES, Chipping Camden.	do	1 slab.
MYACITES (LUTRARIA) UNIONIDES, Chipping Camden.	do	2
CARDIUM TRUNCATUM, Chipping Camden.	do	6 and slab.
ARCA TRUNCATA, Chipping Camden.	do	2
— ELONGATA, Chipping Camden.	do	3
GONIOMYA LITERATA, Chipping Camden.	do	2
CARDINIA LANCEOLATA, Near Gloucester.	do	3
BELEMNITES ACUTUS, Cheltenham.	do	6
— PISTILLIFORMIS, Cheltenham.	do	3
AMMONITES PLANICOSTATUS, Chipping Camden.	do	2
— OXYNOTUS, Cheltenham.	do	5
— CARUSENSIS, Stonehouse.	do	5
— ANGULIFERUS? (Phillips), Denbury hill, Warwickshire.	do	3

Added Silurians, 4

OPHIODERMA EGERTONI, Lyme Regis.	Marlstone.	1
SPIRIFER WALCOTTI, Near Radstock.	Middle Lias ( Marlstone).	6
TEREBRATULA PUNCTATA, S. of Paulton, &c.	do do	5
RHYNCHONELLA TRIPLICATA, S. of Paulton.	do do	3
— TETRAHEDRA, Near Yeovil.	do do	4
LINGULA BEANII, Struchcombe.	do do	2
PECTEN ÆQUIVALVIS, Gloucestershire.	do do	1
— DEMISSUS, Gloucestershire.	do do	1
CARDINIA HYBRIDA, Bridgend.	do	2
CARDIUM TRUNCATUM, Nibley Green.	do	3
ARCA TRUNCATA, Nibley Green.	do	2
MYACITES ROTUNDATUS, Near Radstock.	do	2
PLEUROTOMARIA EXPANSA, Near Radstock.	do	2
— ANGLICA, Near Paulton.	do	2
BELEMNITES BRUGUIERI, Dorsetshire, &c.	do	6
— ELONGATUS, Struchcombe.	do	4
AVICULA NOVEMCOSTÆ, Gloucestershire.	Marlstone.	1
UNICARDIUM CARDIODES, Gloucestershire.	do	1
MYACITES UNIONIDES (Goldfuss), Gloucestershire.	do	2
AMMONITES SPINATUS, Gloucestershire.	do	2
— SERPENTINUS, Struchcombe.	Upper Lias.	1
— BIFRONS, Alham.	do	3
— ANNULATUS, Alham.	do	3

AMMONITES THOARENSIS ( D'Orbigny),	Upper Lias.	2
Near Sandford orcas.		
— SOLARIS ( Phillips),	do	2
Dorsetshire.		
BELEMNITES COMPRESSUS,	do	6
Dorsetshire.		
PYGASTER SEMISULCATUS,	Inferior Oolite.	2
Near Cheltenham.		
NUCLEOLITES SINUATUS,	do	1
Near Cheltenham.		
DYSASTER RINGENS,	do	2
Burton Bradstock.		
HOLECTYPUS HEMISPHERICUS,	do	2
Burton Bradstock.		
— DEPRESSUS,	do	1
Near Frome.		
ECHINUS PERLATUS,	do	1
Cheltenham.		
DIADEMA DEPRESSA,	do	2
Cheltenham.		
TEREBRATULA ORNITHOCEPHALA,	do	4
Egford near Frome.		
— PEROVALIS,	do	7
Near Cheltenham.		
— PHILLIPSII,	do	3
Near Sherborne, &c.		
— GLOBATA,	do	7
Near Cheltenham.		
— SPHEROIDALIS,	do	8
Dorsetshire.		
— MAXILLATA,	do	4
Pen hill.		
— FIMBRIA,	do	4
Cotteswolds.		
— CARINATA,	do	4
Miserden.		
RHYNCHONELLA SPINOSA,	do	4
Stroud.		
— OBSOLETA,	do	4
Stroud.		
— VARIANS,	do	7
Whatley near Frome.		
— ANGULATA,	do	6
Stanley hill, Gloucestershire.		
PECTEN LENS,	do	1
Cheltenham.		

<i>LIMA PECTENIFORMIS</i> ,	Inferior Oolite.	2
Cheltenham and Clevecloud.		
— <i>GIBBOSA</i> ,	do	3
Stroud.		
— <i>DUPLICATA</i> ,	do	2
Stanley hill.		
<i>MODIOLA SOWERBYANA</i> ,	do	3
Stanley hill.		
— <i>GIBBOSA</i> ,	do	2
Whatley.		
<i>CARDIUM STRIATULUM</i> ,	do	2
Hadspen.		
<i>TRIGONIA COSTATA</i> and east,	do	2
Cheltenham.		
<i>ASTARTE OBLIQUA</i> ,	do	2
Burton cliff.		
— <i>EXCAVATA</i> ,	do	1
Bradford Abbas.		
<i>GRESSLYA PEREGRINA</i> ,	do	3
Greenland.		
<i>MYACITES DECURTATA</i> ,	do	4
Loders.		
— <i>SECURIFORMIS</i> ,	do	2
Burton Bradstock.		
<i>PHOLADOMYA PRODUCTA</i> ,	do	1
Iron bridge, Gloucester.		
— <i>MURCHISONIÆ</i> ,	do	2
Cheltenham.		
— <i>AMBIGUA</i> ,	do	2
Cheltenham.		
— <i>FIDICULA</i> ,	do	2
Procester hill.		
<i>PLEUROTOMARIA GRANULATA</i> ,	do	2
Near Bridport harbour.		
<i>TROCHUS DUPLICATUS</i> ,	do	2
Smokeham.		
<i>TEREBRA LINEATA</i> ,	do	2
Burton cliff.		
<i>BELEMNITES ABBREVIATUS</i> ,	do	3
Camdown.		
— <i>ELLIPTICUS</i> ,	do	4
Compton Pouncefoot.		
— <i>SULCATUS</i> ,	do	4
Dorsetshire.		
— <i>BLAINVILLII</i> ,	do	2
Dorsetshire.		

AMMONITES CONCAVUS, Near Yeovil.	Inferior Oolite.	1
— MURCHISONIÆ, Dorsetshire.	do	2
TEREBRATULA ORNITHOCEPHALA, Near Maperton.	Fuller's earth.	5
— GLOBATA, Hawkesbury Upton.	do	4
RHYNCHONELLA TETRAHEDRA, Lamyat beacon.	do	6
— CONCINNA, Cheltenham.	do	4
OSTREA ACUMINATA, Rushmere farm and	do	3 slabs.
	Hawkesbury Upton.	
PECTEN VAGANS, Rushmere farm.	do	2
MODIOLA GIBBOSA, Radstock.	do	2
BELEMNITES SULCATUS, Pendomer.	do	4
PTEROPHYLLUM COMPTUM, Yorkshire.	Oolite shale.	1
TEREBRATULA MAXILLATA, Gloucestershire.	Great Oolite.	3
— DIGONA, Gloucestershire.	do	3
RHYNCHONELLA CONCINNA, Sapperton.	do	3
OSTREA SOWERBYI, Sharnbrook.	do	2
<i>Tooth of Sauroid Fish,</i> Stonesfield.	do	Stonesfield slate. 1
RHYNCHONELLA FURCATA, Bradford.	Bradford clay.	3
TEREBRATULA MAXILLATA, Pickwick, Wiltshire.	Forest marble.	1
CHEMNITZIA VARIABILIS, Lacock.	do	clay. 5
NUCLEOLITES CUNICULARIS, Oxford hill, Frome.	Cornbrash.	4
DIADEMA DEPRESSA, Near Buckland, Dorsetshire.	do	1
TEREBRATULA INTERMEDIA, Stony Stoke.	do	3
— DIGONA, Stalbridge.	do	3

TEREBRATULA OBOVATA, Dorsetshire.	Cornbrash.	2
RHYNCHONELLA CONCINNA, Near Melbury Osmond.	do	5
AVICULA ECHINATA, Near Frome.	do	5
PECTEN VAGANS, Stony Stoke, Burton.	do	1
OSTREA RUGOSA, Dorsetshire.	do	8
PHOLADOMYA MURCHISONIÆ, E. Coker.	do	2
GRESSLYA PEREGRINA, Bishop's Caundle.	do	2
MYACITES SECURIFORMIS, Ryme, Map 18.	do	2
— DECURTATA, Hentsbridge.	do	2
AMMONITES ELIZABETHÆ, Christian Malford.	Oxford clay.	2
— LAMBERTI, Isle of Skye.	do	2
THECOSMILEA ANNULARIS, Steeple Ashton.	Coral rag.	2
THAMNASTREA ARACHNOIDES, Steeple Ashton.	do	1
STYLINA TUBULIFERA, Steeple Ashton.	do	1
NUCLEOLITES SCUTATUS, Dorsetshire.	do	3
HEMICIDARIS INTERMEDIA, Calne.	do	3
MYACITES DECURTATA, Abbotsbury.	do	1
TRIGONIA COSTATA? Near Devizes.	do	1
LITHODOMUS INCLUSUS, Near Devizes.	do	2
OSTREA GREGARIA, Near Devizes.	do	2
— SANDALINA? (Phillips), Todbere.	do	3
PECTEN FIBROSUS, Near Devizes.	do	2
CHEMNITZIA, Bourton.	do	1

NATICA, Hazlebury Bryan.	Coral rag.	1
RHYNCHONELLA INCONSTANS, Ringstead bay.	Kimeridge clay.	1
OSTREA DELTOIDEA, Ringstead bay.	do	1
CARDIUM STRIATULUM, Near Devizes.	do	2
MYACITES RECURVA, Ringstead bay.	do	1
PLEUROTOMARIA RETICULATA, Near Devizes.	do	1
PATELLA LATIOSIMA, Ringstead bay.	do	1
ISASTREA OBLONGA, Tisbury.	Portland stone.	1
CYCADOIDEA MICROPHYLLA, Isle of Portland.	Purbeck.	1
HEMICIDARIS PURBECKENSIS, Swanage.	do	1
<i>Insect and Vegetable remains,</i> Swanage.	do	3
HYBODUS (tooth), Swanage.	do	2
LEPIDOTUS MINOR (whole fish), Swanage.	do	1
ENDOGENITES EROSA, Isle of Wight.	Wealden.	1
CYPRIDEA VALDENSIS, Isle of Wight.	do	1 slab.
— TUBERCULATA, Isle of Wight.	do	2
CYRENA MEDIA, Hastings.	do	2
LEPIDOTUS MANTELLI, Hastings.	do	2
HOLOCYSTIS ELEGANS, Sandown, Isle of Wight.	Lower Greensand.	2
VERMETUS POLYGONALIS, Atherfield.	do	2
MEYERIA MAGNA, Atherfield.	do	5
TEREBRATULA SELLA, Atherfield.	do	8
RHYNCHONELLA GIBBSIANA, Isle of Wight.	do	5

EXOGYRA SINUATA,	Lower Greensand.	2
Atherfield and Isle of	Wight.	
— HARPAÆ,	do	1
Sandown.		
ANOMIA LÆVIGATA,	do	1
Atherfield.		
PECTEN APTIENSIS,	do	2
Sandown.		
— QUINQUECOSTATUS,	do	2
Sandown.		
PINNA TETRAGONA,	do	1
Atherfield.		
GERVILLIA ALÆFORMIS,	do	1
Blackgang Chene, Isle of	Wight.	
— ANCEPS,	do	1
Atherfield.		
ASTARTE OBOVATA,	do	1
Sandown.		
VENUS PARVA,	do	2
Sandown and East-Shalford.		
CYPRINA ANGULATA,	do	1
East-Shalford.		
CYPRINA sp.	do	1
Haslemere.		
CORBULA STRIATULA,	do	1
Atherfield.		
MODIOLA REVERSA,	do	1
Atherfield.		
THETIS MINOR,	do	2
Atherfield and Sandown.		
MYACITES PLICATA,	do	3
Atherfield and Sandown.		
ARCA RAULERIA,	do	3
Atherfield.		
— GLABRA,	do	2
Atherfield and Sandown.		
ROSTELLARIA ROBISCALDINA,	do	2
Atherfield.		
TORNATELLA FORBESIANA,	do	2
Atherfield.		
AMMONITES MARTINI (fragments),	do	2
Sandown.		
— DESHAYESII,	do	2
Atherfield.		
HAMITES GIBBOSUS,	Gault.	2
Folkstone.		

ORBITOLITES COMPLANATUS, Warminster.	Upper Greensand.	2
MICROBACIA CORONULA, Warminster.	do	3
DIADEMA ROTATA, Warminster.	do	2
DISCOIDEA SUBUCULUS, Warminster.	do	3
CATOPYGUS CARINATUS, Warminster.	do	1
VERMILCA AMPULLACEA, Warminster.	do	2
SERPULA PLEXUS, Warminster.	do	2
SERPULA sp. Warminster.	do	2
TEREBRATULA BIPLICATA, Warminster.	do	4
RHYNCHONELLA GRASIANA, Warminster.	do	4
MYACITES MANDIBULA, Near Devizes.	do	1
THETIS MAJOR, Near Devizes.	do	1
CYPRINA OBLONGA, Near Devizes.	do	1
CYPRINA sp. Near Devizes.	do	1
ARCA CARINATA, Near Devizes.	do	1
ARCA sp. Near Warminster.	do	1
AMMONITES VARIANS, Near Warminster.	do	2
TROCHOSMILIA SULCATA, Cambridge.	Chloritic marl.	2
GALERITES CASTANEA, Dorsetshire.	do	2
TEREBRATULA OBTUSA, Dorsetshire.	do	3
— BIPLICATA, Dorsetshire.	do	3
RHYNCHONELLA COMPRESSA, Maiden Bradley.	do	1
TEREBRATULINA GRACILIS, Cambridge.	do	5

ARCA FIBROSA?	Chloritic marl.	2
Dorsetshire.		
CYPRINA sp. 2,	do	2
Near Devizes.		
PLEUROTOMARIA MOREAUSIANA,	do	2
Dorsetshire.		
SOLARIUM ORNATUM,	do	2
Cambridge.		
NOTOPOCORYSTES STOKESII,	do	1
Cambridge.		
SCAPHITES ÆQUALIS,	do	1
Dorsetshire.		
AMMONITES VARIANS,	do	2
Dorsetshire.		
— INFLATUS,	do	1
Cambridge.		
LAMNA sp.	do	3
Cambridge.		
OTODUS APPENDICULATUS,	do	4
Whitenore.		
SAUROCEPHALUS LANCIFORMIS,	do	3
Cambridge.		

## UPPER EOCENE.

CHARA TUBERCULATA,	Bembridge limestone.	1
Whitecliff.		
PLANORBIS ROTUNDATUS,	do	1
Binstead.		
— EUOMPHALUS,	do	1
Binstead.		
— DISCUS,	do	5
Sconce.		
PALUDINA ANGULOSA,	do	2
Sconce.		
— GLOBULOIDES,	do	1 mass.
Isle of Wight.		
LINNÆA LONGISCATA,	do	2 & slab.
Cliffend.		
BULIMUS ELLIPTICUS,	do	2
Sconce.		
ACHATINA COSTELLATA,	do	2
Sconce.		
HELIX OCCLUSA,	do	2
Sconce.		
— VECTENSIS,	do	3
Sconce.		

HELIX DURBANI, Sconce.	Bembridge limestone.	2
CYCLOTUS CINCTUS, Sconce.	do	1 mass.
CARPOLITHES OVULUCRA, Hempstead.	Hempstead series.	1 slab.
— THALICTROIDES, Hempstead.	do	1 slab.
CAUDONA FORBESII, Hempstead.	do	1 slab.
MELANIA FASCIATA, Hempstead.	do	1 slab.
— MURICATA, Hempstead	Bembridge marls.	15 and slab.
— INFLATA, Hempstead.	Upper Eocene.	12 and slab.
— FASCIATA, &c. &c. Hempstead.	do	20
PALUDINA LENTA, Hempstead.	do	1 slab.
CERITHIUM PLICATUM, Hempstead.	do	6
— MUTABILE, Hempstead.	Bembridge marls.	3
RISSEA CHASTELLI, Hempstead.	Upper Eocene.	20
HYDROTIA PUPA and CYRENA SEMIOTRIATA, } Hempstead.	do	10 and slab.
CYRENA SEMIOTRIATA, Hempstead.	do	2 and slab.
— OBOVATA, Hempstead.	do	4
CYTHEREA INCRASSATA, Quere?	Bembridge marls.	1
CORBULA PISUM, Hempstead.	Upper Eocene.	20
— VECTIENSIS, Hempstead.	do	20
UNIO GIBBSII, Hempstead.	do	1
ECHINOCYAMUS PUSILLUS, Alderton.	Red crag.	10
CYPRÆA EUROPÆA, Quere?	Crag.	6
CARDIUM EDULE, Colchester.	Pleistocene marine.	

TELLINA SOLIDULA, Colchester.	Pleistocene marine.	6
CYRENA TRIGONULA, Gray's Essex.	Pleistocene freshwater.	3
ASTARTE COMPRESSA, Clyde.	Pleistocene marine.	4
LITTORINA LITTORALIS, Colchester.	Pleistocene marine.	6
— LITTOREA, Dalmuir.	Pleistocene marine.	7
BUCCINUM UNDATUM, Colchester.	Pleistocene marine.	3
BITHINIA TENTACULATA, Gray's Essex.	Pleistocene freshwater.	6
ZUA LUBRICA, Copford.	Pleistocene.	5
HELIX ROTUNDATA, Copford.	Pleistocene.	7
SPONGIA PLANA, Yorkshire.	Upper Chalk.	1
— RADICIFORMIS, Yorkshire.	do	1
PARASMILIA CENTRALIS, Northfleet.	do	2
ANANCHYTES OVATUS, Gravesend.	do	2
MICRASTER CORANGUINUM, Gravesend.	do	1
GALERITUS ALBOGALERUS, Gravesend.	do	2
— SUBROTUNDUS, Gravesend.	do	2
— DIXONI, Dover.	do	2
CYPHOSOMA COROLLARE, Gravesend.	do	1
CIDARIS CLAVIGERA, Gravesend.	do	4
BOURGUETICRINUS ELLIPTICUS } (1 root and × joints), } Gravesend.	do	× 2
TEREBRATULA SEMIGLOBOSA, Gravesend and near Lewes.	do	3
TEREBRATULINA GRACILIS, Northfleet.	do	5
RHYNCHONELLA MANTELLIANA, Northfleet.	do	2

RHYNCHONELLA CUVIERI, Isleham.	Lower Chalk.	2
PECTEN NITIDUS, Gravesend.	Upper Chalk.	1
<i>Striated Flints</i> , Northfleet.	do	4

## LOWER EOCENE.

OSTREA BELLOVICINA,	Woolwich.	2
CYRENA DEPERDITA,	do	2
CYRENA CUNEIFORMIS,	do	2
RISSEO PARKINSONI,	do	5
MELANIA INQUESTATA,	do	4
PINNA AFFINIS,	Alum bay, Isle of Wight.	1
PENTACRINITES SUB-BASALTIFORMIS,	Islington.	4
DITRUPA PLANA,	Whitecliff bay. 1 mass.	
CYTHEREA TRANSVERSA,	Alum bay.	1
CARDIUM SEMIGRANULATUM,	do	1
NUCULA AMYGDALOIDES,	do	1
— —	Near London.	2
CARDITA PLANICOSTA,	Clarendon and Salisbury.	2
NUCULA BOWERBANKII,	Near London.	4
CRYPTODON ANGULATUM,	do	4
PECTUNCULUS DECUSSATUS,	Bognor.	3
TEREDO ANTENANTÆ,	Whetstone.	1
PHOLADOMYA MARGARITACEA,	Alum bay.	1
PANOPÆA INTERMEDIA,	do	2
OSTREA BELLOVICINA,	do	2
CALYPTRÆA TROCHIFORMIS,	do	1
NATICA GLAUCINOIDES,	do	1
APORRHAI SOWERBYII,	Clarendon cutting.	6
CANCELLARIA LÆVIUSCULA,	do	2
PLEUROTOMA sp.	do	3
TURRITELLA IMBRICATARIA,	do	2
NAUTILUS IMPERIALIS,	Near London.	1
NAUTILUS CENTRALIS,	do	4

## MIDDLE EOCENE.

CARDITA PLANICOSTA,	Bracklesham.	2
TURRITELLA IMRRICATARIA,	do	4
LAMNA ELEGANS,	do	2
OTODUS APPENDICULATUS,	do	1
NUMMULITES PLANULATUS,	Alum bay, I. of Wight.	1 mass.
NUMMULITES LÆVIGATUS,	do	20
OSTREA FLABELLULA,	Barton.	4
PECTEN RECONDITUS,	do	3
PLEUROTOMA COLON,	do	10
— PRISCA,	do	2
— CONOIDES,	do	3
— EXORTA,	do	8
— PLEBEIA,	do	3
— ROSTRATA,	do	2
NATICA LABELLATA,	do	2
— EPIGLOTTINA,	do	3
— AMBULACRUM,	do	5
CASSIDARIA STRIATA,	do	3
CANCELLARIA EVULSA,	do	4
PYRULA NEXILIS,	do	2
STROMBUS BARTONENSIS,	do	5
ACTÆA SIMULUS,	do	4
TRITON ARGUTUS,	do	3
SOLARIUM CANALICULATUM,	do	3
SOLARIUM PLICATUM,	do	2
OSTREA FLABELLULA,	do	3
CYTHEREA INCRASSATA,	Brockenhurst.	4
CARDITA DELTOIDEA,	do	4
CYRENA OBOVATA,	do	6
FUSUS LONGÆVUS,	do	3
VOLUTA SOLANDRI?	do	1
PLEUROTOMA COLON,	do	2
POTAMIDES CINCTUS,	do	3
POTAMIDES VENTRICOSUM?	do	2
LAMNA ELEGANS,	do	3
CHARA LYELLII,	Colwell bay.	×
OSTREA COCHLEARIA,	do	3
CYTHEREA INCRASSATA,	do	3
CYRENA PULCHRA,	do	2

## MIDDLE EOCENE.

PALUDINA LENTA,	Colwell bay.	4 and 1 slab.	
PLANORBIS EUOMPHALUS,	Sceonce point.		3
CERITHIUM ELEGANS,	Headon hill.		8
— CONCAVUM,	Colwell bay.		4
— TRIZONATUM,	Headon hill.		2
— VENTRICOSUM,	do		26
MELANIA FASCIATA,	do		9
MELANIA MURICATA,	Colwell bay,		14
ANCILLARIA BUCCINOIDES,	do		3
MELANOPSIS BUCCINOIDES,	do		14
BUCCINIUM LABIATUM,	do		14
NERITINA CONCAVA,	do		11
NATICA DEPRESSA,	do		3
CAUDONA FORBESII,	Cliffend.	1 slab.	
<i>Plant Impressions,</i>	Alum bay.		4
POTAMOMYA PLANA,	Colwell bay.	4 and 1 slab.	
CYRENA OBOVATA,	do		7
LIMNÆA LONGISCATA,	do	2 and 1 slab.	
LIMNÆA PYRAMIDALIS,	Headon hill.	1 slab.	
MELANOPSIS CARINATA,	Cliffend.	1 slab.	
MELANIA MURICATA,	do	1 slab.	
PECTUNCULUS DELETUS,	Barton.		3
PECTUNCULUS COSTATUS,	do		4
LIMOPSIS SCALARIS,	do		5
CHAMA SQUAMOSA,	do		4
CRASSATELLA SULCATA,	do		4
CARDITA SULDATA,	do		5
CARDIUM TURGIDUM,	do		4
CORBULA PISUM,	Alum bay.	1 mass and	5
— FICUS,	Barton.		3
— CUSPIDATA,	do		3
CYTHEREA OBLIQUA,	do		2
TELLINA AMBIGUA,	do		4
SANGUINOLARIA COMPRESSA,	do		1
NUCULA SIMILIS,	do		3
VOLUTA ATHLETA,	do		2
— LACTATRIX,	do		3
— AMBIGUA,	do		4
— SOLANDRI,	do		2

## MIDDLE EOCENE.

VOLUTA SCABRICULA,	Barton.	2
— HUMEROSA,	do	1
— SCALARIS,	do	2
FUSUS CANALICULATUS,	do	3
— LONGÆVUS,	do	3
— FICULUCUS,	do	2
— REGULARIS,	do	2
— BULBIFORMIS,	do	4
— ERRANS,	do	1
— PORRECTUS,	do	4
BUCCINUM LAVATUM,	do	4
— JUNCEUM,	do	2
— DESERTUM,	do	3
TYPHIS PUNGENS,	do	5
TYPHIS FISTULOSUS,	do	2
MUREX MINAX,	do	2
MUREX ASPER,	do	2
OLIVA BRANDERI,	do	2
ANCILLARIA CANALIFERA,	do	2
ANCILLARIA BUCCINOIDES,	do	3
CONUS DORMITOR,	do	5
CONUS SCABRICULA,	do	3
TEREBELLUM SOPITA,	do	3
TROCHUS MONILIFER,	do	3
TURRITELLA IMBRICATARIA,	do	3 and 1 slab.
CALYPTRÆA TROCHIFORMIS,	do	3
PHORUS AGGLUTINANS,	do	5
ROSTELLARIA RIMOSA,	do	5
ROSTELLARIA AMPLA,	do	3
DENTALIUM STRIATUM,	do	5
SERPULA HEPTAGONA,	do	2

## II.

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### CATALOGUE OF SHELLS,

PRESENTED BY W. NEWCOMB, M.D., TO THE STATE COLLECTION

1858.

List.	NAME.	No.	Locality.
1	CYTHEREA HIEROGLYPHICA, <i>Conrad.</i>	3	Sandwich islands.
2	CYTHEREA ALBINA, <i>Lamarck.</i>	1	West Indies.
3	CIRCE EQUIVOCA, <i>Lamarck.</i>	2	Australia.
4	CIRCE GIBBIA, <i>Lamarck.</i>	2	China.
5	CYLENE SINENSIS, <i>Sowerby.</i>	1	China.
6	TAPES INFLATA, <i>Lamarck.</i>	1	Australia.
7	TAPES MALABARICA, <i>Chemnitz.</i>	2	Bombay.
8	VENUS PUERPERA, <i>Lamarck.</i>	1	Guam.
9	— SCABRA, <i>Linnæus.</i>	5	China.
10	— FLEXUOSUS, <i>Linnæus.</i>	1	China.
11	PERUA CALIFORNICA, <i>Conrad.</i>	3	Sandwich islands.
12	LINGULA OVALIS, <i>Sowerby.</i>	2	Sandwich islands.
13	CARDIUM FRAGUM, <i>Linnæus.</i>	1	East Indies.
14	PECTEN ZICZAC, <i>Linnæus.</i>	1	West Indies.
15	PANDORA TRILINEATA, <i>Say.</i>	4	New-Jersey.
16	PECTEN PLEURONECTES, <i>Linnæus.</i>	1	China.
17	PINNA SACCATA, <i>Linnæus.</i>	1	Sandwich islands.
18	PINNA MURICATA, <i>Linnæus.</i>	1	South-Carolina.
19	PHOLAS COSTATA, <i>Linnæus.</i>	1	Cuba.
20	PECTEN IRRADIANS, <i>Lamarck.</i>	2	New-York.
21	ARCA GRANOSA, <i>Lamarck.</i>	2	Bombay.
22	CYRENA CAROLINENSIS, <i>Lamarck.</i>	1	Georgia.
23	TRITON SPENGLERII, <i>Lamarck.</i>	1	Australia.

List.	NAME.	No.	Locality.
24	CERITHIUM LINEATUM, <i>Lamarck.</i>	2	Pacific.
25	— ALUCO, <i>Bruguère.</i>	1	Pacific.
26	— NODULOSUM, <i>Bruguère.</i>	2	Australia.
27	— FLUVIATILE, <i>Potier.</i>	2	Bombay.
28	PERSONA ANUS, <i>Linnæus.</i>	2	China.
29	TRITON TUBEROSUS, <i>Lamarck.</i>	1	Fejees.
30	TRITON BRACTRIATUS, <i>Hinds.</i>	3	Sandwich islands.
31	NERITINA DELESTERMII, <i>Petit.</i>	3	Guam.
32	NERITINA VESPERTINA, <i>Nuttall.</i>	12	Sandwich islands.
33	NERITINA CARIOSA, <i>Gray.</i>		Sandwich islands.
34	LITTORINA NEWCOMBIANA, <i>Reeve.</i>	15	Sandwich islands.
35	MELANIA ASPERATA, <i>Lamarck.</i>		Manilla.
36	— MARIENSIS, <i>Lea.</i>		Sandwich islands.
37	— TRANSVERSA, <i>Lea.</i>		Guiana.
38	— LECONTIANA, <i>Lea.</i>		Georgia.
39	— CATENOIDEA, <i>Lea.</i>		Georgia.
40	— HASTULA, <i>Lea.</i>		Guam.
41	CHITON AUSTRALIS, <i>Sowerby.</i>	1	Australia.
42	— DISPAR, <i>Sowerby.</i>	1	Panama.
43	— INCEI, <i>Adams.</i>	1	Australia.
44	CYPRÆA ACHATINA, <i>Solander.</i>	1	
45	— ARGUS, <i>Linnæus.</i>	1	
46	— MAPPA, <i>Linnæus.</i>	1	
47	— TESTUDINARIA, <i>Linnæus.</i>	1	
48	— EROSA, <i>Linnæus.</i>	1	
49	— CAURICA, <i>Linnæus.</i>	1	
50	— LYNX, <i>Linnæus.</i>	2	
51	OLIVA AXEMULINA, <i>Lamarck.</i>	2	
52	— CARNEOLA, <i>Linnæus.</i>	5	
53	— EPISCOPALIS, <i>Lamarck.</i>	1	
54	— GUTTATA, <i>Lamarck.</i>	2	
55	HELIX LACTEA, <i>Müller.</i>	2	
56	HELIX BAJADERA, <i>Pfeiffer.</i>	1	
57	<i>Helices</i> to fill up about one dozen species.		American.
58	BULIMUS OBLONGA, <i>Müller.</i>	1	
59	— ZEBRA, <i>Müller.</i>	1	
60	— FULGURATUS, <i>Jay.</i>		
61	— MALLEATUS, <i>Jay.</i>		
62	ACHATINA FASCIATA, <i>Müller.</i>		
63	ACHATINA GRANOSA, <i>Pfeiffer.</i>		

List.	NAME.	No.
64	ACHATINELLA ALBOLABRIS, <i>Newcomb.</i>	2
65	— VITREA, <i>Newcomb.</i>	6
66	— LORATA, <i>Fer.</i>	4
67	— RUTILE, <i>Newcomb.</i>	4
68	— TAPPANIANA, <i>Adams.</i>	2
69	— MUSTELLINA, <i>Mighels.</i>	4
70	— TESSELLATA, <i>Newcomb.</i>	3
71	— COLORATA, <i>Reeve.</i>	5
72	— LUGUBRIS, <i>Chemnitz.</i>	5
73	— POLITA, <i>Newcomb.</i>	4
74	— BACCA, <i>Reeve.</i>	5
75	— TETRAO, <i>Newcomb.</i>	4
76	— DECIPIENS, <i>Newcomb.</i>	5
77	— MASTERSII, <i>Newcomb.</i>	4
78	— PUPOIDEA, <i>Newcomb.</i>	4
79	— CASTA, <i>Newcomb.</i>	4
80	— TRISTIS, <i>Fer.</i>	3
81	— PORPHYRIA, <i>Newcomb.</i>	4
82	— TURRITELLA, <i>Fer.</i>	5
83	— NIGRA, <i>Newcomb.</i>	4
84	— SOROR, <i>Newcomb.</i>	6
85	— CURTA, <i>Newcomb.</i>	6
86	— VENUSTA, <i>Mighels.</i>	9
87	— AFFINIS, <i>Newcomb.</i>	12
88	— LABIATA, <i>Newcomb.</i>	3
89	— CRASSILABRIS, <i>Newcomb.</i>	3
90	— NITIDA, <i>Newcomb.</i>	9
91	— TÆNIOLATA, <i>Pfeiffer.</i>	2
92	— FUMOSA, <i>Newcomb.</i>	6
93	— SANGUINEA, <i>Newcomb.</i>	4
94	— MIGHELSIANA, <i>Pfeiffer.</i>	5
95	— CITRINA, <i>Mighels.</i>	6
96	— CESTUS, <i>Newcomb.</i>	4
97	— VARIABILIS, <i>Newcomb.</i>	5
98	— ADUSTA, <i>Reeve.</i>	3
99	— SPLENDIDA, <i>Newcomb.</i>	2
100	— GOULDII, <i>Newcomb.</i>	3
101	— OLIVACEA, <i>Reeve.</i>	3
102	— BELLA, <i>Reeve.</i>	4
103	— STEWARTII, <i>Green.</i>	3

List.	NAME.	No.
104	ACHATINELLA MELANOSTOMA, <i>Newcomb.</i>	4
105	— REDFIELDII, <i>Newcomb.</i>	3
106	— CRASSA, <i>Newcomb.</i>	4
107	— VIRIDANS, <i>Mighels.</i>	5
108	— ABBREVIATA, <i>Reeve.</i>	5
109	— PERVERSA, <i>Swainson.</i>	4
109a	— PERVERSA var., <i>Swainson.</i>	4
110	— VIRGULATA, <i>Mighels.</i>	3
110a	— VIRGULATA var., <i>Mighels.</i>	3
110b	— VIRGULATA var., <i>Mighels.</i>	3
111	— RUFATA, <i>Newcomb.</i>	2
112	— BUDDII, <i>Newcomb.</i>	4
113	— ROSEA, <i>Swainson.</i>	3
114	— RETICULATA, <i>Newcomb.</i>	3
115	— RUGOSA, <i>Newcomb.</i>	4
116	— VENTULUS, <i>Fer.</i>	6
117	— BIPPLICATA, <i>Newcomb.</i>	4
118	— OBESA, <i>Newcomb.</i>	3
119	— GLABRA, <i>Newcomb.</i>	3
120	— SWIFTII, <i>Newcomb.</i>	4
121	— ELEGANS, <i>Newcomb.</i>	4
122	— TURGIDA, <i>Newcomb.</i>	5
123	— BALDWINII, <i>Newcomb.</i>	3
124	— MODESTA, <i>Adams.</i>	3
125	— INTERMEDIA, <i>Newcomb.</i>	4
126	— RUBENS, <i>Gould.</i>	5
127	— SPIRIZONA, <i>Fer.</i>	4
127a	— SPIRIZONA var., <i>Fer.</i>	4
127b	— SPIRIZONA var., <i>Fer.</i>	4
128	— NUBILOSA, <i>Mighels.</i>	3
129	— PRODUCTA, <i>Reeve.</i>	4
130	— MARMORATA, <i>Gould.</i>	3
131	— STRAMINEA, <i>Reeve.</i>	3
132	— VULPINA, <i>Fer.</i>	3
132a	— VULPINA var., <i>Fer.</i>	3
132b	— VULPINA var., <i>Fer.</i>	3
132c	— VULPINA var., <i>Fer.</i>	3
133	— OVATA, <i>Newcomb.</i>	3
133a	— OVATA var., <i>Newcomb.</i>	3
133b	— OVATA var., <i>Newcomb.</i>	3

LIST.	NAME.	No.	Locality.
133c	ACHATINELLA OVATA var., <i>Newcomb.</i>	3	
134	SDIRAXIS CUMINGIANA, <i>Pfeiffer.</i>	2	
135	SPIRAXIS ADUSTA, <i>Jay.</i>	3	
136	PITHEA LEKEITHOSTOMA et var., <i>Reeve.</i>	6	
137	PITHEA PYRAMIDATA, <i>Reeve.</i>	5	
138	PROSERPINA NITIDA, <i>Gray.</i>	3	
139	CLAUSILIA TRIDENS, <i>Chemnitz.</i>	4	
140	CYCLOSTOMA STENOMPHALIA, <i>Pfeiffer.</i>	2	
141	CYCLOSTOMA ANGUSTA, <i>Adams.</i>	6	
142	AURICULA MIDEA, <i>Linnæus.</i>	1	
143	HELICINA ORBICULATA, <i>Say.</i>	13	
144	MUREX HAUSTELLUM, <i>Lamarck.</i>	1	
145	STROMBUS AURISDIANA, <i>Linnæus.</i>	1	
146	TEREBRATULA PULCHELLA, <i>Sowerby.</i>	3	
146	TRITON SPENGLERI (repeated), <i>Lamarck.</i>	1	
147	UNIO EXIGUUS, <i>Lea.</i>	2	
148	— SUBANGULATA, <i>Lea.</i>	2	
149	— INFURCATUS, <i>Conrad.</i>	3	
150	— RUBIGINOSUS, <i>Linnæus.</i>	2	
151	— BENGALENSIS, <i>Lea.</i>	3	
152	— DOLABRÆFORMIS, <i>Lea.</i>	1	
153	— OBESUS, <i>Lea.</i>	2	
154	— HOPETONENSIS, <i>Lea.</i>	2	
155	— SHEPARDIANUS, <i>Lea.</i>	2	
156	— RUTILANS, <i>Lea.</i>	2	
157	— PULLATUS, <i>Lea.</i>	2	
158	— DECLIVIS, <i>Lea.</i>	2	
159	— CONRADICUS, <i>Lea.</i>	2	
160	MITRA EPISCOPALIS, <i>Linnæus.</i>	2	
161	PARTUTA AURICULA, <i>Fer.</i>	15	
162	— GIBBA, <i>Fer.</i>	5	
163	— MASTERSI and var., <i>Pfeiffer.</i>	10	
164	TROCHATELLA PULCHELLA, <i>Gray.</i>	3	
165	PUPINA VITREA, <i>Sowerby.</i>	4	
166	HELICINA STRIATA, <i>Gray.</i>	4	
167	LUCIDELLA AUREOLA, <i>Gray.</i>	4	
168	CYLINDRELLA PALLIDA, <i>Guilding.</i>	9	
169	ANODONTA GIBBOSA, <i>Say.</i>	1	
170	CAPSELLA VIRESCENS, <i>Deshayes.</i>	12	Manilla.
171	HELIX INFLECTA, <i>Say.</i>	3	Ohio.

List.	NAME.	No.	Locality.
172	RANELLA TUBERCULATA, <i>Brodie.</i>	2	
173	CERITHIUM RHIZOPORARUM, <i>Adams.</i>	4	China.
174	CERITHIUM VULGATUM, <i>Bruguère.</i>	3	Mediterranean.
175	BULLA VIRIDIS, <i>Rany.</i>	3	Sandwich islands.
176	PALUDINA BOROUGHSIANA, <i>Lea.</i>	3	Manilla.
177	NERITINA CREPIDULARIA, <i>Lamarck.</i>	3	Bombay.
178	— CUMINGIANA, <i>Rechz.</i>	2	Guam.
179	— BRUGUIERI, <i>Rechz.</i>	2	Guam.
180	— COROMANDELIANA, <i>Sowerby.</i>	2	Guam.
181	ALEXIA BERMUDENSIS, <i>Adams.</i>	5	Bermuda.
182	PURPURA HARPA, <i>Conrad.</i>	1	Sandwich islands.
183	CYPRÆA GEMMATA, <i>Gould.</i>		Sandwich islands.
184	CYPRÆA INSECTA, <i>Mighels.</i>		Sandwich islands.
185	MARGINELLA APICINA, <i>Menke.</i>		West Indies.
186	— AVENA, <i>Valenciennes.</i>		West Indies.
187	— INTERRUPTA, <i>Lamarck.</i>		Africa.
188	AMPULLARIA CORNUARIETIS, <i>Sowerby.</i>		Venezuela.
189	TROCHUS CONULUS, <i>Linnæus.</i>		Mediterranean.
190	TROCHUS TANTILLUS, <i>Gould.</i>		Sandwich islands.
191	MITRA MARMORATA, <i>Swainson.</i>		S. Pacific.
192	PLECOTREMA INEQUALIS, <i>Adams.</i>		Sandwich islands.
193	NASSA ARCULARIA, <i>Lamarck.</i>		Philippines.
194	MELANIA BELLICOSA, <i>Hinds.</i>		Fejees.
195	MELANIA NEWCOMBIANA, <i>Lea.</i>		Sandwich islands.
196	CYLINDRELLA GRACILIS, <i>Wood.</i>		Jamaica.
197	HELIX AURICOMA, <i>Fer.</i>		Cuba.
198	— NEMORALINA, <i>Petit.</i>		St. Thomas.
199	— NEMORALIS, <i>Linnæus.</i>		Europe.
200	— LAPICIDA, <i>Linnæus.</i>		Europe.
201	— ERICETORUM, <i>Müller.</i>		Europe.
202	— PISANA, <i>Müller.</i>		Europe.
203	— VARIABILIS, <i>Draparnaud.</i>		Europe.
204	— PYRAMIDATA, <i>Draparnaud.</i>		Europe.
205	— ALGIRA, <i>Linnæus.</i>		Europe.
206	— TROCHOIDES, <i>Poiret.</i>		Europe.
207	— LAMELLOSA, <i>Fer.</i>		Sandwich islands.
208	— SIMILARIS, <i>Fer.</i>		Sandwich islands.
209	— EXEQUATA, <i>Gould.</i>		Sandwich islands.
210	— SUBRUTILE, <i>Mighels.</i>		Sandwich islands.
211	BULIMUS DECOLLATUS, <i>Müller.</i>		Charleston.

### III.

## CATALOGUE OF FOSSILS,

FROM H. C. GROSVENOR, OF CINCINNATI.

- |   |  |
|---|--|
| 41 SPIRIFER LYNX.                                     | 2 slabs MURCHISONIA GRACILIS,<br>&c. &c. |
| 13 ATRYPA INCREBESCENS.                               |  |
| 54 LEPTÆNA SERICEA.                                   | 1 slab ATRYPA MODESTA.                   |
| 6 ORBICULA TERMINALIS.                                | 59 CHÆTETES LYCOPERDON var.              |
| 17 LEPTÆNA TENUISTRIATA.                              | 12 — — stellate variety.                 |
| 13 LEPTÆNA ALTERNATA.                                 | 1 slab STICTOPORA.                       |
| 11 LEPTÆNA DEFLECTA.                                  | 9 GYPTOCRINUS DECADECTYLUS.              |
| 19 LEPTÆNA PLANUMBONA.                                | 4 HETEROOCRINUS SIMPLEX.                 |
| 3 ORTHIS DISSIMILIS.                                  | 1 POTERIOCRINUS GRACILIS.                |
| 3 LEPTÆNA DELTOIDEA.                                  | 3 ISOTELUS GIGAS.                        |
| 4 ORTHIS SINUATA.                                     | 3 ISOTELUS MEGISTUS.                     |
| 5 ORTHIS SUBJUGATA.                                   | 2 Epistoma of ISOTELUS.                  |
| 13 ORTHIS OCCIDENTALIS.                               | 2 CERAURUS CRASSATUS.                    |
| 21 ORTHIS BELLIRUGOSA.                                | 12 CALYMENE SENARIA.                     |
| 26 ORTHIS PlicateLLA.                                 | 1 CONULARIA GRACILIS.                    |
| 19 LEPTÆNA SUBTENTA.                                  | 21 ORTHOCERATITES (various).             |
| 35 ORTHIS TESTUDINARIA.                               | 3 FAVISTELLA STELLATA.                   |
| 12 ATRYPA DENTATA.                                    | 1 FAVOSITES FIBROSA.                     |
| 4 ORTHIS FISSICOSTA.                                  | From the Falls of the Ohio.              |
| 3 AVICULA DEMISSA.                                    | 12 CORALS (various).                     |
| 3 MODIOLOPSIS MODIOLARIS,<br>and 3 slabs of the same. | 5 TRILOBITES (of 3 species).             |
| 2 MODIOLOPSIS MYTILOIDES.                             | 1 OLIVANTES VERNEUILII.                  |
| 4 MODIOLOPSIS ?                                       | From Columbus, Ohio (corniferous).       |
| 7 AMBONYCHIA CARINATA.                                | 1 CYRTOCERAS.                            |
| 6 AMBONYCHIA RADIATA.                                 | 2 ATRYPA.                                |
| 2 MODIOLOPSIS AVICULOIDES.                            | 1 SPIRIFER.                              |
| 5 STELLAPORA STELLATA.                                | 1 PLEUROTOMARIA.                         |
| 3 SERPULA.  | From Crawfordsville, Indiana.            |
| 3 BRYOZOA.  | 9 CAPULUS.                               |
| 2 CYATHOPHYLLA.                                       | 18 GONIATITES PRINCEPS.                  |
| 15 PLEUROTOMARIA BILIX.                               | From Springfield, Ohio.                  |
| 4 BELLEROPHON BILOBATUS.                              | 1 PENTAMERUS OBLONGUS.                   |
| 7 MURCHISONIA.  |  |

## IV.

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### MISCELLANEOUS CONTRIBUTIONS.

DANIEL SHAW, Superior City, Michigan.

Specimens of NATIVE COPPER and COPPER ORE from the "Cliff Mine," Lake Superior.

S. W. EDDY, Stillwater, Saratoga County.

CONCRETIONS of singular form from sand.

MAJOR G. O. HALLER, U.S.A.

A BOX of valuable MARINE SHELLS from Port Townsend, Washington Territory.

DR. E. W. HUBBARD, Staten Island.

Specimens of CLAY and LIQONITE ; ISOTELUS MEGISTUS ; a FISHBONE from Sandusky, Ohio.

A. O. OLDHAM, Waterville, Oneida County.

Three EURYPTERUS REMIPES.

HORACE AVERILL, Albany.

GARNETS and IRON ORE from Salisbury, Connecticut.

ROBERT TOWNSEND, ESQUIRE, Albany.

Twelve MARINE SHELLS.

ROBERT B. HOWLAND, Hillside, Cayuga County.

SELENITE with Crystals of SULPHUR.

COL. WILLIAM LYMAN, Moscow, Livingston County.

FOSILS from the Hamilton group.

J. E. HALENBECK, Albany.

Specimens of GOLD from the Pioneer Mine, North-Carolina.

*BY PURCHASE.*

Three DIPLEURA DEKAYI, Hamilton group.

TWELFTH ANNUAL REPORT

OF THE

REGENTS OF THE UNIVERSITY

OF THE

State of New-York,

ON THE

CONDITION OF THE STATE CABINET

OF

NATURAL HISTORY,

AND THE

HISTORICAL AND ANTIQUARIAN COLLECTION

CONNECTED THEREWITH.

---

Made to the Assembly, March 15, 1859.

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ALBANY :

PRINTED BY C. VAN BENTHUYSEN.

1859.



# STATE OF NEW YORK.

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No. 186.

IN ASSEMBLY, MAR. 15, 1859.

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## ANNUAL REPORT

Of the Regents of the University, on the State Cabinet of  
Natural History.

To the HON. DE WITT C. LITTLEJOHN,

*Speaker of the Assembly:*

Sir—I have the honor to transmit the Annual Report of the Regents of the University on the State Cabinet of Natural History, and the Historical and Antiquarian collection connected therewith.

I remain, very respectfully,

Your obedient servant,

G. Y. LANSING, *Chancellor.*

*March 10, 1859.*

## REGENTS OF THE UNIVERSITY, 1859.

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GERRIT Y. LANSING, LL.D.,  
*Chancellor.*  
GULIAN C. VERPLANCK, LL.D.,  
*Vice-Chancellor.*  
EDWIN D. MORGAN,  
*Governor, ex-officio.*  
ROBERT CAMPBELL,  
*Lieutenant Governor, ex-officio.*  
GIDEON J. TUCKER,  
*Secretary of State, ex-officio.*  
HENRY H. VAN DYCK,  
*Sup't Public Instruction, ex-officio.*  
ERASTUS CORNING.  
PROSPER M. WETMORE.  
JOHN LORIMER GRAHAM.

GIDEON HAWLEY, LL.D.  
DAVID BUEL.  
JAMES S. WADSWORTH.  
JOHN V. L. PRUYN, LL.D.  
ROBERT CAMPBELL.  
SAMUEL LUCKEY, D.D.  
ROBERT G. RANKIN.  
JOHN N. CAMPBELL, D.D.  
ERASTUS C. BENEDICT.  
GEORGE W. CLINTON.  
ISAAC PARKS, D.D.  
LORENZO BURROWS.  
GEORGE B. CHEEVER, D.D.  
ROBERT S. HALE.  
  
S. B. WOOLWORTH, *Secretary.*

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## STANDING COMMITTEES OF THE REGENTS.

SPECIALLY CHARGED WITH THE CARE OF THE STATE CABINET.

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1858.

JOHN A. KING, *Governor.*  
HENRY R. SELDEN, *Lieutenant Governor.*  
GIDEON J. TUCKER, *Secretary of State.*

REV. DR. CAMPBELL.  
JOHN LORIMER GRAHAM.

1859.

EDWIN D. MORGAN, *Governor.*  
ROBERT CAMPBELL, *Lieut. Governor.*  
REV. DR. CAMPBELL.

JOHN LORIMER GRAHAM.  
JAMES S. WADSWORTH.

# REPORT.

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*To the Legislature of the State of New York:*

The Regents of the University

RESPECTFULLY REPORT :

The efforts of the Regents, as trustees of the State Cabinet, have been principally directed during the past year to enlarging the collections, and rendering them a better exponent of the Natural History of the State. The labors of the Curator, during a few weeks of the summer, when he could take the field, have supplied many deficiencies, and have contributed essentially to the value and perfection of the Geological department. While the first object is to gather whatever may illustrate the Natural History of this State, it has been regarded as proper and desirable, whenever the opportunity has presented, to place with our own productions, for study and comparison, those of other localities. The Cabinet is thus rendered valuable to the general student, and will furnish him the means of comparing the Fauna of different latitudes; of tracing their range of habitation, and determining their specific analogies and differences.

Among the contributions, it is proper specifically to mention, some fifty beautiful African birds, presented by George Benedict, Esq., through the Hon. Erastus C. Benedict, a member of this Board. They have been prepared with his accustomed skill, by the Taxidermist, and are placed in the case which contains the De Rham collection. In the last report, allusion was made to a collection of shells, which was expected from Mr. Cuming, the distinguished English conchologist. These have been received, and properly arranged, and labelled by Dr. Newcomb, of this city, to whom we have been formerly indebted for similar favors.

A large collection of fossils, from the Eocene Tertiary of the Paris basin, have been presented by W. A. Johnson, Esq., of Utica.

An offer was received, several months since, from Mr. Philip C. Carpenter, of Warrington, England, to present to the State Cabi-

net of New York, a duplicate of the suite of the Mazatlan Mollusca, procured, described, catalogued and arranged by him for the British Museum. The condition of the offer required that the collection should be kept distinct, and open to the examination of students, and that Mr. Carpenter should be permitted personally to arrange it on the same plan which he had adopted in the British Museum, and that his necessary expenses should be paid. The collection embraces about 6,000 specimens, and its value is greatly increased by the many varieties of each species. After full enquiry in regard to the value of the collection, it was determined to accept the offer. Mr. Carpenter arrived a few months since, and has been diligently employed in mounting and arranging the collection. Sufficient space could not be afforded to place the whole under glass, and it became necessary to provide drawers for such parts as could not otherwise be arranged. The cases which have been provided are well adapted for the purpose, and the whole collection, under Mr. Carpenter's admirable method, is unsurpassed for the beauty of its forms, and the convenience of its arrangements. A catalogue by classes, orders and species, will be prepared as soon as the arrangement is completed, and will be submitted in the next annual report. A descriptive catalogue, prepared for the British Museum collection, is placed in one of the cases for the use of students. An appropriation of six hundred dollars, it is believed, will cover the cost of the cases and all other expenses.

By order of the Regents.

G. Y. LANSING, *Chancellor.*

S. B. WOOLWORTH, *Secretary.*

## ACCOUNT CURRENT.

THE REGENTS of the University, in account current with the appropriation for preserving and increasing the "State Cabinet of Natural History, and the Historical and Antiquarian Collection annexed thereto, and for defraying the incidental expenses of the same."

### DR.

1857,			
Oct. 1.	To balance to new account ( See Senate Document of 1858, No. 163, p. 10) .....		\$103 72
Oct. 22.	To amount received from the Comptroller, part appropriation 1857 - 58 .....		110 00
Nov. 18.	To do do .....		300 00
1858,			
Feb. 10.	To do do .....		390 00
May 5.	To amount loaned to "Geological Rooms repairs" account ...		50 00
May 31.	To amount received from sale of a case .....		5 00
Sept. 6.	To amount returned by J. C. Boynton .....		3 00
Sept. 8.	To do do .....		5 00
Sept. 8.	To amount overdrawn by checks, dated July 6th, 1857, and December 19th, 1857 .....		2 00
			\$968 72

### CR.

1857,			
Oct. 17.	By cash paid C. Dimmick, wages .....	Voucher No. 1,	\$35 00
Oct. 19.	By " contingents .....	" No. 2,	9 43
Nov. 10.	By " William Montonye, cases .....	" No. 3,	32 00
Nov. 13.	By " J. A. Hurst, specimens, .....	" No. 4,	111 50
Nov. 13.	By " A. M'Clure & Co., camphor ...	" No. 5,	17 13
Nov. 17.	By " C. Dimmick, wages .....	" No. 6,	35 00
Nov. 23.	By " J. A. Hurst, stands for birds ..	" No. 7,	150 00
Nov. 23.	By " William Montonye, cases .....	" No. 8,	6 00
Dec. 3.	By " C. Dimmick, wages .....	" No. 9,	25 00
Dec. 3.	By " contingents .....	" Nos. 10 & 11,	14 81
Dec. 16.	By " Agassiz, Work, vols. 1 & 2 ..	" No. 12,	24 00
Dec. 19.	By " contingents .....	" No. 13,	28 24
1858,			
Jan. 11.	By " Wells & Co. express, quarterly acc.	No. 14,	45 54
Jan. 18.	By " Irving & Willey, expense on case of fossils,	" No. 15,	16 36
Jan. 22.	By " C. B. Boyle, architect .....	" No. 16,	50 00
Jan. 25.	By " J. C. Boynton, wages .....	" No. 17,	16 00
Feb. 2.	By " contingents .....	" No. 18,	7 09
Feb. 22.	By " contingents .....	" No. 19,	20 60
April 12.	By " contingents .....	" No. 20,	15 58
May 8.	By " contingents .....	" No. 21,	53 60
May 20.	By " J. C. Boynton .....	" No. 22,	16 00
May 31.	By " S. W. Gibbs & Son, aquarium.	" No. 23,	15 00
June 21.	By " contingents .....	" No. 24,	23 80
July 12.	By " contingents .....	" No. 25,	8 38
July 12.	By " Col. Jewett, expenses of collections,	No. 26,	100 00
July 20.	By " J. C. Boynton, wages .....	" No. 27,	10 00
Aug. 28.	By " J. C. Boynton, wages and expenses,	No. 28,	18 00
Oct. 5.	By " J. C. Boynton and others ....	" No. 29,	18 75
	By balance .....		45 91
			\$968 72

IN BEHALF of the Standing Committee on the State Cabinet, I have examined the above account, and find it correct. The payments have been made by order of the Standing Committee, and are accompanied with proper vouchers

JOHN A. KING, *Chairman.*

*December 27, 1858.*

# CONTRIBUTIONS

TO THE

## PALÆONTOLOGY OF NEW-YORK;

BEING SOME OF THE RESULTS OF

**Investigations made during the Years 1855, '56, '57 & '58.**

**BY JAMES HALL.**

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THE following notices and descriptions of new genera, with other investigations, have been communicated, in part or entirely, at different times, to the Albany Institute; to the Reports of the Regents of the University on the State Collections of Natural History, for the years 1856 and 1858; to the American Association for the Advancement of Science; and are already printed in the third volume of the Palæontology of the State of New-York.

# NOTICE

OF THE

## GENERA AMBONYCHIA, PALAEARCA AND MEGAMBONIA.

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IN the first volume of the Palæontology of New-York, I have designated by the generic name AMBONYCHIA a group of certain species which are allied in form and other external characters; but not having at that time seen the structure of the hinge, the generic description could not be founded on the study of these most essential parts. Since then I have obtained casts of *A. radiata*, and separated valves of one or two other species; (and I have also seen some very fine specimens in the collections of the Geological Survey of Canada.) These examples show that *A. radiata* and *A. carinata* have a single large and nearly central muscular impression; one specimen of the former showing distinctly two strong teeth beneath the beak, while at the posterior extremity of the hinge-line there are three lateral elongate and slightly curving teeth, the hinge-area being striated longitudinally. The cardinal teeth of the *A. carinata* are similar, but there is some obscurity in regard to the lateral teeth. These characters probably exist in all those with extended and subspiral unbones and striated or costate surfaces; but in the concentrically striated forms, this hinge structure is somewhat varied, and some of them at least exhibit double muscular impressions, one large subcircular pit lying at the anterior extremity.



The illustration is from a cast of this species (the beak being left out), showing the cardinal and lateral teeth, the muscular and palléal impressions. The marks of the costæ are preserved in the margin of the cast.

AMBONYCHIA RADIATA

The *Ambonychia obtusa*, and an allied form from Tennessee, have the same general characteristics; while there is a distinct external ligamental area, which is likewise seen in other species.

A farther examination has shown that some species heretofore referred to the Genus MODIOLOPSIS have this structure of hinge, muscular impressions, etc.; while some of those from the Trenton limestone, which I referred to EDMONDIA, have likewise essentially the same structure of hinge as the *Ambonychia obtusa*. The *Edmondia ventricosa*, which is farthest removed from the *Ambonychia* type, has a wide and deep ligamental area, with three or four oblique teeth beneath the beak, and three lateral oblique teeth at the posterior-extremity of the cardinal line.

This character of hinge, although so nearly like that of *Ambonychia radiata*, is nevertheless accompanied by a strong anterior muscular impression, and a less conspicuous posterior one, which renders it necessary to separate the two forms. In *Edmondia ventricosa*, where the hinge-line is less curved than in any other form at present known to me, the structure bears some resemblance to that of MACRODON; but the cardinal line is never so straight, the posterior teeth are not so nearly parallel with the direction of that line, and the shells are externally marked by concentric striæ or laminæ, and never by radiating costæ as in that genus or in the ark-shells of more recent periods.

In view of the knowledge we now possess, it becomes necessary to separate the fossils formerly united under the Genus AMBONYCHIA, and to place those having double muscular impressions under one division; including with them some forms that have been referred to MODIOLOPSIS and EDMONDIA. At the same time we are not fully aware of the internal characters of MODIOLOPSIS\*; but the typical forms of that genus do not present the exterior features which mark those of the group here noticed, and I shall venture to separate the latter under the name PALÆARCA.

\* The type of the Genus MODIOLOPTIS is the *M. modiolaris* (*Cypricardites modiolaris* of CONRAD = *Pterinea modiolaris* of the same author, 1838). The Genus CYPRICARDITES, as constituted by Mr. CONRAD, embraced species of more than a single genus. The *C. bisulcata* (1841) is the *Pterinea bisulcata* of the same author (Report of 1838, p. 116); and this fossil is the type of the Genus GRAMMYSIA (*G. hamiltonensis*) of DE VERNEUIL. It is probable that a careful investigation of the numerous species of Lamellibranchiata in the Hamilton and Chemung groups will throw some light upon the generic relations of these fossils with those of the lower rocks. An examination of the casts of *M. modiolaris*, and other allied forms in the Hudson-river group, has not yet disclosed the structure of the hinge; and the large anterior muscular scar is equally common to those species and many similar forms in the Hamilton group, of which we know nothing of the hinge structure.

## GENUS PALÆARCA:\*

GENERIC DESCRIPTION. Shell equivalve, very inequilateral, ovate or rhomboid-ovate, gibbous or ventricose; umbones subanterior: anterior extremity abruptly rounded; posterior extremity broadly rounded, or sometimes obliquely subtruncate: anterior muscular impression very strongly marked (usually a deep round pit), the posterior impression obscurely defined; anterior teeth 3, 4 or 5, oblique, placed beneath or in advance of the umbones, with two or three remote oblique posterior or lateral teeth; palleal line simple; ligament external; ligamental area often deep and wide, striated.

The shells of this genus vary in the development of the ligamental area and in the teeth of the hinge-line, the latter often becoming much thickened, and some of them obsolete with age: the anterior muscular impression is very deep and strong, while the posterior one is superficial, though the shell is always thinner at that point, as frequently observed in worn specimens.

## PALÆARCA VENTRICOSA.

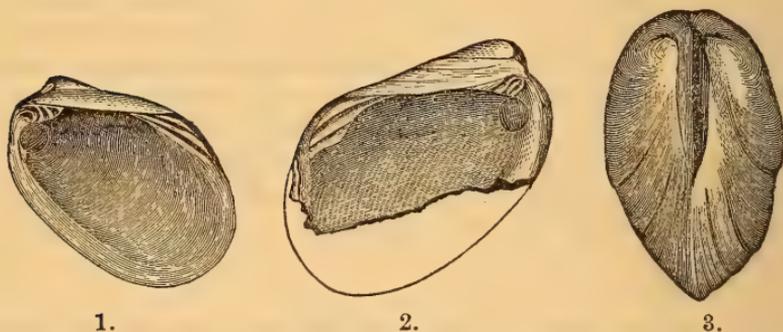


Fig. 1. The interior of the right valve of this species, showing the anterior and posterior teeth, the ligamental area and muscular impression.

Fig. 2. The left valve of an older specimen, in which the anterior teeth appear to have been partially obliterated by age. The ligamental area is proportionally wider than in fig. 2.

Fig. 3. A cardinal view of the exterior of the same species, showing the ligamental area.

\* This genus was proposed in 1847, and the description has been printed in the Palæontology of New-York, Vol. III, with the accompanying illustrations.

PALÆARCA SAFFORDI.

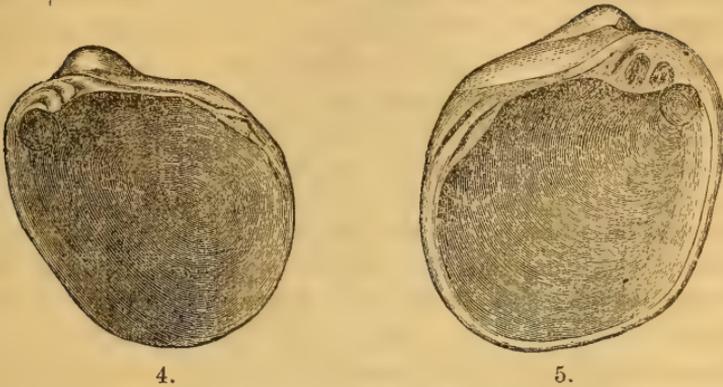


Fig. 4. The interior of the right valve, showing the hinge-teeth and ligamental area, muscular impressions, etc. The ligamental area is very narrow in the specimen.

Fig. 5. The left valve, showing a wider ligamental area, with the anterior teeth less strongly defined than in the preceding figure, which represents the prevailing character of this part of the shell. The posterior teeth are more oblique and more strongly defined than in fig. 4.

The posterior muscular impression is but faintly defined, though distinctly visible in several specimens, occupying a larger area than the posterior impression; the shell at that point being much thinner, and often worn through from the exterior, in the specimens examined.

This species occurs in Tennessee, and, like the preceding, in strata of the age of the Trenton limestone, and approaches in form some of the species in New-York, the hinge structure of which is yet unknown.

Under this genus may be arranged the following species from Vol. I, Palæontology of New-York :

<i>Ambonychia obtusa</i>	=	Palæarca obtusa.
<i>Cardiomorpha vetusta</i>	=	P. vetusta.
<i>Edmondia subtruncata</i>	=	P. subtruncata.
<i>E. subangulata</i>	=	P. subangulata.
<i>E. ventricosa</i>	=	P. ventricosa.
<i>Modiolopsis latus</i>	=	P. lata.
<i>M. subspatulatus</i>	=	P. subspatulata.

There are, also, besides these, some species in the Lower Helderberg rocks, which resemble the Palæarcæ of the Lower Silurian rocks, both in their general external features and in the large muscular scar. In several forms, however, they approach AVICULA, and do not appear to have had an external ligamental area. A single cast has, upon the anterior portion of the hinge-line, as many as six or seven crenulations; while the posterior portion of the cardinal line. in another specimen, shows two long narrow teeth. This structure of the hinge-line, though

similar to that of PALÆARCA, differs greatly in the number of teeth, which likewise appear to be simple crenulations transverse to the hinge-line. In this feature, as well as in certain external characters, some of these shells resemble PTEROPERNA; while the Palæarcæ, on the other hand, approach in character to BAKEWELLIA.

Among the fossils of this group are some which, in single valves, present the characters of AVICULA, and have heretofore been referred to that genus; but an examination of specimens which preserve the two valves shows that both valves are gibbous, and that they are essentially equivalved shells, possessing a more or less conspicuous alation upon the anterior and posterior sides. The surfaces of many of these are marked by strong concentric laminæ of growth and fine radiating striæ, corresponding in this character to the surface of some species of AMBONYCHIA.

An examination of the casts from the interior of some of these shells shows that they are provided with a very strongly marked muscular impression close to the anterior extremity. On farther comparison, these forms have much resemblance to some in the Upper Helderberg group; one of which was figured in the Geological Report of the Fourth District in 1843, under the name of *Pterinea? cardiiformis*. This species is expanded on the posterior cardinal line, and has an anterior lobe or wing separated by a sinus from the body of the shell, and possessing a very large muscular impression which lies just within this anterior lobe.

It would appear, therefore, that we have a group of shells, possessing the characters here noticed, and, so far as now known, beginning their existence in the Lower Helderberg group, and extending through the Oriskany sandstone, the Upper Helderberg limestone and the Hamilton group. Although the hinge-structure has not been fully determined, they are clearly separable from AMBONYCHIA, taking *A. bellistriata* and *A. radiata* as the types, by the strong anterior muscular impression, which does not exist in those shells, and by numerous teeth in the anterior part of the hinge.

For these forms I propose the generic name *Megambonia*.

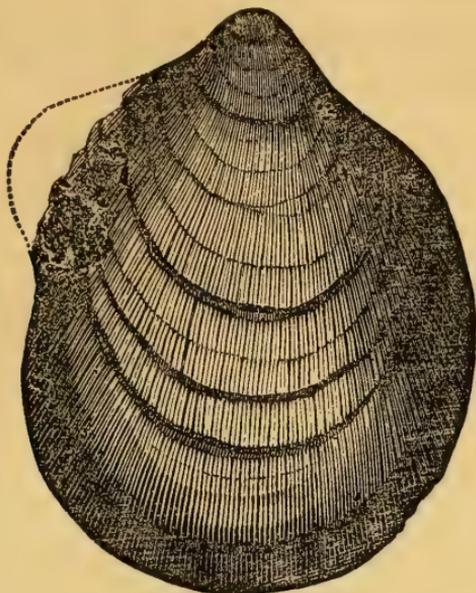
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### GENUS MEGAMBONIA.\*

**SHELL** equiwalve or subequiwalve, inequilateral, subovoid, usually very gibbous in the middle and towards the umbones: anterior side often lobed or auriculate, a strong muscular impression occupying a considerable portion of this part of the shell; posterior cardinal margin expanded, more or less compressed and frequently alate: hinge-line crenulated on the anterior end, teeth numerous; posterior teeth linear, remote from the umbones.

\* Palæontology of New-York, Vol. III.

SURFACE marked by concentric laminae of growth, and often by fine radiating striae.



MEGAMBONIA CARDIFORMIS.

The following species from the Lower Helderberg group have been referred to this genus, some of them having been determined from external features alone, and others from the internal casts and a partial exposure of the hinge-line. See Plates 49, 49 *a*, and 50, Palæontology of New-York, Vol. III.

Megambonia suborbicularis.

M. spinneri.  
M. aviculoides.  
M. rhomboidea.  
M. mytiloidea.  
M. ovoidea.

Megambonia obscura.

M. lata.  
M. oblonga.  
M. cordiformis.  
M. ovata.

NOTE.

In this connection, I may also notice the Genus *CYPRICARDITES* of CONRAD, published in 1841 (Annual Report on the Palæontology of New-York, p. 51), which has been almost entirely overlooked. The description is as follows:

“GENUS *CYPRICARDITES*. Equivalved, profoundly inequilateral : hinge with  
“four or five unequal cardinal teeth, anterior one largest and most prominent ; lateral teeth short, and very remote from the cardinal teeth.”

“This genus is allied to *PTERINEA* of GOLDFUSS, but is never properly alated, nor has it the very large muscular impressions of that genus : the cardinal and lateral teeth are also different ; the anterior cicatrix is often deeply impressed ; the posterior one not visible in casts of the interior.

“ This genus abounds in the Silurian rocks, but I have not seen a species  
 “ from any more recent formation.”\*

Mr. CONRAD describes sixteen species under this genus, among which were included the *C. bisulcata* since described by DE VERNEUIL as the type of the Genus GRAMMYSIA, under the name of *G. hamiltonensis*.

The description corresponds in many respects with that of PALÆARCA, and the illustration given by Mr. CONRAD likewise resembles that genus. Should an examination of the typical species prove the two identical, the later name will give place to that of CYPRICARDITES.



CYPRICARDITES (CONRAD). †

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\* When these remarks were written, the Hamilton and Chemung groups were regarded by the New-York Geologists as Silurian, and as being the equivalent of the Ludlow rocks of England.

† This figure is copied from the original figure of Mr. CONRAD, accompanying his description of the genus in 1841. The plate upon which this occurs was engraved to accompany the Annual Report of 1841 ; but, unfortunately, only a small number were ever distributed, so far as known to the writer. The same plate contains illustrations of the Genera NUCULITES, LYRODESMA, ORTHONOTA, CYRTOLITES, ORTHOSTOMA, DICTYOCRINUS, ASPIDOLITES and DICRANURUS, as well as of one species of PLATYCERAS ; all genera proposed by Mr. CONRAD. At the time I proposed the Genus PALÆARCA in 1847, I had overlooked the description and figure of CYPRICARDITES ; and it is only since the printing of that part of Vol. III, Palæontology of New-York, that my attention has been directed to the subject of the preceding note.

## OBSERVATIONS

ON THE GENERA

## CAPULUS, PILEOPSIS, ACROCULIA, AND PLATYCERAS.

IN the work entitled "Figures and Descriptions of the Palæozoic Fossils of Cornwall, Devon and West-Somerset," by Professor PHILLIPS, published in 1841, he has proposed the Genus ACROCULIA to include certain fossils which had been referred to the Genus PILEOPSIS, and to which, he remarks, they "offer but slight analogy." His description is as follows :

• *Provisional character.* Obliquely spiral ; the apex free, the aperture "ample, without columella : a sinus in the right lip."

This generic distinction has been acknowledged by some palæontologists ; but, more recently, both Continental and English naturalists have referred all these forms to CAPULUS or PILEOPSIS, which are regarded as synonymous.

Previous to the publication of the work of Professor PHILLIPS cited above, Mr. CONRAD, in his Report on the Palæontology of New-York for 1840 (p. 205), proposed the generic name PLATYCERAS, with the following remarks :

"I propose to group in this genus the *Pileopsis tubifer* (SOWERBY), *P. vetusta* (SOWERBY), the *Nerita haleotis* (SOWERBY), and perhaps *Bellerophon cornuarietes*. The shells are suboval or subglobose, with a small spire, the whorls of which are sometimes free and sometimes contiguous : the mouth is generally campanulate or expanded. I have not seen a species above the Silurian rocks, though they probably occur above them in Europe\*, and they are never found in the Lower Silurian strata ; they characterize the middle portion of the system."

The generic description of Mr. CONRAD is more comprehensive than that of Professor PHILLIPS, as it includes shells with the volutions free or contiguous. Both authors, however, have designated among the typical forms the *Pileopsis vetusta* of SOWERBY. The species first described by Mr. CONRAD are the *P. dumosum* of the Upper Helderberg limestone, the *P. ventricosum* and *P. gebhardii* from the Lower Helderberg.

The *P. dumosum* is spiniferous, and the volutions in all these are essentially contiguous ; but some species subsequently referred by Mr. CONRAD to

\* See note on page 9.

this genus have the lower volutions free, and the apex consisting of one or two minute contiguous volutions. From these forms we gradually pass to others where the apex is simply arcuate, and finally to those which are entirely straight. From the large number of species grouped under this designation, it might be doubted whether there is not room for farther separation; but with our present knowledge, it does not appear practicable to draw any lines of generic distinction, and we find, moreover, that some of the species, in their different stages of growth, present a variety of character which might render it difficult to recognize them as identical under all circumstances.

Although possessing numerous casts of some species of this genus, and a large number of shells of several species from the interior of which the stony matter is entirely separated, I have thus far been unable to recognize the peculiar muscular impressions which are characteristic of *CAPULUS* or *PILEOPSIS*; and I feel therefore constrained, in the present state of my knowledge, to adopt the generic name *PLATYCERAS*.

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### GENUS *PLATYCERAS* (CONRAD, as emended).

**SHELLS** depressed subglobose, subovoid or obliquely subconical. Spire small: volutions few, sometimes free and sometimes contiguous, without columella; aperture more or less expanded, often campanulate and sometimes with the lip reflexed; peristome entire or sinuous.

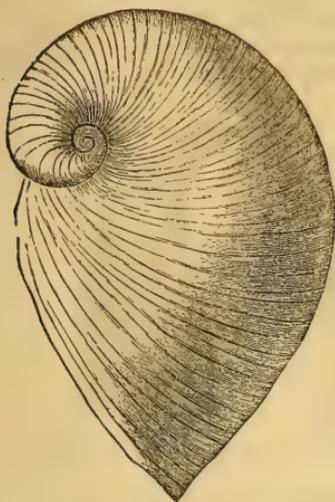
**SURFACE** striated or cancellated, often spirally ridged or plicate, and sometimes strongly lamellose transversely, nodose or spiniferous.

Many of the species show a sinuosity of the striæ, indicating a notch in the margin of the aperture during the first stages of growth, and this notch sometimes remains in the mature condition. More frequently, however, the earlier sinus is closed, and, in certain species, the margin continues unbroken, while in a few others this sinus is continued to the margin at the final period of growth; but more often it becomes closed at some period during the growth of the shell, and another commenced at some other point, and not seldom two or more are thus begun and continued; while some simply striated species, with a single sinus in their earlier stages of growth, become more or less plicated towards the margin, with several sinuosities in the peristome in the mature condition: usually, however, one or two of the marginal sinuosities are deeper than the others.\*

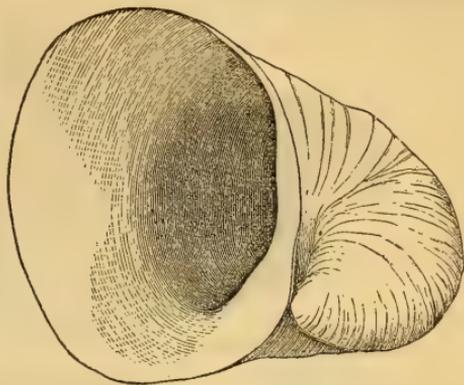
\* The variety of form here described, with extensive illustrations of more than forty species in the third volume of the *Palæontology of New-York*, convey but an imperfect idea of the variety of character and expression presented in an extensive collection of the species of this genus. Since the preceding observations were written and printed (in Vol. III, p. 309), I have examined a collection obtained at Cumberland, Md., in September 1858, and find some specimens which show the

The accompanying figures are illustrations of one of the typical species of Mr. CONRAD.

PLATYCERAS VENTRICOSUM.

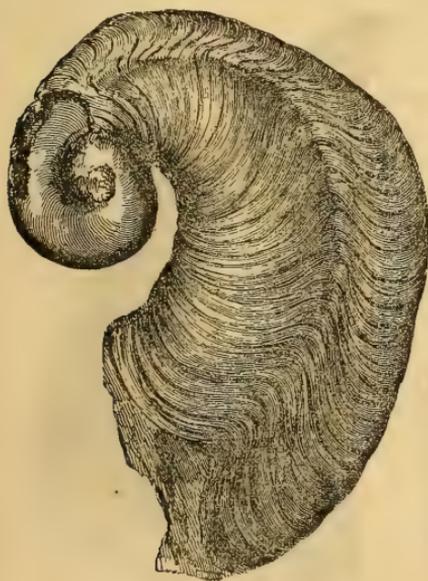


1



2

The following figures are of other species, where the last volution is free, there being one or two closely contiguous turns at the apex : one of them is deeply sinuate at the margin.



PLATYCERAS TRILOBATUM.



PLATYCERAS INTERMEDIUM.

expansion of the columellar lip, and its partial or entire union with the volution, presenting all the appearance of a thin columella with a deep umbilicus. An approximation to this condition is likewise shown, more or less complete, in some of the figures on Plates 117 and 118, Vol. III, Pal. New-York.

The following figures are illustrations of two other species; one of them having a single minute close volution at the apex, and the other being simply bent or arcuate. For the latter forms, I had proposed in 1843 the generic name *ORTHONYCHIA*\*; but an examination of a great number of specimens has not shown any reliable character, by which they may be separated from *PLATYCERAS*.



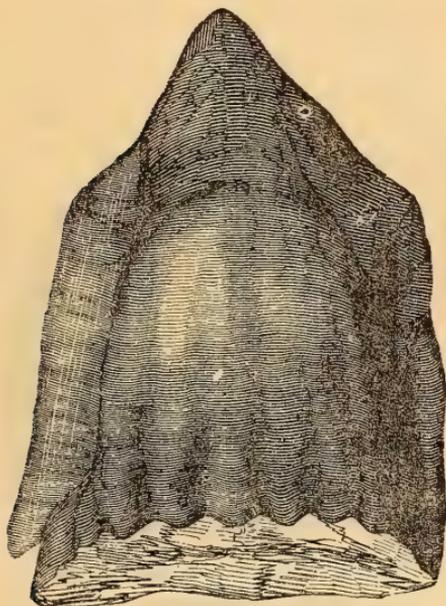
*PLATYCERAS BISULCATUM.*



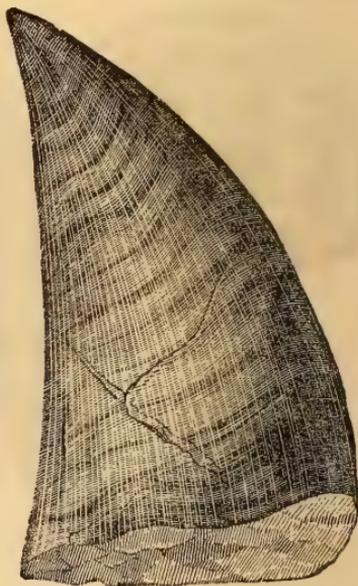
*PLATYCERAS SUBRECTUM.*

In the farther removed from the spiral forms of this genus, we have the straight and nearly straight species, which, in the striate, cancellate, and plicate surfaces and sinuous peristomæ, still preserve externally the generic characteristics.

*PLATYCERAS PLICATUM.*



1



2

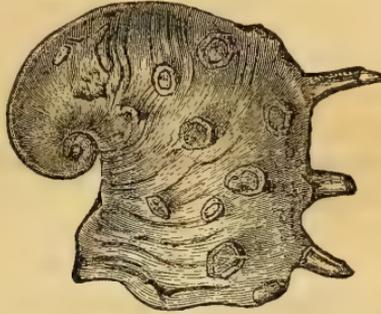
Fig. 1. The anterior side of a specimen which is partially crushed.

Fig. 2. The left side of a specimen.

\* Report on the 4th District, Geology of New-York, 1843

The preceding figures (with one exception) illustrate some of the numerous varieties of form which occur in the rocks of the Lower Helderberg group, in which, and the Oriskany sandstone together, we know nearly fifty species.

The following species from the Upper Helderberg limestone offers an illustration of the spiniferous forms : the specimen is one of medium size of the *P. dumosum* (CONRAD). The larger individuals of this species are sometimes more thickly set with spines ; and in a single individual before me, some of these spines are two inches in length.



PLATYCERAS DUMOSUM.

There are about fifteen species of this genus already known in the limestones of the Upper Helderberg group, some of them approaching in character to those of the Lower Helderberg limestones ; but they never acquire that degree of development, nor the prolific variety of form and number of individuals, which meet us in the latter group of strata.

We already know several species in the Hamilton group, and among them one spine-bearing form ; but the individuals are comparatively rare, and they form but an inconspicuous feature in the fauna of the period.

In the Chemung group, where the calcareous element is greatly subordinate, and the mass consists principally of sands and clays, these forms are exceedingly rare or almost entirely wanting.

In the Carboniferous limestones of the Mississippi valley, we already know some seven or eight species, and a larger number will doubtless be found during the progress of investigations.

## OBSERVATIONS

ON THE GENERA

## PLATYOSTOMA AND STROPHOSTYLUS.

## PLATYOSTOMA.

The Genus PLATYOSTOMA was described by Mr. CONRAD in the Journal of the Academy of Natural Sciences of Philadelphia in 1842, Vol. VIII, p. 275, as follows :

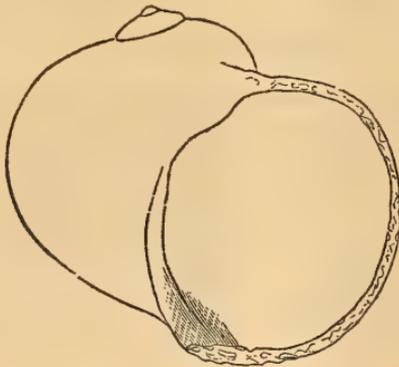
## “PLATYOSTOMA (Conrad)

“SHELL subglobose : spire short ; aperture very large, suborbicular, dilated ; labrum joining the body whorl at right angles to the axis of the shell.”

The Platystomæ are globose shells with low spires, having columella : the last volution is extremely expanded, the aperture very large, and the columellar lip thickened.

These shells are often distorted by pressure to a great extent, and it is not always possible to distinguish the casts of this genus from those of the STROPHOSTYLUS, or from those of some species of the PLATYCERAS of CONRAD.

The *P. ventricosa* is given as the type of the genus, and the accompanying figure is copied from the outline of the shell as given by Mr. CONRAD on Plate XVII of the volume cited.



PLATYOSTOMA VENTRICOSA.

Under this genus Mr. CONRAD described three species, the *Platystoma ventricosa* and *P. arenosa* from the Oriskany sandstone, and the *P. lineata* from the Hamilton group.

## STROPHOSTYLUS.

There are, besides the true PLATYOSTOMÆ, some other shells of not very dissimilar character in the rocks of the Lower Helderberg and Oriskany sandstone periods. Some of these, in the casts and in their exterior conformation, are remarkable for their oblique form and the wide-spreading of the last volution, which is also often exaggerated by pressure in the same direction.

These fossils have sometimes the globose form of PLATYOSTOMA ; but in these instances they are usually more symmetrical, and may be recognized by the smoothly rounded outline and the extreme posterior extension of the peristome on the adjacent volution. The surface is evenly striated by fine elevated threadlike striæ parallel to the lines of growth.

Although differing in external characters from any other gasteropods of the group, I have not until recently had the means of determining the generic relations of these forms. During the past year (1857) I obtained from Cumberland (Maryland), some Gasteropoda of the Oriskany sandstone, among which was a single specimen of one of these shells entire and without adhering stone. This specimen, and some others subsequently obtained, show that the fossils having the character just noticed possess a peculiar form of columella, which is more or less distinctly twisted or folded, or with a broad spiral groove within the outer edge of the columella, and between that and a parallel ridge or callosity.

For these shells I have proposed the generic name *Strophostylus*.\*

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 GENUS STROPHOSTYLUS (Hall).

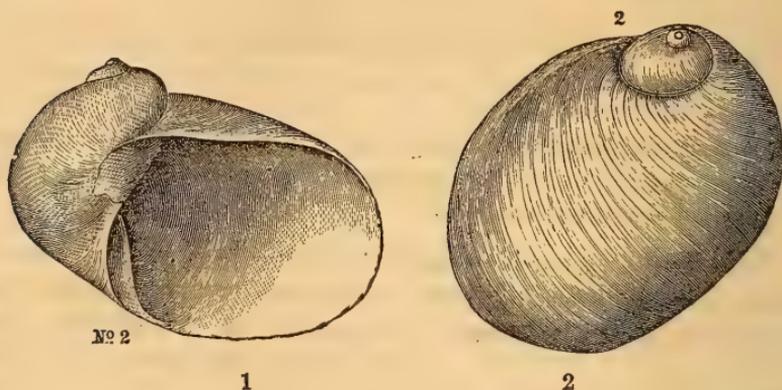
[ Gr. στρεψω, *verto* ; στυλος, *columella*. ]

GENERIC CHARACTER. Shells subglobose or ovoid-globose. Spire small, with a large ventricose body-whorl; outer lip thin, not reflected (sometimes slightly expanded); columella twisted or spirally grooved within, not reflected; umbilicus none: aperture somewhat round-ovate or transversely broad oval.

The columella is rarely seen, though I have been so fortunate as to discover it in three species from the Oriskany sandstone; while it is partially exposed in two other species, one of which is from the Ori-

\* Palæontology of New-York, Vol. III. p. 303.

skany sandstone, and the other from the limestone of the Lower Helderberg group.



The figures 1 and 2 are illustrations of well-marked species from the Oriskany sandstone.

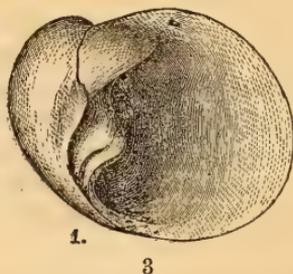


Fig. 3 is of another species from the same rock, showing the same general character of the columella.

Under this genus I have described the *Strophostylus elegans*, *S. globosus*, *S. obtusus*, *S. depressus*, *S. fitchi* and *S. rotundatus*, from the rocks of the Lower Helderberg group; and *S. transversus*, *S. matheri*, *S. andrewsi* and *S. expansus* from the Oriskany Sandstone.

## OBSERVATIONS ON THE GENUS NUCLEOSPIRA.

IN MURCHISON'S Silurian System, Mr. SOWERBY has described, under the name *Spirifer? pisum*, a species differing essentially in general external characters from the typical forms of that genus. This species has been adopted as a true *Spirifer* in MORRIS'S Catalogue of British Fossils, and in the Nomenclator Palæontologicus of BRONN, as well as elsewhere. Subsequently I discovered in the Niagara shales a form so similar to the British species, that I regarded it as identical; but, from the condition and character of the specimens, I considered them as more nearly allied to *Orthis* than to *Spirifer*, and, accordingly, in the second volume of the Palæontology of New-York, designated the Niagara fossil *Orthis pisum*.

Since that period, my collections from the Helderberg have revealed a species similar to the one from the Niagara group; but among the numerous individuals from the latter rocks, I found several which were clearly furnished with internal spires like the true *Spirifer*, thus separating it from *Orthis* by unequivocal characters. Finding no genus for the reception of these forms, I described the latter as *Spirifer ventricosa*; and it has been so published in my descriptions of new palæozoic fossils in the Report of the Regents of the University upon the State Collections of Natural History.

Farther examination has satisfied me of the impropriety of placing this fossil under either of the genera named, for several reasons. The central depressed line, or narrow sinus, which might be regarded as the mesial sinus of *Spirifer*, is almost equally a character of both valves; the apparent area is not a true area; and the apparent foramen, being merely a depression in the false area, does not correspond to the foramen either of *Spirifer* or of *Orthis*, not opening into the cavity of the shell. The hinge-line is not extended in the manner of these shells, particularly of the former; while the presence of a spire sufficiently distinguishes it from the latter.

The Lower Helderberg group furnishes one, and perhaps two, other species; and I find that the fossil described by me as *Atrypa concinna* in the Report of the Fourth Geological District (1843), is another species belonging to the same group of fossils, in which both the external characters and internal structure differ so essentially from any of the described genera of Brachiopoda as to constitute a distinct genus; and which, from the general nucleolar character of the known species, I propose to designate NUCLEOSPIRA.

## GENUS NUCLEOSPIRA (Hall, 1857).

*Spirifer* : MURCHISON, SOWERBY, et al.; *Orthis* : HALL.

[Gr. *πυρην*, nucleus; *σπειρα*, spira.]

SHELL spheroidal or transversely elliptical, more or less gibbous or ventricose, furnished with internal spires as in *Spirifer* : hinge-line shorter than the width of the shell; cardinal extremities rounded : valves subequal, articulating by teeth and sockets. Ventral valve having the beak extended beyond the opposite valve, and beneath it a triangular depression or area, which sometimes terminates in a shallow spoonshaped pit; on each side of which, at the base, is a strong tooth. A narrow ridge or septum extends along the centre of the inner side of the valve, from beak to base. Dorsal valve furnished with a strong spatulate cardinal process, which, rising vertically from the cardinal margin, is closely grasped at its base by the cardinal teeth of the other valve; and thence bending abruptly upwards, and expanding, is projected into the cavity of the opposite beak, lying close upon the underside of the false area. This process is grooved or depressed in the centre of the upper side, so as to leave between it and the arch of the ventral beak a narrow space for the passage of a pedicle, for the protrusion of which a minute foramen is sometimes observed in the beak. From the sides of this process, above the junction of the teeth of the opposite valve, and at the point where it bends upwards, originate the crural processes which support the spires. A deep cavity beneath the cardinal process extends to the dorsal beak, from which originates a thin elevated septum running to the base of the shell. Muscular imprints confined to a narrow oval space.

SURFACE apparently smooth; under a lens, punctate : shell structure punctate, and, when perfect, covered with minute hair-like spines.

The larger species of this genus present some analogy in external appearance with *Spirigera*, and the presence of internal spires increases the similarity. The cardinal teeth resemble those of *Spirigera* and *Merista* : the punctate shell and the structure of the hinge are, however, quite different. In form, and in the punctate character, it simulates *Magas*; while the elongate cardinal process of the dorsal valve resembles that organ in *Thecidium*. The genus, however, when regarded in all its features, is very distinct from any of these; and the species will constitute, so far as regards American palæozoic brachiopoda at present known, a well-marked, beautiful, and interesting little group. The geological range of the genus, as

at present known, extends from the Niagara, through the Lower Helderberg, to the Hamilton; though it is probable we shall find them in other strata.

Under this genus I have described *N. ventricosa*, *N. elegans* and *N. concentrica* from the Lower Helderberg rocks; *N. pisiformis* (*Orthis pisum*, Pal. New-York, Vol. ii, p. 250), from the Niagara group; and *N. concinna* (*Atrypa concinna*, Rep. of the Fourth Geol. District of New-York, 1843, p. 200, f. 3), which are the species known to me at the beginning of 1848.

The following figures are illustrations of the structure of the genus, as shown in *N. ventricosa*.

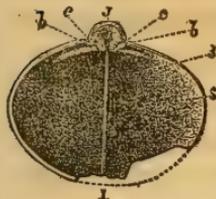


FIG. 1. Interior of the dorsal valve.

- j. Cardinal process.
- c, c. Crural processes.
- b, b. Dental fossets.
- r. Muscular imprints.
- s. Medio-longitudinal septum.



FIG. 2. Profile view of the dorsal valve, showing the recurved cardinal process and the bases of the spiral arms.

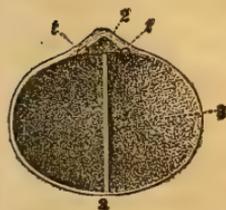


FIG. 3. Interior of the ventral valve.

- 2. A flattened space or false area beneath the beak.
- t, t. Teeth.
- s. Medio-longitudinal septum.



FIG. 4. Profile view of the ventral valve.



FIG. 5. The interior of the dorsal valve, with a portion of the ventral valve attached. The figure shows the concave or grooved surface of the cardinal process j, as if for the passage of a pedicle; the bases of the crura c, c, coming off at the base of the cardinal process; while the teeth of the ventral valve, t, t, fitting into the fossets below these, clasp the whole firmly.

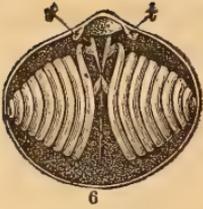


FIG. 6. The ventral valve, showing the spires as detached from the dorsal valve, and the arching transverse filament which connects the two a little below their base.

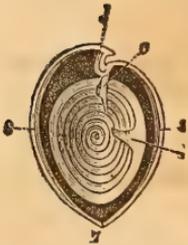


FIG. 7. A longitudinal section of the two valves in their natural relations to each other, showing the cardinal process  $\jmath$  of the dorsal valve extending beneath the false area of the opposite valve, and curving into the rostral cavity. The crura  $c$ , from which the spiral arm on one side is shown, first bend a little into the ventral cavity, and then turn abruptly backwards and curve into the dorsal cavity, following essentially the curvature of the valve: about midway between the beak and base is shown one side of the connecting process  $L$ , which tends abruptly upwards and backwards, terminating in an acute point which is directed towards the free extremity of the descending branch of the crural process. The medio-longitudinal septa  $s, s$ , are of equal elevation in the two valves.

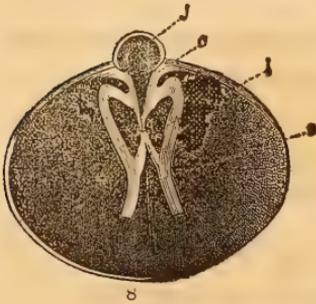


FIG. 8. Dorsal valve, showing the attachment and base of the crura.

These figures are all enlarged three diameters, except fig. 8, which is four diameters. Every part here shown has been clearly seen in specimens of *N. ventricosa*, and the structure is corroborated by specimens of *N. concinna*.



FIG. 9. Dorsal and cardinal views of a specimen of *Nucleospira concinna* (*Atrypa concinna*), from the Hamilton group of New-York.

For farther illustrations of the genus and species, see Vol. iii, Palæontology of New-York, Plate XVIII B.

## GENUS TREMATOSPIRA (Hall, 1857).

*Spirifer* : CONRAD, HALL; *Atrypa* : HALL.[ Gr. *τρῆμα*, *foramen*; *σπείρα*, *spira*.]

SHELL transverse, elliptical or subrhomboidal, inequivalve, furnished with internal spires (arranged as in *Spirifer*) : hinge-line shorter than the width of the shell; cardinal angles rounded. Valves articulated by teeth and sockets : beak of ventral valve produced or incurved and truncated by a small round perforation, separated from the hinge-line by a deltidium. A deep triangular pit, or foramen beneath the beak of the ventral valve, which is filled by the closely incurved beak of the dorsal valve. False area sometimes defined.

SURFACE marked either with strong simple plications or finer fasciculate or bifurcating striæ, which cover also the mesial elevation and depression. Shell structure punctate?

In the extension of the hinge-line, the mesial sinus, the internal spires, and, partially, in the exterior markings, this genus resembles SPIRIFER and SPIRIFERINA : in the perforate beak, false area, and incurvature of the beak of the dorsal valve beneath the apex of the opposite valve, it resembles ATRYPA ; while one of the species has the general aspect of RHYNCHONELLA. From RETZIA, SPIRIGERA, and MERISTA, which have similar internal spires, it is separated by external and other important characters. The appearance of an area is deceptive ; depending mainly upon a partial displacement of the valves, which presents to view the hinge-line of the ventral valve. This is true of *T. multistriata*, where we find some specimens with an appearance of an area, and others without. The *T. perforata* is clearly without an area, as well as *T. costata* ; though the margin of the foramen in the former of these is often defined in such a manner as to resemble a true area. The broad triangular foramen or pit for the reception of the beak of the dorsal valve is a constant and conspicuous feature. This pit does not appear to be like the foramen of *Spirifer*, an opening into the cavity of the valve, but is spoonshaped, somewhat like that of *Pentamerus* ; its lateral walls in *T. multistriata* having been traced for some distance below the margins, apparently converging towards each other.

The known species present the variety of surface marking, respectively, of simple costæ, strong angular striæ in fascicles, and finer somewhat rounded bifurcating or simple striæ. Specimens of each are rare ; and of *T. costata*, but a single one was found among collections continued uninterruptedly through a period of ten years, and a second specimen has since been obtained. The condition of the specimens is such as not to admit of satisfactory investigations of the interior, which must for the present remain partially undetermined.

The species positively determined to the present time are from the rocks of the Lower Helderberg group ; to which may be added the *Trematospira* (*Atrypa*) *camura* of the Niagara group, which presents some slight deviation in the perforation of the beak, and a species from the Hamilton group which is apparently of the same genus.



Fig. 1. *Trematospira costata*. Dorsal and front views.

Fig. 2. *T. perforata*. Dorsal view.

Fig. 3. *T. multistriata*. The ventral valve, from which the dorsal valve has been ground away, showing the spires as they appear on the polished surface of the stone.

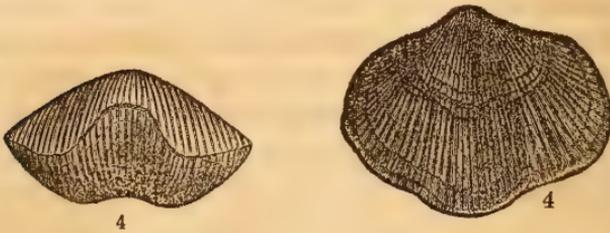


Fig. 4. Ventral and front view of *T. multistriata*.

*Geological range.* Admitting the species from the Hamilton group as of the same genus, its range is from the Niagara group to the Hamilton group, or from near the base of the Upper Silurian to the middle of the Devonian period.

The following species have been described :

*T. perforata*,

*T. multistriata*,

*T. costata*,

*T. simplex*,

*T. simplex* var. from the Lower Helderberg group ;

*T. camura*, from the Niagara group.

## GENUS RHYNCHOSPIRA (n. g.).

[ Gr. *ρυγχος*, *rostrum*; *σπειρα*, *spira*: in allusion to its similarity in form to RRYNCHONELLA, and having internal spires.]

*Terebratula* and *Rhynchonella* of authors.

*Waldheimia*: HALL, 1856.

*Trematospira*, Subgenus *Rhynchospira*: HALL, 1857.

*Rhynchospira*: HALL, 1858.

SHELL longitudinally ovate or subglobose, more or less gibbous, acute or obtuse at the apex. Valves subequally convex; mesial fold not strongly defined, one, two, or more smaller plications usually marking the centre of each valve: beak of the ventral valve perforate, the perforation generally well defined, the lower formed by a deltidium which separates it from the umbo of the opposite valve.

SURFACE radiatingly plicate or striate: shell-structure punctate or striato-punctate?

VALVES articulating by teeth and sockets; the crura supporting two conical spires, which occupy the greater part of the cavity of the two valves. The cardinal process of the dorsal valve is a broad subemarginate plate, spreading laterally and a little recurved at its basal margins, where it is clasped by the teeth of the opposite valve, and extends beneath the deltidium, lying close against the inner surface of that part of the ventral valve.

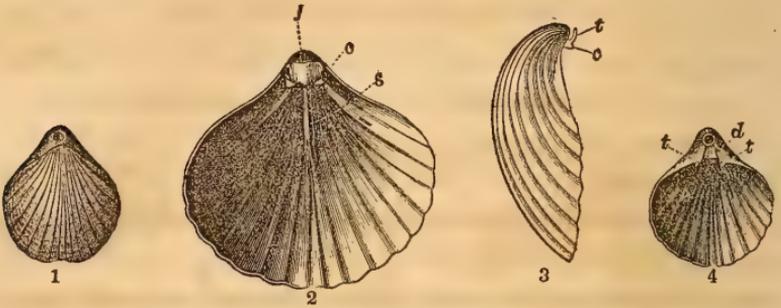
The mode of articulation, as now determined, is very similar to that of NUCLEOSPIRA; but the cardinal process is proportionally shorter and emarginate at the extremity, the perforation of the beak large and distinct, while the form is different and the exterior surface plicate or striate, and not punctate as in that genus.

The form of the species is not unlike *Rhynchonella*, but usually more symmetrically rounded, and with less distinct mesial sinuosities. In these characters they resemble WALDHEIMIA, to which genus I had originally referred them until the discovery of the internal spires.

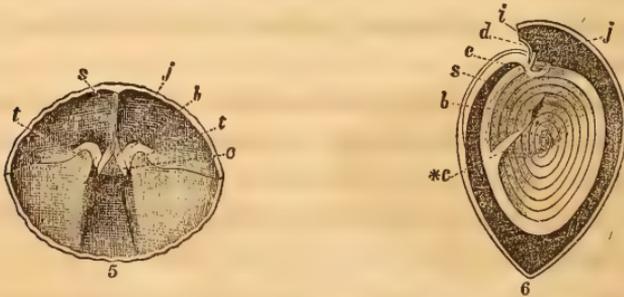
Several of these shells bear a close resemblance, both in the general form and in the interior spires, to RETZIA; but the dorsal valve never presents the straight extended hinge-line, nor the ventral valve the short area, common to the carboniferous species of that genus.

From the external characters of the species referred by me to *Atrypa aprinis*, Palæontol. New-York, Vol. ii, pa. 280, pl. 57, f. 7 (= *Terebratula aprinis*, M. V. K. Geol. Russia and the Ural Mountains, Vol. ii, pa. 90, pl. x, f. 10), I infer that it belongs to this genus.

The accompanying figures illustrate the principal characters shown in the typical species *R. formosa*.



- Fig. 1. Dorsal view of a specimen, natural size.  
 Fig. 2. Interior of the dorsal valve enlarged two diameters, to show the broad cardinal process *j* which covers the extremity of the beak, the bases of the crura *c*, and the short medio-longitudinal septum *s*.  
 Fig. 3. Profile view of the same, showing the cardinal and crural processes.  
 Fig. 4. Interior of the ventral valve, natural size, showing the teeth, the deltidium, and the foramen.



- Fig. 5. The upper part of the two valves connected in their natural relations to each other, showing the teeth, the ventral valve below, the sockets, base of crura, cardinal process, and septum of the dorsal valve.  
 Fig. 6. Longitudinal section, showing the foramen, the deltidium and the cardinal process of the opposite valve lying beneath it; the crura, first bending downwards, and then recurved into the dorsal valve and its continuation in the spire, with the descending process *e*, which forms, with the opposite one, a connecting filament between the two spires.

The following species, published in the Report of the Regents of the University for 1856, may be referred to this genus.

<i>Waldheimia globosa</i>	=	<i>Rhynchospira globosa</i> ;
<i>W. formosa</i>	=	<i>R. formosa</i> ;
<i>W. deweyi</i>	=	<i>R. deweyi</i> ;
<i>W. rectirostra</i>	=	<i>R. rectirostra</i> .

See also the same species described in the Palæontology of New-York, Vol. iii, pages 215, 216 & 217, Plates xxxvi & xxxvi A.

*Geological range.* The species at present referred to this genus are from the Niagara and Lower Helderberg groups; while I have a single analogous form, not yet fully determined, from the Hamilton group.

## GENUS TROPIDOLEPTUS (Hall).

[Gr. τροπισ, *carina*; λεπτος, *tenuis* : the carinate ventral valve and shallow visceral cavity, in its analogy with LEPTÆNA.]

*Strophomena* : CONRAD.

*Leptæna* : HALL, OWEN, and others.

*Tropidoleptus* : HALL, Regents' Report for 1856; Palæozoic Fossils, 1857.

SHELL transversely oval or longitudinally semielliptical, one valve convex and the other concave, articulating by teeth and sockets; hinge-line equal to or less than the greatest width of the shell. Ventral valve with a linear area and triangular foramen or notch in the margin of the area : from the inner edges of this proceed the dental lamellæ, which are separated from the area by a narrow groove strongly crenulated on the outer edge and extending obliquely outwards, terminating in a low ridge which partially surrounds the muscular impression. Dorsal valve concave; the cardinal process prominent, somewhat wedge-shaped, obtuse at the outer extremity, and diverges in the interior, supporting the bases of the crura. Dental fossets crenulate.

SURFACE plicate : shell-structure punctate.

The *Strophomena carinata* of CONRAD is the type of this genus, and the only species determined at the present time (See Report of the Regents for 1856, page 111).

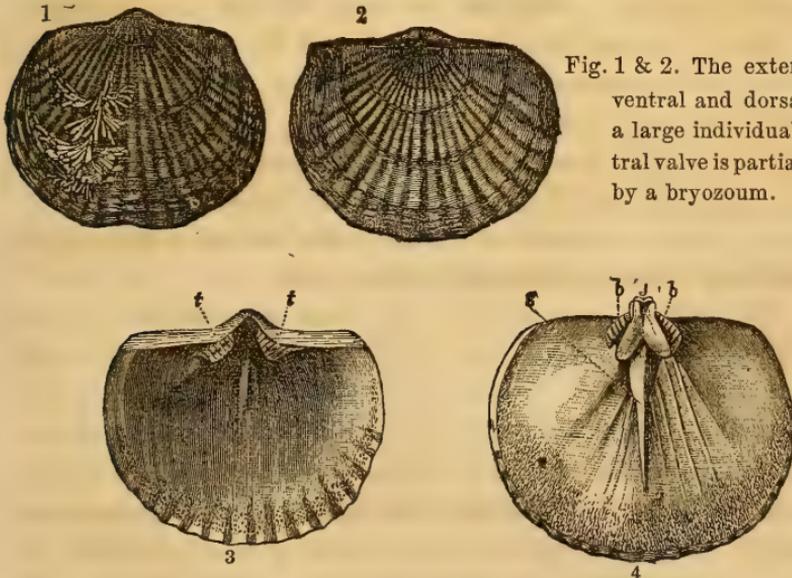


Fig. 1 & 2. The exterior of the ventral and dorsal valves of a large individual. The ventral valve is partially covered by a bryozoium.

Fig. 3. The interior of the ventral valve, showing the area, foramen, teeth, etc., enlarged.

Fig. 4. The interior of the dorsal valve, showing the cardinal process, the dental fossets, the bases of the crura, and the septum.

## GENUS LEPTOCÆLIA ( Hall, 1856 ).

[ Gr. λεπτος, *tenuis*; κοιλια, *venter*, in allusion to the shallow visceral cavity.]

*Terebratula* and *Rhynchonella*, in part, of authors.

*Atrypa* : CONRAD, HALL, et al.

*Leptocælia* : HALL, Regent's Report for 1856.

SHELL inequivalved, variable in form, usually semioval or subcircular, transverse or elongate, plano-convex or concavo-convex : hinge-line sometimes equal to the greatest width of the shell. Ventral valve convex or subangular in the middle, with beak more or less extended, moderately incurved; foramen terminal, the lower side formed by two deltidial pieces. Dorsal valve flat or concave, or depresso-convex. A mesial fold and sinus usually existing, but not often prominent. Structure of shell lamellose or fibrous, not punctate.

VALVES articulating by means of two strong teeth in the ventral, inserted into sockets in the dorsal valve, which are mainly excavated in the base of a strong cardinal process : teeth converging, denticulate, with corresponding denticulations in the sockets. Muscular impressions marking a large oval or flabelliform area, with a thin median septum : adductor imprints small.

The dorsal valve is marked by a strong cardinal process, at the base of which, on each side, are the deep oblique dental fossets; and from the inner margins of these proceed the crural processes, supported below by thickened plates which extend obliquely for a short distance towards the middle of the shell, bordering the muscular impression. The muscular impression forms a suboval space, divided through the middle by a low median septum.

The crura, in their extension, are united in a flattened disk, which terminates at its remote extremity in an acute point; and on the centre of the cardinal side of the disc there is a slender process extending downwards, while near the junction of the crura with the disc there is, on each side, a slender descending process continued into the cavity of the ventral valve. The cardinal process, in its central portion, is thickened at first and divided in the middle, but, in old shells, gradually filling the passage to the foramen, and sometimes by a prominent point in the centre entirely dividing the passage.

The hinge-line is often much extended, and in the dorsal valve nearly straight to the cardinal angles. There is sometimes the ap-

pearance of a false area on the ventral valve, somewhat similar to *ATRYPA*, the margin being thickened and grooved; but this does not appear to be a characteristic or constant feature.

The specimens of the interior, which have fallen under my observation, usually preserve only the short crural processes; and it is in one specimen alone, which is partially filled with crystalline matter, that distinct cavities can be seen corresponding with what I have described. The crystalline matter was first deposited upon these internal organs, which have subsequently almost entirely decomposed, leaving in the cavities fragments of the substance, showing the original form of the crura and appendages.

The shells of this form have been described as *TEREBRATULA*, and more recently have been included with *RHYNCHONELLA*, from which they differ conspicuously in the great inequality of the valves and the extension of the hinge-line, as well as in their internal structure.

The accompanying illustrations show all that has been thus far determined relative to the internal structure of this genus. Figures 1, 2 and 4 are from specimens of *L. flabellites*; and fig. 3 is a nearly perfect specimen of *L. fimbriata*.

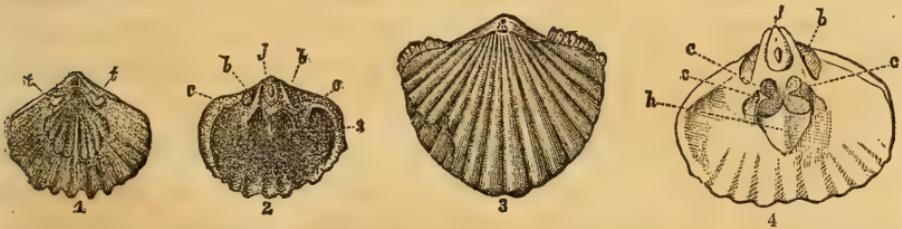


Fig. 1. The interior of the ventral valve, showing the cardinal teeth and the muscular impression.

Fig. 2. Interior of the dorsal valve, showing the cardinal process *j*, the teeth sockets *b b*, the bases of the crura *c c*, and the short thickened septum which divides the muscular impression.

Fig. 3. An enlarged figure of *L. fimbriata*, showing the usual form, the foramen at the beak, and the fimbriae on the cardinal margin.

Fig. 4. The interior as shown in a specimen of *L. flabellites*, where it has been partially filled with crystalline quartz. The decomposition of the crura, loop, and the flattened disc, have left cavities of the same form in the quartz, and small portions of the substance of some of these parts still remain. The specimen is a dorsal valve which retains the matter formerly filling the shell, and it is seen from the ventral side.

I have heretofore referred to this genus the *Leptocælia (Atrypa) disparilis* of the Niagara group, the *Terebratula lepida* of GOLDFUSS, the *T. sublepida* and *T. duboisii* of MM. MURCHISON, DE VERNEUIL and KEYSERLING (Geology of Russia and the Ural Mountains). The *L. concava* and *L. imbricata* of the Lower Helderberg group are analogous forms, which have been referred to this genus. The *Atrypa hemispherica* of MURCHISON is apparently a characteristic form of this genus, as well as

the *A. planoconvexa*, both of the Clinton group\*. The internal structure, however, has been determined from the species of the Oriskany sandstone and Lower Helderberg specimens, but mainly from the former.

In its hinge-structure it approaches TROPIDOLEPTUS ; but the hinge-line of the dorsal valve is never so far produced, while the beak is much more extended. In TROPIDOLEPTUS there is a distinct linear area, and the teeth and sockets are crenulated ; the form and character of the muscular impressions are different, and the structure of the shell is punctate.

*Geological range.* The genus begins its existence as low down in the system as the Clinton group, and extends through all the members of the series to the limestones of the Upper Helderberg, and perhaps above that point.

## OBSERVATIONS ON THE GENUS EATONIA.

In the Annual Report on the Palæontology of New-York for 1841, Mr. CONRAD described and figured a species of brachiopod from the Oriskany sandstone under the name of *Atrypa peculiaris*†. A similar species was described by Mr. VANUXEM, in his Geological Report in 1843, under the name of *Atrypa singularis*‡, from the shaly limestone of the Lower Helderberg group.

These species are both remarkable in their form and exterior surface markings; having one valve deeply sinuate on its anterior margin, and the other with a long linguiform extension filling the sinuosity, while the surfaces are finely marked by radiating striæ. A third species, described by Mr. VANUXEM as the *Atrypa medialis*, was placed in the same group with the two preceding, though the external appearance would scarcely justify such an arrangement.

In the course of continued collections in the Helderberg, numerous casts of these species were obtained; and it became apparent that they possessed a peculiar internal structure, leaving upon the casts similar muscular and vascular impressions. For these forms I proposed, in 1856, the name EATONIA||, describing several species. The genus may be characterized as follows :

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\* The last-named species presents some differences in the hinge-structure, which may prove of sufficient importance to unite the lower group of species under another generic designation.

† Annual Report on the Palæontology of New-York, 1841, pa. 56, pl. f. 11.

‡ Report on the Third Geological District of New-York, 1843, p. 120, f. 3.

|| Report of the Regents of the University on the State Cabinet of Natural History for 1856 : Also New Species of Palæozoic Fossils, 1857.

## GENUS EATONIA\* (Hall, 1856).

*Terebratula*, in part, of authors.

*Atrypa* : CONRAD, VANUXEM, HALL, and MATHER.

*Rhynchonella*, in part, of authors.

SHELL oval or ovoid, subcircular, elongate or transverse. Valves very unequally convex, with a strongly developed mesial fold and sinus. Beak of the ventral valve perforate.

The ventral valve is usually nearly flat or slightly convex near the beak, flattened or concave in the middle, with a broad deep sinus extending thence to the front of the shell; the anterior extension being often turned at right angles to the plane of the longitudinal axis. Beak small, elevated and closely incurved over the umbo of the opposite valve, perforate : no area. Dorsal valve convex, often ventricose, with a deep sinus in the anterior margin. Valves articulating by teeth and sockets; the anterior and anterolateral margins often crenulate or plicate within. The cardino-lateral margins of the ventral valve are usually angularly inflected, and embraced within the edges of the dorsal valve.

The valves articulate by means of two teeth in the ventral valve with corresponding sockets in the dorsal valve, and a medio-longitudinal ridge in the ventral valve which is more or less completely embraced between the deeply bifurcating cardinal process of the dorsal valve, which forms part of the apophysary system.

The dorsal valve has a prominent bifurcating cardinal process, the branches of which, slightly diverging, form the first or lower crural processes, which are directed upwards and inwards, or, when the valves are closed, are directed into the muscular cavity of the ventral valve ( their upper surfaces slightly grooved ) †. Below these first processes, and proceeding from the origin of the thickened cardinal process, another pair of crura are directed inwards, and gently curve towards the first, the medio-longitudinal ridge being continued to the centre of the valve; and on each side, from these

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\* *In memoriam* Professor AMOS EATON, Principal of the Rensselaer School in Troy, from its establishment in 1824, to his death in 1842.

† These processes correspond precisely with what are termed the crural processes in *RHYNCHONELLA*, and do not differ materially from the corresponding parts of *Rhynchonella psittacea*, except in their prominence or extension beyond the cavity of the shell as shown in the figures. In the older shells, at least, this process is deeply bifurcate, and grasps the medio-longitudinal septum of the ventral valve, giving additional strength to the hinge. The ultimate extension and form of these processes is still undetermined. Separate valves of the species of this genus are rarely observed, even in positions where the entire shells are common, and where they would have been preserved had they been readily separable like many others.

second crural processes, a ridge proceeds along the inside of the shell nearly parallel to the margin. This ridge, or thickening of the shell, marks the extent to which the margin of the ventral extends within the edge of the dorsal valve.

In the ventral valve, the two strong teeth proceed from the thickened margin of the valve; and below these, but not distinctly connected with them, are lamellæ, which, extending into the cavity of the beak, continue downwards, forming an elevated rim around the deep muscular impression. This elevated rim, which is convergent, grasps the neck of the cardinal process of the opposite valve in its narrowest part between the two pairs of processes (figures 1, 2, 3, and 6).

The muscular area is longitudinally oval, with a strong median plate, which, about halfway from the beak to the base of the muscular impression, spreads laterally and becomes slightly raised from the shell, leaving a little cavity beneath it; and in this, and below its edge, are the cordiform adductor imprints\*. The median ridge is continued below this point, but less prominently than above. When the muscular impression is perfectly preserved, it is radiatingly plicated towards the margin in all the species observed. The casts of the ventral valve show the form of this muscular impression in strong relief, and, in well-preserved specimens, the small adductor impression projects a little above the level of the other part.

The muscular impression in the dorsal valve is somewhat central, oval or cordiform; beginning sometimes a little above the termination of the median septum, and sometimes nearer the beak, and expanding towards the front of the shell. This impression is margined by a slightly elevated rim, and in some species there is a double rim.

The points of similarity with *RHYNCHONELLA* will at once be observed on comparison of this description with that of the former genus, or on comparison with the fossils themselves. The most striking difference in the ventral valve is the absence of dental plates, strictly speaking; though these are represented in the elevated lamellæ surrounding the muscular impression, which is much stronger and differs in some respects from that of *Rhynchonella*. In some of the palæozoic *Rhynchonellæ* there are no dental plates visible, and the muscular depression is but faintly defined. In the median septum of the ventral valve, which in the older shells articulates with the central process of the opposite one, there is a character not observed in *Rhynchonella* proper. The most conspicuous difference, however, is in the dorsal valve and its four crural processes, which differ essentially from *Rhynchonella* and every other brachiopod known to me.

\* See figures 3 and 4, page 37.

I have not discovered the deltidial plates, though they have probably existed. The foramen appears to be formed on the lower side by the umbo of the opposite valve, and, in the young state, there is room for the protrusion of a small pedicle; while in older shells, where these parts have been seen, there appears to be a thickening of the shell, and a closing of the passage to the beak.

The surfaces of these shells are radiatingly striate or plicate; one of the most conspicuous external features being the broad deep sinus on the lower half of the ventral valve, and the abrupt bending of the front of the shell.

*Geological range.* Hitherto I have not distinguished any species in the Lower Silurian rocks; and, in the State of New-York, those already known are confined to the Lower Helderberg group and the Oriskany sandstone.

Under this genus, the *Eatonia medialis*, *E. eminens*, *E. singularis* and *E. peculiaris* are described on pages 241, 242, 243 and 244 of the Palæontology of New-York, vol. iii; and *E. pumila*, *E. whitfieldi*, and *E. sinuata*, on pages 437 and 438 of the same volume.

The following figures are from specimens of *Eatonia peculiaris*, and illustrate the more important features of the genus.

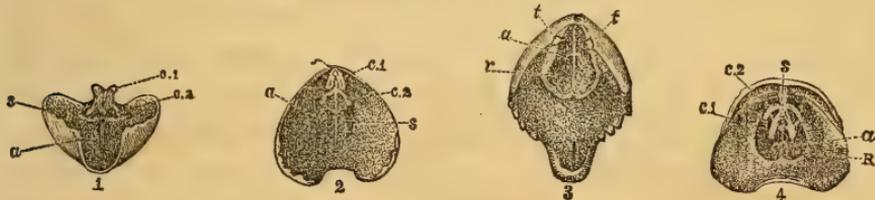


Fig. 1. The dorsal valve in profile, showing the deep sinus in front, the crural processes (c 1 and c 2), the median septum (s), and muscular impression (a).

Fig. 2. The dorsal valve, looking vertically into the interior. The upper crural processes (c 2) are not quite sufficiently divergent.

Fig. 3. The ventral valve, showing the form of the muscular impressions (a, R) and the teeth (t).

Fig. 4. The ventral valve preserving a part of the dorsal valve attached, showing the first crural processes (c 1) extending into the muscular cavity. The extension of the shell in front is broken off, to show the interior.

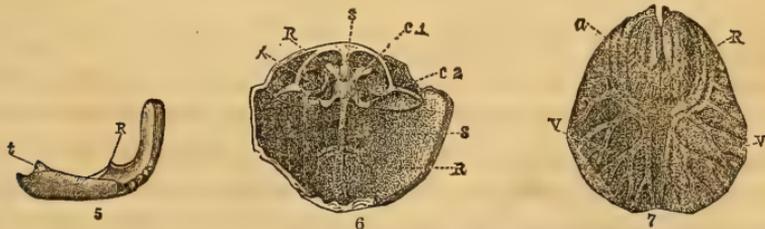


Fig. 5. Profile of the ventral valve, showing the teeth and the elevation of the shell at R, the lower limit of the muscular impression.

Fig. 6. Another specimen (the figure enlarged) with the dorsal valve downwards, showing the median septum of that valve (s), and the crural processes with the median septum of the ventral valve (s) embraced between the processes (c 1). The muscular cavity of the ventral valve (R) is limited by inflected lamellæ, which embrace the neck of the cardinal process of the dorsal valve.

Fig. 7. A cast of the interior of the ventral valve, showing the muscular and vascular impressions.

## OBSERVATIONS ON THE GENUS RENSSELÆRIA.

THE species which I have grouped under this designation, have, in some of their forms, been described as *TEREBRATULA*, *ATRYPA* and *PENTAMERUS*, and more recently I have referred them to *MEGANTERIS*; to neither of which genera do they belong. One of the most common species in the Oriskany sandstone attracted attention in the collections which were made at the Helderberg mountains forty years ago, and specimens are preserved in the "Clinton Collection" of the Albany Institute. Professor AMOS EATON, in his Geological Textbook published in 1832 (p. 45), recognizes two species which he notices as *Terebratula ovoides* and *T. perovalis*; but since he remarks that they are found "also in all parts of Europe in the same rock," it is to be presumed that he regarded these forms as identical with the European species of the same names.

In 1839, Mr. CONRAD described the more common form from the Oriskany sandstone as *Atrypa elongata*\*; a name adopted by the geologists of New-York, and perpetuated in their reports. He also describes a species of this genus, from the Lower Helderberg group, as *Atrypa equiradiata*†.

In 1843, Mr. VANUXEM described a species of this genus, from the Upper Helderberg limestone, as *Pentamerus elongata*‡.

These fossils, though presenting considerable variety when compared in their extreme forms, nevertheless constitute a very natural and beautiful group, easily recognized both in their external and internal characters||.

\* Annual Report on the Palæontology of New-York, 1839, p. 65.

† Journal of the Academy of Natural Sciences, Vol. viii, 1842, p. 266.

‡ Geological Report of the Third District of New-York, 1843, pp. 132 & 133, f. 1.

|| In 1855, after having studied the exterior of the shell and its structure, together with the casts which I had obtained in New-York, I proposed for these fossils a distinct generic designation; but receiving, soon after, Mr. DAVIDSON'S paper "On the systematic arrangement of recent and fossil brachiopoda," published in the Annals and Magazine of Natural History for December 1855, I observed for the first time, in the accompanying improved table of genera, the name of *Meganteris* (Suess), with a reference to *Terebratula archiaci* as the type of the genus. The figure given in the Palæontographica so much resembles the casts of some of the Rensselæriæ, that I inferred the two to be identical, and have thus described these fossils in my paper published in the Regents' Report for 1856 (Palæozoic Fossils, 1857); and it was not until recently (1858) that my correspondence with Mr. DAVIDSON and Mr. SUSS, and the reception of the paper of Mr. SUSS on the Genus *MEGANTERIS*, with illustrations, has satisfied me that this genus is quite distinct from the *RENSSELÆRIA*.

## GENUS RENSSSELÆRIA\* (Hall).

*Terebratula* : EATON, 1834 - 1842.*Atrypa* : CONRAD, 1839.*Pentamerus* : VANUXEM, HALL, 1843.*Atrypa* : VANUXEM, MATHER, HALL, 1843.*Meganteris* : HALL, 1856 & 1857.*Rensselæria* : HALL, 1858.

SHELL inequivalved, oval, ovoid or suborbicular, elongated or rarely transverse and sometimes subtriangular, generally gibbous or ventricose. Valves more or less convex, without mesial fold or sinus : beak prominent, acute, more or less incurved; foramen terminal, sometimes concealed, round or oval, the lower side formed by two small deltidial pieces, and, in their absence, by the umbo of the opposite valve, and then appears triangular. Shell-structure distinctly punctate.

SURFACE radiatingly striated or finely plicated, rarely smooth?

VALVES articulating by two somewhat widely separated teeth in the ventral valve, with corresponding sockets in the dorsal valve. The diverging cardinal teeth supported by strong dental plates, which, on their anterior margins, extend about half the depth of the cavity of the valve, when they turn abruptly towards the beak, and approach each other or unite in the rostral cavity : from this point of return, there is a low ridge bounding the muscular area, which is an elongate more or less oval depression, in the centre of which the adductor muscles occupy two small narrow scars; a more or less prominent median septum extends the entire length.

In the dorsal valve, the dental sockets lie between the shell proper, and a strong, often much thickened process, from the anterior extension of which proceed the slender crural processes, first in a direct line, and then one division of each, diverging into the centre of the ventral valve, terminate in acute points. On the other side the divisions extend nearly at right angles to the axis of the shell, into the cavity of the dorsal valve; and thence bending abruptly forward and gradually converging, terminate above the centre of the shell in a thin flattened or longitudinally concave plate, which, at its remote extremity, ends in an acute point, the whole being lan-

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\* I have given this generic designation to commemorate the name of the late Hon. STEPHEN VAN RENSSELAER, to whose munificence we owe the early geological and agricultural surveys in the State of New-York; and to whose liberality, in establishing the Rensselaer School for teaching the sciences with their application to agriculture and the arts, I conceive is due the great impulse given to the study of the natural sciences, at a period when these pursuits were little fostered in any of our institutions of learning; and if the results of the Geological Survey in New-York are entitled to any pre-eminence, we are indebted to this early influence more than to any other cause.

ceolate or hastate; and from the centre of the concave margin between the crura issues a slender process, which penetrates into the cavity of the ventral valve. This process, with the two first described as extending into the cavity of the ventral valve, sometimes reach nearly to the inner side of the shell, the three gradually converging to the extremities which are near together. This peculiar apparatus is not attached to any median septum; and the plate is left without any support, except from the slender crura.

The cardinal process at the base of the crura is often much thickened, and sometimes extends forward into the shell much more than in others; and when it becomes thickened in old shells, is often distinctly marked by two grooves upon its summit. Behind this process and between it and the beak, there is a distinct round foramen communicating beneath with the interior cavity of the valve. The points for the attachment of adductor muscles in the dorsal valve are double.

The internal structure described has been fully determined in two species, and partially seen in others. In one species, twenty or more individuals have shown it, with some slight variations in the form of the longitudinal plate, as illustrated in the figures on Plate CVII, Palæontology N.Y. Vol. iii.

The shells of this genus are usually oval or ovate in outline, and often very ventricose; some species varying greatly in their different stages of growth. At present, I know of but a single exception to the form mentioned.

In the greater number of species, the lateral margins of the shell are bent abruptly inwards, often at right angles, or still more abruptly, so as to leave an angular groove along the margin of the united valves. This character is sometimes seen in the young shell, while often it appears only in the more advanced stages of growth. The species vary greatly in size, ranging from the smallest to nearly that of the largest brachiopod of this general form in the palæozoic rocks. The largest specimens figured have a length of three inches, and I have fragments of others which have been much larger.

*The geological range* of the genus, as at present known, is from the upper part of the Lower Helderberg group, through the Oriskany sandstone, and into the Upper Helderberg limestones.

*In its geographical range*, it is known from Gaspé in Canada East, to Virginia and Tennessee (and probably occurs in Alabama), and westerly from New-York through Canada West, Mackinac island, Ohio, Illinois and Missouri.

The accompanying figures illustrate the characteristics of the genus, as shown in two species.

## RENSELÆRIA SUESSANA.

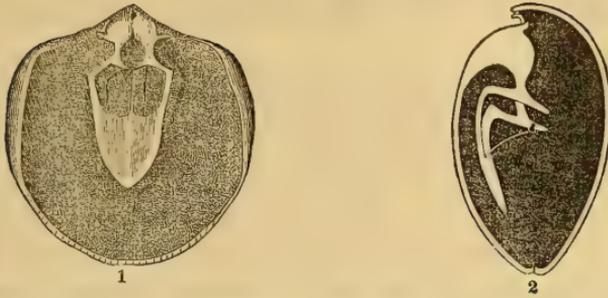


Fig. 1. The dorsal valve, showing the thickened processes at the base of the crura, the dental fossets, and the minute foramen at the beak. The descending processes, and the abrupt bending of the crura which are joined in a plate below with the slender central process, are all shown in the specimen from which this figure is made.

Fig. 2. A diagram presenting a profile view, showing the relations of the parts described.

These figures are enlarged to about one and a half diameters.

## RENSELÆRIA OVOIDES.

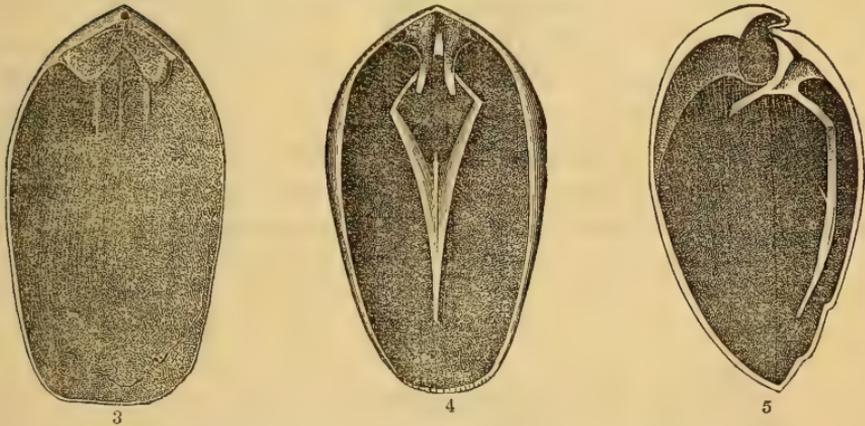


Fig. 3. Interior of the ventral valve, showing the foramen, the large dental lamellæ, muscular impressions, etc.

Fig. 4. The interior of the dorsal valve of the same species, showing the thickened processes at the beak, the crura, the loop and the narrow longitudinal plate, which together so much resemble a bird's tongue with the hyoid bones.

Fig. 5. A diagram presenting a longitudinal section of the two valves, showing the crura, the descending process, etc. The dark line in the dorsal valve, between the base of the crura and the shell, indicates the foramen described as extending from the beak into the cavity of the shell beneath the bases of the crura. In the ventral valve a low medio-longitudinal septum is shown; while the darker and more elevated ridge is a continuation from the base of the dental lamellæ, which limits the muscular area.

## OBSERVATIONS ON THE GENUS CAMARIUM.

AMONG the fossil species referred by me to the Genus MERISTA, and published in the Report of the Regents of the University in 1856 and 1857, and printed in the Palæontology of New-York, vol. iii, in the latter year, are several which, although possessing the general external form of *Merista*, present nevertheless some noticeable peculiarities. One of these is the strongly incurved beak of the ventral valve, while the cardinal margin is abruptly bent inwards, leaving an angular or subangular ridge extending from the beak to the margin of the shell, the space between this and the cardinal margin being sometimes flattened about halfway to the base. The front of the shell is often produced in a broad linguiform extension of the ventral valve : there is sometimes no depression on the middle of the valve, and sometimes a strong angular sinus. Some separated valves of specimens from Maryland show an arching transverse septum below the rostral cavity, rising from the inner surface of the shell and leaving a deep pit beneath.

The casts present an appearance somewhat as if there had been a double rostral cavity, one below the other. Although the internal structure is but partially determined, I can have no hesitation in separating it from the more abundant forms which I have recognized as *Merista*; and I have proposed for these fossils the generic designation of CAMARIUM.

### GENUS CAMARIUM ( n. g.).

[ Gr. *καμαρα*, *fornix*, in reference to the arching septum.]

*Terebratula* and *Atrypa*, in part, of authors.

*Merista*, in part : DAVIDSON, HALL, and other authors.

*Camarium* : HALL, 1858.

SHELLS ovoid or elliptical, and sometimes depressed subglobose : valves articulating by teeth and sockets; beak of ventral valve perforate. Interior of ventral valve marked by an arching transverse septum about one-third the distance from beak to base. The inner surface of the shell, above and below the septum, marked by muscular imprints : structure of the crura, etc. of the dorsal valve unknown.

SURFACE marked by fine concentric striæ; and partially exfoliated specimens show some obscure radiating striæ.

VENTRAL valve flat or sinuate in the middle, and produced in a linguiform extension in front.

From the similarity of structure, I have presumed these forms to belong to the same group as *Spirigera* and *Merista*; but the presence of the transverse septum seems incompatible with the existence of the internal double spires.

Under this genus I include *Merista princeps* and *M. meeki* (Pal. N.Y. Vol. iii, pp. 251 & 252, excluding figures 1 - 3, which may be regarded as doubtful). I have not yet been able to determine the internal structure so far as to make satisfactory comparisons with similar parts of *Camara-phoria*.

The following generic illustrations are from *Camarium typum* of the rocks of the Lower Helderberg group, associated with the *Pentamerus galeatus* and other well-known species.

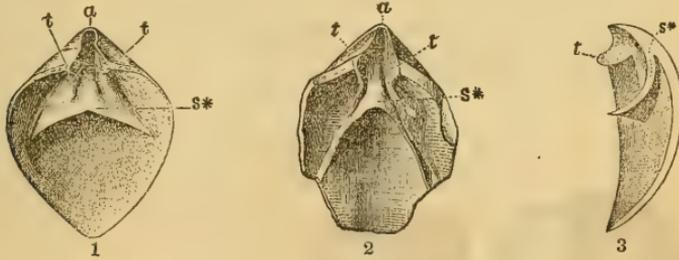


Fig. 1. Interior of a ventral valve, showing the arching septum.

Fig. 2. A similar specimen where the septum is more extended down the sides of the shell: the upper part is somewhat broken.

Fig. 3. Longitudinal section of the ventral valve.

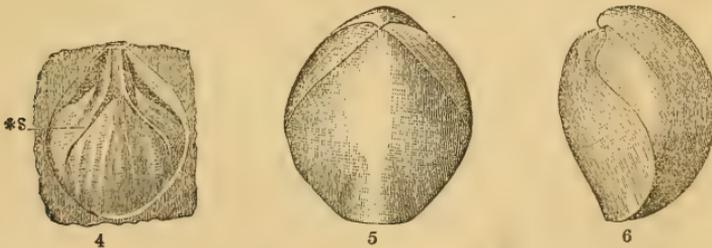


Fig. 4. A cast from the interior of fig. 1.

Fig. 5. Dorsal view of a perfect specimen.

Fig. 6. Profile view of the same.

## GENUS TRIPLESIA (Hall, 1858).

[Gr. *τριπλασιος*, *triplex*, in reference to the trilobate character of several of the species.]

SHELLS transverse or elongate, trilobate or subtrilobate; the ventral valve being marked by a broad deep sinuosity, and the dorsal valve by a corresponding fold. Hinge-line straight : area small; foramen triangular. External surface concentrically striated, and with fine obscure or obsolete radiating striæ : internal structure not determined.

I have proposed this name to include *Atrypa extans*, *A. cuspidata*, and *A. nucleata* of Vol. i, Palæontology of New-York, as well as other species. An examination of *Atrypa extans* has shown the existence of a narrow area and small triangular foramen as in *Spirifer*; but I have not been able thus far to determine the internal structure. The texture of the shell, and surface marking, although differing in some particulars from those of *Merista*, are nevertheless similar.

## TRIPLESIA EXTANS.

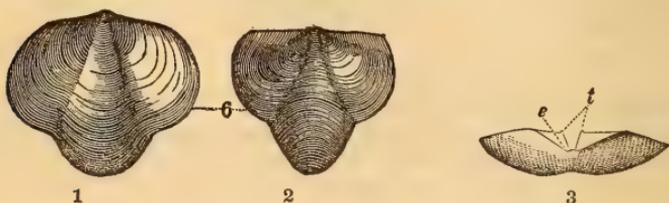


Fig. 1. Ventral valve.

Fig. 2. Dorsal valve.

Fig. 3. Area and foramen of the ventral valve.

## NOTES UPON THE GENUS GRAPTOLITHUS;

[WITH REMARKS UPON SOME OF THE SPECIES, THEIR MODE OF GROWTH, AND MANNER OF REPRODUCTION.

[Supplement to Volumes I & II of the Palæontology of New-York.]

THE short time allowed, and the limited means at my disposal, for the investigations and collections for the first volume of the Palæontology of New-York, prevented that careful and continued examination of many of the fossiliferous beds which becomes so desirable in the present state of the science and the requirements of geology\*. Notwithstanding this, however, fifteen species of Graptolites were determined, ten of which were at that time new; while of those identified with European species, we may still raise the question as to positive specific identity, and, with the addition of new material, the subject at this time requires a thorough revision. At that time the peculiar branching forms of the genus were first made known, and, so far as I am aware, a greater variety of form and character illustrated than had previously been observed.

Two other species from the Clinton group were described in the second volume of the Palæontology of New-York, one of these being referable to the Genus GLADIOLITES. In the same volume I described the Genus DICTYONEMA, referring it to the Family GRAPTOLITIDÆ.

In a short paper published in the Proceedings of the American Association for the Advancement of Science for 1849, I stated that the Graptolites were not represented in the higher Silurian, Devonian or Carboniferous strata. Subsequently, in the same year, however, I determined the Genus DICTYONEMA to belong to the Graptolitidæ; and this opinion was expressed in the second volume of the Palæontology of New-York in 1850 (though the volume was not published till 1852). The DICTYONEMA, on farther examination, has proved to be an unequivocal graptolitic genus, consisting of radiating filaments or branches which are connected together by transverse bars, and form flabellate or funnelshaped fronds growing from a radix, and

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\* The first volume of the Palæontology of New-York was published in less than four years from the time the work was placed in my charge, and this without an assistant of any kind furnished by the State; and the entire collections, except a small number previously in the State collection, were made at my private expense. This state of things, and the comparatively imperfect knowledge of the rocks at that time possessed by every one, may offer some excuse for many omissions and some imperfections.

having the inner side of the branches serrated\*. The *DICTYONEMA* is known in the Niagara group, the Upper Helderberg limestones, and in the Hamilton group; while the Genus *PLUMALINA*, which may be regarded as an allied form, is known in the Chemung group.

The Graptolitideæ are therefore at this time clearly traced to the base of the Carboniferous system, and we may probably find allied genera to the close of the Palæozoic period.

Various opinions had been entertained, not only as to the nature of the Graptolites, but likewise as to their mode of growth; and it was not until 1854 that the researches in the Geological Survey of Canada brought to light some remarkable and unique forms, which for the first time gave us a true idea regarding their perfect form and manner of growth.

Through the kindness of Sir WILLIAM E. LOGAN, these specimens were placed in the hands of the writer, and some observations upon them were communicated to him in April 1855 : that notice was soon after read before the Geological Society of France, and otherwise made public in Europe.

The following extract from the Report of Progress of the Geological Survey of Canada for 1857 will serve to give a more perfect idea of this discovery, and of the character of the fossils.

## CANADIAN GRAPTOLITES.

REPORT OF JAMES HALL, ESQUIRE, ADDRESSED TO SIR WILLIAM E. LOGAN, F.R.S.,  
DIRECTOR OF THE GEOLOGICAL SURVEY OF CANADA.

ALBANY, MARCH 1, 1858.

SIR — In reply to your inquiry regarding the Graptolites and other allied genera, confided to me for description on behalf of the Geological Survey of Canada, partly in 1854 and partly at a subsequent time, I have the honor to inform you that six plates of the Graptolites have been engraved, and are now only waiting to be lettered, and that drawings for ten plates more are in the engraver's hands.

The description of twenty-four species accompanies the present communication, and the plates will follow as fast as they are completed.

In April 1855, I communicated to you a note upon these remarkable graptolites, discovered in the progress of the Geological Survey during the previous year. This discovery gave for the first time a

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\* Mr. SALTER was the first to announce publicly the serrate character of these branches, and, not recognizing his fossil as identical with *DICTYONEMA*, proposed the name *GRAPTOPORA* in 1857.

knowledge of the true forms and mode of growth of these fossils, of which fragments and detached branches have for so many years been described as complete forms. Neither up to that time, nor so far as I am aware to the present, has any evidence of the existence of perfect forms such as these been given to the public.

Two of the species were described in the note transmitted to you in 1855, and I have preceded the description of the remainder by a repetition of that note.

I have the honor to be, Sir, your most obedient servant,

JAMES HALL.

NOTE upon the Genus GRAPTOLITHUS, and Descriptions of some remarkable new forms from the shales of the Hudson-river group, discovered in the investigations of the Geological Survey of Canada, under the direction of Sir W. E. LOGAN. By JAMES HALL.

[Communicated in April, 1855.]

THE discovery of some remarkable forms of the Genus GRAPTOLITHUS, during the progress of the Canada Geological Survey, has given an opportunity of extending our knowledge of these interesting fossil remains. Hitherto our observations on the Graptolites have been directed to simple linear stipes, or to ramose forms, which, except in branching, or rarely in having foliate forms, differ little from the linear stipes. In a few species, as *G. tenuis* (HALL) and one or two other American species, there is an indication of more complicated structure; but, up to the present time, this has remained of doubtful significance. The question whether these animals, in their living state, were free or attached, is one which has been discussed without result; and it would seem to be only in very recent times that naturalists have abandoned altogether the opinion that these bodies belong to the *Cephalopoda*.

In the year 1847, I published a short paper on the Graptolites from the rocks of the Hudson-river group in New-York: to the number there given, two species have since been added from the shales of the Clinton group. Other species, yet unpublished, have been obtained from the Hudson-river group; and since the period of my publication in 1847, large accessions have been made to our knowledge of this family of fossils, and to the number of species then known. The most important publications upon this subject are *Les Graptolites de Bohême*, par J. BARRANDE, 1850; *Synopsis of the Classification of British Rocks, and Description of Palæozoic Fossils*, by Rev. A. SEDGWICK and FREDERICK M'COY, 1851; *Grauwacken Formation in Sachsen, etc.*, von H. B. GEINITZ, 1852.

The radix-like appendages, known in some of our American as well as in some European species, have been regarded as evidence that the animal in its living state was fixed; while M. J. BARRANDE, admitting the force of these facts, asserts his belief that other species were free. It does not, however, appear probable that in a family of fossils so closely allied as are all the proper *Graptolitideæ*, any such great diversity in mode of growth would exist.

It will appear evident from what follows, that heretofore we have been compelled to content ourselves, for the most part, with describing fragments of a fossil body, without knowing the original form or condition of the animal when living. Under such circumstances, it is not surprising that various opinions have been entertained, depending in a great measure upon the state of preservation of the fossils examined. The diminution in the dimensions, or perhaps we should rather say in the development, of the cellules or serrations of the axis towards the base, has given rise to the opinion advanced by BARRANDE, that the extension of the axis by growth was in that direction, and that these smaller cells were really in a state of increase and development. In opposition to this argument, we could before have advanced the evidence furnished by *G. bicornis*, *G. ramosus*, *G. sextans*, *G. furcatus*, *G. tenuis*, and others, which show that the stipes could not have increased in that direction. It is true that none of the species figured by BARRANDE indicate insuperable objections to this view; though in the figures of *G. serra* (BRONGNIART), as given by GEINITZ, the improbability of such a mode of growth is clearly shown.

It is not a little remarkable that with such additions to the number of species as have been made by BARRANDE, M'COY and GEINITZ, so few ramose forms have been discovered; and none, so far as the writer is aware, approaching in the perfection of this character to the American species.

Maintaining as we do the above view of the subject, which is borne out by well-preserved specimens of several species, we cannot admit the proposed separation of the Graptolites into the genera *Monograpsus*, *Diplograpsus* and *Cladograpsus*, for the reason that one and the same species, as shown in single individuals, may be *monoprionidean* or *diprionidean*, or both; and we shall see still farther objections to this division, as we progress, in the utter impossibility of distinguishing these characteristics under certain circumstances. We do not yet perceive sufficient reason to separate the branching forms from those supposed to be not branched; for it is not always possible to decide which have or have not been ramose, among the

fragments found. Moreover there are such various modes of branching, that such forms as *G. ramosus* present but little analogy with such as *G. gracilis*.

M. GEINITZ introduces among the *Graptolitideæ* the genus *Nereograpsus*, to include *Nereites*, *Myrianites*, *Nemertites* and *Nemapodia*. Admitting the first three of these to be organic remains, which the writer has elsewhere expressed his reasons for doubting, they are not related in structure, substance, or mode of occurrence, to the Graptolites, at least so far as regards American species; and the *Nemapodia* is not a fossil body, nor the imprint of one, but simply the recent track of a slug over the surface of the slates. The genus *Rastrites* of BARRANDE has not yet been recognized among American *Graptolitideæ*. These forms are by GEINITZ united to his genus *Cladograpsus*, the propriety of which we are unable to decide.

The genus *Gladiolites* (*Retiolites* of BARRANDE, 1850; *Graptophyllia* of HALL, 1849) occurs among American forms of the *Graptolitideæ* in a single species in the Clinton group of New-York. A form analogous, with the reticulated margins and straight midrib, has been obtained from the shales of the Hudson-river group in Canada; suggesting an inquiry as to whether the separation of this genus, on account of the reticulated structure alone, can be sustained. In the mean time we may add that the Canada collection sustains the opinion already expressed, that the *Dictyonema* will form a genus of the family *Graptolitideæ*. The same collection has brought to light other specimens of a character so unlike anything heretofore described, that another very distinct genus will thereby be added to this family. The Canadian specimens show that the Graptolites are far from always being simple or merely branching flattened stems.

The following diagnosis will express more accurately the character of the Genus GRAPTOLITHUS, as ascertained from an examination of perfect specimens in this collection.

### GENUS GRAPTOLITHUS (Linnæus).

CORALLUM or bryozoum fixed (free?), simple or compound; the parts bilaterally arranged, consisting of simple stipes or of few or many simple or variously bifurcating branches, radiating more or less regularly from a centre, and, in the compound forms, united towards their base in a continuous thin corneous membrane or disk formed by an expansion of the substance of the branches, and which in the living state may have been in some degree gelatinous. Branches with a single or double series of cellules or serratures, communicating with a common longitudinal

canal, affixed by a slender radix or pedicle from the centre of the exterior side.

The fragments, either simple or variously branched, hitherto described as species of *Graptolithus*, are for the most part to be regarded as detached portions from the entire frond.

In the living state, we may suppose those with the corneous disks and numerous branched fronds to have been concavo-convex (the upper being the concave side), or to have had the power to assume this form at will. In many specimens there is no evidence of a radix or point of attachment, and they have very much the appearance of bodies which may have floated free in the ocean.

The accompanying figure 1 is the central portion of one of these graptolites, showing the bilateral arrangement of these branches and the bifurcation of the same. The disc enclosing the bases of the branches is well preserved, while most of the rays are broken off a little beyond its margin. The side presented is the lower or exterior of the specimen, and the serratures are not visible.

Fig. 2 is a specimen of the same species, from which the substance of the disc is removed, showing the serrated margin which is compressed in that direction.

ILLUSTRATIONS OF GRAPTOLITHUS LOGANI.

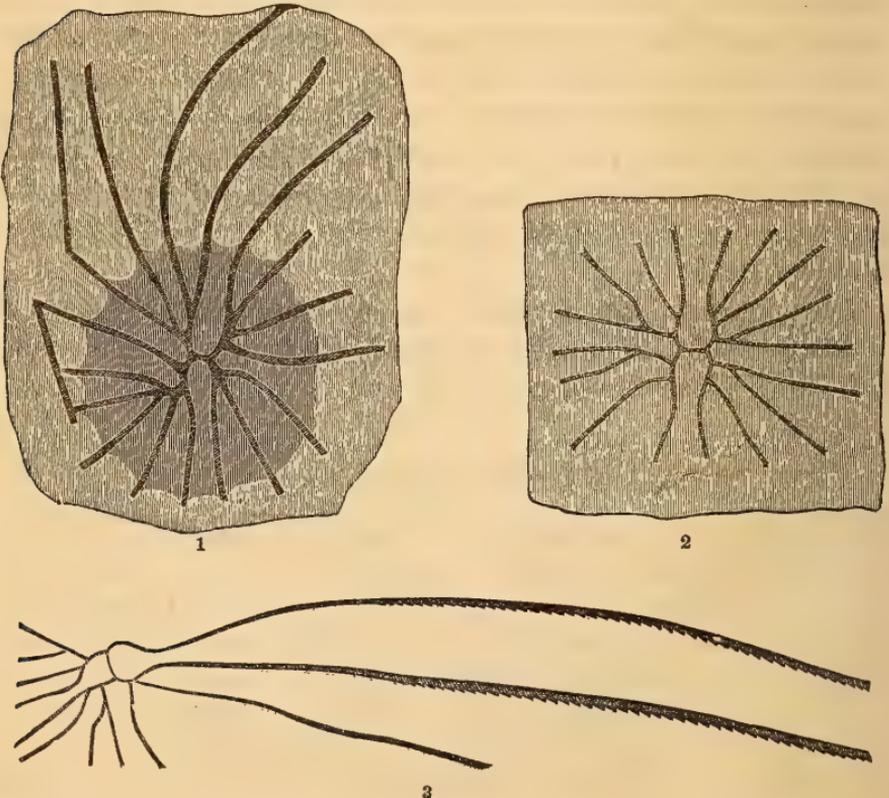


Fig. 3 shows the central portion or radix, with the bases of the branches; while two of these are shown in their extension, laterally compressed and showing the serratures. The entire length of some of these branches is about seven inches.

#### GRAPTOLITHUS LOGANI.

FROND composed of numerous branches nearly equally disposed on two sides of a central connecting stipe, and each again subdividing nearly equally; after which they bifurcate, always near the base, with greater or less regularity: connecting membrane thin, composed of the same substance and continuous with the branches, extending from the centre to some distance beyond the bifurcations. The branches, after the third bifurcation, become marked on the inner side by a row of cellules, and along the centre by an abruptly impressed line which follows the divarication of the branches: cellules minute, not prominent towards the base of the branches, being compressed vertically, and appearing like a double series with a central depressed line, becoming developed as they recede from the base. The branches beyond the disk are turned on one side and laterally flattened, and present a single series of cellules or serrations, which are moderately deep, with the serratures acute at their extremities; from twenty-four to twenty-eight in an inch. The substance of the branches, upon the exterior surface near the centre, is marked by a depressed longitudinal line, which follows the ramifications, and gradually dies out as the branches become finally simple, when the surface on the same side is smooth or somewhat obliquely striated. The disk is smooth exteriorly; and from the centre is a small radicle, from which the two sets of branches diverge.

This species, though in a general manner bilateral and presenting four principal branches, is, nevertheless, from the irregular division of these, usually unequal upon the two sides; and we find on examination of those figured that they are as ten and ten, nine and eleven, eight and nine, ten and eleven, seven and ten, twelve and twelve, eight and eight, eight and ten, while the half which is figured (plate ii) has eleven rays.

*Locality and formation.* These specimens were obtained at Point Lévy, opposite to Quebec, in a band of bituminous shale separating beds of grey limestone. These strata belong to the Lower Silurian series, and are of that part of the Hudson-river group which is sometimes designated as Eaton's sparry limestone, being near the summit of the group: they form also the rocks of Quebec.

#### GRAPTOLITHUS ABNORMIS.

This species, of which only imperfect specimens have been seen, presents four principal branches diverging from the centre, two from each extremity of the vinculum, and each one of these bifurcating and branching unequally and at unequal distances from the centre.

The forms above described do not by any means exhaust the variety presented in this collection. With a single exception, however, all the specimens which offer any new light in regard to the habit of the Graptolites indicate that the mode of growth was in the manner described, in branches radiating from a centre, or in tufts joining in a central connecting substance.

The specimens from the Canadian locality afford further evidence in confirmation of what we have elsewhere observed, that, with few exceptions, the species have a limited geographical range. This locality has already, after very cursory examination, afforded eight new species of Graptolites, with one or two species which appear to be identical with those previously found in the State of New-York. A comparison of specimens from more southern localities, with those of New-York, shows a large proportion of new species; and it now appears probable that the number of American species of *Graptolithus* previously known (about twenty), will soon be increased by an equal number of new ones.

*Locality and formation.* Point Lévy : Hudson-river group.

In addition to the species above noticed, the following are published in the same Report for 1857 :

<i>Graptolithus flexilis,</i>	<i>Graptolithus indentus,</i>
<i>G. rigidus,</i>	<i>G. nitidus,</i>
<i>G. octobrachiatus,</i>	<i>G. bifidus,</i>
<i>G. octonarius,</i>	<i>G. patulus,</i>
<i>G. quadribachiatus,</i>	<i>G. extensus,</i>
<i>G. crucifer,</i>	<i>G. denticulatus,</i>
<i>G. bryonoides,</i>	<i>G. pristiniiformis,</i>
<i>G. headi,</i>	<i>G. ensiformis, and</i>
<i>G. alatus,</i>	<i>G. tentaculatus.</i>
<i>G. fruticosus,</i>	

Besides these species of GRAPTOLITHUS, there are some other forms separated by the writer under the name PHYLLOGRAPTUS, as follows :

### GENUS PHYLLOGRAPTUS.

FROND consisting of simple foliate expansions, celluliferous or serrated upon the two opposite sides : margins with a mucronate extension from each cellule ; or of similar foliate forms united rectangularly by their longitudinal axes, and furnished on their outer margins with similar cellules or serratures, the whole supported on a slender radicle.

These bodies, which usually appear upon the stone in the form of simple leaf-like expansions, may possibly have been attached in groups to some other support; but the form of some of them, and the character of the projecting radicle at the base, indicates that we have the entire frond. These forms furnish perhaps the best illustration of all the *Graptolitidæ*, of the lesser development of the cells at the base, and their gradual expansion above until they reach the middle or upper part of the frond. Many of them diminish from the centre upwards; and rarely the cells are more developed above the centre, reversing the usual form, and leaving the narrower part at the base.

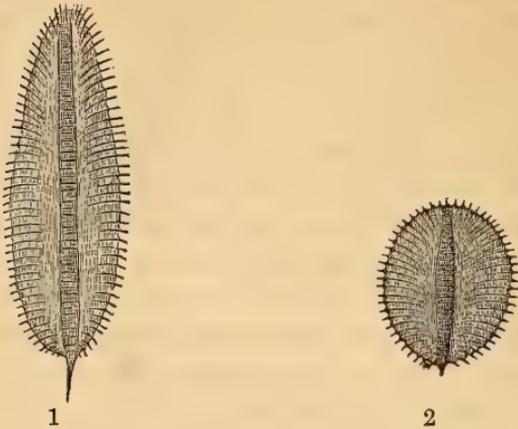
The species of this genus approach in general form to *G. ovatus* of BARRANDE and *G. folium* of HISINGER. They present, however, some differences of character; varying from broad-oval with the extremities nearly equal, to elongate-oval or ovate, the apex usually the narrower, but in a few instances the base is narrower than the apex. These forms are sometimes extremely numerous in the shales, and present on a cursory examination a general similarity to the leaves of large species of *Neuropteris* in the shales of the Coal measures.

Instead of the narrow filiform midrib represented in the figures and descriptions of the authors mentioned, these specimens present a broad linear midrib continued from the apex to the base, and extended beyond the base in a slender filiform radicle, usually of no great extent, but in some instances nearly half an inch in length. The midrib is rarely smooth, varying in width, with its margins not often strictly defined. In examining a great number of individuals of one species, I have discovered that this midrib is serrated; and though for the most part the serratures are obscure, they nevertheless present all the characteristics which they exhibit in graptolites of other forms, in which the branches have been compressed vertically to the direction of the serratures.

In this view, the lateral leaflike portions appear to be appendages to the central serrated portion; but these are nevertheless denticulate on their margins, and the intermediate spaces are well defined, as if admitting of no communication by serratures or cellular openings with the centre.

In another species the central axis or midrib is strong and broad, often prominent and distinctly serrate; the edges of the interspaces being all broken off, as if the extremities had been left in the slate cleaved from the surface: at the same time, the lateral portions are so well preserved as to show distinct cellules upon each side. We have therefore three ranges of cells visible, the central axis projecting at right angles to the two lateral parts. This remarkable feature leads to the inference that this graptolite was composed of four semielliptical parts joined at their straight sides, and projecting rectangularly to each other; presenting on each of the four margins a series of serratures, which, penetrating towards the centre, were all united in a common canal, and all sustained upon a simple radicle.

## PHYLOGRAPTUS TYPUS in two extreme forms.



Under this genus are described :

*Phyllograptus typus*, *P. ilicifolius*, *P. angustifolius*, and *P. similis*.

While these discoveries have been made in Canada, giving us for the first time a correct knowledge of the mode of growth and the varying forms of these bodies, I have not neglected opportunities of increasing our knowledge of these fossils from localities within my reach. The locality of graptolites near Albany has heretofore furnished several species, which, now that we know better their original forms, offer additional information, and become of greater interest both in their zoological and geological relations.

At this locality, some specimens have been obtained which show apparently the mode of reproduction in this family of animals, which is more similar to the hydroid polyps than to the Bryozoa\*.

The specimens in which this feature has been observed, first show a slight swelling or vesicle proceeding from the axils of the serratures : this vesicle, which in the beginning is barely perceptible beyond the outlines of the margin, swells and becomes elongated, the extremity finally much inflated, and the base of the footstalk extended and attenuate. As this process of development goes on, the sac or inflated portion curves downwards, and finally becomes ruptured or dehiscent on the lower side near the extremity. At this period, and sometimes previously, the sac, which appears to be an extremely thin membrane and almost without substance, shows one or two elongated fibres, like the central midrib or the marginal longitudinal fibre of the graptolites. At a more advanced stage the

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\* This notice was read at the meeting of the American Association for the Advancement of Science at Baltimore in 1858, accompanied also by references to the Canadian graptolites.

substance of the sac gradually disappears, apparently by decomposition, leaving the slender fibre still attached for some time to the axil of the serrature.

These buds or vesicles do not appear at every serrature, but only on every third or fourth, and are apparently opposite each other on the two sides of the rachis, but in reality alternating as do the serratures. Associated with these specimens, and apparently resulting from these vesicles, are numerous young graptolites. But although these young or embryonic forms of graptolites occur in such great numbers, it cannot yet be said that any specimens have been seen within the sac, or attached to the parent stipe\*.

The following figures will render more clear the preceding observations, and illustrate in some degree the forms described.

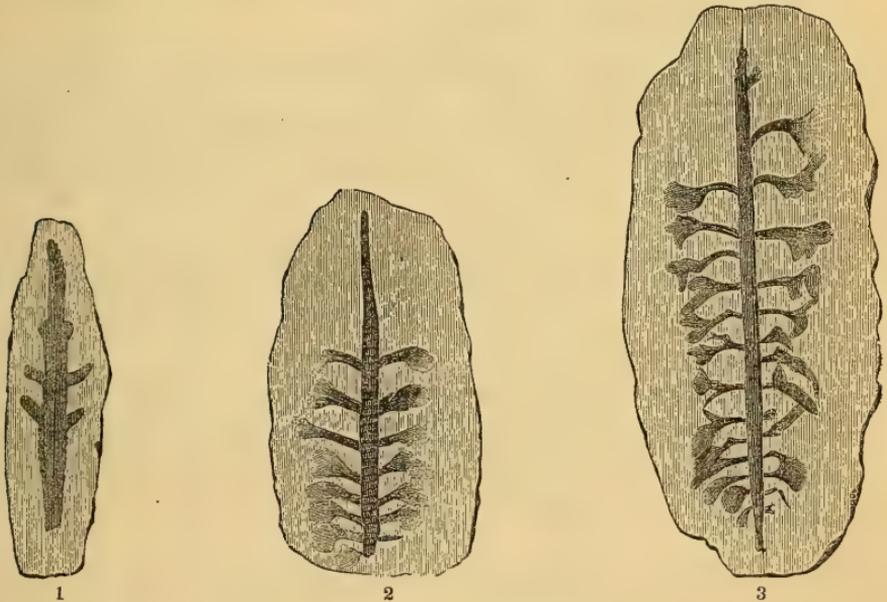


Fig. 1. A fragment of the stipe, showing the earlier development of these buds or vesicles.

Fig. 2. A fragment where these buds are farther developed, and the upper ones less expanded than those below.

Fig. 3. A longer stipe preserving numerous expanded vesicles in a farther developed condition; the most of them being broken, and some of them partially decomposed or absorbed, while they preserve very distinctly the delicate hair-like fibre before mentioned.

\* The first discovery of a specimen of this character is due to Mr. WHITFIELD, some three years since; and subsequently I have been indebted to Mr. J. B. ELLIS, and to Mr. G. W. TAYLOR, for other specimens of the same, as well as for other forms; while I owe to Mr. HENRY CANFIELD the possession of the very fine specimen of *G. gracilis* figured on page 58. The discovery of the young graptolites has been of later date, and they have recently been observed in large numbers.

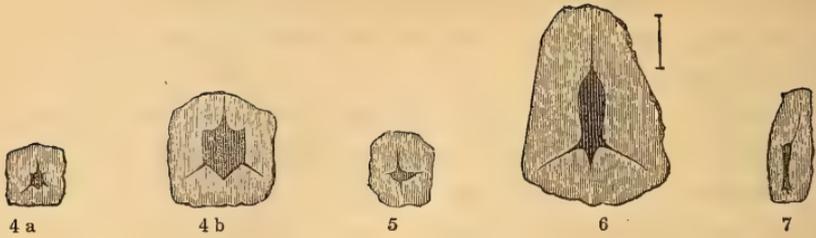


Fig. 4 *a, b*. A germ or young graptolite, showing the rootlets below and a short axial fibre extending above. This is a broad form, apparently of the doubly serrated kind, or *diplograpsus*, and appears to be developed to the first serratures. The figures are respectively of the natural size and enlarged.

Fig. 5. A minute specimen of a less symmetrical and apparently less fully developed form.

Fig. 6. Another individual which is farther developed than either of the preceding : the line marks the natural size.

There are several other varieties of form, which, inferring from the central midrib, are of those serrated on the two sides of the stipe, as are all those yet discovered with the vesicles attached.

Fig. 7 is apparently the young of one of the singly serrated forms, from the radical fibre extending along one side and beyond the body, while minute fibres (or rootlets?) extend downwards.

All these young forms preserve the axial fibre extended beyond the substance of the stipe, and there are usually two or three slender fibres extended below in the direction of the radix.

The condition of these bodies, and their association with those bearing the sacs, is so constant, that I have inferred their connexion, and that these are in fact the embryonic sacs.

The collection of specimens is quite numerous; but I am still making additions, with the hope that, at no distant period, we may know something more satisfactory relative to this newly observed and peculiar development.

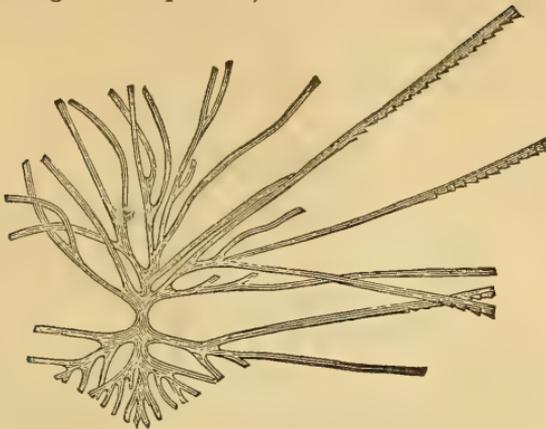
The following new species of Graptolites appear to be worthy of notice in this place.

#### GRAPTOLITHUS MULTIFASCIATUS.

BODY consisting of numerous bifurcating branches, which are arranged bilaterally on either side of a short strong central bar. The branches bifurcate irregularly, and the subdivisions on one side amount to twenty-one, and on the other to twenty-two, while the specimen is far from being entire. The branches are serrated on one side : serratures somewhat closely arranged.

The specimen shows the lower or non-serrated surface, and several of the longer branches are turned sufficiently on one side to show the serrations in a tolerable degree of perfection.

Fig. 8. The specimen, natural size.



GRAPTOLITHUS MULTIFASCIATUS.

## GRAPTOLITHUS DIVERGENS (n. s.).

BODY slender, consisting of a straight central stipe or rachis ; on each side of the longitudinal centre of which are given off diverging branches in pairs, and nearly opposite each other at the bases : these branches are of unequal length, the longest being frequently as long as the main stipe on either side of its centre. Branches slenderly serrate on one side.

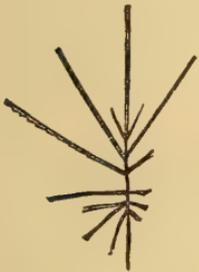


Fig. 9 is an individual of this species, one branch of which appears to bifurcate near its origin.

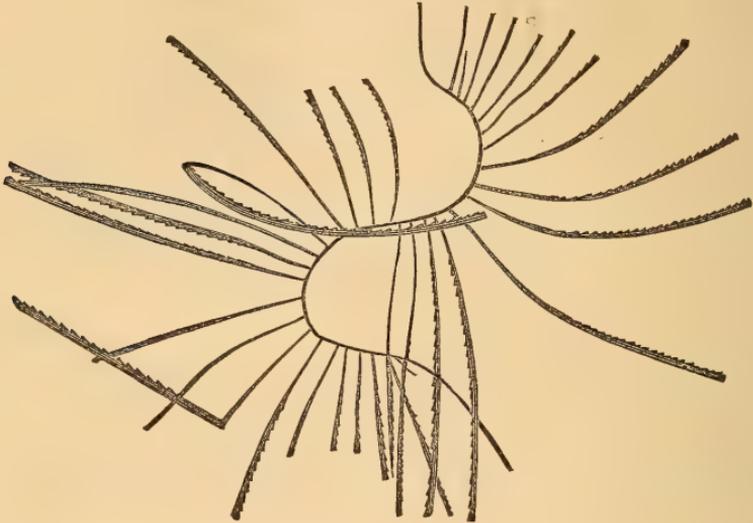
These species are from the shales of the upper part of the Hudson-river group.

## GRAPTOLITHUS GRACILIS.

The accompanying figure is of a very beautiful specimen of the *G. gracilis*, first described in the Palæontology of New-York, Vol. i, p. 274. The specimens of this species all present the peculiarity of having a slender sinuous rachis, approaching in form the letter S, from which the branchlets diverge always on the convex side of the curve, so that ordinarily one half the branchlets proceed in one direction and the other half in the opposite direction ; and although there has been observed no mark of a radicle or central point, it seems probable that the place from which

the branches turn in opposite directions is the centre or point of origin of the animal body. It should moreover be observed that the serratures on the two sets of branches are usually turned in opposite directions, or towards the two extremities of the rachis.

Fig. 10. GRAPTOLITHUS GRACILIS.



This one and the preceding species are remarkably slender, and, though serrated on one side only, present some marked peculiarities when compared with the singly serrated forms with central discs, and a bilateral arrangement of the branches, as in *G. logani*, *G. flexilis* and *G. multifasciatus*.

Among the undescribed fossils from the shales of the Hudson-river group, I have lately noticed a species of RASTRITES, a graptolitic genus proposed by BARRANDE, and which, so far as I am aware, has not before been observed in this country. The similarity of the latter form with the last noticed species of GRAPTOLITHUS (*G. gracilis*), suggests a probable relationship which may unite the two, or authorise the separation of *G. gracilis*, *G. divergens*, and some others, as a generic type distinct from those with central discs and uniserrate stipes.

# TRILOBITES

OF THE

## SHALES OF THE HUDSON-RIVER GROUP.

---

THE Trilobites most common in the shales of the Hudson-river group are *Triarthrus beckii* and *Calymene senaria* = *C. blumenbachii*? I have likewise described two species of *Olenus* in the first volume of the Palæontology of New-York ; but these are rare in most localities of the rocks of this period.

Some years since, during the progress of the Geological Survey of Vermont by Rev. Z. THOMPSON, some specimens of Trilobites were obtained from the shales of this age in the town of Georgia; and these were subsequently placed in my hands. The Survey having since passed under the direction of Professor HITCHCOCK, I postponed the publication of the descriptions, fearing it might not be agreeable to him; but having now not only his approval, but his express desire that I would publish them, I give below the following species, preliminary to a more complete description and illustration.

### OLENUS THOMPSONI (n. s.).

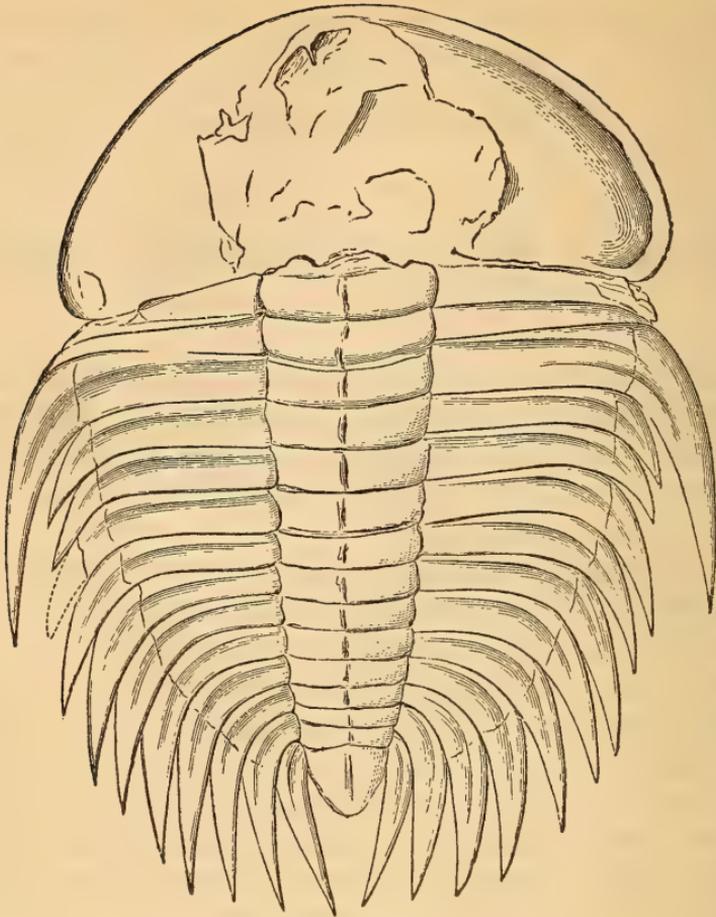
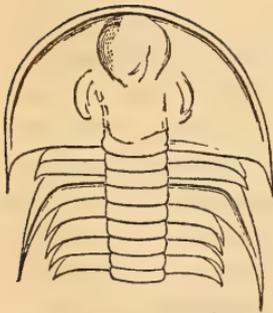
GENERAL form ovate, the length and breadth being nearly as six to five.

Head broad lunate, with the postero-lateral angles much extended; the width from the centre to the outer margin of the eye almost equal to the width of the cheek. Eyes (which are much crushed in the specimen) elongate semioval, equal in length to the space between the anterior angles and the frontal margin: glabella distinctly lobed, narrower in front.

THORAX with the lateral lobes about once and a half as wide as the middle lobe, consisting of fourteen articulations, the third one of which is much longer than the others, and curving downwards with an extension reaching as far as the line of articulation of the seventh rib. The posterior articulations are bent abruptly backwards, so that the free extremities are parallel with the axis. Pygidium small, pointed, without visible rings, and having a narrow ridge running down the centre.

The description is chiefly drawn from an impression in slate, and a cast made from the same, together with some fragments of the same species.

*Geological position.* In the shales in the upper part of the Hudson-river group.

Fig. 1. *OLENUS THOMPSONI*.*OLENUS VERMONTANA* (N. S.).Fig. 2. *OLENUS VERMONTANA*.

GENERAL form elongate : the posterior extremity obtuse. Head semioval, twice as wide as long, the posterior angles produced in short acute spines. Eyes narrow elongate ; the space from the centre of the head to the outer margin of the eye much greater than the cheek, and the distance from the anterior angle of the eye to the frontal margin less than the length of the eye. Glabella lobed : hypostoma broad oval.

THORAX imperfect, preserving six articulations and part of the seventh ; the middle lobe wider than the lateral ones. The third articulation is much broader towards and at its lateral margin, and is prolonged obliquely downwards in a sharp spine, which reaches below the seventh articulation : the lateral extremities of the other articulations produced in short acute spines.

Another fragment, which is apparently of the same species, preserves eleven articulations of the thorax and the pygidium. The upper articulations are imperfect at their extremities; the last one is bent abruptly downwards, and terminates in a long spine on each side reaching below the pygidium. Pygidium semioval; the axis marked by four annulations, the two upper of which are faintly indicated in the lateral lobes.

This species differs from the preceding in its proportionally narrower form, the relative proportions of the parts of the head, and the short acute posterior spines. The comparative width of the middle and lateral lobes of the thorax is a very distinguishing feature.

*Geological position.* In the shales of the upper part of the Hudson-river group.

### PELTURA (OLENUS) HOLOPYGA ( n. s.).

ENTIRE form elongate subelliptical, having a length of about twice and a half the width. Head somewhat semielliptical; the posterior angles produced in long spines. Glabella strongly lobed, its length a little greater than its greatest breadth; the entire breadth of the head, when entire, being about twice as great as the length. Hypostoma wider than long.

THORAX with eleven articulations; the middle lobe prominent, and about twice as wide as the lateral lobes; the articulations strong, rounded above, and each one marked in the centre by a node (or the base of a spine which has been broken off in the specimens examined). Articulations of the lateral lobes short (the extremities of the upper ones broken off in the specimen); the lower ones bending abruptly downwards, and terminating in spiniform processes, the last pair being prolonged much beyond the extremity of the pygidium.

PYGIDIUM longitudinally semielliptical; the middle lobe marked by three annulations, and a fourth obscure one above the terminal lobe: lateral lobes flat and plain, the exterior margin apparently free from ornament or inequality.

The specimen from which the description and figure have been made is imperfect, in the absence of the cheeks with the posterior spines and frontal limb. These parts, with the hypostoma attached, lie upon the stone a little in advance and turned to one side of the head of the specimen, and have been drawn in their proper relations, but not attached to the head. That this portion of a trilobite belongs to the one figured, can scarcely admit of doubt; but in the absence of an entire head, which would warrant the restoration, I have given the figure as it occurs on the stone, with merely a change of the relation of the two parts. It is not proved, from this specimen, that the third articulation from the head may not have extended beyond the others, as shown in the two preceding species.

This species appears to belong to the Genus PELTURA, taking the figures of *Olenus (Peltura) scarabæoides* as the type of the genus\*. Our specimen

\* This species, the *Entomostracites scarabæoides* of WAHLENBERG, 1821 (*scarabæorum vel aliorum vaginipennium animale vestigia*: BROMEL in Act. Litt. Upsal. 1729),

differs from that one in the absence of the obscure crenulations or inequalities upon the limb of the pygidium, which is regarded by PICTET as important. The number of segments of the thorax, if a constant character, seems much more important, and furnishes a more marked feature for the separation from *OLENUS*.

*Geological position.* In the shales of the Hudson-river group.

NOTE. In addition to the evidence heretofore possessed regarding the position of the shales containing the Trilobites, I have the testimony of Sir W. E. LOGAN that the shales of this locality are in the upper part of the Hudson-river group, or forming a part of a series of strata which he is inclined to rank as a distinct group above the Hudson-river proper. It would be quite superfluous for me to add one word in support of the opinion of the most able stratigraphical geologist of the American continent.

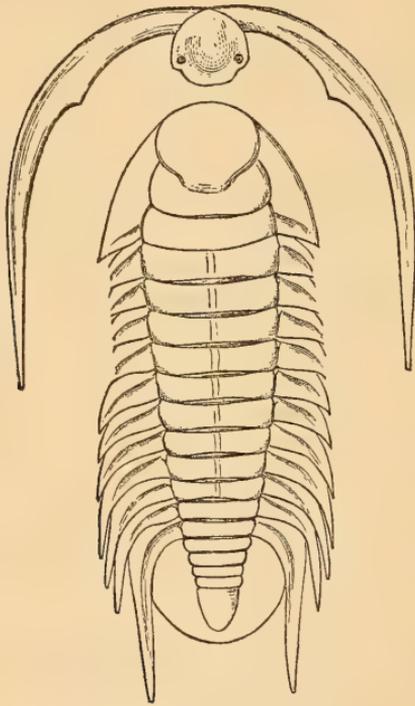


Fig. 3. PELTURA HOLOPYGA.

has apparently been refigured from the same specimen, or from the same figure throughout, by subsequent authors; and the original appears to have been deprived of the cheeks, the frontal limb, and the posterior cephalic spines. The eye-tubercle, or the palpebral lobe, having collapsed as in our specimen, gives but a partial representation of the entire animal.

CATALOGUE  
OF THE  
SPECIES OF FOSSILS,

DESCRIBED IN VOLUMES I., II. AND III. OF THE PALÆONTOLOGY OF NEW-YORK ;

With the Corrections in Nomenclature, as far as determined to the present time.

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At the time of the publication of the first volume of the Palæontology of New-York, many of the species were referred to genera already described, in preference to proposing new genera, even where the identification was not entirely satisfactory : first, in deference mainly to European authors, from whom we had derived our knowledge of the palæozoic fossils of parallel or equivalent strata; and, secondly, because the materials available were not always in a condition to furnish satisfactory evidence, from the interior of the shell, of the relations of the fossils under examination. With few exceptions beyond the Brachiopoda, all the determinations of species were made from external characters; and I was even compelled, in a few instances, to describe new genera, with only a knowledge of the exterior of the shells. The collections at my disposal were very inadequate to the production of a satisfactory work; and it was only from the necessity arising from my position, that the volume was published before more complete investigations had been made.

At that time no general studies of the Brachiopoda had been made, or, if made, had not been published; and generic names had been adopted by authors without scrutinizing the relations of the fossils grouped under them. The terebratuloid forms had been proved not to be true Terebratulæ, and the generic name *Atrypa* of DALMAN had been adopted, but without restriction; so that it finally came to include a heterogeneous assemblage of species similar to that before, and to some extent still, designated as *Terebratula*.

Although American authors favored the adoption of RAFINESQUE'S genus *Strophomena*, European authors were not inclined to the same opinion; and DALMAN'S genus *Leptæna* was at that time regarded by several eminent European palæontologists as more clearly defined, and better applicable to a large number of forms, than the un-

certain and partially defined genus of RAFINESQUE. With such authority before me, I adopted the generic name *Leptæna*, and it has not been until a later period that the researches of Mr. DAVIDSON have fully established, in Europe, the genus *Strophomena*.

The difficulties attending the proper distribution of the Brachiopoda were scarcely less at the time of the publication of the second volume; and I there intentionally avoided proposing new genera, waiting for the appearance of Mr. DAVIDSON'S work "On the Classification of the Brachiopoda." This important treatise, which, in its several editions in different languages, has thrown so much light upon the intimate structure, organization, and habits of this class of fossils, has given a new impulse to their study, and has rendered them of far greater geological value than ever heretofore.

Notwithstanding however the great extension of genera proposed by Mr. DAVIDSON and by other English and Continental naturalists, the field appeared to me far from being fully explored; and after proposing several genera in addition to those already described, I have still material for others, though not yet satisfactorily determined.

In correcting the list of Brachiopoda, I have referred the species as far as possible to established genera, and have endeavored to indicate all cases of doubt by the simple ? or by some remark.

I had hoped to be able to devote more time to the preparation of this Catalogue; but to give it in all respects as I could wish, requires a re-examination of a large number of the species, and such a revision of the arrangement as would present the whole in a more connected form. This work I propose to complete as early as possible; offering in the mean time the following imperfectly corrected catalogue, which may be of use to the students in American Palæontology.

## FOSSILS OF THE FIRST VOLUME.

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
ACIDASPIS.....	240	
Acidaspis spiniger .....	241	
“        trentonensis .....	241	
Actinocrinus tenuiradiatus ..	18	Palæocystites tenuiradiatus, BILLINGS, Canadian Fossils, Decade iii, p. 69.
“        (indet.) .....	18	Probably a plate of a cystidean.
Agnostus lobatus .....	258	
Alecto? inflata .....	77	
AMBONYCHIA.....	163	
Ambonychia amygdalina ..	165	Palæarca? amygdalina. This species is not a true <i>Ambonychia</i> , belonging rather to <i>Palæarca</i> , or to <i>Megambonia</i> .
“        bellastriata .....	263	
“        carinata .....	294	
“        obtusa .....	166	Palæarca obtusa.
“        orbicularis .....	164	
“        radiata .....	292	
“        undata .....	165	The interior yet undetermined: perhaps referable to another genus.
“        (indet.) .....	167	The specimen is not an <i>Ambonychia</i> , and remains undetermined.
Asaphus extans .....	228	
“        latimarginata .....	258	
“        marginalis .....	24	
“        nodostriatus .....	248	
“        obtusus .....	24	
Asterias matutina .....	91	Palæaster matutina.
“        (indet.) .....	18	
Atrypa acutirostra .....	21	Rhynchonella acutirostra.
“        altilis .....	23	Rhynchonella altilis.
“        ambigua .....	143	Triplesia? ambigua.
“        bisulcata .....	139	Genus?
“        circulus .....	142	Perhaps the young of <i>Pentamerus hemi-</i> <i>plicatus</i> .
“        cuspidata .....	138	Triplesia cuspidata.
“        deflecta .....	140	Genus?
“        dentata .....	148	Rhynchonella dentata.

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
<i>Atrypa dubia</i> .....	21	<i>Rhynchonella dubia</i> .
“ <i>exigua</i> .....	141	Genus?
“ <i>extans</i> .....	137	<i>Triplesia extans</i> .
“ <i>hemiplicata</i> .....	144	<i>Pentamerus hemiplicatus</i> .
“ <i>increbescens</i> .. 146 -	289	<i>Rhynchonella increbescens</i> .
“ <i>modesta</i> .....	144	Genus? Related to <i>Leptocælia</i> ?
“ <i>nucleus</i> .....	138	<i>Triplesia nucleus</i> .
“ <i>plena</i> .....	21	<i>Rhynchonella plena</i> .
“ <i>plicifera</i> .....	21	<i>Rhynchonella plicifera</i> .
“ <i>recurvirostra</i> .....	140	<i>Rhynchonella? recurvirostra</i> . This species is perhaps generically identical with <i>A. modesta</i> .
“ <i>sordida</i> .....	148	<i>Rhynchonella sordida</i> .
“ <i>subtrigonalis</i> .....	145	<i>Rhynchonella subtrigonalis</i> .
<i>Aulopora arachnoidea</i> .....	76	
<i>Avicula demissa</i> .....	292	
“ ? <i>desquamata</i> .....	292	The specimen has not been satisfactorily determined to the present time. It is not <i>Avicula</i> .
“ <i>elliptica</i> .....	162	Genus?
“ <i>insueta</i> .....	291	
“ <i>trentonensis</i> .....	161	Genus?
<i>Bellerophon bilobatus</i> , 184 -	307	
“ <i>var. acutus</i> .....	185	
“ <i>var. corrugatus</i> ..	185	
“ <i>cancellatus</i> .....	307	
<b>BUCANIA</b> .....	32	The genus <i>Bucania</i> is regarded by most authors as not distinct from <i>Bellerophon</i> ; while these forms are made by D'ORBIGNY typical of the genus <i>Bellerophon</i> , and those like <i>B. bilobatus</i> are very erroneously placed by him under the genus <i>Cyrtolites</i> . Although there may be no sufficient reason for separating some forms of <i>Bellerophon</i> with exposed spires, I have for the present allowed these species to remain as originally described.
<i>Bucania bidorsata</i> .....	186	
“ <i>expansa</i> .....	186	
“ <i>intexta</i> .....	317	
“ <i>punctifrons</i> .....	187	
“ <i>rotundata</i> .....	33	
“ <i>sulcatina</i> .....	32	
<b>BUTHOTREPHIS</b> .....	8	
<i>Buthotrephis antiquata</i> .....	8	
“ <i>flexuosa</i> .....	263	
“ <i>gracilis</i> .....	62	
“ <i>subnodosa</i> .....	262	
“ <i>succulens</i> .....	62	
<i>Calymene beckii</i> .....	237, 250	<i>Triarthrus beckii</i> .

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
Calymene multicosta .....	228	The generic relations not fully determined
“        senaria .....	238	
CAMEROCERAS .....	221	
Cameroceras trentonense ...	221	
Capulus auriformis .....	31	This specimen is not a <i>Capulus</i> ; and although admitted among the Chazy collections on the authority of the collector, it may be doubtful whether it does not come from a higher rock, and is more nearly related to <i>Platystoma</i> .
Cardiomorpha vetusta .....	157	The generic relations are not satisfactorily determined.
CARINAROPSIS .....	183	Notwithstanding the objections made to the admission of this genus, I am not prepared to place the species under any other designation at the present time.
Carinaropsis carinatus .....	183	
“        orbiculatus .....	306	
“        patelliformis, 183,	306	
Ceraurus* pleurexanthemus,	242	
“        pustulosus .....	241	Harpes pustulosus.
“        vigilans .....	245	Cybele† vigilans.
Chætetes columnaris .....	68	Tetradium columnaris.
“        lycoperdon .....	48	Stenopora?
“        rugosus .....	67, 18	
CLEIDOPHORUS .....	300	

\* I retain the name *Ceraurus* of GREEN (1832), though fully aware of the arguments of BARRANDE and others in favor of adopting *Cheirurus* of BEYRICH (1845). In GREEN's monograph, a figure of this trilobite, though imperfect, was given; and a cast of the same was distributed widely both in Europe and America, and the genus became well known to palæontologists and amateurs among us. The view of M. BARRANDE that the genus was not clearly described, and therefore untenable before a later name, is an argument that could be applied with equal force to some of the genera proposed by European naturalists; for of the Trilobites, the genera *Homalonotus* and *Trinucleus* are, among others, examples of this kind, which names have nevertheless been adopted by American palæontologists without objection. The adoption of the generic name *Strophomena* is another case in point, for the original description is not remarkable for clearness.

It may perhaps be true that the limits of this genus of GREEN were not well understood in America; but the fact that I erroneously referred a species of another genus to *Ceraurus* is to be charged to me alone, and not to the obscurity of the description; for I had the original of GREEN and other well-marked specimens before me at the time, but referred the species to this genus in preference to proposing a new name, as it did not seem referable to any genus, the description of which was accessible to me.

In persisting in the use of this name, I believe I am sustained by common custom among naturalists in all countries; and I am convinced that the name *Ceraurus* will be restored, as have the names *Homalonotus*, *Trinucleus*, *Acidaspis*, and others, notwithstanding the later proposed and more clearly defined generic names of subsequent authors.

† I adopt the genus *Cybele* in deference to the opinion of Mr. SALTER; not having myself examined the claim of priority of the authors of *Cybele* and *Encrinurus*, which are synonymous.

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
Cleidophorus planulatus	300	
Columnaria alveolata	47	
Conularia gracilis	224	
“ granulata	223	
“ papillata	223	
“ trentonensis	222	
Cyrtoceras annulatum	194	
“ arcuatum	196	
“ camurum	196	
“ constrictostriatum,	195	
“ lamellosum	193	
“ macrostomum	194	
“ multicameratum	195	
Cyrtolites compressus	188	
“ filosum	189	
“ ornatus	308	
“ trentonensis	189	Shell slightly unsymmetrical, and perhaps referable to the genus <i>Ecculiomphalus</i> .
Cytherina (indet.)	44	Leperditia.
Delthyris biforatus, var. lynx,	133	Orthis biforatus, var. lynx.
DISCOPHYLLUM	277	This is probably a graptolitic genus, or a true graptolite; preserving the thin disc, as shown in the Canadian graptolites, while the apparent dissepiments are the rays or branches of the graptolite.
Discophyllum peltatum	277	
ECHINO-ENCRINITES	87	
Echino-encrinites? anatiformis,	89	
Edmondia? subangulata	156	Palæarca subangulata.
“ subtruncata	156	Palæarca subtruncata, fig. 3 a b c, p. 35. Palæarca — ? Pl. 34, f. 9.
“ ventricosa	155	Palæarca ventricosa.
ENDOCERAS	58	I leave the species under this genus as originally described for the present, though the subject requires revision. I am, however, by no means prepared to admit that the presence of the small orthoceras within the siphon of the larger one is accidental. Were it accidental, it seems most remarkable that some one of the numerous specimens should not have drifted into the cavity in the direction opposite that in which they always occur.
Endoceras angusticameratum,	218	
“ annulatum	207	
“ approximatum	219	
“ arctiventrum	217	
“ distans	220	
“ duplicatum	219	
“ gemilliparum	60	
“ longissimum	59	
“ magniventrum	218	
“ “ var. a.,	218	

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Endoceras multitubulatum	59	
" proteiforme	208, 213, 216, 311.	
" var. elongatum	216	
" var. lineolatum	211	
" var. strangulatum	212	
" var. tenuistriatum	209	
" var. tenuitextum	210	
" subcentrale	59	
ESCHAROPORA	72	
Escharopora recta	72	
" var. nodosa	73	
Euomphalus uniangulatus	9	
FAVISTELLA	275	
Favistella stellata	275	
GLYPTOCRINUS	281	
Glyptocrinus decadactylus	381	
GONIOCERAS	54	
Gonioceras anceps	54	
Gordia marina	264	The trail formed by some animal (shell or worm), moving along the bottom. See remarks, page 264, vol. i, Palæontology of New-York; also Report of Dr. A. FITCH on the Geology of Washington county, published in the Report of the New-York State Agricultural Society, vol. ix, p. 866.
Gorgonia? aspera	16	Fenestella aspera.
" ? perantiqua	76	Retepora? perantiqua.
Graptolithus amplexicaule	79	
" bicornis	269	
" furcatus	273	
" gracilis	274	
" lævis	274	
" mucronatus	268	
" pristis	265	
" ramosus	270	
" sagittarius	272	
" scalaris	274	
" secalinus	267	
" serratulus	274	
" sextans	273	
" tenuis		
HETEROCRINUS	278	
Heterocrinus gracilis	280	
" heterodactylus	274	
" simplex	280	

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
HOLOPEA .....	169	
Holopea obliqua .....	170	
“ paludiniiformis ..	170	
“ symmetrica .....	170	
“ ventricosa .....	171	
Illænus arcturus .....	23	
“ crassicauda .....	24, 229	
“ latidorsata .....	230	
“ trentonensis .....	230	
“ (Thaleops) ovatus ..	259	
Intricaria? reticulata .....	77	The generic relations of the specimen not clearly determined.
Isotelus canalis .....	25	Asaphus canalis.
“ gigas .....	25, 231 - 254	Asaphus canalis.
Leptæna alternata ...	102 - 286	Strophomena alternata.
“ alternistriata .....	109	S. alternistriata.
“ camerata .....	106	S. camerata.
“ deflecta .....	113	S. deflecta.
“ deltoidea .....	106	S. deltoidea.
“ fasciata .....	20	S. fasciata.
“ filitexta .....	111	S. filitexta.
“ incrassata .....	19	S. incrassata.
“ planoconvexa .....	114	S. planoconvexa.
“ planumbona .....	112	S. planumbona.
“ plicifera .....	19	S. plicifera.
“ recta .....	113	S. recta.
“ sericea .....	110 - 287	Leptæna sericea.
“ subtenta .....	115	Strophomena subtenta.
“ tenuilineata .....	115	S. tenuilineata.
“ tenuistriata .....	108	S. tenuistriata.
Lingula acuminata .....	9	
“ æqualis .....	95	
“ antiqua .....	3	
“ attenuata .....	94	
“ crassa .....	98	
“ curta .....	97	
“ elongata .....	97	
“ obtusa .....	98	
“ prima .....	3	
“ quadrata .....	96, 285	
“ riciniiformis .....	95	
Lituites convolvans .....	53	

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
Lituites undata .....	52	
LYRODESMA .....	302	
Lyrodesma plana .....	302	
“ pulchella .....	302	Tellinomya pulchella.
Maclurea magna .....	20	
“ matutina .....	10	
“ sordida .....	20	
Metoptoma ? dubia .....	23	Genus undetermined.
“ ? rugosa .....	306	Genus undetermined.
Modiola ? obtusa .....	40	The shell is too obscure to be satisfactorily determined. It is probably a <i>Palæarca</i> or a <i>Modiolopsis</i> .
MODIOLOPSIS .....	157	The species originally described under this genus are not all referable to one generic form, but I have not yet obtained the means of a satisfactory discrimination in all the examples.
Modiolopsis anodontoides ..	298	
“ arcuatus .....	159	
“ aviculoides .....	161	
“ carinatus .....	160	
“ ? curta .....	297	This species is probably distinct from <i>Modiolopsis</i> .
“ faba .....	158, 298	
“ latus .....	160	Palæarca lata.
“ modiolaris .....	294	
“ nasutus .....	159, 296	
“ ? nuculiformis .....	298	This species is probably a <i>Nucula</i> or <i>Tellinomya</i> .
“ parallela .....	158	
“ subspatulatus .....	159	Palæarca subspatulata.
“ ? trentonensis .....	161	
“ truncatus .....	296	
Murchisonia abbreviata .....	32	
“ ? angustata .....	41	
“ bellacineta .....	179	
“ bicincta .....	177	
“ gracilis .....	181 - 303	
“ perangulata .....	41	
“ var. A .....	179	
“ subspiniiformis .....	180	
“ bicarinata .....	178	
“ uniangulata .....	179	
“ var. abbreviata .....	304	
“ varicosa .....	41	
“ ventricosa .....	41	
“ vittata .....	181	

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
Natica? .....	42	This is probably a species of <i>Holopea</i> .
Nucula? donaciformis .....	316	Tellinomya donaciformis.
“ levata .....	150	Tellinomya levata.
“ ? postriata .....	151, 201	Genus undetermined.
Ogygia? vetusta .....	227	Asaphus vetustus.
Olenus asaphoides .....	256	
“ undulostriatus .....	258	
ONCOCERAS .....	196	
Oncoceras constrictum .....	197	
OPHILETA .....	11	
Ophileta complanata .....	11	
“ levata .....	11	
Orbicula cœlata .....	290	Trematis cœlata.
“ ? crassa .....	290	Genus?
“ ? deformata .....	23	Genus?
“ ? filosa .....	99	Crania? filosa. The relations of this species are with <i>Crania</i> , if it be not a true <i>Crania</i> .
“ lamellosa .....	99	Discina lamellosa.
“ ? subtruncata .....	290	Probably related to <i>Crania</i> , from its analogy with other forms in the higher rocks.
“ terminalis .....	100	Trematis terminalis.
Ormoceras gracile .....	58	
“ tenuifilum .....	55, 222	This species is probably identical with <i>Ormoceras backi</i> .
“ var. distans .....	58	
Orthis æquivalvis .....	120	
“ bellarugosa .....	118	
“ centrilineata .....	289	
“ costalis .....	20	
“ dichotoma .....	125	
“ disparilis .....	119	
“ ? erratica .....	228	
“ fissicosta .....	121	
“ inculpta .....	125	
“ occidentalis .....	127	This species, with <i>O. sinuata</i> and <i>O.</i> <i>subjugata</i> , may form but a single species; though from the collections in my hands in 1847, I found what appeared to be satisfactory means of distinguish- ing them. Since examining the species of the Lower Helderberg limestone, I have found numerous forms which appear as closely allied as do these, but which are nevertheless clearly distinguished by their interior markings. I am not satisfied that the European species, <i>Orthis porcata</i> , is identical with ours.
“ pectinella .....	123	
“ var. semiovalis .....	124	
“ perveta .....	120	

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
Orthis plicatella .....	122	
“ sinuata .....	128	
“ subæquata .....	118	
“ subjugata .....	129	
“ subquadrata .....	126	
“ testudinaria .....	117	
“ tricenaria .....	121	
Orthoceras amplicameratum,	205	
“ anellum .....	202	
“ arcuoliratum .....	198	
“ bilineatum .....	199	
“ <i>var. a</i> .....	300	
“ clathratum .....	201	
“ fusiforme .....	60	Gomphoceras? fusiforme.
“ junceum .....	204	
“ laqueatum .....	13	
“ latiannulatum .....	204	
“ moniliforme .....	35	
“ multicameratum .....	44	
“ primigenium .....	13	
“ rectiannulatum .....	34	
“ recticameratum .....	45	
“ strigatum .....	405	
“ subarcuatum .....	34	
“ tenuiseptum .....	35	
“ teretiforme .....	198	
“ textile .....	199	
“ undulostriatum .....	202	
“ vertebrale .....	201	
Orthonota contracta .....	300	
“ parallela .....	299	
“ pholadis .....	299	
PALÆOPHYCUS .....	7	
Palæophycus irregularis .....	8	
“ rugosus .....	63	
“ simplex .....	63	
“ tubularis .....	7	
“ virgatus .....	263	
“ (indet.) .....	28	
Phacops callicephalus .....	247	In the present distribution of the Trilobites, this species will fall under the genus <i>Dalmania</i> = <i>Dalmania callicephala</i> .

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
Phacops? laticaudus .....	248	This name may be stricken from the list. The specimen, in dark limestone, was undoubtedly originally sent from Schoharie to Lewis county, and finally becoming mingled with the Trenton limestone fossils of the latter locality, was labelled as from the Trenton limestone. It is the pygidium of <i>Dalmania micrurus</i> or <i>D. pleuroptyx</i> . See Palæontology of New-York, Vol. iii, p. 356.
PHYTOPSIS .....	38	
Phytopsis tubulosum .....	38	
“ cellulosum .....	39	
PLATYNOTUS .....	235	LICHAS.
Platynotus trentonensis .....	235	Lichas trentonensis.
Pleurotomaria ambigua .....	176	
“ antiquata .....	31	
“ biangulata .....	31	
“ [?] bilix .....	305	Cyclonema bilix.
“ indenta .....	176	
“ lenticularis .....	172	
“ ? nodulosa .....	44	
“ ? nucleolata .....	42	
“ ? obsoleta .....	44	
“ percarinata .....	177	It is probable that this species may be identical with <i>P. bilix</i> of the original list.
“ quadricarinata ..	43	
“ rotuloides .....	173	
“ subconica ..	174 - 304	
“ subtilistriata .....	172	
“ turgida .....	12	
“ umbilicata ..	43 - 175	
“ (indet.) .....	31	
Porites vetusta .....	71	Heliolites vetusta.
Poteriocrinus alternatus .....	83	—— ?
“ gracilis .....	84	
RAPHISTOMA .....	28	The distinction between this genus and <i>Scalites</i> requires to be more clearly determined.
Raphistoma planistria .....	30	
“ var. parva .....	30	
“ staminea .....	29	
“ striata .....	28	
Receptaculites neptunii .....	68	
Retepora? foliacea .....	78	This name may be erased from the list of fossils.
“ gracilis .....	15	Fenestella gracilis.
“ incepta .....	15	Fenestella incepta.
Scalites angulatus .....	27	

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
SCHIZOCRINUS .....	81	
Schizocrinus nodosus .....	81	
“ striatus .....	316	
“ (indet.) .....	86	
SCYPHOCRINUS .....	85	Not <i>Scyphocrinus</i> of ZENKER.
Scyphocrinus heterocostalis .....	85	
SCOLITHUS .....	2	
Scolithus linearis .....	2	
SPHENOTHALLUS .....	261	
Sphenothallus angustifolius .....	261	
“ latifolius .....	262	
STELLIPORA .....	79	
Stellipora antheloidea .....	79	This species is referred by EDWARDS and HAIME to the Genus <i>Constellaria</i> of DANA (Zoophytes, 1849). A more careful examination, and removal of the adhering shaly matter, shows the entire surface to be poriferous. I have not, however, found good reason for separating these forms of <i>Chætetes</i> ( <i>Stenopora</i> ) from others in the same association; and the <i>Chætetes lycoperdon</i> , in the hemispheric forms, has not unfrequently its surface, or a part of its surface, marked by stelliform elevations as in the specimen under consideration.
STICTOPORA* .....	73	
Stictopora acuta .....	74	
“ elegantula .....	75	
“ fenestrata .....	16	
“ glomerata .....	17	
“ labyrinthica .....	50	
“ ramosa .....	51	
STREPTELASMA .....	17	MM. MILNE-EDWARDS & JULES HAIME have regarded the <i>S. corniculum</i> , <i>S. crassa</i> , <i>S. multilamellosa</i> and <i>S. parvula</i> as identical species. The <i>S. parvula</i> may be the young of <i>S. corniculum</i> ; but <i>S. crassa</i> presents features incompatible with specific identity. The original of <i>S. multilamellosa</i> is not now accessible to me for comparison. The species identified as <i>S. corniculum</i> by these authors, from western localities, I have regarded as a distinct form.
Streptelasma corniculum .....	69	
“ crassa .....	70	
“ expansa .....	17	
“ multilamellosa .....	70	
“ parvula .....	71	
“ profunda .....	49	
STROMATOCERIUM .....	48	
Stromatocerium rugosum .....	48	

\* I am not yet convinced that this genus is synonymous with *Ptilodictyia* of LONSDALE. The typical species of the latter genus, *P. lanceolata*, presents certain differences of character, which, judging from figures only, may be regarded as of generic importance. The characters of *P. lanceolata*, as shown in figures and in a closely allied species in our strata, correspond more nearly with those species which I have referred to the genus *Phenopora*, and which may be identical with *Ptilodictyia*. All the species of *Phenopora* which I have observed are simple, as is the typical form of *Ptilodictyia*, while the *Stictopora* are always ramose.

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
SUBULITES .....	182	
Subulites elongata .....	182	
TELLINOMYA* .....	151	
Tellinomya anatiniformis ..	154	
“ dubia .....	153	
“ gibbosa .....	153	
“ nasuta .....	152	
“ sanguinolaroidea ..	152	
Tentaculites flexuosa ..	92 - 284	The pedicle of a cystidean, and the name may therefore be stricken from the list.
Thaleops (Illænus) ovatus ..	259	Illænus ovatus.
Theca triangularis .....	313	
Trinucleus concentricus, 249, 255		
Trocholites ammonius ..	192, 309	
“ planorbiformis ..	310	
Turbo dilucula .....	12	} These species require farther examination to determine their generic relations.
“ obscura .....	12	
—? cyathiformis .....	72	This species, originally figured on Plate 25 of Vol. I, Palæontology of New-York, was too obscure in its intimate structure to be referred satisfactorily to any known genus. At a later period (1850), I determined it to be generically identical with a species occurring in the Leadbearing limestone of Wisconsin and Iowa, which was subsequently figured and described by Dr. D. D. OWEN under the name <i>Selenoides</i> ( <i>S. iovens</i> ); being referred by him to the Foraminifera, and related to the <i>Orbitulina</i> or <i>Orbitoides</i> . Should this genus prove distinct from <i>Receptaculites</i> , to which I had referred the western specimens, the species above will be recorded as <i>Selenoides cyathiformis</i> .

Very recently Mr. SALTER has advanced the opinion that the *Receptaculites* belongs to the Foraminifera, and is related to the *Orbitolites*, without apparently having known of this suggestion of Dr. OWEN in regard to an allied or identical generic form.

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\* Mr. SALTER has more recently proposed the name *Ctenodonta* for the species included under this genus, on account of the inappropriateness or erroneous signification of the name *Tellinomya*; the hinge-line being crenulate, and the species not at all related to *Tellina* or *Mya*. The name was originally given from the external form; and so soon as I obtained the means to do so, I illustrated the hinge-structure. I retain the name *Tellinomya*, according to the usage of naturalists.

FOSSILS OF THE SECOND VOLUME.

ORIGINAL NAMES.	Vol. II, page	CHANGED NAMES, REMARKS, etc.
Acidaspis ——— ? .....	299	
ACROCLIA .....	288	PLATYCERAS.
Acroclia angulata .....	289	Platyceras angulata.
“ niagarensis .....	288	P. niagarensis.
APIOCYSTITES .....	242	
Apiocystites elegans .....	243	
Arges phlyctanodes .....	314	Lichas phlyctanodes.
ARTHROPHYCUS .....	4	
Arthropycus harlani .....	5	
“ ——— ? .....	6	
ASTROCERIUM .....	120	
Astrocerium constrictum .....	123	
“ parasiticum .....	122	
“ pyriforme .....	123	Favosites ?
“ venustum .....	120	
Atrypa aprinis .....	280	Rhynchospira ? aprinis.
“ bidens .....	69	Rhynchonella bidens.
“ bidentata .....	276	Rhynchonella bidentata.
“ brevirostris .....	278	Pentamerus brevirostris. Probably only a variety of <i>Pentamerus</i> <i>interplicatus</i> .
“ camura .....	273	Trematospira camura.
“ congesta .....	67	Triplexia ? congesta.
“ corallifera .....	281	Genus ?
“ crassirostra .....	269	Merista ? crassirostra.
“ cuneata .....	276	Rhynchonella cuneata.
“ cylindrica .....	76	Merista cylindrica.
“ ——— (?) .....	78	
“ disparilis .....	277	Leptocœlia disparilis.
“ emacerata .....	71	Rhynchonella emacerata.
“ equiradiata .....	70	Rhynchospira ? equiradiata.
“ ? gibbosa .....	79	
“ hemispherica .....	74	Leptocœlia hemispherica.
“ intermedia .....	77	Merista intermedia.
“ interplicata .....	275	Pentamerus interplicatus.

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“ <i>naviformis</i> .....	76	<i>Merista?</i> * <i>naviformis</i> .
“ <i>neglecta</i> .....	70 - 274	<i>Rhynchonella neglecta</i> .
“ <i>nitida</i> .....	268	<i>Merista nitida</i> .
“ <i>nitida, var. oblata</i> ..	269	<i>M. nitida, var. oblata</i> .
“ <i>nodostrata</i> .....	272	
“ <i>nucleolata</i> .....	328	<i>Merista nucleolata</i> .
“ <i>oblata</i> .....	9	<i>Merista oblata</i> .
“ <i>obtusiplicata</i> .....	279	<i>Rhynchonella obtusiplicata</i> .
“ <i>planoconvexa</i> .....	75	<i>Leptocœlia planoconvexa</i> .
“ <i>plicata</i> .....	10	<i>Rhynchonella plicata</i> .
“ <i>plicatella?</i> .....	279	<i>R. plicatella</i> .
“ <i>plicatula</i> .....	74	Allied to <i>Leptocœlia</i> .
“ <i>quadricostata</i> .....	68	<i>Triplesia?</i> <i>quadricosta</i> .
“ <i>reticularis</i> .....	72 - 270	
“ <i>robusta</i> .....	71	<i>Rhynchonella robusta</i> .
“ <i>rugosa</i> .....	271	
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“ <i>limæformis</i> .....	332	
“ ? <i>orbiculata</i> .....	284	
“ <i>rhomboidea</i> .....	84	
“ <i>securiformis</i> .....	331	
“ <i>subplana</i> .....	283	
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“ <i>undata</i> .....	283	
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“ <i>symmetrica</i> .....	317	
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“ <i>stigmosa</i> .....	92	
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\* This species, and some others of the Clinton and Niagara groups, differ somewhat from true *Meristæ*; and should these differences prove of generic importance, I propose for them the name *Meristella*.

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“ “ var. senaria	299
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 Halysites escharoides.  
 H. agglomerata.

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Leperditia jonesi.

See description, Pal. N. Y. vol. iii, p.372.

Leperditia cylindrica.

Beyrichia? spinosa.

Probably identical with the genus *Diphyphyllum*.

Diphyphyllum cæspitosum.

D. coralliferum.

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\* I am not prepared, at the present time, to accept the view advanced that this fossil is the siphuncle of an *Orthoceras*. On some future occasion, I hope to be able more fully to illustrate its characters.

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“ depressa .....	62, 257	S. rugosa.
“ obscura .....	62	S. obscura.
“ obscura ? .....	103	S. obscura ?
“ orthididea .....	62	S. orthididea.
“ patenta .....	60	S. patenta.
“ profunda .....	61	S. profunda.
“ ——— (?) .....	61	S. ——— ?
“ sericea .....	59	
“ striata .....	259	Strophomena striata.
“ subplana .....	259	S. subplana.
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“ ——— (?) .....	326	S. ——— ?
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“ laminata .....	143	
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“ ? primigenius .....	11	This species is probably a <i>Palæarca</i> .
“ subalatus .....	84	
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“ macrospira .....	346	
“ (?) obtusa .....	332	
“ subulata .....	91	
“ (?) terebralis .....	334	
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“ convolutus .....	192	
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“ tenuilamellata	250	Discina tenuilamellata.
Ormoceras vertebratum	94	
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“ interstriata	326	
“ pisum	250	
“ punctostriata	254	
“ pyramidalis	351	
“ tenuidens	58	
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“ oblongus	79	
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“ ovalis	103	
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“ trisulcatus	300	
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“ perlata	349	
“ (?) pervetusta	12	
“ solarioides	348	
“ subdepressa	332	
“ (?) —————	348	
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Polydilasma turbinatum	112	<i>Zaphrentis?</i> turbinatum.
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“ tubulosa	49	
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“ biforatus, var. lynx	65	Orthis biforatus, var. lynx.
“ bilobus	260	O. bilobus.
“ crispus	262, 328	

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“ pyramidalis .....	266	
“ radiatus .....	66, 265	
“ sulcatus .....	261	
“ ————— .....	66	Pentamerus?
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Stephanocrinus angulatus ..	212	
“ gemmiformis .....	215	
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CORRECTED LIST OF THE FOSSILS DESCRIBED IN THE REPORT  
OF THE FOURTH GEOLOGICAL DISTRICT OF NEW-YORK

(EXCEPTING THOSE WHICH ARE CORRECTED IN THE PRECEDING LISTS).



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Atrypa sulcata .....	142	Merista? sulcata.
Cytherina alta .....	142	Leperditia alta.
Delthyris plicatus .....	142	Spirifer plicatus.
Littorina antiqua .....	142	Holopea antiqua.
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Atrypa lacunosa .....	*	Rhynchonella lacunosa.
Euomphalus profundus .....		Bucania profunda.
Lepocrinites gebhardi .....		Lepadocrinus gebhardi.
Pentamerus galeatus .....		

ORGANIC REMAINS OF THE DELTHYRIS SHALY LIMESTONE.

Strophomena punctulifera ..	Strophodonta punctulifera.
Strophomena radiata .....	

\* The species given without references to page are from the Report of the Third District by Mr. VANUXEM, and were not repeated in the text of the Report of the Fourth District, but in the plates of fossils at the end of the volume.

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<i>Atrypa elongata</i> .....	148	<i>Rensselæria ovoides.</i>
<i>Atrypa peculiaris</i> .....	148	<i>Eatonia peculiaris.</i>
<i>Atrypa unguiformis</i> .....	149	<i>Orthis hipparionyx, or</i> <i>O. unguiformis.</i>
<i>Delthyris arenosa</i> .....	148	<i>Spirifer arenosa.</i>

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<i>Astrea rugosa</i> .....	159	<i>Acervularia rugosa.</i>
<i>Cyathophyllum</i> .....	160	<i>Cyathophyllum lesueuri.</i>
<i>Cyathophyllum dianthus</i> ..	160	———— ———?
<i>Delthyris undulatus</i> .....		<i>Spirifer undulatus.</i>
<i>Favosites alveolaris</i> .....	157	This species has been referred to <i>Favosites (Emmonsia) hemispherica</i> of YANDELL & SHUMARD; but I am not satisfied of the identity, by comparison of specimens which I believe to be authentic.
<i>Favosites fibrosa</i> .....	159	———— ———?
<i>Favosites gothlandica</i> .....	157	<i>Favosites basaltica.</i>
<i>Hipparionyx (Atrypa) con-</i> <i>similaris</i> .....		<i>Atrypa reticularis, var.!</i>
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<i>Acroculia erecta</i> .....	172	<i>Platyceras erecta.</i>
<i>Atrypa prisca</i> .....	175, 198	<i>Atrypa reticularis.</i>
<i>Atrypa scitula</i> .....	171	<i>Merista scitula.</i>
<i>Calymene crassimarginata</i> ..	172	<i>Proetus crassimarginata.</i>
<i>Cyrtoceras undulatum</i> .....	175	
<i>Delthyris duodenaria</i> .....	171	<i>Spirifer duodenaria.</i>
<i>Euomphalus? rotundus</i> .....	172	<i>Pleurotomaria? rotunda.</i>
<i>Ichthyodorulite</i> .....	174, 175	
<i>Odontocephalus selenurus</i> ..	175	<i>Dalmania selenurus.</i>
<i>Orthis lenticularis</i> .....	175	
<i>Orthonychia</i> ——— .....	172	<i>Platyceras (Orthonychia) subrectum.</i>
<i>Paracyclas elliptica</i> .....	171	<i>Lucina elliptica</i> = ? <i>L. proavia.</i>
<i>Pleurorhyncus trigonalis</i> ...	171	
<i>Pterinea cardiiformis</i> .....	172	<i>Megambonia cardiiformis.</i>
<i>Strophomena acutiradiata</i> ..	171	<i>Chonetes acutiradiata.</i>
<i>Strophomena crenistria</i> .....	171	<i>Strophodonta crenistria.</i>
<i>Strophomena lineata</i> .....	175	<i>Chonetes lineata.</i>
<i>Strophomena undulatum</i> .....	175	<i>Strophomena rugosa, var.</i>
<i>Tentaculites scalaris</i> .....	172	

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<i>Avicula equilatera</i> .....	180	<i>Aviculopecten equilatera</i> .
<i>Avicula lævis</i> .....	180	<i>Pteronites? lævis</i> .
<i>Avicula muricata</i> .....	180	————— ?
<i>Orbicula minuta</i> .....	180	<i>Discina minuta</i> .
<i>Orthis nucleus</i> .....	180	
<i>Orthoceras subulatum</i> .....	180	
<i>Strophomena mucronata</i> .....	180	<i>Chonetes? mucronata</i> .
<i>Strophomena pustulosa</i> .....	180	<i>Productus pustulosus; not</i> <i>P. pustulosus</i> of European authors.
<i>Strophomena setigera</i> .....	180	<i>Chonetes setigera</i> .
<i>Tentaculites fissurella</i> .	180, 222	

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<i>Atrypa concinna</i> .....	200	<i>Nucleospira concinna</i> .
<i>Atrypa rostrata</i> .....	202	<i>Merista rostrata</i> .
<i>Atrypa spinosa</i> .....	200	<i>Atrypa aspera</i> .
<i>Avicula decussata</i> .....	203	<i>Pteronites? decussata</i> .
<i>Avicula orbiculata</i> .....	202	<i>Aviculopecten orbiculata</i> .
<i>Bellerophon patulus</i> .....	196	
<i>Calymene bufo</i> .....	200	<i>Phacops bufo</i> .
<i>Cryphæus calliteles</i> .....	200	<i>Dalmania calliteles</i> .
<i>Cucullea opima</i> .....	196	<i>Nucula opima</i> .
<i>Cyathophyllum</i> ——— .....		<i>Cyathophyllum vanuxemi</i> .
<i>Cyathophyllum turbinatum</i> .		<i>Heliophyllum halli</i> .
<i>Cypriocardia truncata</i> .....	196	————— ?
<i>Cystiphyllum cylindricum</i> .	209	<i>Cystiphyllum americanum</i> .
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<i>Delthyris fimbriata</i> .....	208	<i>Spirifer fimbriatus</i> .
<i>Delthyris granulifera</i> .....	207	<i>Spirifer granuliferus</i> .
<i>Delthyris macronota</i> .....	207	<i>Spirifer macronotus</i> .
<i>Delthyris medialis</i> .....	208	<i>Spirifer medialis</i> .
<i>Delthyris mucronata</i> ..	198, 205	<i>Spirifer mucronatus</i> .
<i>Delthyris sculptilis</i> .....	202	<i>Spirifer sculptilis</i> .
<i>Delthyris zigzag</i> .....	200	<i>Spirifer zigzag</i> .
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<i>Nucula lineata</i> .....	196	
<i>Nucula oblonga</i> .....	196	<i>Nuculites?</i> oblonga.
<i>Tellina ovata</i> .....	196	———— ?
<i>Orthonata undulata</i> .....	205	
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<i>Strombodes distortus</i> .....	210	<i>Cyathophyllum?</i> distortus.
<i>Strombodes helianthoides</i> ..	210	<i>Heliophyllum halli.</i>
<i>Strombodes rectus</i> .....	210	<i>Streptelasma recta.</i>
<i>Strombodes simplex</i> .....	210	<i>Zaphrentis simplex.</i>
<i>Strophomena inequistriata</i> ..	200	<i>Strophodonta inequistriata.</i>
<i>Turbo lineatus</i> .....	198	<i>Pleurotomaria lineata.</i>

## ORGANIC REMAINS OF THE TULLY LIMESTONE.

<i>Atrypa affinis</i> .....	215	<i>Atrypa reticularis.</i>
<i>Atrypa cubioides</i> .....	215	<i>Rhynchonella cuboides</i> : Not <i>R. cuboides</i> of Europe = <i>R. subcuboides.</i>
<i>Atrypa lentiformis</i> .....	215	<i>Atrypa reticularis.</i>
<i>Orthis resupinata</i> .....	215	<i>Orthis tulliensis.</i>

## ORGANIC REMAINS OF THE GENESEE SLATE.

<i>Atrypa quadricostata</i> .....	223	<i>Rhynchonella quadricostata.</i>
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<i>Lingula spatulata</i> .....	223	
<i>Orbicula lodensis</i> .....	223	<i>Discina lodensis.</i>
<i>Strophomena setigera</i> .....	222	<i>Chonetes setigera.</i>

## ORGANIC REMAINS OF THE PORTAGE GROUP.

<i>Astarte</i> [?] <i>subtextilis</i> .....	245	
<i>Avicula speciosa</i> .....	243	———— - ?
<i>Bellerophon expansus</i> .....	243	Not <i>B. expansus</i> of SOWERBY = <i>B. cyclopterus.</i>
<i>Bellerophon striatus</i> .....	245	
<i>Cardium</i> ? [?] <i>vetustum</i> .....	245	
<i>Clymenia?</i> <i>complanata</i> .....	243	
<i>Cyathocrinus ornatissimus</i> ..	247	
<i>Delthyris lævis</i> .....	245	<i>Spirifer lævis.</i>
<i>Fucoides graphica</i> .....	241	
<i>Fucoides verticalis</i> .....	242	

## PORTAGE GROUP.

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Lucina retusa .....	245	
Nucula lineolata.....	245	
Orthis tenuistriata .....	245	
Orthoceras aciculum .....	243	
Pinnopsis acutirostris.....	243	Perhaps generically identical with <i>Am- bonychia</i> .
Pinnopsis ornatus.....	243	
Ungulina suborbicularis ...	243	Generic relations undetermined:

## ORGANIC REMAINS OF THE CHEMUNG GROUP.

Atrypa contracta .....	271	Rhynchonella contracta.
Atrypa dumosa.....	271	Perhaps identical with <i>Atrypa aspera</i> .
Atrypa duplicata .....	271	Rhynchonella duplicata.
Atrypa eximia .....	271	Rhynchonella eximia.
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Atrypa laticosta .....	271	Rhynchonella laticosta.
Atrypa laticosta, <i>var.</i> .....	271	Rhynchonella laticosta, <i>var.</i>
Atrypa mesacostalis .....	271	Rhynchonella mesacostalis.
Atrypa polita .....	271	Merista polita.
Atrypa? tenuilineata .....	271	
Atrypa tribulis.....	271	Atrypa reticularis.
Avicula acanthoptera .....	263	Pteronites acanthoptera.
Avicula damoniensis? .....	262	Pteronites? chemungensis.
Avicula longispina.....	262	Pteronites longispina.
Avicula pectiniformis .....	262	Aviculopecten pecteniformis.
Avicula signata .....	264	Aviculopecten signatus.
Avicula spinigera .....	262	Pteronites spinigera.
Calymene nupera .....	262	Phacops nupera. Perhaps a variety of <i>P. bufo</i> .
Delthyris acanthota .....	270	Spirifer acanthotus.
Delthyris acuminata .....	270	Spirifer acuminatus.
Delthyris cuspidata .....	270	Spirifer cuspidatus.
Delthyris disjuncta .....	269	Spirifer disjunctus [?].
Delthyris inermis .....	270	Spirifer inermis.
Delthyris mesacostalis .....	269	Spirifer mesacostalis.
Delthyris mesastrialis .....	269	Spirifer mesastrialis.
Delthyris mucronata .....	270	Spirifer mucronatus.
Filicites?.....	273, 275	Plumalina plumosa.
Lima glaber .....	264	Genus?

## CHEMUNG GROUP.

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Orthis unguiculus .....	267	
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Pecten convexus .....	264	Aviculopecten convexus.
Pecten crenulatus .....	264	Genus?
Pecten dolabriformis .....	264	Aviculopecten dolabriformis.
Pecten duplicatus .....	264	Aviculopecten duplicatus.
Pecten striatus .....	264	Aviculopecten striatus.
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Strophomena bifurcata .....	266	Strophodonta bifurcata.
Strophomena interstitialis .....	266	Strophodonta interstitialis.
Strophomena nervosa .....	266	Strophodonta nervosa.
Strophomena pectinacea .....	266	Strophodonta pectinacea.

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Sauripteris taylori .....	281	Holoptychius taylori.
Scale of Holoptychus nobilissimus ..	281	Probably identical with the following :
Scale of Sauripteris .....	281	Holoptychius taylori.
Jawbone and teeth of ditto .....	282	Probably of <i>H. taylori</i> .

## ORGANIC REMAINS OF THE SANDSTONE OF THE CONGLOMERATE.

Cypricardia? angustata .....	186	
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Cypricardia rhombea .....	291	Genus?
Euomphalus depressus .....	291	Not <i>E. depressus</i> of SOWERBY = <i>E.</i>

CATALOGUE OF THE SPECIES OF FOSSILS DESCRIBED IN THE  
THIRD VOLUME OF THE PALEONTOLOGY OF NEW-YORK;

INCLUDING THOSE FROM THE WATERLIME GROUP, THE LOWER HELDERBERG GROUP,  
AND THE ORISKANY SANDSTONE.

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# DONATIONS AND PURCHASES

DURING THE YEAR 1858.

## I. FOSSILS FROM THE EOCENE TERTIARY OF PARIS,

PRESENTED BY W. C. JOHNSON, ESQ., OF UTICA.

CHAMA CALICULATA,	TEREBELLUM, sp.?
CYTHEREA NITIDULA,	ROSTELLARIA FISSINELLA,
CYTHEREA LEVIGATA,	ROSTELLARIA MACROPTERA,
ARCA BIANGULATA,	ROSTELLARIA COLUMBELLA,
ARCA MODIOLIFERA,	TURRITELLA IMBRICATARIA,
LUCINA GIGANTEA,	TURRITELLA INTERMEDIA,
CARDELLA, sp.?	MELANIA CASTELLATA,
CORBA PECTUNCULUS,	MELANIA MARGINATA,
PECTUNCULUS, sp.?	MUREX CRISPIUS,
PECTUNCULUS GENICULATUS,	FUSUS IMPLICATA,
CARDIUM PENDULOSUM,	FUSUS ACICULATUS,
CARDITA IMBRICATARIA,	FUSUS NEOMII,
ANOMIA EPIPHRAM,	FUSUS BULLIFORMIS,
ASTRÆA FLABELLULA,	FUSUS FACULENS,
NUCULA MARGARITACEA,	TROCHUS AGLUMANUS,
CORBULA ANSTERIA,	TROCHUS TRICARINATUS,
CORBULA RUGOSA,	CONUS DEPREDATUS,
CORBULA STRIATA,	BUCCINUM STROMBOIDEUS,
DENTALIA DENTALIS,	VOLUTA SPINOSA,
PELIOPSIS CORNUCOPIA,	VOLUTA MARICINA,
CALYPTERA TROCHIFORMIS,	VOLUTA MUCRONATA,
NATICA MUTABILIS,	VOLUTA HARPA,
NATICA CARAPACEA,	VOLUTA MUSCULINA,
NATICA EPISTOLARIA,	CERITHIUM GIGANTEUS,
AMPULLARIA VILMETA,	CERITHIUM TEREABELLA,
CIGARETUS CANALICULATUS,	CERITHIUM ECHINOIDEUS,
ANCILLARIA BUCCINOIDES,	CERITHIUM HEXAGONUM,
ANCILLARIA OLIVULA,	CERITHIUM SECATUM,
ANCILLARIA, sp.?	CERITHIUM LABELLATUM,
PLEUROTOMA CLAVICULATUS,	CERITHIUM PLEUROTOMOIDES,
PLEUROTOMA FILOSA,	CERITHIUM, sp.?
PLEUROTOMA DENTATA,	SEPIA CUVIERI,
PLEUROTOMA BREVICAUDATA,	ECHINOLAMPUS SIMILIS,
MITRA FISSULINA,	SOLANIUM CANALICULATUS,
MITRA TEREBELLUM,	CYPRÆA ELEGANS,
TEREBRA PlicateLLA,	DELPHINULA STRIATA.

JOHN CHAMBERS, ESQ., OVID, SENECA COUNTY.

Two large boxes of fine and rare fossils from the Tully limestone, containing several new species.

PROFESSOR A. J. UPSON.

Fossils from the Old Redsandstone, Delaware county.

## II. FOSSILS FROM PHILIP P. CARPENTER, WARRINGTON, ENG.

## 1. POST-PLIOCENE FOSSILS.

## CORALLINE CRAG.

CORAL, sp.?	Sudbourn.
BRYOZOA,	"
RETEPORA,	Aldborough.
CELLAPORA,	"
RETEPORA, &c.	Sudbourn.
LEPRALIA, CELLAPORA on PECTEN,	"
LEPRALIA,	"
Cast of LIMA and MEMBRANIPORA,	Aldborough.
LEPRALIA on PECTEN (4),	Sudbourn.
LEPRALIA and MEMBRANIPORA,	"
PECTEN,	"
CELLAPORA on PECTEN (2),	"
MEMBRANIPORA,	"
LEPRALIA,	"
PECTEN MAXIMUS,	Sutton.
PECTEN LENS,	Sudbourn.
LUCINA BOREALIS,	"
ASTARTE (2),	"
VOLUTA LAMBERTI (cast of),	"
TEREBRATULA,	"
VENERICARDIA,	"
OSTREA,	"
LIMA,	"
TURRITELLA IMBRICATA,	"

## RED CRAG.

TELLINA SOLIDULA,	Sutton.
CARDIUM EDULA,	"
TELLINA PROXIMA,	"
ASTARTE,	"
TELLINA,	"
MACTRA,	"
TELLINA CRASSA,	"
PECTEN GLYCIMERIS,	"
VENERICARDIA SENILIS,	"
PECTEN OPERCULARIS,	"
FUSUS GRACILIS,	"
NASSA RETRORSA,	Brightwell.
LITORINA LITOREA,	Sutton.
PURPURA LAPILLUS,	"
FUSUS ANTIQUUS,	"
TURRITELLA COMMUNIS,	"
PINGUICULA BUCCINEA,	"
CYPRÆA EUROPEA,	Alderton.
ECHINOCYANUS PUSILLUS,	Sutton.
CANCER LEACHII (detrital beds),	"
FISH-TEETH	"
OTOLITH (ear-bone) of a whale,	"

## MAMMALIFEROUS CRAG.

ASTARTE ANTIQUA,	Chiltsford.
TELLINA PROXIMA,	“
PURPURA LAPILLUS,	“
PECTEN OPERCULATUS,	“
MANGELIA TURRICULA,	“

## 2. EOCENE TERTIARY.

CORBULA, LUCINA (2), NATICA (2), TROCHUS : Grignon, France.

## 3. GREENSAND.

TEREBRATULA BIPPLICATA,	Cambridge.
TEREBRATULA PECTILA,	Westminster.
MYOCONCHA CRASSA,	Dundry.
TROCHIARTHURUS,	Cambridge.
TROCHIARTHURUS WARBURTONI,	“
NUCLEOLITES CARINATUS,	Warminster.
GALERITES SUBACULEATUS,	“
ECHINUS GRANULOSUS,	“
VERTEBRA of osseous fish,	Cambridge.
VERTEBRA of LAMNA,	“
TEETH of LAMNA,	“

## 4. INFERIOR OOLITE.

TEREBRATULA, sp.? (2),	Dundry.
TEREBRATULA ELEGANS,	Cambridge.
TEREBRATULA, sp.?	Blackdown.
AMMONITE, sp.?	Dundry.
OSTREA, sp.?	“

## 5. CARBONIFEROUS LIMESTONE, ENGLAND.

TEREBRATULA PLEURODON,	Skipton.
TEREBRATULA HASTATA,	Kildare, Ireland.
TEREBRATULA ACUMINATA,	Skipton.
ORTHIS CONNIVENS,	“
LEPTÆNA ANALOGA,	“
PRODUCTUS MARTINI,	“
PRODUCTUS FIMBRICATA,	“
PRODUCTUS COSTATUS,	Richmond.
SPIRIFERA RHOMBOIDEA,	Skipton.
SPIRIFERA PEREGRINA,	Kildare, Ireland.
SPIRIFERA GLABER,	Bolland.
NERITA SPIRATA,	“
CIRRUS ROTUNDATUS,	Skipton.
ACTINOCRINUS TRIACANTHADACTYLUS,	Kildare.
ACTINOCRINUS GILBERTSONI,	Skipton.
PLATYCRINUS LÆVIS,	“
CADENASTER ACUTUS,	“
ASAPHUS PUNCTATUS,	“

## III. LIST OF FOSSILS DEPOSITED IN THE STATE CABINET,

BY LEDYARD LINCKLAEN, ESQ.;

AND SUBJECT TO HIS ORDER.

Five parts of <i>ASTROLEPIS</i> ,	Marcellus shale.
Four <i>HOMALONOTUS DEKAYII</i> ,	Hamilton group.
One <i>GONIAITITES</i> ,	"
Two <i>GOMPHOCERAS</i> ,	"
Three <i>CYRTOCERAS</i> ,	"
Two <i>ORTHO CERAS</i> ,	"
Two <i>ORTHO CERAS</i> ,	Marcellus shale.
One <i>FENESTELLA</i> ,	Hamilton group.
One large Plant,	"
One slab <i>ORTHIS STRIATUS</i> ,	Waterlime group.
One <i>PHACOPS DECORUS</i> ,	Lower Silurian, Europe.
One <i>ILLENUS CRASSICAUDATUS</i> .	
<i>TUBA SPINOSA</i> ,	Upper Silurian : Litem, Bohemia.
<i>PLEURORHYNCHUS ORNATUS</i> ,	" "
<i>TEREBRATULA PSEUDOLIVONICA</i> ,	" "
<i>SPIRIFERA TRAPEZOIDALIS</i> ,	" "
<i>TEREBRATULA PRINCEPS</i> ,	" "
<i>CAPULUS CONOIDEUS</i> ,	" "
<i>TEREBRATULA MECHANICA</i> ,	" "
<i>SPIRIFERA NAGEDUM</i> ,	" "
<i>NATICA GREGARIA</i> ,	" "
<i>TEBEBRATULA TUMIDA</i> ,	" "
<i>PENTAMERUS ACUTILOBATUS</i> ,	" "
<i>SPIRIFERA SECANS</i> ,	" "
<i>SPIRIFERA ROBUSTA</i> ,	" "
<i>CARDIOLA CORNUCOPIA</i> ,	" Barich, Bohemia.
<i>TEREBRATULA PISCIFER</i> ,	" Komeprus, Bohemia.
<i>PENTAMERUS SIBERICA</i> ,	" "
<i>POLYDILASMA LAMARCKII</i> ,	Cretaceous : Germany.
<i>AMMONITES VIRGATUS</i> ,	Jurassic : "
<i>AMMONITES WALCOTII</i> ,	Lias : "
<i>AMMONITES CORDATUS</i> ,	Oolite : "
<i>AMMONITES AMALTHUS</i> ,	Lias : "
<i>AMMONITES HUMPHRIESANUS</i> ,	Lias : "
<i>AMMONITES</i> , sp.?	Oolite : "
<i>AMMONITES HOLLANDIA</i> ,	Lias : "
Two <i>LYONSIA ALDOUSIA</i> ,	Eocene : "
Four <i>BRACHIOPODA</i> , sp.?	Eocene : "
One <i>BUCCINUM ARCUATUM</i> ,	Devonian : "
One <i>CHÆTETES RADIENS</i> ,	Devonian : "
One <i>AMMONITES VARIABILIS</i> ,	Lias : "
One <i>TRIGONIA MAJOR</i> ,	Oolite : "
One <i>AMMONITES BICARINATUS</i> ,	Lias : "
One <i>MEGALODON CUCULLATUS</i> ,	Devonian : "

## IV. LIST OF BRITISH MOLLUSCA,

PURCHASED OF MR. PHILIP P. CARPENTER, WARRINGTON, ENGLAND.

ECHINODERMS, sp.? .....	3	ARTEMIS EXOLETA .....	3
AMPHIDOTUS CORDATUS ....	2	TAPES VIRGINEA .....	4
ASTERIAS, sp.? .....	1	TAPES AUREA .....	1
ECHINOCYAMUS PUSILLUS ...	8	TAPES DECUSSATA .....	4
BALANUS PORCATUS .....	2	TAPES PUSTULATA .....	1
BALANUS TINTINNABULUM ..	1	LUCINA BOREALIS .....	4
LEPAS ANSIFERA .....	3	LUCINA LEUCOMA .....	6
PENNATULA PHOSPHOREA ...	1	LUCINA UNDATA .....	3
CINERAS VITTATA .....	2	LUCINA FLEXUOSA .....	3
? .....	2	LUCINA SPINIFER .....	1
? .....	1	TEREBRATULA CAPUT-SERPENS,	5
TEREBELLA, sp.? .....	1	CRANIA ANOMALA .....	2
SPIRORBIS GRANULATUS .. mass.		ISOCARDIA COR .....	1
SPIRORBIS CORRUGATUS .. mass.		CARDIUM EDULE .....	3
SPIRORBIS, sp.? .....	mass.	CARDIUM PYGMÆUM .....	9
CÆCUM TRACHÆ .....	5	CARDIUM NORVEGICUM.....	1
CÆCUM, sp.? .....	3	CARDIUM ACULEATUM .....	2
SERPULA COMPLEXA .....	mass.	CARDIUM ECHINATUM .....	2
SPIRORBIS, sp.? .....	60	MACTRA SOLIDA .....	4
CÆCUM, sp.? .....	1	MACTRA STULTORUM .....	6
DENTALIUM TARENTUM .....	9	MACTRA TUNICATA .....	3
DENTALIUM DENTALIS .....	3	MACTRA SUBTRUNCATA .....	2
DENTALIUM DITRUPA .....	2	MACTRA ELLIPTICA .....	1
PATELLA ATHLETICA .....	6	DIPLODONTA ROTUNDATA....	1
PATELLA ANGULATA .....	12	PANDORA OBTUSA, .....	1
PATELLA PELLUCIDA .....	14	GALEOMMA TURTONI.....	1
ACMÆA TESTUDINALIS .....	6	PSAMMOBIA TELLINELLA....	2
ACMÆA, sp.? .....	6	PSAMMOBIA FERROENSIS....	3
PELISPRIS HUNGARIENSIS ..	1	PSAMMOBIA VESPERTINA....	1
ACMÆA VIRGINALIS .....	9	TELLINA DONACINA .....	3
EMARGINATA ROSEA.....	7	TELLINA SOLIDA .....	30
EMARGINATA RETICULATA ..	21	TELLINA INCARNATA .....	3
PUNCTINELLA NOACHIA ....	1	TELLINA TENUIS .....	22
CALYPTERA SINENSIS.....	19	TELLINA FABULA .....	10
ANOMIA PATELLIFORMIS....	20	TELLINA CRASSA .....	1
CHITON ASELLUS .....	5	SYNDOMYA PRISMATICA .....	2
CHITON CINEREUS .....	1	SYNDOMYA ALBA .....	6
CHITON RUBER .....	1	DONAX ANTINUS .....	14
PECTEN MAXIMUS .....	3	MYA TRUNCATA.....	2
PECTEN OPERCULATUS .....	6	MYA ARENARIA.....	1
PECTEN VARIUS .....	5	SCROBICULARIS PIPERITA...	1
PECTEN FUSUS .....	5	COCHLODESMÆ PRÆTENUÆ...	1
PECTEN TIGRINUS .....	1	THRONA PHASEALINA .....	3
PECTEN NIVEUS.....	1	PECTUNCULUS GLYCINERIS ..	4
VENUS STRIATULA .....	18	ARCA LACTEA .....	30
VENUS OVATA .....	18	SAXICAVA ARCTICA .....	15
VENUS CARINA .....	1	SAXICAVA RUGOSA .....	5
CYPRÆA ISLANDICA .....	2	CORBULA NUCLEUS .....	12
CYPRÆA, sp.? .....	2	CARDIUM FASCIATUM .....	4

CARDIUM NODOSUM .....	5	LITORINA NOATOIDES .....	7
SYNDOMYA TENUIS .....	1	LITORINA SEXTILIS .....	11
ASTARTE TRIANGULARIS ....	3	LITORINA FABALIS .....	2
MONTICULA BIDENTATA.....	7	LITORINA LITORALIS .....	28
MONTICULA FERRUGINOSA ..	1	LITORINA RUDIS .....	67
KELLIA SUBORBICULARIS ...	2	LITORINA PPLICATA .....	5
KELLIA RUBRA .....	10	LITORINA, sp.?.....	32
LEDA CORDATA .....	2	MUREX CORALLINUS .....	5
LEPTON SQUAMOSA.....	3	NATICA MONALIFERA ....	8
PLANORBIS VORTEX.....	3	NATICA MONTAGUI .....	8
VENERUPIS VIUS .....	3	NATICA, sp.? .....	1
MODIOLA MODIOLUS .....	5	NATICA, sp.? .....	32
MODIOLA TULIPA .....	1	SIALARIA COMMUNIS .....	1
MODIOLA BARBATA .....	1	SIALABIA CLATHRATULA ...	2
DREISSENA POLYMORPHA ...	3	SIALARIA TURTONI .....	1
PHOLAS CANDIDA .....	1	TURRITELLA COMMUNIS....	32
PHOLAS DACTYLUS .....	1	TROCHUS UMBELLICATUS ...	15
PHOLAS CRISPATA .....	1	TROCHUS MAJUS .....	14
NUCULA NUCLEUS .....	16	TROCHUS EXIGUUS .....	25
NUCULA NITIDA .....	2	TROCHUS MILLEGRANUS ...	1
LIMA HIANS .....	3	TROCHUS CINEREUS .....	11
LIMA SUBORBICULARIS ....	1	TROCHUS TUMIDUS .....	7
LIMA LASCOMBII .....	1	TROCHUS MONTAGUI.....	4
MYTILUS EDULIS.....	12	TROCHUS LINEATUS.....	3
MYTILUS DISSIMULIS .....	3	TROCHUS UMBILICATA .....	4
SOLEN MARGINATUS .....	2	TROCHUS, sp.? .....	5
SOLEN CURIS, var. MAGNA...	1	TROCHUS, sp.? .....	23
SOLEN SILIQUA .....	3	CYPRÆA EUROPÆA .....	24
SOLEN ENSIS .....	1	ERATO LÆVIS .....	1
SOLEN PELLUCIDUS .....	1	TORNATELLA FASCICULATA..	6
ERRATISOLEN LEGUMEN ....	3	BULLA PHYSALIS .....	2
CRENELLA DISCORS .....	2	MARGINELLA LINEATUS....	10
CRENELLA MARMORATA ....	3	MARGINELLA COSTATA.....	2
THRASIA DISTORTA .....	2	MARGINELLA NEBULA .....	1
SPHENIA BINGHAMI .....	9	MARGINELLA RUFÆ .....	4
ANOMIA EPHIPIUM .....	7	MARGINELLA TUNICULA ...	2
PISIDIUM PULCHELLUM ....	2	SCAPHANDER LIGNEUS .....	9
PISIDIUM AMNICUM.....	1	HALIOTIS TUBERCULATA ...	1
PISIDIUM PUSILLUM .....	2	LUCINA VENITA .....	5
PISIDIUM HENSLowIANUM ..	3	LUCINA PUTEOLUS .....	14
CYCLUS CORNEA .....	1	LUCINA CRASSIOR .....	5
BUCCINUM UNDATUM .....	16	LACHESIS MINIMA .....	5
“ “ (spawn) ..	1	TURTONIA MINUTA .....	1
BUCCINUM, sp.? .....	2	TEREBRO NAVALIS .....	2
FUSUS CONTIGUUS.....	3	TROPHON BARRIENSIS .....	1
FUSUS PROPINQUUS .....	1	ELUMA DISTORTA .....	1
FUSUS ISLANDICUS .....	19	ELUMA BILINEATA .....	1
FUSUS, sp.?.....	4	ELUMA POLITA .....	3
NASSA RETICULATA .....	7	PHILLIONE APERTA .....	1
NASSA INCRASSITELLA .....	33	CERITHIUM RETICULATUM ...	18
NASSA PYGMÆA .....	29	CERITHIUM ADVERSA.....	9
APORRHAI'S PES-PELICAN ...	5	CERITHIOPSIS TUBERCULARIS,	2
VELUTINA LÆVIGATA .....	24	RISSEA PARVA .....	11
PURPURA LAPILLUS .....	14	RISSEA CRENULATA .....	9
LITORINA LITOREA .....	7	RISSEA STRIATULA .....	3
LITORINA PATULA .....	7	RISSEA LABROSA .....	9

RISSEO BEANII .....	2	VALVATA PISCINALIS .....	9
RISSEO RUBRA .....	3	PLANORBIS CORNEUS .....	9
RISSEO COSTULA .....	5	PLANORBIS MARGINATUS....	17
RISSEO CALATHUS.....	3	PLANORBIS CARINATUS .....	5
RISSEO STRIATUS .....	9	PLANORBIS VORTEX.....	19
RISSEO COSTATA .....	5	PLANORBIS CONTORTUS .....	7
RISSEO PUNCTATUS .....	5	PLANORBIS NAUTILUS .....	5
RISSEO VENTROSA .....	2	PLANORBIS NITIDENS .....	7
RISSEO INCONSPICUA .....	9	PLANORBIS ALBUS .....	8
RISSEO SEMISTRIATA .....	3	PLANORBIS SPIRORBIS.....	3
RISSEO ULVÆ .....	10	ASSINEA, sp.? .....	1
RISSEO CINGULLUS .....	3	MELANIA CONTORTA .....	1
RISSEO ULVÆ (variety)....	5	LIMNEA PEREGRA (fossil) ..	3
RISSEO INFINITESIMA .....	2	BITHYNIA ARTICULATA, do..	1
RISSEO TELLINICA .....	2	VALVATA PISCINALIS, do..	5
ODOSTOMIA ECLIMIDES .....	3	ANCYLUS FLUVIATILIS, do..	1
ODOSTOMIA ACUTA .....	1	HELIX POMATIA .....	3
ODOSTOMIA PPLICATA .....	1	HELIX ASPERA .....	17
ODOSTOMIA INTERSTINCTA ..	3	HELIX NEMORALIS, & varieties,	142
ODOSTOMIA EXCAVATA .....	1	HELIX ARBUSTORUM .....	17
ODOSTOMIA UNIDENTA .....	3	HELIX PISANA .....	27
ODOSTOMIA SPIRALIS .....	5	HELIX VIRGATA .....	50
ODOSTOMIA RESONOIDES .....	1	HELIX SERICEA.....	2
CHEMNITZIA ELEGANTULA ..	5	HELIX PYGMÆA .....	5
CHEMNITZIA RUFÆ .....	1	HELIX UMBILICATA .....	7
CHEMNITZIA SCALARIS.....	3	HELIX ACULEATA .....	1
CLYCHNA CYLINDRICA .....	1	HELIX ERICETORUM.....	14
CLYCHNA OBTUSA .....	9	HELIX LAPICIDA .....	11
PHASIANELLA PULLUS .....	9	HELIX RUFIIENS .....	15
ODEOSPIIS SUBCARINATUS ..	3	HELIX CANTIANA.....	5
TRUNCATELLA MONTAGUI ...	9	HELIX CARTHUSIANA.....	1
UNIO TUMIDUS .....	1	HELIX CAPERATA.....	18
ANODONTA ANATINA .....	2	HELIX ROTUNDATA .....	22
ANODONTA VENTRICOSA .....	1	HELIX HISPIDULA .....	32
ANODONTA CYGNEA .....	1	HELIX FULVA .....	3
CYCLAS CORNEA .....	60	HELIX PULCHELLA .....	7
CYCLAS RIVECULATA .....	15	ZONITES CELLARIA .....	21
CYCLAS LACUSTRIS .....	2	ZONITES PURUS .....	3
CYCLAS CALICULATA .....	13	ZONITES ALARIA .....	4
PISIDIUM AMNICUM .....	19	ZONITES CRYSTALLINUS.....	30
PISIDIUM CINEREUM.....	4	ZONITES NITIDUS .....	5
PISIDIUM PULCHELLUM .....	3	ZONITES NITIDULUS .....	8
PISIDIUM PUSILLUM .....	3	BULIMUS ACUTUS.....	9
ANCYLUS OBLONGUS .....	6	BULIMUS OBSCURUS .....	5
ANCYLUS FLUVIATILIS .....	13	CLAUSILIA LAMINATA .....	9
PALUDINA LISTERI .....	6	CLAUSILIA NIGRICANS.....	45
PALUDINA VIVIPORA .....	11	CONOVULUS DENTICULATA ..	35
BITHYNIA VENTRICOSA .....	2	CONOVULUS BIDENTATUS .....	6
LIMNEUS STAGNATUS .....	9	CYCLOSTOMA ELEGANS .....	8
LIMNEUS TRUNCATUS .....	10	ZUA LUBRICATA .....	16
LIMNEUS PALUSTRIS .....	19	BALEA FRAGILIS.....	9
LIMNEUS PEREGRÆ .....	23	MICATULA .....	
BITHYNIA VENTRICULUM....	15	SUCCINEA PUTRIS .....	16
NERITINA FLUVIALIS .....	32	SUCCINEA OBLONGUS .....	3
PHYSA FONTINALIS.....	12	ACHATINA ACICULA .....	5
PHYSA HYPERNORICUM .....	12	PUPA SECALE .....	7

PUPA MUSCORUM .....	9	PUPA UMBILICATA .....	7
PUPA ANGLICA .....	3	CHARICHIUM MINIMUM .....	5
PUPA PYGMÆA .....	5	ACME LINEATA .....	

## V. LIST OF SHELLS FROM MR. CUMING, ENGLAND.

NAMES.		LOCALITIES.	AUTHORS.
1.	3 LINGULA ANATINA .....	Philippines.	Lamarck.
2.	2 TEREBRATULA AUSTRALIS ..	Australia.	do
3.	2 T— PULCHELLA .....	Sandwich islands.	Sowerby.
4.	2 T— RUBICUNDA .....	New-Zealand.	do
5.	2 T— var. ....	Do.	do
6.	2 T— TRUNCATA .....	Mediterranean, Sicily.	Lamarck.
7.	2 T— CAPUT-SERPENTIS .	British.	Linneus.
8.	2 ORBICULA LAMELLOSA ....	Peru.	Broderip.
9.	2 CRANIA PERSONATA .....	British.	Kœninghaus.
10.	2 ISOCARDIA COMMUNIS .....	China.	Reeve.
11.	1 DONAX SCORTUM .....	Cape of Good Hope.	Linné.
12.	1 ACHATINA ZEBRA .....	East Coast of Africa.	Lamarck.
13.	1 A— KRAUSSI .....	Do.	Reeve.
14.	1 A— LAMARCKII .....	Do.	Pfeiffer.
15.	1 A— MARGINATA .....	West Coast of Africa.	Swainson.
16.	1 A— FULICA .....	Mauritius.	Ferussac.
17.	1 BULIMUS MAURITIANUM ...	Venezuela.	Pfeiffer.
18.	1 B— do. var. ....	Do.	do
19.	1 B— REGINA .....	Meobamba.	Ferussac.
20.	2 B— METAFORMIS .....	Philippines.	Sowerby.
21.	2 B— KOCHII .....	Do.	Pfeiffer.
22.	2 B— HYDROPHANA .....	Do.	Sowerby.
23.	2 B— MIRABILIS .....	Do.	Ferussac.
24.	1 B— FULGENS .....	Do.	Sowerby.
25.	1 B— PFEIFFERI .....	Lo.	Reeve.
26.	1 B— PHILIPPENSIS .....	Do.	Pfeiffer.
27.	1 B— FULGETRUM .....	Do.	Broderip.
28.	1 B— RUGOGASTER .....	Do.	Ferussac.
29.	1 B— PYTHOGASTER ....	Do.	do
30.	1 B— REEVEI .....	Do.	Broderip.
31.	1 B— DAPHNIS .....	Do.	do
32.	1 B— FAUNUS .....	Do.	do
33.	2 B— MINDOROENSIS ....	Do.	do
34.	1 B— ELECTRICUS .....	Do.	Reeve.
35.	1 B— CHRYSALIDIFORMIS,	Do.	Sowerby.
36.	2 B— CONCINNUS .....	Do.	do
37.	2 B— PARTULOIDES .....	Do.	Broderip.
38.	1 B— LIGNARIUS .....	Do.	Pfeiffer.
39.	1 B— DRYAS .....	Do.	Broderip.
40.	1 B— SYLYANUS .....	Do.	do

	NAMES.	LOCALITIES.	AUTHORS.
41.	2 BULIMUS LUZONICA . . . . .	Philippines.	Sowerby.
42.	2 B— var. . . . .	Do.	do
43.	1 B— SIMPLEX . . . . .	Do.	Jones.
44.	1 B— PERVERSUS . . . . .	Malacca.	Müller.
45.	1 B— CHLORIS . . . . .	Philippines.	Reeve.
46.	1 HELIX OVUM . . . . .	Do.	Valenciennes.
47.	1 H— RHŒA . . . . .	Do.	Pfeiffer.
48.	1 H— LAMARCKIANA . . . . .	Do.	Reeve.
49.	1 H— PAN . . . . .	Do.	Broderip.
50.	1 H— ROISSYANA . . . . .	Do.	Ferussac.
51.	2 H— PULCHERRIMA . . . . .	Do.	Sowerby.
52.	2 H— SEMIGRANOSA . . . . .	Do.	do
53.	2 H— LUZONICA . . . . .	Do.	do
54.	2 H— ZONIFERA . . . . .	Do.	do
55.	2 H— SPHÆRICA . . . . .	Do.	do
56.	2 H— COCCOMELUS . . . . .	Do.	do
57.	2 H— INTORTUS . . . . .	Do.	do
58.	2 H— do. var. . . . .	Do.	do
59.	2 H— ILLOCOENSIS . . . . .	Do.	do
60.	2 H— do. var. . . . .	Do.	do
61.	2 H— ANNULATA . . . . .	Do.	do
62.	2 H— do. var. . . . .	Do.	do
63.	2 H— BALTEATA, var. . . . .	Do.	do
64.	2 H— MORICAUDI . . . . .	Do.	do
65.	2 H— LISTERI . . . . .	Do.	Gray.
66.	2 H— ROTA . . . . .	Do.	Broderip.
67.	2 H— BEGONIA . . . . .	Do.	Ferussac.
68.	2 H— MARGINATA . . . . .	Do.	Müller.
69.	2 H— SIRENA . . . . .	Do.	Beck.
70.	1 H— PORPHYRIA . . . . .	Do.	Pfeiffer.
71.	1 H— CADUCIOR . . . . .	Do.	Reeve.
72.	2 H— ZEBUENSIS . . . . .	Do.	Broderip.
73.	1 H— VIRGO . . . . .	Do.	do
74.	2 H— AMŒNA . . . . .	Do.	Pfeiffer.
75.	2 H— MONTICULA . . . . .	Do.	Sowerby.
76.	1 H— XANTHOTRICA . . . . .	Do.	Pfeiffer.
77.	2 H— FIBULA . . . . .	Do.	Broderip.
78.	2 H— VITTATA . . . . .	Ceylon.	Müller.
79.	1 H— WALTONI . . . . .	Do.	Reeve.
80.	1 H— PHENIX . . . . .	Do.	Pfeiffer.
81.	1 H— BISTRIALIS . . . . .	Do.	Beck.
82.	2 H— ERRONEA . . . . .	Do.	Albers.
83.	1 CYCLOPHORUS OCVLIS-CAPRI,	Java.	Gray.
84.	2 C— BORNEENSE . . . . .	Borneo.	Metcalf.
85.	2 C— CEYLANICA . . . . .	Ceylon.	Sowerby.
86.	1 C— SEMISULCATA . . . . .	Malacca.	do
87.	2 OPISTHOPORUS BIROSTRE . . . . .	Borneo.	Pfeiffer.
88.	2 O— TAYLORIANUS . . . . .	Do.	do
89.	2 PTEROCYCLOS TENUPLICATUM,	Do.	Metcalf.
90.	1 CYCLOTUS DYSONI . . . . .	Mexico.	Pfeiffer.
91.	2 C— INCA . . . . .	Venezuela.	D'Orbigny.
92.	2 CYCLOSTOMUS CREPLINI . . . . .	Madagascar.	Ferussac.
93.	1 TIARA THIARELLA . . . . .	Seyschelles.	Linneus.
94.	1 ZIZIPHINUS ANNULATUS . . . . .	Upper California.	Martya.

NAMES.	LOCALITIES.	AUTHORS.
95. 1 GUILDFORDIA IMPERIALIS ..	China.	<i>Philippi.</i>
96. 1 MUREX PALMA-ROSÆ .....	Ceylon.	<i>Lamarck.</i>
97. 1 M— MARTYNIANUS .....	Philippines.	<i>Reeve.</i>
98. 1 M— SINENSIS .....	China.	<i>Sowerby.</i>
99. 1 M— MICROPHYLLA .....	Madagascar.	<i>Lamarck.</i>
100. 1 M— CUMINGII .....	Philippines.	<i>H. Adams.</i>
101. 1 NEPTUNEA ISLANDICA .....	Britain.	<i>Lamarck.</i>
102. 1 TRITON AUSTRALIS .....	Australia.	do
103. 1 PLEIODON OVATUM .....	East Coast of Africa.	<i>Swainson.</i>
104. 1 FISSURELLA PICTA .....	Straits of Magellan.	<i>Lamarck.</i>
105. A group of CATAPHRAGMUS POLYMERUS, Australia.		<i>Darwin.</i>
106. 1 ÆTHERIA SEMILUNATA .....	River Nile.	<i>Lamarck.</i>
107. 1 CLEIDOTHERUS CHAMOIDES ..	Sidney.	<i>Stutchbury.</i>
108. 2 CÆCELLA CUMINGII .....	Philippines.	<i>Lamarck.</i>
109. 1 CONUS NOCTURNUS .....	Do.	<i>Bruguière.</i>
110. 2 C— LIGNARIUS .....	Do.	<i>Reeve.</i>
111. 1 C— TEXTILE .....	Do.	<i>Linneus.</i>
112. 1 C— VERRICULUM .....	Do.	<i>Reeve.</i>
113. 1 C— NEMOCAMUS .....	Do.	<i>Bruguière.</i>
114. 1 C— AMADIS .....	Ceylon.	<i>Martyn.</i>
115. 1 C— MAGUS .....	Philippines.	<i>Lamarck.</i>
116. 1 C— STERCUS-MUSCARUM,	Do.	do
117. 1 C— MILES .....	Do.	<i>Linneus.</i>
118. 1 C— ERMINEUS .....	Do.	<i>Chemnitz.</i>
119. 1 C— CANONICUS .....	Do.	<i>Bruguière.</i>
120. 1 C— STRIATUS .....	Do.	<i>Linné.</i>
121. 1 C— GUBERNATOR .....	Madagascar.	<i>Bruguière.</i>
122. 1 C— ACHATINUS .....	Malacca.	<i>Chemnitz.</i>
123. 1 C— MONILE .....	Ceylon.	<i>Bruguière.</i>
124. 1 C— OMARIA .....	Philippines.	do
125. 1 AMPULLARIA AMPULLACERA,	Do.	<i>Linné.</i>
126. 1 CYTHEREA CHIONE .....	British.	do
127. 1 CASSIS nov. spec. ....	Madeira.	
128. 1 OLIVA ERYTHROSTOMA ....	Philippines.	<i>Lamarck.</i>
129. 1 O— TREMOLINA .....	Do.	do
130. 1 CARDIUM ACULEATUM .....	British.	<i>Linné.</i>
131. 1 MITRA EPISCOPALIS .....	Philippines.	<i>Argenville,</i>
132. 2 AMPHIPEPLIA CUMINGII .....	Do.	<i>Pfeiffer.</i>
133. 1 PECTEN SENATORIUS .....	Do.	<i>Gmelin.</i>
134. 1 P— RADULA .....	Do.	<i>Lamarck.</i>
135. 1 P— CUMINGII .....	Australia.	<i>Reeve.</i>
136. 1 MARGINELLA CÆRULESCENS,	Panama.	<i>Lamarck.</i>
137. 1 M— QUINQUEPLICATA ..	Malacca.	do
138. 1 M— GLABELLA .....	West Africa.	do
139. 1 M— CORNEA .....	Do.	do
140. 1 M— LINEATA .....	Do.	do

With H. CUMING's compliments.

## VI. DONATIONS FOR ECONOMIC GEOLOGY.

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MESSRS. B. & J. CARPENTER, of Lockport, Niagara county,  
Contributed two specimens of the NIAGARA LIMESTONE.

MR. HENRY LEWIS, of Utica, Oneida county :  
TRENTON and BIRDSEYE LIMESTONE, a block of each.

MR. A. A. BOYCE, of Utica, Oneida county :  
ONEIDA CONGLOMERATE.

MR. BENJAMIN, of Utica, Oneida county :  
A slab of PORTAGE ROCK used for flagging, from Covert, Seneca county ;  
and a block of CORNIFEROUS LIMESTONE, from Cassville.

MR. WILLIAM JONES, of Utica, Oneida county :  
Two specimens of CLINTON ROCK, from his quarry in New-Hartford.

MR. FREDERICK TUTTLE, of Clinton, Oneida county :  
Specimen of IRON ORE from the Clinton ore bed.

HON. EDWIN DODGE, of Gouverneur, St. Lawrence county :  
IRON ORE, from his ore bed.

R. B. HOWLAND, Esquire, of Cayuga county :  
GYPSUM from his quarries ; also SELENITE with crystals of SULPHUR.

T. A. HOPKINS, Esquire, of Williamsville, Erie county :  
HYDRAULIC LIMESTONE, from the Onondaga-salt group.

MR. WENDEL FOGLESONGER, of Williamsville, Erie county :  
ONONDAGA LIMESTONE.

## VII. MISCELLANEOUS.

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From HORACE AVERILL, ESQUIRE :

Specimens of IRON, ZINC, COPPER, LEAD and SILVER ORES, from Mine hill, Roxbury, Litchfield county, Connecticut.

From the TRUSTEES OF CORTLAND ACADEMY, Homer, Cortland county :  
A large ELEPHANT'S TOOTH.

From MESSRS. THOMAS COLE & JOHN A. SHARTS :

A live BANDED PROTEUS.

From BENJAMIN MARSH, ESQUIRE, of Albany :

Section of a PETRIFIED TREE, from Arizona.

From COLONEL M'CHESNEY, of Troy, Rensselaer county :

Fossil teeth of the AMERICAN HORSE, found in Troy.

From W. V. MANLY, of Albany :

The jaws of a SHARK, and two *Limuli*.

From Mr. JAMES I. BARCLAY :

A slab of TRENTON LIMESTONE, with *Leptæna alternata*, from Elk county, Pennsylvania.

ASA W. DOUGLASS, ESQUIRE, of Lockport, Niagara county,

Deposited in the State Cabinet, subject to his order, an *Orthoceras annulatum* and a *Lichas boltoni*.

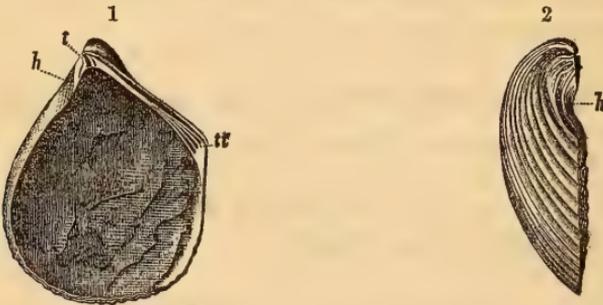
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The Regents are indebted to Professor HASKINS, of Buffalo, for his valuable services in assisting the Curator to collect fossils.

SUPPLEMENTARY NOTE ON THE GENUS AMBONYCHIA.

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SINCE the preceding pages were printed, I have been able, through the kindness of Professor SAFFORD of Tennessee, to illustrate more fully the hinge-structure of *Ambonychia radiata*. The accompanying figure 1 shows the hinge-line, the cardinal teeth *t*, and the lateral teeth *tt*. On the anterior side, the margin of the shell is sinuate for the passage of the byssus *b*. The latter character is likewise more distinctly shown in figure 2, which is an anterior view of the right valve.



JAMES HALL.

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*ERRATA.*

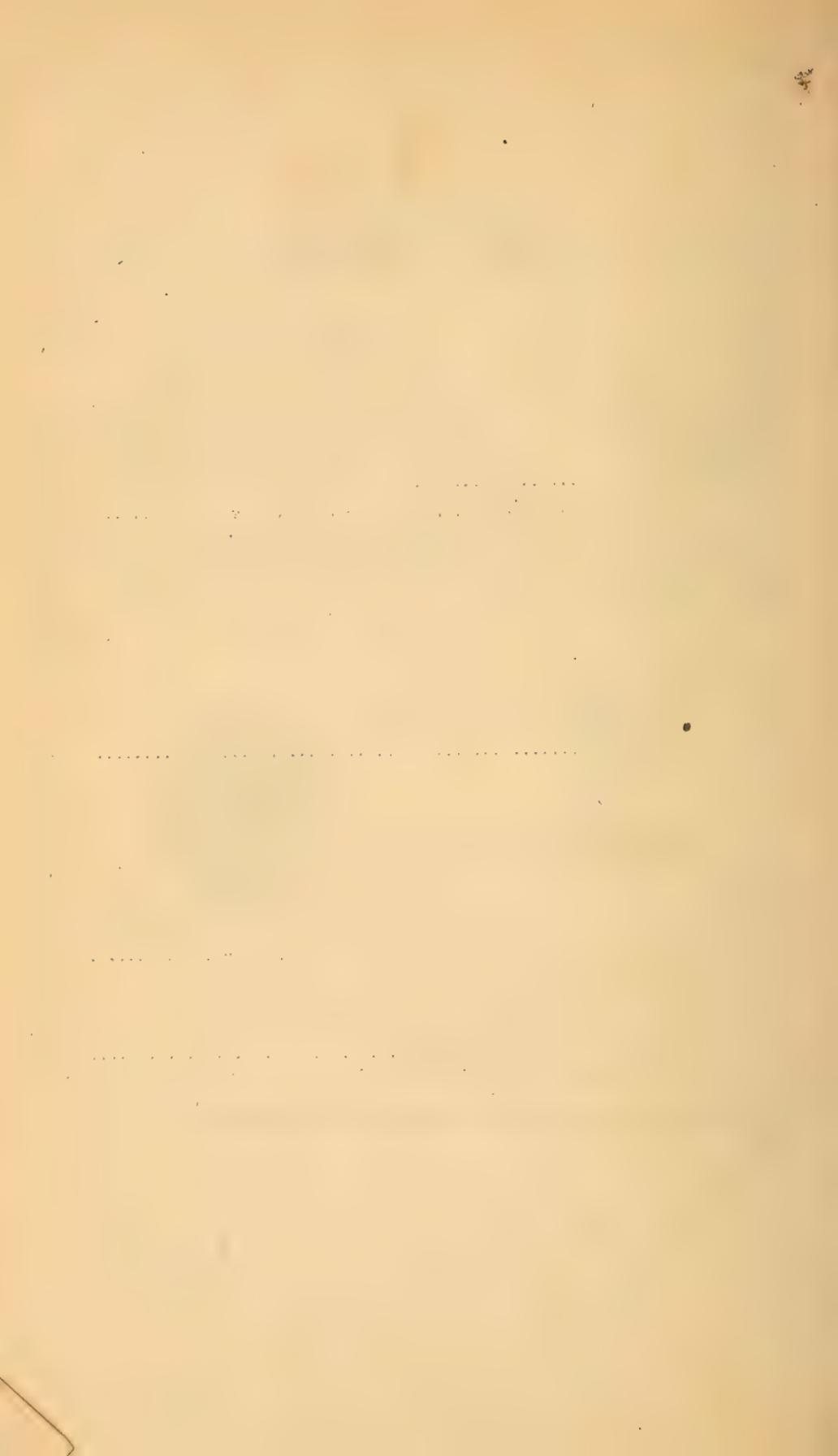
Page 10, note at bottom of page, for 1847, read 1857.

Page 14, note 4th line from bottom, for 1847, read 1857.

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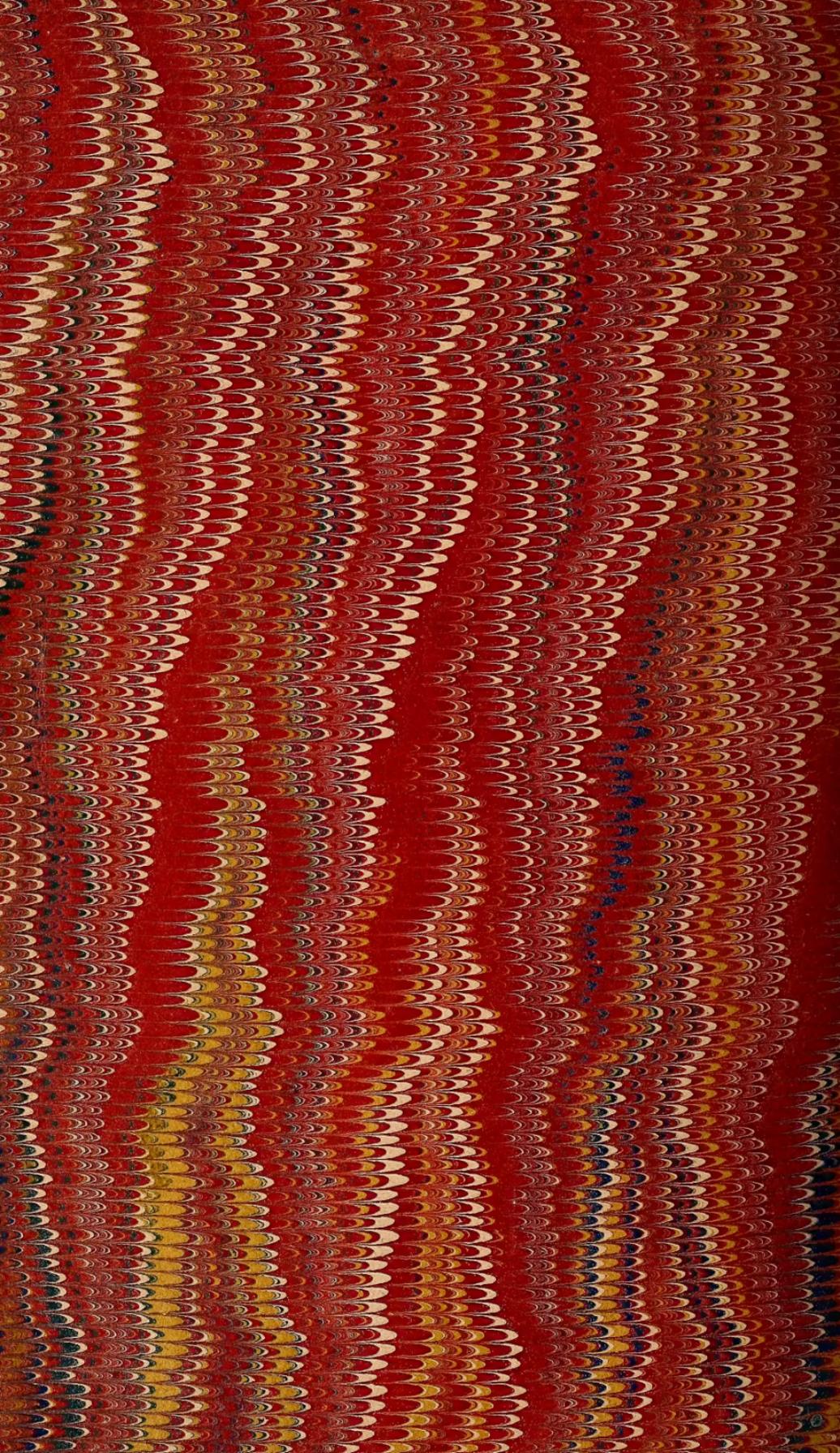














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