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WASHINGTON
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1897

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CHARLES D. WALCOTT, DIRECTOR

A SYNOPSIS

OF

AMERICAN FOSSIL BRACHIOPODA

INCLUDING

BIBLIOGRAPHY AND SYNONYMY.

BY

CHARLES SCHUCHERT



WASHINGTON
GOVERNMENT PRINTING OFFICE
1897



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CONTENTS.

| | Page. |
|---|-------|
| Letter of transmittal..... | 9 |
| Preface..... | 11 |
| Chapter I. Geologic development and geographic distribution of American fossil Brachiopoda..... | 13 |
| Geologic development..... | 13 |
| Geographic distribution..... | 17 |
| Table I Brachiopod genera alphabetically arranged, their geologic distribution, and North American specific representation..... | 18 |
| Table II. North American Paleozoic representation of the orders, superfamilies, and families, geologically arranged..... | 25 |
| Tables of North and South American species, geologically arranged..... | 26 |
| Table III. Cambrian Brachiopoda..... | 26 |
| Table IV. Ordovician Brachiopoda..... | 29 |
| Table V. Silurian Brachiopoda..... | 36 |
| Table VI. Devonian Brachiopoda..... | 43 |
| Table VII. Carboniferous and Permian Brachiopoda..... | 57 |
| Table VIII. Mesozoic Brachiopoda..... | 67 |
| Table IX. Cenozoic and recent Brachiopoda..... | 68 |
| Table X. South American fossil Brachiopoda..... | 69 |
| Chapter II. Brachiopod terminology, applied to fossil forms..... | 73 |
| Chapter III. Biologic development of the Brachiopoda..... | 78 |
| Ordinal development..... | 78 |
| Atremata..... | 78 |
| Neotremata..... | 79 |
| Protremata..... | 81 |
| Telotremata..... | 85 |
| General development..... | 88 |
| Structural characters..... | 90 |
| The protégulum..... | 90 |
| The prodeltidium..... | 91 |
| Significance of the prodeltidium..... | 93 |
| Development of cardinal areas and articulation..... | 97 |
| Development and significance of the deltidium..... | 98 |
| The chilidium..... | 99 |
| Origin and function of the spondylium..... | 99 |
| Crura and cruralium..... | 102 |
| Morphologic equivalents..... | 102 |
| Summary..... | 102 |
| Chapter IV. Morphology of the brachia, by Charles E. Beecher..... | 105 |
| Classification of brachial structures..... | 106 |
| Leiolophus stage..... | 107 |
| Taxolophus stage..... | 107 |
| Trocholophus stage..... | 107 |
| Schizolophus stage..... | 108 |

| | |
|---|-------|
| Chapter IV. Morphology of the brachia, by Charles E. Beecher—Continued. | |
| Classification of brachial structures—Continued. | Page. |
| Ptycholophus stage | 109 |
| Zugolophus and plectolophus stages | 109 |
| Spirolophus stage | 110 |
| References | 112 |
| Chapter V. Classification of the Brachiopoda | 113 |
| Historical | 113 |
| Principles of classification | 115 |
| Classification and synonymy | 118 |
| Atremata | 119 |
| Telotremata | 121 |
| Neotremata | 129 |
| Protremata | 131 |
| Diagram illustrating geologic distribution of families | 134 |
| Synopsis of the divisions of Brachiopoda higher than genera | 136 |
| Chapter VI. Index and bibliography of American fossil Brachiopoda | 138 |

ILLUSTRATIONS.

| | Page. |
|--|-------|
| PLATE I. Diagram illustrating geologic distribution of families | 134 |
| FIG. 1. Diagram giving the geologic distribution of the brachiopod orders ... | 96 |
| 2. Stages of growth of the lophophore in Thecidea, Cistella, and Méga- thyris..... | 108 |
| 3. Stages of growth of the lophophore in the Terebratulidae and Tere- bratulidae | 109 |
| 4. Metamorphoses of the brachidium in Dielasma turgida..... | 110 |
| 5. Early stages of the lophophore of Glottidia and adult brachia in Lingula and Hemithyris..... | 110 |
| 6. Metamorphoses of the brachidium of Zygospira and the brachidium of Rhynchospira | 111 |



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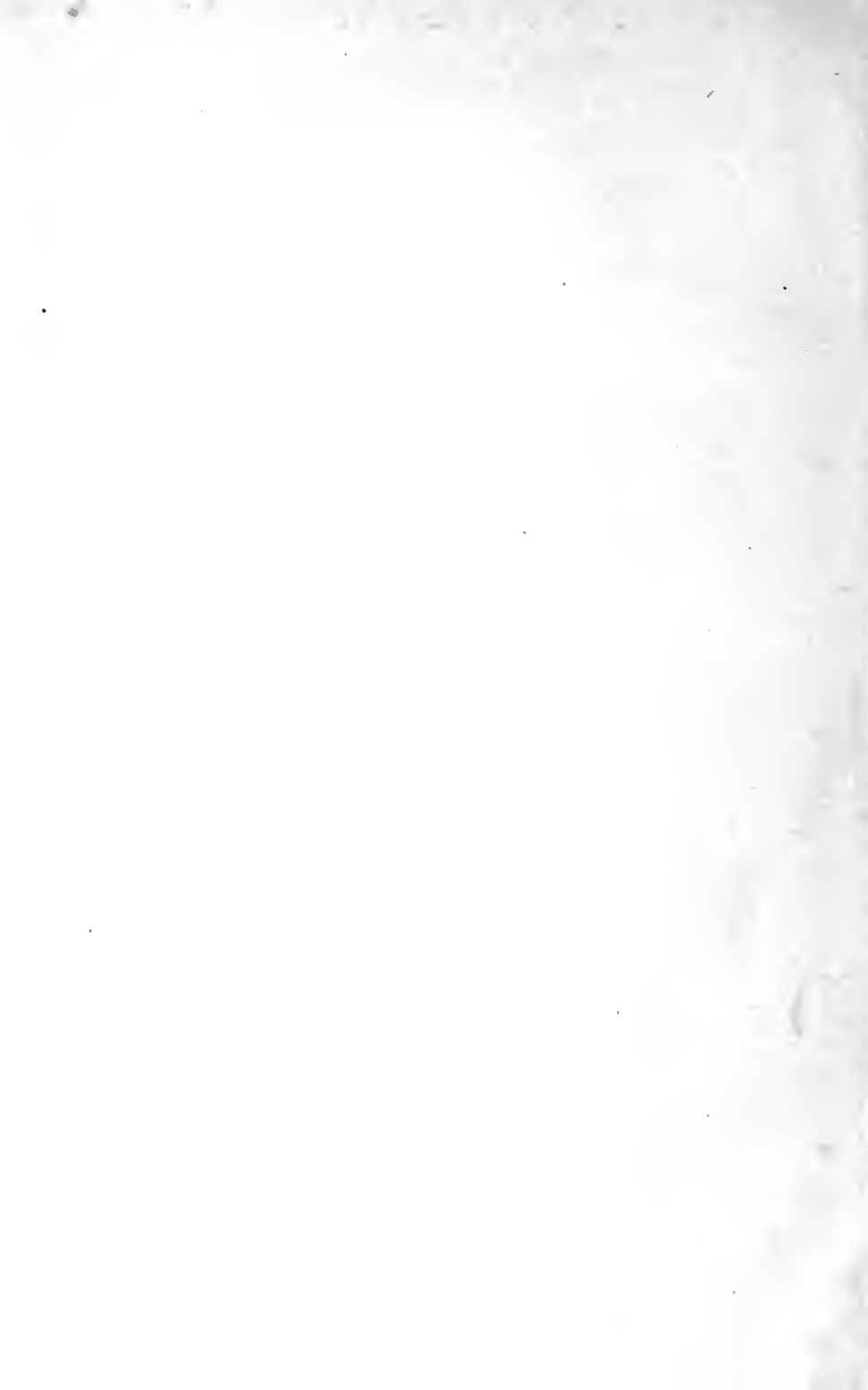
LETTER OF TRANSMITTAL.

UNITED STATES NATIONAL MUSEUM,
Washington, D. C., January 9, 1897.

SIR: I have the honor to transmit herewith the manuscript of A Synopsis of American Fossil Brachiopoda, including Bibliography and Synonymy, which has been prepared out of official hours. It is presented with a view to its publication as a bulletin by the United States Geological Survey.

CHARLES SCHUCHERT.

Hon. CHARLES D. WALCOTT,
Director of the United States Geological Survey.



P R E F A C E .

Probably no continent is more productive of well-preserved Paleozoic brachiopods than North America. Throughout the vast territory of the United States which is drained by the Mississippi River the strata have suffered little change, and it is this region which has furnished nearly all the material, from the Middle Ordovician to the top of the Upper Carboniferous. The numerous species of American Cambrian brachiopods which are found scattered along the margins of this great interior plateau and throughout New Brunswick have also aided largely in determining the evolution of the class. To Mr. Walcott, Director of the United States Geological Survey, much honor is due for making clear the structure of brachiopods from this system.

The present synopsis was begun in Cincinnati eleven years ago, while the writer was engaged in paleontologic work with Mr. E. O. Ulrich. In 1887, when the list had increased to about 700 cards, the position of assistant to Prof. James Hall was entered upon. A nearly complete library of American paleontologic literature thus became available to the writer, and during the next two years the greater part of his leisure was devoted to recording brachiopod literature. The large private collection of brachiopods belonging to Professor Hall, together with the many public and private collections then under investigation by Hall and Clarke, also afforded the writer abundant facilities and a rare opportunity for the study of this class. Every occasion was embraced to examine into the synonymy suggested by authors, and in this work it is believed much has been attained. In addition to the above collections and to the material in his own possession, the writer has also studied the specimens belonging to this class in the American Museum of Natural History, Yale University Museum, Cincinnati Society of Natural History, and the United States National Museum. In 1890 the present catalogue comprised upward of 3,500 cards, arranged in boxes having a united length of about 4 feet. It now includes nearly 10,000 references relating to North and South American fossil brachiopods.

It is believed that with the exception of local faunal lists all the literature of North and South America pertaining to this subject is recorded in the following synopsis. Much possible synonymy which the writer could not satisfactorily determine is noted under "Observations." The complete known distribution of widely dispersed species

is not always given, only the more important localities being cited. In every case, however, the locality first mentioned is believed to be the original one.

For the proper generic disposition of the species the work of Hall and Clarke¹ has been closely followed, and the entire synopsis is arranged alphabetically to facilitate easy finding. The geologic distribution of the genera is given at the end of Chapter I, and their systematic position in the classification in Chapter V. The evolution of the lophophore, from the simple crescentic condition with few tentacles of the protogulum to the most complex condition in the Terebratulacea, described in Chapter IV, is wholly the work of Dr. Beecher. From the development of this organ in recent species the peculiarly complicated growth of the lophophore in the Spiriferacea is also explained. Some of the embryonic brachial conditions are likewise indicated as probably existing in a mature condition in early Paleozoic genera.

The danger of neglecting young or small specimens of any organism can not be too often impressed upon collectors. Often by means of such fossils intricate problems in phylogeny or life history may be solved. To have much value, however, young specimens must be very small, and these can not be picked up in the field. Where brachiopods abound, whether in clay or of a siliceous nature in limestone, material should be collected in bulk and prepared later by washing or etching with weak muriatic acid. This method of collecting generally results in securing fossils that otherwise will not be observed.

To Dr. Charles E. Beecher, of Yale University Museum, the best thanks of the writer are especially due for the continued interest taken in this catalogue, as well as for valuable suggestions regarding classification; and to Mr. Charles D. Walcott, Director of the United States Geological Survey, for favors relating to the publication of the paper.

To the following gentlemen the grateful acknowledgments of the writer are due for specimens or for suggestions in synonymy: Prof. J. F. Whiteaves, Canadian Geological Survey; Prof. H. S. Williams, Yale University; Director Charles D. Walcott, Dr. W. H. Dall, Dr. T. W. Stanton, and Dr. George H. Girty, United States Geological Survey; Prof. R. P. Whitfield, American Museum of Natural History; Prof. N. H. Winchell, State geologist of Minnesota; Mr. E. O. Ulrich, Newport, Kentucky; Mr. S. A. Miller, Cincinnati, Ohio; Mr. R. R. Rowley, Louisiana, Missouri, and Mr. D. K. Gregor, Fulton, Missouri; and to Dr. C. Davies Sherborn, of the British Museum, for valuable suggestions in bibliography.

C. S.

¹ Paleontology of New York, Vol. VIII, 1892-95.

A SYNOPSIS OF AMERICAN FOSSIL BRACHIOPODA, INCLUDING BIBLIOGRAPHY AND SYNONYMY.

BY CHARLES SCHUCHERT.

CHAPTER I.

GEOLOGIC DEVELOPMENT AND GEOGRAPHIC DISTRIBUTION OF AMERICAN FOSSIL BRACHIOPODA.

GEOLOGIC DEVELOPMENT.

Upward of 2,500 species of brachiopods have been described or identified from the sediments of the North and South American continents and adjacent islands. Of these, 2,053 are recognized in this catalogue, the other species, about 20 per cent, being considered as synonyms.

Little is known of the fossil forms from South America. Forty-eight genera are represented by 159 species, ranging from the Cambrian upward. Of these, 125 are from the Paleozoic and 34 from the Mesozoic. The Cambrian, Ordovician, and Jurassic brachiopods require further study, since authors have given little or no attention to their internal characters, and also have too readily identified them with well-known European species.

In North America there are 1,922 species, of which 1,859 are restricted to the Paleozoic. In 1880 Zittel,¹ on the basis of Bigsby's Thesaurus, gave a total of 4,243 species of Paleozoic Brachiopoda. Since Bigsby's compilation the total has probably been increased to 6,000 species, about one-third of which occur in North America. On account of their good preservation and great abundance, both in species and individuals, throughout the Paleozoic, the brachiopods in North America are of particular value in stratigraphic and correlative geology.

In the Mesozoic there is a remarkable scarcity of brachiopods, since but 49 species have been recorded, and many of these are rare. The Cenozoic representation is even smaller, there being but 14 species. This scarcity of post-Paleozoic brachiopods is very apparent in the oldest system of the Mesozoic, the Triassic, from which but 11 species have been described, whereas in the Carboniferous there are 478

¹Handbuch der Palaeontologie, Vol. I, 1880, pp. 709-710.

species. In marked contrast, also, is this lack of brachiopod continuity when compared with the Alpine Trias, from which Bittner has described 380 species; but nowhere else is this system known to have so large a development. This evidence not only indicates a decadence of the class during late Paleozoic, but epeirogenic movements as well near the close of the American Carboniferous, for none of the 478 species of this system pass into the Trias.

With the Trias a new facies of brachiopod life is initiated; many of the familiar types of Paleozoic shells had, at that time, long since ceased to live or had ended in the Carboniferous or Permian. The superfamilies Acrotretacea, Obolacea, and Pentameracea have died out, while the Lingulacea, Discinacea, Craniacea, Strophomenacea, and Spiriferacea are sparingly represented, and commonly by small species. Before the close of the Jurassic system the Spiriferacea also disappeared, so that since the Cretaceous era the class is practically represented by rhynchonellas and terebratulas, with a few scattering species of Lingula, Crania, and Discinisa.

In the American Jurassic there are but 13 species, and all are rare. How remarkable is this representation when contrasted with the Jura of Europe, where certain beds of the Lias, Dogger, and Mahn terranes contain millions of specimens of a few species belonging to the families Terebratulidæ and Rhynchonellidæ.¹ The Cretaceous has 26 species, also a meager representation, and yet "outside of Europe, North America is the most important for the occurrence of Cretaceous Brachiopoda."² The American Eocene has 9 species and the Neocene 5. The disparity between the European and American Cenozoic brachiopod faunas is partly due to the scarcity of marine deposits representing the different horizons in America.

The geographic distribution of the 63 post-Paleozoic species shows that 30 are found along the eastern and southern border of the United States, 15 on the Pacific Coast, and 18 from the Arctic Circle south to about the fortieth parallel and between the one hundredth and the one hundred and twentieth meridians.

The Trias of eastern North America, with its unfavorable shore deposits, has but one species, while the Cordilleran Sea³ to the east of the Rocky Mountains has 7, and these were there followed by 5 other species in the Jurassic system. A larger brachiopod fauna may have existed in the deeper waters of the Atlantic Trias, but nothing of it is known. In Cretaceous times conditions were again more favorable, 10 forms being recorded from the Atlantic border of North America, 10 from the Pacific, and 6 from the interior Cordilleran Sea. Toward the close of the Cretaceous the Cordilleran Sea became more and more

¹ Zittel, *op. cit.*, p. 714.

² *Ibid.*, p. 716.

³ For the areas covered by this and the Mississippian and Appalachian seas, see Walcott's presidential address, *Geologic time as indicated by the sedimentary rocks of North America*: Proc. Am. Assoc. Adv. Sci., Vol. XLII, 1893.

unfit for marine life, and no brachiopods are known from the Tertiary deposits of this area. From the eastern North American Tertiary 9 species are known, but only 2 from the Pacific border. In recent times conditions are apparently more favorable for the introduction and existence of brachiopods from other areas, as 14 species have been dredged from the Atlantic and 24 from the Pacific continental plateaus of North America.

The living forms are universally distributed in the seas of the world. Their range in depth is no less extended. They occur in shallow waters, at low-water mark, and varying degrees of depth, from 200 to 600 fathoms being the usual limit of the majority of species. Several far-ranging abyssal species were dredged in from 1,000 to 2,000 fathoms. The delicate transparent shell of that interesting little Terebratuloid, *Liothyrina Wyvillei* Davidson, was actually obtained in a living condition by the *Challenger* expedition from the enormous depth of 2,900 fathoms, or $3\frac{1}{4}$ miles, at the bottom of the South Atlantic Ocean.¹

In the North American Cambrian there are 116 species described, a far greater development than in any other country. Davidson records but 14 species in Great Britain, while Bigsby, in 1868, gave the total for this system as 126 for all countries. In the next, or Ordovician, system the rapidity of brachiopod differentiation is remarkable. There are 319 species known in North America, an increase nearly three times that of the Cambrian. Bigsby's percentage of increase for this system is even greater, since in 1868 he listed 556 Ordovician species, which represent a growth of nearly four and one-half times that of his Cambrian total of 126.

While there is much specific differentiation throughout the Ordovician, it is a notable fact that the essential types of brachiopods of this system are also found near its base in the Calciferous. In the Chazy, or next younger horizon, the species are very much like those of the Trenton, where this class has great and varied representation, which is maintained to the end of the Ordovician. It is also true that the species become more generalized structurally as the Cambrian is approached, and most rapidly so toward the base of the Ordovician.

The evolution of the Cambrian brachiopods is similar in its history to that of the Ordovician, except that there the differentiation was along more fundamental structural lines. In the following table it is seen that the four orders of the class Brachiopoda began with the Lower Cambrian, and that throughout this system differentiation was mainly of family importance, since none of these divisions has many genera or species. Where minor groups occur in quantity it is always in the more primitive divisions, as in the Atremata. In none of the other three orders is there a similar rapid differentiation in the Cambrian.

¹Agnes Crane, Geol. Mag., Dec. IV, Vol. II, 1895, p. 3 (extract).

Table showing the differentiation of the Brachiopoda during Cambrian time.

| | Number of species. | Number of genera. | Number of families. | Atremata species. | Neotremata species. | Protremata species. | Telotremata species. |
|--------------------|--------------------|-------------------|---------------------|-------------------|---------------------|---------------------|----------------------|
| Upper Cambrian ... | 51 | 14 | 8 | 30 | 4 | 17 | ..... |
| Middle Cambrian... | 39 | 12 | 5 | 19 | 16 | 4 | ..... |
| Lower Cambrian ... | 31 | 12 | 7 | 17 | 5 | 8 | 2 |

The earliest deep-water deposits of the Silurian, the Clinton formation, have a brachiopod fauna which is quite different from that of the Ordovician. The Atremata, Neotremata, and Protremata are much like those of the Ordovician, but the Spiriferacea of the Telotremata, the most characteristic brachiopods of the Silurian, have here attained a great variety of forms, with varied brachydial structures. Throughout the American Silurian the brachiopods show little structural differentiation, but in the Lower Helderberg, at the base of the Devonian, the spire-bearers are changing and assuming characters which are fully developed in the higher Devonian. Here also occur the oldest loop-bearers, or Terebratulacea, though the ontogeny of *Zygospira* seems to show that this superfamily originated in the Ordovician.

In the Mississippian Sea deposition was apparently quite continuous throughout Devonian and Carboniferous times, and not much interrupted by earth movements. The faunas of these systems in this area show no rapid evolution along any of the brachiopod phyla. The species of the basal member of the Carboniferous, the Waverly or Kinderhook, are not unlike those of the Chemung of the Upper Devonian, nor is there any great faunal difference between the Kaskaskia of the Lower Carboniferous and the productive Coal Measures above.

From the foregoing rapid summary of the geologic history of American brachiopods, it follows that differentiation in the Paleozoic is most rapid near the base of the older systems, and diminishes in force from the older to the younger geologic divisions. While earth movements in America were greater and more numerous during the early Paleozoic than later in and just previous to the close of this time, yet the early and rapid evolution of the class is probably due not only to the varying conditions produced by these movements but also to the greater plasticity of the class during the Cambrian and Ordovician eras.

There are 311 species in the American Silurian, increasing to 662 in the Devonian, while the Carboniferous representation declines to 478 species. In 1880 Zittel gave a total of 1,366 species for the Devonian, 871 for the Carboniferous, and but 30 for the Permian. Waagen's researches in the Permian of India, however, have increased this representation considerably.

There is no more striking evidence than these figures needed to show

the very rapid increase of the class during the Ordovician, its culmination in the Devonian era, and its rapid decline in the Carboniferous.

Of the 230 established Paleozoic genera, not fewer than 186 are represented in North America.

GEOGRAPHIC DISTRIBUTION.

The geographic distribution of North American Paleozoic brachiopods is extensive, since 30 per cent, or 537 species, had great areal or horizontal dispersion. One hundred and seventeen species are found in both the Mississippian and Cordilleran seas, and of these 36 are also known to occur in foreign countries. The number of species common to North America and other continents, however, is 121.

When considered chronologically, it is observed that 20 per cent of the Cambrian brachiopods have great geographic distribution, and that this increases to 32 per cent in the Ordovician, Silurian, and Devonian, and declines to 28 per cent in the Carboniferous. Greatest specific dispersion, however, is most noticeable in the Devonian and Carboniferous, where *Atrypa reticularis*, *Leptæna rhomboidalis*, *Orthothetes crenistriatus*, *Productus semireticulatus*, *P. punctatus*, *Rhynchonella pleurodon*, *Spirifer disjunctus*, and *S. striatus* have almost world-wide distribution and great vertical or chronologic range. Many similar species common to America and several European countries could be mentioned.

Specific distribution increases with ordinal rank. In the radical order Atremata 25 per cent had dispersion, increasing to 27 per cent in the Neotremata, and to 32 per cent in the Protremata and Telotremata.

From the above considerations it is evident that brachiopods, as a rule, can not be of great value in correlating over wide areas minor Devonian, but particularly Carboniferous, horizons. In the Cambrian, Ordovician, and Silurian, however, these fossils are of great value for stratigraphic purposes. Since post-Paleozoic brachiopods are not common in America, they can have little stratigraphic value, but in the Trias and Jura of Europe, where species and individuals are common, reliance can be placed upon them, and they are there regarded as next in importance to the Ammonoidea for correlation. When paleontology shall have advanced sufficiently, so that extracontinental correlation of Paleozoic formations can be taken up in detail, it will be seen that brachiopods, because of their wide dispersion, abundance, and favorable preservation, will be of great service in working out paths of migration and intercommunicating oceanic basins.

TABLE I.—*Brachiopod genera alphabetically arranged, etc*—Continued.

| Genus. | Ordinal rank. | South American species. | North American species. | Cambrian. | Ordovician. | Silurian. | Devonian. | Permian and Carboniferous. | Triassic. | Jurassic. | Cretaceous. | Tertiary. | Recent. |
|------------------------------------|---------------|-------------------------|-------------------------|-----------|-----------------|-----------------|-----------------|----------------------------|-----------|-----------|-------------|-----------|---------|
| Terebratella d'Orbigny..... | T. | | 5 | | | | | | | | 5 | | |
| Terebratula Lliwyd..... | T. | 20 | 22 | | | | 3 ¹ | 10 | 3 | 12 | 12 | 12 | ..... |
| Terebratulina d'Orbigny..... | T. | | 6 | | | | | | | | 4 | 2 | ..... |
| Terebratuloidea Waagen..... | T. | | | | | | | | | | | | |
| Tetractinella Bittner..... | T. | | | | | | | | | | | | |
| Thecidella M. Chalmas..... | P. | | | | | | | | | | | | |
| Thecidia Defrance..... | P. | | | | | | | | ? | | | | |
| Thecidops M. Chalmas..... | P. | | | | | | | | | | | | |
| Thecozyrtella Bittner..... | T. | | | | | | | | | | | | |
| Thecospira Zügmeier..... | T. | | | | | | | | | | | | |
| Thysanotos Mickwitz..... | A. | | | | | | | | | | | | |
| Tomasina Hall and Clarke..... | A. | | | | | | | | | | | | |
| Torynifer Hall and Clarke..... | T. | | 1 | | | | | 1 | | | | | |
| Trematis Sharpe..... | N. | | 14 | | 14 ² | | | | | | | | |
| Trematobolus Matthew..... | N. | | 1 | 1 | | | | | | | | | |
| Trematospira Hall..... | T. | | 12 | | | 1 | 11 ¹ | | | | | | |
| Trigeria (Bayle) Hall and Clarke.. | T. | 2 | 3 | | | | 3 | | | | | | |
| Trigonosemus Koenig..... | T. | | | | | | | | | | | | |
| Trimerella Billings..... | A. | | 5 | | | 5 ³ | | | | | | | |
| Triplecia Hall..... | P. | | 7 | | 5 | 2 | | | | | | | |
| Tropidoleptus Hall..... | T. | | 2 | | | | 2 ¹ | | | | | | |
| Uncinella Waagen..... | T. | | | | | | | | | | | | |
| Uncinulus Bayle..... | T. | | 8 | | | 1 ¹ | 7 ³ | | | | | | |
| Uncites Defrance..... | T. | | | | | | | | | | | | |
| Verneulia Hall and Clarke..... | T. | | | | | | | | | | | | |
| Vitulina Hall..... | T. | | 1 | | | | 1 ¹ | | | | | | |
| Volborthia von Müller..... | N. | | | | | | | | | | | | |
| Whitfieldella Hall and Clarke..... | T. | | 13 | | | 11 ⁶ | 2 | | | | | | |
| Wilsonia Kayser..... | T. | | 4 | | | 4 ² | 1 | | | | | | |
| Zeilleria Bayle..... | T. | | | | | | | | | | | | |
| Zellania Moore..... | T. | | | | | | | | | | | | |
| Zugmeieria Waagen..... | T. | | | | | | | | | | | | |
| Zygospira Hall..... | T. | | 14 | | 10 ⁵ | 3 | 1 | | | | | | |
| Total..... | | 154 | 1,894 | 103 | 311 | 320 | 655 | 482 | 10 | 5 | 22 | 9 | 32 |

TABLE II.—*North American Paleozoic representation of the orders, superfamilies, and families, geologically arranged.*

| Order, superfamily, and family. | Number of species. | Number of genera. | Cambrian species. | Ordovician species. | Silurian species. | Devonian species. | Permian and Carboniferous species. |
|---------------------------------|--------------------|-------------------|-------------------|---------------------|-------------------|-------------------|------------------------------------|
| Order Atremata | 196 | 19 | 57 | 60 | 31 | 30 | 21 |
| Superf. Obolacea | 43 | 9 | 22 | 6 | 17 | ..... | ..... |
| Fam. Paterinidæ | 8 | 1 | 8 ² | ..... | ..... | ..... | ..... |
| Obolidæ | 17 | 4 | 16 ⁴ | 3 | ..... | ..... | ..... |
| Trimerellidæ | 20 | 4 | ..... | 3 ¹ | 17 ⁸ | ..... | ..... |
| Superf. Lingulacea | 153 | 10 | 35 | 54 | 14 | 30 | 21 |
| Fam. Lingulellidæ | 35 | 4 | 28 ⁶ | 9 ³ | ..... | 1 ¹ | ..... |
| Lingulidæ | 113 | 4 | 7 | 41 ¹⁴ | 13 ¹ | 29 ⁵ | 21 ³ |
| Lingulasmaticidæ | 5 | 2 | ..... | 4 ¹ | 1 | ..... | ..... |
| Order Neotremata | 153 | 21 | 20 | 44 | 21 | 42 | 26 |
| Superf. Discinacea | 99 | 18 | 19 | 30 | 8 | 20 | 22 |
| Fam. Trematidæ | 24 | 4 | ..... | 17 ³ | 2 | 2 ¹ | 3 ¹ |
| Discinidæ | 50 | 5 | 1 | 6 ³ | 6 ¹ | 18 ⁶ | 19 ⁶ |
| Acrotretidæ | 16 | 5 | 15 ⁵ | 1 ¹ | ..... | ..... | ..... |
| Siphonotretidæ | 7 | 3 | 1 | 6 ¹ | ..... | ..... | ..... |
| Superf. Craniacea | 54 | 3 | 1 | 14 | 13 | 22 | 4 |
| Fam. Craniidæ | 54 | 3 | 1 | 14 ¹ | 13 ³ | 22 ⁴ | 4 ¹ |
| Order Protremata | 735 | 62 | 22 | 173 | 161 | 210 | 179 |
| Superf. Thecacea | 608 | 45 | 16 | 152 | 96 | 185 | 169 |
| Fam. Kutorginidæ | 1 | 1 | 1 | ..... | ..... | ..... | ..... |
| Eichwaldiidæ | 6 | 2 | ..... | 1 | 5 ¹ | ..... | ..... |
| Billingsellidæ | 12 | 1 | 9 ² | 2 | 1 | ..... | ..... |
| Strophomenidæ | 211 | 19 | ..... | 65 ¹⁹ | 48 ¹⁰ | 77 ³¹ | 26 ⁸ |
| Productidæ | 186 | 9 | ..... | ..... | 5 ¹ | 60 ²³ | 125 ⁴⁶ |
| Orthidæ | 192 | 13 | 6 | 84 ³² | 37 ⁷ | 48 ¹⁶ | 18 ⁹ |
| Superf. Trullacea | 127 | 17 | 6 | 21 | 65 | 25 | 10 |
| Fam. Clitambonitidæ | 9 | 3 | ..... | 6 ³ | 1 | 2 ¹ | ..... |
| Syntrophiidæ | 7 | 1 | 6 ¹ | 1 | ..... | ..... | ..... |
| Porambonitidæ | 24 | 3 | ..... | 14 ¹ | 10 ³ | ..... | ..... |
| Pentameridæ | 87 | 10 | ..... | ..... | 54 ¹² | 23 ⁵ | 10 ³ |
| Order Tcotremata | 562 | 76 | 2 | 20 | 109 | 369 | 269 |
| Superf. Rostracea | 197 | 14 | 2 | 18 | 37 | 94 | 49 |
| Fam. Protorhynchidæ | 3 | 1 | 2 | 1 ¹ | ..... | ..... | ..... |
| Rhynchonellidæ | 194 | 13 | ..... | 17 ¹⁰ | 37 ¹² | 94 ²⁸ | 49 ⁹ |
| Superf. Terebratulacea | 79 | 19 | ..... | ..... | 1 | 50 | 30 |
| Fam. Centronellidæ | 30 | 8 | ..... | ..... | ..... | 26 ⁵ | 4 ² |
| Terebratulidæ | 47 | 10 | ..... | ..... | 1 | 22 ¹¹ | 26 ⁷ |
| Tropidoleptidæ | 2 | 1 | ..... | ..... | ..... | 2 ¹ | ..... |
| Superf. Spiriferacea | 486 | 43 | ..... | 2 | 71 | 225 | 190 |
| Fam. Atrypidæ | 45 | 8 | ..... | ..... | 14 ⁷ | 18 | 14 ⁶ |
| Spiriferidæ | 278 | 11 | ..... | 1 ¹ | 24 ¹³ | 138 ³⁸ | 115 ³⁵ |
| Athyridæ | 163 | 24 | ..... | 1 | 33 ¹⁴ | 69 ²³ | 61 ¹⁴ |

TABLES OF NORTH AND SOUTH AMERICAN SPECIES
GEOLOGICALLY ARRANGED.

TABLE III, CAMBRIAN.—TABLE IV, ORDOVICIAN.—TABLE V, SILURIAN.—TABLE VI, DEVONIAN.—TABLE VII, CARBONIFEROUS AND PERMIAN.—TABLE VIII, MESOZOIC.—TABLE IX, CENOZOIC AND RECENT.—TABLE X, SOUTH AMERICAN FOSSIL BRACHIOPODA.

TABLE III.—*Cambrian Brachiopoda.*

[Species preceded by an asterisk (*) are found in the Ordovician also.]

| Species. | Lower Cambrian. | Middle Cambrian. | Upper Cambrian. |
|--|-----------------|------------------|-----------------|
| <i>Acrothele</i> (?) <i>dichotoma</i> Walcott..... | × | | |
| <i>Acrothele matthewi</i> (Hartt)..... | | × | |
| <i>Acrothele matthewi costata</i> Matthew..... | | × | |
| <i>Acrothele matthewi lata</i> Matthew..... | | × | |
| <i>Acrothele matthewi prima</i> Matthew..... | | × | |
| <i>Acrothele subsidua</i> (White)..... | × | × | |
| <i>Acrotreta baileyi</i> Matthew..... | | × | |
| <i>Acrotreta gemma</i> Billings..... | × | × | × |
| <i>Acrotreta gemma depressa</i> Walcott..... | | × | |
| <i>Acrotreta gemmula</i> Matthew..... | | × | |
| <i>Acrotreta microscopica</i> (Shumard)..... | | × | |
| <i>Billingsella alberta</i> (Walcott)..... | | × | |
| <i>Billingsella billingsi</i> (Hartt)..... | | × | |
| <i>Billingsella coloradoensis</i> (Shumard)..... | | | × |
| <i>Billingsella festinata</i> (Billings)..... | × | | |
| <i>Billingsella latourensis</i> (Matthew)..... | | × | |
| <i>Billingsella orientalis</i> (Whitfield)..... | × | | |
| <i>Billingsella quacoensis</i> (Matthew)..... | | × | |
| <i>Billingsella transversa</i> (Walcott)..... | × | | |
| <i>Billingsella whitfieldi</i> (Walcott)..... | × | | |
| <i>Botsfordia pulchra</i> Matthew..... | | × | |
| <i>Crania</i> (?) <i>columbiana</i> Walcott..... | | × | |
| <i>Dalmanella melita</i> (Hall and Whitfield)..... | | | × |
| <i>Discina</i> (?) <i>inutilis</i> Hall..... | | | × |
| <i>Discinopsis guielmi</i> Matthew..... | | × | |
| <i>Elkania desiderata</i> (Billings)..... | | | × |
| <i>Iphidea bella</i> Billings..... | × | | |
| <i>Iphidea labradorica</i> (Billings)..... | × | | |
| <i>Iphidea labradorica swantonensis</i> (Walcott)..... | × | | |
| <i>Iphidea ornatella</i> Hall and Clarke..... | | | × |
| <i>Iphidea pannula</i> (White)..... | × | × | |
| <i>Iphidea prospectensis</i> (Walcott)..... | × | | |
| <i>Iphidea sculptilis</i> (Meek)..... | | | × |
| <i>Iphidea stissingensis</i> (Dwight)..... | | × | |
| <i>Kutorgina cingulata</i> Billings..... | × | | |
| <i>Kutorgina</i> (?) <i>pterineoides</i> Matthew..... | | × | |
| <i>Lingula</i> (?) <i>calumet</i> N. H. Winchell..... | | | |
| <i>Lingula</i> (?) <i>elliptica</i> Emmons..... | ? | | |
| <i>Lingula</i> (?) <i>manticula</i> White..... | | | × |
| <i>Lingula</i> (?) <i>mosia</i> Hall..... | | | × |
| <i>Lingula</i> (?) <i>murrayi</i> Billings..... | | | × |
| * <i>Lingula quebecensis</i> Billings..... | | | × |
| <i>Lingula</i> (?) <i>striata</i> Emmons..... | × | | |
| <i>Lingulella ampla</i> Owen..... | | × | |
| <i>Lingulella aurora</i> Hall..... | | | × |

TABLE III.—*Cambrian Brachiopoda*—Continued.

| Species. | Lower Cambrian. | Middle Cambrian. | Upper Cambrian. |
|---|-----------------|------------------|-----------------|
| <i>Lingulella</i> (?) <i>billingsana</i> (Whiteaves) | | | × |
| <i>Lingulella</i> (?) <i>cœlata</i> (Hall) | × | | |
| <i>Lingulella dawsoni</i> Matthew | | × | |
| <i>Lingulella ella</i> (Hall and Whitfield) | × | × | |
| <i>Lingulella granvillensis</i> Walcott | × | | |
| <i>Lingulella</i> (?) <i>inflata</i> Matthew | | × | |
| <i>Lingulella</i> (?) <i>inflata ovalis</i> Matthew | | × | |
| * <i>Lingulella irene</i> (Billings) | | | × |
| <i>Lingulella lævis</i> Matthew | | | × |
| <i>Lingulella lamborni</i> Meek | | | × |
| <i>Lingulella linguloides</i> Matthew | | × | |
| <i>Lingulella macconelli</i> Walcott | | × | |
| <i>Lingulella martinensis</i> Matthew | | × | |
| * <i>Lingulella minuta</i> Hall and Whitfield | | | × |
| <i>Lingulella radula</i> Matthew | | × | |
| <i>Lingulella starri</i> Matthew | | × | |
| <i>Lingulella starri minor</i> Matthew | | | × |
| <i>Lingulella stoneana</i> Whitfield | | | × |
| <i>Lingulella winona</i> Hall | | × | |
| <i>Lingulepis acuminata</i> (Conrad) | | | × |
| <i>Lingulepis acutangula</i> (Roemer) | | | × |
| <i>Lingulepis cuneolus</i> Whitfield | | | × |
| * <i>Lingulepis</i> (?) <i>mæra</i> Hall and Whitfield | | | × |
| <i>Lingulepis matinalis</i> Hall | | | × |
| <i>Lingulepis pinniformis</i> Owen | | | × |
| <i>Lingulepis prima</i> (Hall) | | | × |
| <i>Lingulepis prima-formis</i> Whitfield | | | × |
| <i>Linnarsonia belti</i> Davidson ? | | | × |
| <i>Linnarsonia misera</i> (Billings) | | × | |
| <i>Linnarsonia pretiosa</i> (Billings) | | | × |
| <i>Linnarsonia sagittalis taconica</i> Walcott | × | × | |
| <i>Linnarsonia transversa</i> (Hartt) | | × | |
| <i>Obolella atlantica</i> Walcott | × | | |
| <i>Obolella chromatica</i> Billings | × | | |
| <i>Obolella circe</i> Billings | × | | |
| <i>Obolella crassa</i> (Hall) | × | | |
| * <i>Obolella</i> (?) <i>discoidea</i> Hall and Whitfield | | | × |
| <i>Obolella gemma</i> Billings | × | | |
| <i>Obolella</i> (?) <i>gemma</i> Matthew | | | × |
| * <i>Obolella</i> (?) <i>ida</i> Billings | | | × |
| <i>Obolella minuta</i> (Hall and Whitfield) | | | × |
| <i>Obolella nana</i> Meek and Hayden | | × | |
| <i>Obolella nitida</i> Ford | × | | |
| <i>Obolella pectenoides</i> Whitfield | | | × |
| <i>Obolella polita</i> Hall | | × | |
| <i>Obolus</i> (?) <i>major</i> Matthew | × | | |
| <i>Obolus</i> (?) <i>murrayi</i> Billings | | × | |
| <i>Obolus pristinus</i> Matthew | | × | |
| <i>Obolus pulcher</i> Matthew | | | × |
| <i>Obolus refulgens</i> Matthew | | | × |
| <i>Orbicula</i> (?) <i>excentrica</i> Emmons | × | | |
| <i>Orthis</i> (?) <i>apicalis</i> Billings | | | × |
| <i>Orthis</i> (?) <i>enrekensis</i> Walcott | | | × |
| <i>Orthis</i> (?) <i>highlandensis</i> Walcott | × | | |

TABLE III.—*Cambrian Brachiopoda*—Continued.

| Species. | Lower Cambrian. | Middle Cambrian. | Upper Cambrian. |
|---|-----------------|------------------|-----------------|
| <i>Orthis</i> (?) <i>lenticularis</i> Wahlenberg..... | | | × |
| <i>Orthis</i> (?) <i>lenticularis atrypoides</i> Matthew..... | | | × |
| <i>Orthis</i> (?) <i>lenticularis lynceoides</i> Matthew..... | | | × |
| <i>Orthis</i> (?) <i>lenticularis strophomenoides</i> Matthew..... | | | × |
| <i>Orthis</i> (?) <i>remnichia</i> N. H. Winchell..... | | | × |
| <i>Orthis</i> (?) <i>salemensis</i> Walcott..... | × | | |
| <i>Orthis</i> (?) <i>sandbergi</i> N. H. Winchell..... | | | × |
| <i>Orthisina</i> (?) <i>johannensis</i> Matthew..... | | | × |
| <i>Protorhyncha</i> (?) <i>antiquata</i> (Billings)..... | × | | |
| <i>Protorhyncha</i> (?) <i>minor</i> (Walcott)..... | × | | |
| <i>Syntrophia</i> <i>arachne</i> (Billings)..... | | | × |
| <i>Syntrophia</i> <i>arethusa</i> (Billings)..... | | | × |
| <i>Syntrophia</i> (?) <i>armanda</i> (Billings)..... | | | × |
| <i>Syntrophia</i> <i>harabucensis</i> (A. Winchell)..... | | | × |
| <i>Syntrophia</i> <i>calcifera</i> (Billings)..... | | | × |
| <i>Syntrophia</i> <i>primordialis</i> (Whitfield)..... | | | × |
| <i>Trematobolus</i> <i>insignis</i> Matthew..... | | × | |
| Number of Cambrian species, 116. | | | |
| Number of species in each division..... | 31 | 39 | 51 |
| Number of species common to the Lower and the other divisions of the Cambrian..... | | 5 | 1 |
| Number of species common to the Middle and the other divisions of the Cambrian..... | 5 | | 1 |
| Number of species common to the Cambrian and Ordovician system, 6. | | | |
| Number of species passing from each division into the Ordovician.... | 0 | 0 | 6 |

TABLE IV.—*Ordovician Brachiopoda.*

[Bi = Birdseye; BR = Black River; Ci = Cincinnati and Lorraine; EO = Eoordovician; MO = Mesoor-dovician; NO = Neoordovician; T = Trenton; U = Utica. Species preceded by an asterisk (*) are found in the Silurian also; by an obelisk (†), in the Cambrian.]

| Species. | Eoordovician. | | Mesoordovician. | Neoordovician. |
|---|---------------|--------|---------------------------------|--------------------|
| | Calceferous. | Chazy. | Trenton, Black River, Birdseye. | Cincinnati, Utica. |
| <i>Billingsella (?) grandæva</i> (Billings) | × | | | |
| <i>Billingsella (?) primordialis</i> (Whitfield) | × | | | |
| <i>Camarella ambigua</i> (Hall) | | | T | |
| <i>Camarella breviplicata</i> Billings | × | | | |
| <i>Camarella (?) costata</i> Billings | × | | | |
| <i>Camarella longirostrum</i> Billings | | × | | |
| <i>Camarella panderi</i> Billings | | | BR | |
| <i>Camarella parva</i> Billings | × | | | |
| <i>Camarella polita</i> Billings | × | | | |
| <i>Camarella varians</i> Billings | × | × | | |
| <i>Camarella volborthi</i> Billings | | | BR | |
| <i>Camarotæchia plena</i> Hall | | × | | |
| <i>Catazyga erratica</i> Hall | | | | Ci |
| <i>Catazyga headi</i> (Billings) | | | | U, Ci |
| <i>Clitambonites (?) borealis</i> (Castelnau) | | | T | |
| <i>Clitambonites diversa</i> (Shaler) | | | T | Ci |
| <i>Clitambonites diversa altissima</i> Winchell and Schuchert | | | T | |
| <i>Clitambonites plana retroflexa</i> de Vermeuil | ×† | | | |
| <i>Conotreta rusti</i> Walcott | | | T | |
| <i>Crania albersi</i> Miller and Faber | | | | U |
| <i>Crania (?) deformis</i> (Hall) | | × | | |
| <i>Crania dyeri</i> Miller | | | | U |
| <i>Crania granulosa</i> N. H. Winchell | | | T | |
| <i>Crania helia</i> Hall | | | | U, Ci |
| <i>Crania (?) reversa</i> Sardeson | | × | | |
| <i>Crania scabiosa</i> Hall | | | | U, Ci |
| <i>Crania setigera</i> Hall | | | T | Ci |
| <i>Crania socialis</i> Ulrich | | | | U |
| <i>Crania trentonensis</i> Hall | | | T | |
| <i>Craniella (?) ulrichi</i> Hall and Clarke | | | T | |
| <i>Cyclospira bisulcata</i> (Emmons) | | | T | |
| <i>Dalmanella amœna</i> N. H. Winchell | | | T | |
| <i>Dalmanella bellula</i> (James) Meek sp. | | | | Ci |
| <i>Dalmanella crispata</i> (Emmons) | | | | Ci |
| <i>Dalmanella electra</i> (Billings) | × | | | |
| <i>Dalmanella electra major</i> Matthew | × | | | |
| <i>Dalmanella electra laevis</i> Matthew | × | | | |
| <i>Dalmanella (?) evadne</i> (Billings) | × | | | |
| <i>Dalmanella hamburgensis</i> (Walcott) | | | T | |
| <i>Dalmanella macleodi</i> (Whitfield) | × | | | |
| <i>Dalmanella (?) plicifera</i> (Hall) | | × | | |
| <i>Dalmanella pogonipensis</i> (Hall and Whitfield) | × | | | |
| <i>Dalmanella stonensis</i> (Safford) | | | T | |
| <i>Dalmanella subæquata</i> (Conrad) | | | T | |
| <i>Dalmanella subæquata circularis</i> N. H. Winchell | | | T | |
| <i>Dalmanella subæquata conradi</i> N. H. Winchell | | | T | |
| <i>Dalmanella subæquata gibbosa</i> Billings | | × | BR, T | |
| <i>Dalmanella subæquata perveta</i> (Conrad) | | | T | |
| <i>Dalmanella tersus</i> (Sardeson) | | | | Ci |

TABLE IV.—*Ordovician Brachiopoda*—Continued.

| Species. | Eoordovician. | | Mesoordovician. | Neoordovician. |
|--|---------------|--------|---------------------------------|--------------------|
| | Calceiferous. | Chazy. | Trenton, Black River, Birdseye. | Cincinnati, Utica. |
| <i>Dalmanella testudinaria</i> (Dalman) | | × | Bi, BR, T | U, Ci |
| <i>Dalmanella testudinaria emacerata</i> Hall | | | | U |
| <i>Dalmanella testudinaria meeki</i> (Miller) | | | | Ci |
| <i>Dalmanella testudinaria multisetata</i> (James) Meek sp. | | | | U |
| <i>Dinobolus canadensis</i> (Billings) | | | BR, T | |
| <i>Dinobolus magnificus</i> (Billings) | | | BR, T | |
| <i>Dinobolus (?) parvus</i> Whitfield | | | T | |
| <i>Dinorthis deflecta</i> Conrad | | | T | |
| <i>Dinorthis fontinalis</i> (White) | × | | | |
| <i>Dinorthis iphigenia</i> (Billings) | | | T | |
| <i>Dinorthis meedsi</i> Winchell and Schuchert | | | T | |
| <i>Dinorthis meedsi germana</i> Winchell and Schuchert | | | T | |
| <i>Dinorthis pectinella</i> (Emmons) | | | T | |
| <i>Dinorthis pectinella sweneyi</i> N. H. Winchell | | | T | |
| <i>Dinorthis platys</i> (Billings) | | × | | |
| <i>Dinorthis porcata</i> (McCoy) | | | T | Ci |
| <i>Dinorthis proavita</i> Winchell and Schuchert | | | | Ci |
| <i>Dinorthis retrorsa</i> (Salter) | | | T | Ci |
| <i>Dinorthis subquadrata</i> Hall | | | | Ci |
| <i>Discina (?) sublamellosa</i> Ulrich | | | | Ci |
| <i>Eichwaldia subtrigonalis</i> Billings | | | T | |
| <i>Elkania ambigua</i> (Walcott) | × | | | |
| <i>Glossia romingeri</i> Hall and Clarke | | | T | |
| <i>Glossina crassa</i> (Hall) | | | T | |
| <i>Glossina cyane</i> (Billings) | × | | | |
| <i>Glossina deflecta</i> Winchell and Schuchert | | | T | Ci |
| <i>Glossina hurlbuti</i> N. H. Winchell | | | T | |
| <i>Glossina trentonensis</i> (Conrad) | | | T | U |
| <i>Hebertella battis</i> (Billings) | × | | | |
| <i>Hebertella bellarugosa</i> (Conrad) | | | T | |
| <i>Hebertella borealis</i> (Billings) | | × | BR, T | |
| <i>Hebertella imperator</i> (Billings) | | × | | |
| <i>Hebertella insculpta</i> Hall | | | | Ci |
| <i>Hebertella lonensis</i> (Walcott) | × | | | |
| <i>Hebertella maria</i> (Billings) | | | | Ci |
| <i>Hebertella occidentalis</i> Hall | | | | Ci |
| <i>Hebertella occidentalis sinuata</i> Hall | | | | Ci |
| <i>Heterorthis clytie</i> Hall | | | T | |
| <i>Leptaena charlotte</i> Winchell and Schuchert | | | T | |
| <i>Leptaena rhomboidalis</i> (Wilckens) | | | T | U, Ci |
| <i>Leptaena unicastata</i> Meek and Worthen | | | | Ci |
| <i>Leptella sordida</i> (Billings) | × | | | |
| <i>Leptella decipiens</i> (Billings) | × | | | |
| <i>Leptobolus grandis</i> Matthew | × | | | |
| <i>Leptobolus insignis</i> Hall | | | | U |
| <i>Leptobolus lepis</i> Hall | | | | U |
| <i>Leptobolus occidentalis</i> Hall | | | | U |
| <i>Lingula equalis</i> Hall | | | T | |
| <i>Lingula belli</i> Billings | | × | | |
| <i>Lingula beltrami</i> Winchell and Schuchert | | | | Ci |
| <i>Lingula bisulcata</i> Ulrich | | | | U |
| <i>Lingula briseis</i> Billings | | | T | |

TABLE IV.—*Ordovician Brachiopoda*—Continued.

| Species. | Eoordovician. | | Mesoordo- vician. | Neoordo- vician. |
|---|-------------------|--------|---------------------------------------|----------------------------|
| | Calcefer- ous. | Chazy. | Trenton, Black River, Birdseye. | Cincin- nati, Utica. |
| <i>Lingula (?) canadensis</i> Billings | | | T | Ci |
| <i>Lingula cincinnatiensis</i> Hall and Whitfield | | | | Ci |
| <i>Lingula clathrata</i> Winchell and Schuchert | | | T | |
| <i>Lingula cobourgensis</i> Billings | | | T | |
| <i>Lingula covingtonensis</i> Hall and Whitfield | | | T | |
| <i>Lingula curta</i> Conrad | | | T | U |
| <i>Lingula (?) dolata</i> Sardeson | × | | | |
| <i>Lingula elderi</i> Whitfield | | | T | Ci |
| <i>Lingula elongata</i> Hall | | | T | |
| <i>Lingula eva</i> Billings | | | BR | |
| <i>Lingula forbesi</i> Billings | | | | Ci |
| <i>Lingula howleyi</i> Matthew | × | | | |
| <i>Lingula huronensis</i> Billings | | × | | |
| <i>Lingula iole</i> Billings | × | | | |
| <i>Lingula iowensis</i> Owen | | | T | |
| <i>Lingula iris</i> Billings | × | | | |
| <i>Lingula kingstonensis</i> Billings | | | BR | |
| <i>Lingula lyelli</i> Billings | | × | | |
| <i>Lingula mantelli</i> Billings | × | | | |
| <i>Lingula modesta</i> Ulrich | | | T | U, Ci |
| <i>Lingula morsii</i> N. H. Winchell | | × | | |
| <i>Lingula nympha</i> Billings | × | | | |
| <i>Lingula obtusa</i> Hall | | | T | U |
| <i>Lingula papillosa</i> Emmons | | | T | |
| <i>Lingula perryi</i> Billings | | ×? | | |
| <i>Lingula philomela</i> Billings | | | T | C. |
| <i>Lingula progne</i> Billings | | | T | U |
| † <i>Lingula quebecensis</i> Billings | × | | T | Ci |
| <i>Lingula rectilateralis</i> Emmons | | | T | |
| <i>Lingula riciniformis</i> Hall | | | T | |
| <i>Lingula riciniformis galenensis</i> Winchell and Schuchert | | | T | |
| <i>Lingula vanborni</i> Miller | | | T | Ci |
| <i>Lingula whitfieldi</i> Ulrich | | | | Ci |
| <i>Lingulasma galenensis</i> Winchell and Schuchert | | | T | |
| <i>Lingulasma schucherti</i> Ulrich | | | | Ci |
| <i>Lingulella (?) cuneata</i> Matthew | × | | | |
| † <i>Lingulella irene</i> (Billings) | × | | | |
| † <i>Lingulella minuta</i> Hall and Whitfield | × | | | |
| <i>Lingulella roberti</i> Matthew | × | | | |
| <i>Lingulella selwyni</i> Matthew | × | | | |
| † <i>Lingulepis (?) mæra</i> Hall and Whitfield | × | | | |
| <i>Lingulobolus affinis</i> Billings | × | | | |
| <i>Lingulobolus affinis cuneata</i> Matthew | × | | | |
| <i>Lingulops norwoodi</i> (James) | | | T | |
| <i>Lingulops whitfieldi</i> Hall | | | | U |
| † <i>Obolella (?) discoidea</i> Hall and Whitfield | × | | | |
| † <i>Obolella (?) ida</i> Billings | × | | | |
| <i>Orbiculoidea lamellosa</i> Hall | | | T | Ci |
| <i>Orbiculoidea tenuistriata</i> (Ulrich) | | | | U |
| <i>Orthidium gemmicula</i> (Billings) | × | | | |
| <i>Orthis (?) acuminata</i> Billings | | × | | |
| <i>Orthis carausii</i> Salter | × | | | |

TABLE IV.—Ordovician Brachiopoda—Continued.

| Species. | Eoordovician. | | Mesoordo- vician. | Neoordo- vician. |
|---|-------------------|--------|---------------------------------------|---------------------------|
| | Calci- ferous. | Chazy. | Trenton, Black River, Birdseye. | Cinci- nati, Utica. |
| <i>Orthis (?) centrilineata</i> Hall..... | | | | Ci |
| <i>Orthis corinna</i> Billings..... | × | | | |
| <i>Orthis costalis</i> Hall..... | | × | | |
| <i>Orthis (?) delicatula</i> Billings..... | × | | | |
| <i>Orthis (?) desmopleura</i> Meek..... | × | | | |
| <i>Orthis (?) eudocia</i> Billings..... | × | | | |
| <i>Orthis euryone</i> Billings..... | × | | | |
| <i>Orthis hippolyte</i> Billings..... | × | | | |
| <i>Orthis (?) holstoni</i> (Safford) Hall..... | | | T | |
| <i>Orthis (?) leptenoides</i> Emmons..... | | | T | |
| <i>Orthis menapia</i> Hicks..... | × | | | |
| <i>Orthis (?) minna</i> Billings..... | × | | | |
| <i>Orthis (?) morrowensis</i> James..... | | | | Ci |
| <i>Orthis (?) mycale</i> Billings..... | × | | | |
| <i>Orthis pandariana</i> Hall..... | × | | | |
| <i>Orthis (?) pigra</i> Billings..... | | × | | |
| <i>Orthis (?) porcia</i> Billings..... | | × | | |
| <i>Orthis (?) pumila</i> Ulrich..... | | | | Ci |
| <i>Orthis (?) saffordi</i> Hall and Clarke..... | | | T | |
| <i>Orthis (?) sola</i> Billings..... | | | | Ci |
| <i>Orthis tricenaria</i> Conrad..... | | | T | |
| <i>Orthis (?) tritonia</i> Billings..... | × | | | |
| <i>Orthorhynchula linneyi</i> (James)..... | | | | Ci |
| <i>Parastrophia divergens</i> Hall and Clarke..... | | | | Ci |
| <i>Parastrophia hemiplicata</i> Hall..... | | | T | |
| <i>Parastrophia hemiplicata rotunda</i> (Winchell and Schuchert)..... | | | T | |
| <i>Parastrophia obscura</i> (Hall and Whitfield)..... | × | | | |
| <i>Parastrophia scofieldi</i> (Winchell and Schuchert)..... | | | T | |
| <i>Paterula amii</i> Schuchert..... | × | | | |
| <i>Pholidops cincinnatiensis</i> Hall..... | | | | Ci |
| <i>Pholidops subtruncata</i> Hall..... | | | | Ci |
| <i>Pholidops trentonensis</i> Hall..... | | | T | |
| <i>Pholidops trentonensis minor</i> Winchell and Schuchert..... | | | T | |
| <i>Platystrophia acuminata</i> James..... | | | | Ci |
| <i>Platystrophia acutilirata</i> (Conrad)..... | | | | Ci |
| * <i>Platystrophia biforata</i> (Schlotheim)..... | | × | BR, T | U, Ci |
| <i>Platystrophia crassa</i> (James)..... | | | | Ci |
| <i>Platystrophia laticostata</i> Meek..... | | | | Ci |
| <i>Platystrophia lynx</i> (Eichwald)..... | | | | Ci |
| <i>Plectambonites gibbosa</i> Winchell and Schuchert..... | | | T | |
| <i>Plectambonites plicatella</i> (Ulrich)..... | | | | U |
| * <i>Plectambonites sericea</i> (Sowerby)..... | | | BR, T | U, Ci |
| <i>Plectorthis æquivalvis</i> Hall..... | | | | Ci |
| <i>Plectorthis dichotoma</i> Hall..... | | | | Ci |
| <i>Plectorthis clla</i> Hall..... | | | | Ci |
| <i>Plectorthis fissicosta</i> Hall..... | | | | Ci |
| <i>Plectorthis jamesi</i> Hall..... | | | | Ci |
| <i>Plectorthis kankakensis</i> (McChesney)..... | | | | Ci |
| <i>Plectorthis plicatella</i> Hall..... | | | T | U, Ci |
| <i>Plectorthis sectostriata</i> (Ulrich)..... | | | | Ci |
| <i>Plectorthis triplicatella</i> (Meek)..... | | | | Ci |

TABLE IV.—Ordovician Brachiopoda—Continued.

| Species. | Eoordovician. | | Mesoordo- vician. | Neoordo- vician. |
|---|---------------|--------|---------------------------------------|-----------------------|
| | Calceiferous. | Chazy. | Trenton, Black River, Birdseye. | Cincinnati, Utica. |
| <i>Plectrothis whitfieldi</i> (N. H. Winchell)..... | | | | Ci |
| <i>Polytechia apicalis</i> (Whitfield)..... | × | | | |
| <i>Protorhyncha dubia</i> Hall..... | | × | | |
| <i>Rafinesquina alternata</i> (Conrad) Emmons..... | | | BR, T | U, Ci |
| <i>Rafinesquina alternata alternistriata</i> Hall..... | | | | Ci |
| <i>Rafinesquina alternata fracta</i> (Meek)..... | | | | Ci |
| <i>Rafinesquina alternata loxorhytis</i> (Meek)..... | | | | Ci |
| <i>Rafinesquina alternata nasuta</i> (Conrad)..... | | | | Ci |
| <i>Rafinesquina</i> (?) <i>atava</i> (Matthew)..... | × | | | |
| * <i>Rafinesquina ceres</i> (Billings)..... | | | | Ci |
| <i>Rafinesquina deltoidea</i> (Conrad)..... | | | T | U |
| <i>Rafinesquina fasciata</i> Hall..... | | × | | |
| <i>Rafinesquina imbrex</i> (Pander)..... | | | | Ci |
| <i>Rafinesquina incrassata</i> (Hall)..... | | × | BR | |
| <i>Rafinesquina kingi</i> (Whitfield)..... | | | | Ci |
| <i>Rafinesquina lata</i> Whiteaves..... | | | | Ci |
| <i>Rafinesquina mesacosta</i> (Snyder)..... | | | T? | |
| <i>Rafinesquina minnesotensis</i> (N. H. Winchell)..... | | | T | |
| <i>Rafinesquina minnesotensis iniquassa</i> (Sardeson)..... | | | T | |
| <i>Rafinesquina nitens</i> (Billings)..... | | | | Ci |
| <i>Rafinesquina squamula</i> (James)..... | | | | U, Ci |
| <i>Rafinesquina tenuilineata</i> (Conrad)..... | | | T | |
| <i>Rafinesquina ulrichi</i> (James)..... | | | | U |
| <i>Retzia</i> (?) <i>granulifera</i> (Meek)..... | | | | Ci |
| <i>Rhynchonella</i> (?) <i>acutirostris</i> Hall..... | | × | | |
| <i>Rhynchonella</i> (?) <i>anticostiensis</i> Billings..... | | | | Ci |
| <i>Rhynchonella</i> (?) <i>corinthia</i> Billings..... | × | | | |
| * <i>Rhynchonella</i> (?) <i>janca</i> Billings..... | | | | Ci |
| <i>Rhynchonella</i> (?) <i>neenah</i> Whitfield..... | | | | Ci |
| <i>Rhynchonella</i> (?) <i>orientalis</i> Billings..... | | × | | |
| <i>Rhynchonella</i> (?) <i>sordida</i> Hall..... | | | T | |
| <i>Rhynchonella</i> (?) <i>subtrigonalis</i> Hall..... | | | T | |
| <i>Rhynchotrema ainsliei</i> (N. H. Winchell)..... | | | T | |
| <i>Rhynchotrema capax</i> (Conrad)..... | | | | Ci |
| <i>Rhynchotrema dentata</i> (Hall)..... | | | T | Ci |
| <i>Rhynchotrema inaequivalvis</i> (Castelnau)..... | | | T | |
| <i>Rhynchotrema inaequivalvis laticostata</i> Winchell and Schuchert..... | | | T | |
| <i>Rhynchotrema ottawaensis</i> (Billings)..... | | | T | |
| <i>Rhynchotrema perlamellosa</i> (Whitfield)..... | | | | Ci |
| <i>Scenidium anthonensis</i> Sardeson..... | | | T | |
| <i>Scenidium</i> (?) <i>merope</i> (Billings)..... | | | T | Ci |
| <i>Schizambon</i> (?) <i>dodgii</i> Winchell and Schuchert..... | | | T | |
| <i>Schizambon</i> (?) <i>fissus canadensis</i> Ami..... | | | | U |
| <i>Schizambon</i> (?) <i>lockii</i> Winchell and Schuchert..... | | | | Ci |
| <i>Schizambon typicalis</i> Walcott..... | × | | | |
| <i>Schizocrania filosa</i> Hall..... | | | T | U, Ci |
| <i>Schizocrania</i> (?) <i>rudis</i> Hall..... | | | T | |
| <i>Schizocrania schucherti</i> Hall and Clarke..... | | | T | |
| <i>Schizotreta conica</i> (Dwight)..... | | | T | |
| <i>Schizotreta minutula</i> Winchell and Schuchert..... | | | | Ci |
| <i>Schizotreta ovalis</i> Hall and Clarke..... | | | T | |

TABLE IV.—*Ordovician Brachiopoda*—Continued.

| Species. | Eoordovician. | | Mesoordovician. | Neoordovician. |
|--|---------------|--------|---------------------------------|--------------------|
| | Caleiferous. | Chazy. | Trenton, Black River, Birdseye. | Cincinnati, Utica. |
| <i>Schizotreta pelopea</i> (Billings) | | | T | Ci |
| <i>Siphonotreta (?) micula</i> McCoy | × | | | |
| <i>Siphonotreta (?) minnesotensis</i> Hall and Clarke | | | T | |
| <i>Sphaerobolus spissus</i> Billings | × | | | |
| <i>Strophomena approximata</i> (James) | | | | Ci |
| <i>Strophomena (?) arethusa</i> Billings | | | | Ci |
| <i>Strophomena billingsi</i> Winchell and Schuchert | | | T | |
| <i>Strophomena cardinale</i> (Whitfield) | | | | Ci |
| <i>Strophomena conradi</i> Hall | | | T | |
| <i>Strophomena (?) declivis</i> James | | | | Ci |
| <i>Strophomena emaciata</i> Winchell and Schuchert | | | T | |
| <i>Strophomena fluctuosa</i> Billings | | | | U |
| <i>Strophomena hallii</i> Miller | | | | Ci |
| <i>Strophomena hecuba</i> Billings | | | | Ci |
| <i>Strophomena (?) imbecilis</i> Billings | × | ? | | |
| <i>Strophomena incurvata</i> (Shepard) | | | T | |
| <i>Strophomena laevis</i> Emmons | | | Bi | |
| <i>Strophomena (?) minor</i> (Walcott) | × | | | |
| <i>Strophomena neglecta</i> (James) | | | | Ci |
| <i>Strophomena neglecta acuta</i> Winchell and Schuchert | | | | Ci |
| <i>Strophomena nutans</i> Meek | | | | Ci |
| <i>Strophomena planoconvexa</i> Hall | | | | Ci |
| <i>Strophomena planodorsata</i> Winchell and Schuchert | | | | Ci |
| <i>Strophomena rugosa</i> (Rafinesque) Blainville | | | | Ci |
| <i>Strophomena rugosa subtenta</i> Hall | | | | Ci |
| <i>Strophomena scofieldi</i> Winchell and Schuchert | | | T | |
| <i>Strophomena septata</i> Winchell and Schuchert | | | T | |
| <i>Strophomena sinuata</i> Meek | | | | Ci |
| <i>Strophomena sulcata</i> (Verneuil) | | | | Ci |
| <i>Strophomena thalia</i> Billings | | | T | |
| <i>Strophomena trentonensis</i> Winchell and Schuchert | | | T | |
| <i>Strophomena trilobata</i> (Owen) | | | T | |
| <i>Strophomena vetusta</i> James | | | | Ci |
| <i>Strophomena winchelli</i> Hall | | | T | |
| <i>Strophomena wisconsinensis</i> Whitfield | | | | Ci |
| <i>Syntrophia lateralis</i> (Whitfield) | × | | | |
| <i>Trematis crassipuncta</i> Ulrich | | | | Ci |
| <i>Trematis (?) dyeri</i> Miller | | | | Ci |
| <i>Trematis fragilis</i> Ulrich | | | T | |
| <i>Trematis huronensis</i> Billings | | | BR | |
| <i>Trematis millepunctata</i> Hall | | | | U, Ci |
| <i>Trematis montrealensis</i> Billings | | | T | |
| <i>Trematis oblata</i> Ulrich | | | | U, Ci |
| <i>Trematis ottawaensis</i> Billings | | | T | Ci |
| <i>Trematis punctostriata</i> Hall | | | | Ci |
| <i>Trematis (?) pustulosa</i> Hall | | | | Ci |
| <i>Trematis quincuncialis</i> Miller and Dyer | | | | Ci |
| <i>Trematis reticularis</i> Miller | | | | Ci |
| <i>Trematis terminalis</i> Emmons | | | T | |
| <i>Trematis umbonata</i> Ulrich | | | | Ci |
| <i>Triplecia cuspidata</i> Hall | | | T | |
| <i>Triplecia extans</i> (Emmons) | | | T | |

TABLE IV.—*Ordovician Brachiopoda*—Continued.

| Species. | Eoordovician. | | Mesoordo- vician. | Neoordo- vician. |
|---|-------------------|--------|---------------------------------------|----------------------------|
| | Calcifer- ous. | Chazy. | Trenton, Black River, Birdseye. | Cincin- nati, Utica. |
| <i>Triplecia nucleus</i> Hall..... | | | T | |
| <i>Triplecia</i> (?) <i>radiata</i> Whitfield..... | × | | | |
| <i>Triplecia ulrichi</i> Winchell and Schuchert..... | | | | Ci |
| <i>Zygospira cincinnatiensis</i> Meek..... | | | | Ci |
| <i>Zygospira concentrica</i> Ulrich..... | | | | Ci |
| <i>Zygospira deflecta</i> (Hall)..... | | | T | |
| <i>Zygospira exigua</i> (Hall)..... | | | T | |
| <i>Zygospira kentuckiensis</i> James..... | | | | Ci |
| <i>Zygospira modesta</i> Hall..... | | | | U, Ci |
| <i>Zygospira nicoletti</i> Winchell and Schuchert..... | | | T | |
| <i>Zygospira putilla</i> Hall and Clarke..... | | | | Ci |
| <i>Zygospira recurvirostra</i> (Hall)..... | | | T | |
| <i>Zygospira saffordi</i> Winchell and Schuchert..... | | | T | |
| Number of Ordovician species, 319. | | | | |
| Number of species in each division..... | 63 | 26 | 128 | 136 |
| Number of species common to the Calciferous and the other divisions..... | | 1 | 0 | 1 |
| Number of species common to the Chazy and the other divisions..... | 1 | | 5 | 2 |
| Number of species common to the Trenton and the other divisions..... | 1 | 5 | | 27 |
| Number of species common to the Cincinnati and the other divisions..... | 1 | 2 | 27 | |
| Species common to the Ordovician and Silurian systems, 5. | | | | |
| Number of species passing from each division into the Silurian..... | 0 | 1 | 3 | 5 |

TABLE V.—*Silurian Brachiopoda.*

[A=Anticosti; Ar=Arisaig; Cl=Clinton; Gu=Guelph; MS=Mesosilurian; N=Niagara; NS=Neosilurian; Te=Tentaculite and Coralline; W=Waterlime. Species preceded by an asterisk (*) are found in the Devonian also; by an obelisk (†), in the Ordovician.]

| Species. | Eo-silurian. | | Mesosilurian. | | Neosilurian. |
|--|--------------|--|----------------------|---------------------------|-------------------------|
| | Medina. | | Anti-costi, Clinton. | Guelph, Arisaig, Niagara. | Tentaculite, Waterlime. |
| <i>Anastrophia brevisrostris</i> (Sowerby) Hall..... | | | | N | |
| <i>Anastrophia internascens</i> Hall..... | | | | N | |
| <i>Anastrophia interplicata</i> (Hall)..... | | | | N | |
| <i>Anoplothecha hemispherica</i> (Sowerby)..... | | | Cl | | |
| <i>Anoplothecha planoconvexa</i> (Hall)..... | | | Cl | | |
| <i>Anoplothecha plicatula</i> (Hall)..... | | | Cl | | |
| <i>Athyris</i> (?) <i>solitaria</i> Billings..... | | | A | | |
| <i>Athyris</i> (?) <i>tumidula</i> Billings..... | | | A | | |
| <i>Athyris</i> (?) <i>turgida</i> Sbalzer..... | | | A | | |
| <i>Atrypa</i> (?) <i>gibbosa</i> Hall..... | | | Cl | | |
| <i>Atrypa</i> (?) <i>lara</i> (Billings)..... | | | A | | |
| <i>Atrypa laticorrugata</i> Foerste..... | | | Cl | | |
| <i>Atrypa marginalis</i> (Dalman)..... | | | | N | |
| <i>Atrypa nodostriata</i> Hall..... | | | Cl | N | |
| <i>Atrypa phoca</i> (Salter)..... | | | | MS | |
| * <i>Atrypa reticularis</i> (Linnaeus)..... | | | Cl, A | N | |
| <i>Atrypa reticularis niagarensis</i> Nettelroth..... | | | | N | |
| <i>Atrypa rugosa</i> Hall..... | | | | N | |
| <i>Atrypina elintoni</i> Hall and Clarke..... | | | Cl | | |
| <i>Atrypina disparilis</i> Hall..... | | | | N | |
| <i>Atrypina intermedia</i> Hall..... | | | | Ar | |
| <i>Billingsella</i> (?) <i>laurentina</i> (Billings)..... | | | A | | |
| <i>Bilobites acutilobus</i> (Ringueberg)..... | | | | N | |
| <i>Bilobites bilobus</i> (Linnaeus)..... | | | | N | |
| <i>Camarella lenticularis</i> Billings..... | | | A | | |
| <i>Camarotæchia</i> (?) <i>acinus</i> Hall..... | | | | N | |
| <i>Camarotæchia</i> (?) <i>acinus convexa</i> (Foerste)..... | | | Cl | | |
| <i>Camarotæchia equiradiata</i> Hall..... | | | Cl | | |
| <i>Camarotæchia fringilla</i> Billings..... | | | A | | |
| <i>Camarotæchia glacialis</i> Billings..... | | | A | | |
| <i>Camarotæchia</i> (?) <i>indianensis</i> Hall..... | | | | N | |
| <i>Camarotæchia</i> (?) <i>neglecta</i> Hall..... | | | Cl | N | |
| <i>Camarotæchia</i> (?) <i>obtusiplicata</i> Hall..... | | | | N | |
| <i>Camarotæchia</i> (?) <i>whitii</i> Hall..... | | | | N | |
| <i>Capellinia mira</i> Hall and Clarke..... | | | | N | |
| <i>Chonetes cornuta</i> Hall..... | | | Cl | | |
| <i>Chonetes nova-scotica</i> Hall..... | | | | Ar, N | |
| <i>Chonetes striatella</i> (Dalman)..... | | | | N? | |
| <i>Chonetes tenuistriata</i> Hall..... | | | | Ar | |
| <i>Chonetes undulata</i> Hall..... | | | | N | |
| <i>Clintonella vagabunda</i> Hall and Clarke..... | | | Cl | | |
| <i>Clorinda arenosa</i> (McChesney)..... | | | | N | |
| <i>Clorinda areyi</i> (Hall and Clarke)..... | | | Cl | | |
| <i>Clorinda barrandii</i> (Billings)..... | | | A | | |
| <i>Clorinda fornicata</i> (Hall)..... | | | Cl | N | |
| <i>Clorinda ventricosa</i> (Hall)..... | | | | N | |
| <i>Conchidium biloculare</i> Linnaeus..... | | | | MS | |
| <i>Conchidium colletti</i> Miller..... | | | | | W |
| <i>Conchidium crassiradiatum</i> (McChesney)..... | | | | N | |

TABLE V.—*Silurian Brachiopoda*—Continued.

| Species. | Eo-silurian. | | Mesosilurian. | | Neosilurian. |
|--|--------------|----------------------|---------------------------|-------------------------|--------------|
| | Medina. | Anti-costi, Clinton. | Guelph, Arisaig, Niagara. | Tentaculite, Waterlime. | |
| <i>Conchidium crassiplicum</i> Hall and Clarke | | | N | | |
| <i>Conchidium decussatum</i> (Whiteaves) | | | N | | |
| <i>Conchidium exponens</i> Hall and Clarke | | | N | | |
| <i>Conchidium georgiæ</i> Hall and Clarke | | Cl | | | |
| <i>Conchidium greenii</i> Hall and Clarke | | | N | | |
| <i>Conchidium knappi</i> (Hall and Whitfield) | | | N | | |
| <i>Conchidium laqueatum</i> (Conrad) | | | N | | |
| <i>Conchidium littoni</i> (Hall) | | | N | | |
| <i>Conchidium multicostatum</i> (Hall) | | | N | | |
| <i>Conchidium nysius</i> (Hall and Whitfield) | | | N | | |
| <i>Conchidium obsoletum</i> Hall and Clarke | | | N | | |
| <i>Conchidium occidentale</i> Hall | | | | Gu | |
| <i>Conchidium scoparium</i> Hall and Clarke | | | | Gu | |
| <i>Conchidium tenuicostatum</i> (Hall and Whitfield) | | | N | | |
| <i>Conchidium unguiforme</i> (Ulrich) | | | N | | |
| <i>Crania acadensis</i> Hall | | | Ar | | |
| <i>Crania anna</i> Spencer | | | N | | |
| <i>Crania dentata</i> Ringueberg | | | N | | |
| <i>Crania dubia</i> Foerste | | Cl | | | |
| <i>Crania gracilis</i> Ringueberg | | | N | | |
| <i>Crania setifera</i> Hall | | | N | | |
| <i>Crania siluriana</i> Hall | | | N | | |
| <i>Crania spinigera</i> Hall | | | N | | |
| <i>Craniella</i> (?) <i>clintonensis</i> Foerste | | Cl | | | |
| <i>Cyclospira</i> (?) <i>sparsiplica</i> Foerste | | Cl | | | |
| <i>Cyrtia exporrecta</i> (Wahlenberg) | | | N | | |
| <i>Cyrtia meta</i> Hall | | | Cl | N | |
| <i>Cyrtia myrtia</i> Billings | | | A | N | |
| <i>Cyrtina pyramidalis</i> (Hall) | | | | N | |
| <i>Dalmanella arcuaria</i> Hall and Clarke | | | | N | |
| <i>Dalmanella elegantula</i> (Dalman) | | | Cl | N | |
| <i>Dalmanella elegantula parva</i> (Foerste) | | | Cl | | |
| <i>Dalmanella parva</i> de Verneuil | | | A | | |
| <i>Delthyris</i> (?) <i>rugicosta</i> (Hall) | | | | Ar | |
| <i>Delthyris sulcata</i> Hisinger | | | | N | |
| <i>Dictyonella anticostiensis</i> Billings | | | A | | |
| <i>Dictyonella concinna</i> Hall | | | | N | |
| <i>Dictyonella corallifera</i> Hall | | | | N | |
| <i>Dictyonella gibbosa</i> Hall | | | | N | |
| <i>Dictyonella reticulata</i> Hall | | | | N | |
| <i>Dinobolus conradi</i> Hall | | | | N | |
| <i>Glossina perovata</i> (Hall) | | | Cl | | |
| <i>Gypidula coppingeri</i> (Etheridge) | | | | MS | |
| <i>Gypidula globosa</i> (Nettelroth) | | | | N | |
| <i>Gypidula knotti</i> (Nettelroth) | | | | N | |
| <i>Gypidula nuclea</i> (Hall and Whitfield) | | | Cl | | |
| <i>Gypidula roemeri</i> Hall and Clarke | | | | N | |
| <i>Gypidula uniplicata</i> (Nettelroth) | | | | N | |
| <i>Hebertella daytonensis</i> (Foerste) | | | Cl | | |
| <i>Hebertella fausta</i> (Foerste) | | | Cl | | |
| <i>Hindella prinstana</i> (Billings) | | | A | | |
| <i>Hindella umbonata</i> (Billings) | | | A | | |

TABLE V.—*Silurian Brachiopoda*—Continued.

| Species. | Eo-silurian. | | Mesosilurian. | | Neosilurian. |
|---|--------------|---|----------------------|---------------------------|--------------|
| | Medina. | | Anti-costi, Clinton. | Guelph, Arisaig, Niagara. | |
| <i>Homœospira apriniformis</i> Hall | | | | N | |
| <i>Homœospira evax</i> Hall | | | | N | |
| <i>Homœospira sobrina</i> (Beecher and Clarke) | | | | N | |
| <i>Hyattella congesta</i> (Conrad) | | | Cl | | |
| <i>Hyattella junia</i> (Billings) | | | A | | |
| †* <i>Leptaena rhomboidalis</i> (Wilckens) | | | Cl | N | |
| <i>Lingula acutirostra</i> Hall | | | Cl | | |
| <i>Lingula bicarinata</i> Ringueberg | | | | N | |
| <i>Lingula clintoni</i> Vanuxem | | | Cl | | |
| <i>Lingula cuneata</i> Conrad | | × | | | |
| <i>Lingula gibbosa</i> Hall | | | | N | |
| <i>Lingula ingens</i> Spencer | | | | N | |
| <i>Lingula insularis</i> Billings | | | A | | |
| <i>Lingula lamellata</i> Hall | | | | N | |
| <i>Lingula linguata</i> Hall and Clarke | | | Cl | | |
| <i>Lingula oblata</i> Hall | | | Cl | | |
| <i>Lingula subelliptica</i> d'Orbigny | | | Cl | | |
| <i>Lingula tæniola</i> Hall and Clarke | | | Cl | | |
| <i>Linguleps granti</i> Hall and Clarke | | | | N | |
| <i>Meristina maria</i> Hall | | | | N | |
| <i>Meristina rectirostra</i> Hall | | | | N | |
| <i>Meristina trisinuata</i> (McChesney) | | | | N | |
| <i>Mimulus waldronensis</i> (Miller and Dyer) | | | | N | |
| <i>Monomorella egani</i> Hall and Clarke | | | | N | |
| <i>Monomorella greenii</i> Hall and Clarke | | | | N | |
| <i>Monomorella kingi</i> Hall and Clarke | | | | N | |
| <i>Monomorella newberryi</i> Hall and Whitfield | | | | N | |
| <i>Monomorella orbicularis</i> Billings | | | | Gu | |
| <i>Monomorella ortoni</i> Hall and Clarke | | | | N | |
| <i>Monomorella ovata</i> Whiteaves | | | | Gu | |
| <i>Monomorella ovata lata</i> Whiteaves | | | | Gu | |
| <i>Monomorella prisca</i> Billings | | | | Gu | |
| * <i>Nucleospira elegans</i> Hall | | | | N | |
| <i>Nucleospira pisiformis</i> Hall | | | | N | |
| <i>Nucleospira rotundata</i> Whitfield | | | | | W |
| <i>Orbiculoidea numulus</i> Hall and Clarke | | | | | W |
| <i>Orbiculoidea parmulata</i> Hall | | × | | | |
| <i>Orbiculoidea subplana</i> (Hall) | | | | Ar | |
| <i>Orbiculoidea vanuxemi</i> (Hall) | | | | Ar | W |
| <i>Orthis benedicti</i> Miller | | | | N | |
| <i>Orthis davidsoni</i> de Verneuil | | | A | N | |
| <i>Orthis</i> (?) <i>fissiplica</i> Roemer | | | | N | |
| <i>Orthis flabellites</i> (Hall) Foerste | | | Cl | N | |
| <i>Orthis flabellites spania</i> Hall and Clarke | | | | N | |
| <i>Orthis</i> (?) <i>glypta</i> Hall and Clarke | | | | N | |
| <i>Orthis</i> (?) <i>missouriensis</i> Shumard | | | | N ? | |
| <i>Orthis</i> (?) <i>nisis</i> Hall and Whitfield | | | | N | |
| <i>Orthis</i> (?) <i>punctostriata</i> Hall | | | | N | |
| <i>Orthis</i> (?) <i>rugiplicata</i> Hall and Whitfield | | | | N | |
| <i>Orthis</i> (?) <i>ruida</i> Billings | | | A | | |
| <i>Orthis</i> (?) <i>subnodosa</i> Hall | | | | N | |
| <i>Orthis</i> (?) <i>tennidens</i> Hall | | | Cl | | |

TABLE V.—*Silurian Brachiopoda*—Continued.

| Species. | Eu-silurian. | Mesosilurian. | | Neosilurian. |
|--|--------------|----------------------|---------------------------|-------------------------|
| | Medina. | Anti-costi, Clinton. | Guelph, Arisaig, Niagara. | Tentaculite, Waterlime. |
| <i>Orthis</i> (?) <i>trinucleus</i> Hall..... | | Cl | | |
| <i>Orthostrophia</i> (?) <i>fasciata</i> Hall..... | | | N | |
| <i>Orthothetes hydraulicum</i> (Whitfield)..... | | | | W |
| <i>Orthothetes interstriata</i> (Hall)..... | | | | Te |
| * <i>Orthothetes subplana</i> (Conrad)..... | | | N | |
| <i>Orthothetes tenuis</i> Hall..... | | | N | |
| <i>Orthotrophia dolomitica</i> Hall and Clarke..... | | | N | |
| <i>Parastrophia greenii</i> Hall and Clarke..... | | | N | |
| <i>Parastrophia latiplicata</i> Hall and Clarke..... | | | N | |
| <i>Parastrophia multiplicata</i> Hall and Clarke..... | | | N | |
| <i>Parastrophia ops</i> (Billings)..... | | A | | |
| <i>Parastrophia reversa</i> (Billings)..... | | A | | |
| <i>Pentamerella</i> (?) <i>compressa</i> Ringueberg..... | | | N | |
| <i>Pentamerus oblongus</i> Sowerby..... | | Cl | N | |
| <i>Pentamerus oblongus cylindricus</i> (Hall and Whitfield)..... | | | N | |
| <i>Pentamerus oblongus maquoketa</i> Hall and Clarke..... | | | N | |
| <i>Pentamerus oblongus subrectus</i> Hall and Clarke..... | | | N | |
| <i>Pentamerus ovalis</i> Hall..... | | Cl | | |
| <i>Pentamerus pesovis</i> Whitfield..... | | | | W |
| <i>Pholidops ovalis</i> Hall..... | | | N | |
| <i>Pholidops squamiformis</i> Hall..... | | | N | |
| † <i>Platystrophia biforata</i> (Schlotheim)..... | | Cl | N | |
| <i>Plectambonites glabra</i> Shaler..... | | A | | |
| <i>Plectambonites producta</i> Hall and Clarke..... | | | N | |
| † <i>Plectambonites sericea</i> (Sowerby)..... | | Cl | | |
| <i>Plectambonites transversalis</i> (Wahlenberg)..... | | Cl | N | |
| <i>Plectambonites transversalis alabamensis</i> Foerste..... | | Cl | | |
| <i>Plectambonites transversalis prolongata</i> Foerste..... | | Cl | | |
| † <i>Rafinesquina ceres</i> (Billings)..... | | A | | |
| <i>Rafinesquina</i> (?) <i>obscura</i> (Hall and Clarke)..... | | Cl | | |
| <i>Reticularia bicostata</i> (Vanuxem)..... | | | N | |
| <i>Reticularia bicostata petila</i> (Hall)..... | | | N | |
| <i>Rhinobolus davidsoni</i> Hall and Clarke..... | | | N | |
| <i>Rhinobolus galtensis</i> (Billings)..... | | | Gu | |
| <i>Rhipidomella circula</i> Hall..... | | Cl | | |
| <i>Rhipidomella hybrida</i> (Sowerby)..... | | | N | |
| <i>Rhipidomella media</i> (Shaler)..... | | A | | |
| <i>Rhipidomella rhynchonelliformis</i> (Shaler)..... | | A | | |
| <i>Rhipidomella subcircula</i> (Simpson)..... | | Cl | | |
| <i>Rhipidomella ubera</i> (Billings)..... | | A | | |
| <i>Rhynchonella</i> (?) <i>argentea</i> Billings..... | | A | | |
| <i>Rhynchonella</i> (?) <i>bellaforma</i> Nettelroth..... | | | N | |
| <i>Rhynchonella</i> (?) <i>bidens</i> Hall..... | | Cl | | |
| <i>Rhynchonella</i> (?) <i>bidentata</i> (Hisinger)..... | | | N | |
| <i>Rhynchonella</i> (?) <i>colletti</i> Miller..... | | | N | |
| <i>Rhynchonella</i> (?) <i>decomplicata</i> Sowerby..... | | Cl | | |
| <i>Rhynchonella</i> (?) <i>emacerata</i> Hall..... | | Cl | Ar | |
| <i>Rhynchonella</i> (?) <i>eva</i> Billings..... | | A | | |
| <i>Rhynchonella</i> (?) <i>hydraulicum</i> Whitfield..... | | | | W |
| † <i>Rhynchonella</i> (?) <i>janea</i> Billings..... | | A | | |
| <i>Rhynchonella</i> (?) <i>laevis</i> Simpson..... | | Cl | | |
| <i>Rhynchonella</i> (?) <i>lamellata</i> Hall..... | | | | Te |

TABLE V.—*Sibirian Brachiopoda*—Continued.

| Species. | Eo-silurian. | | Mesosilurian. | | Neosilurian. |
|---|--------------|----------------------|---------------------------|-------------------------|--------------|
| | Medina. | Anti-costi, Clinton. | Guelph, Arisaig, Niagara. | Tentaculite, Waterlime. | |
| <i>Rhynchonella</i> (?) <i>nucula</i> (Sowerby)..... | | | N | | |
| <i>Rhynchonella</i> (?) <i>nutrix</i> Billings..... | | A | | | |
| <i>Rhynchonella</i> (?) <i>pisa</i> Hall and Whitfield..... | | | N | | |
| <i>Rhynchonella</i> (?) <i>plicata</i> Hall..... | × | | | | |
| <i>Rhynchonella</i> (?) <i>plicatella</i> (Linnaeus)..... | | | N | | |
| <i>Rhynchonella</i> (?) <i>pyrrha</i> Billings..... | | A | | | |
| <i>Rhynchonella</i> (?) <i>robusta</i> Hall..... | | Cl | | | |
| <i>Rhynchonella</i> (?) <i>rugacosta</i> Nettelroth..... | | | N | | |
| <i>Rhynchonella</i> (?) <i>tennesseensis</i> Roemer..... | | | N | | |
| <i>Rhynchonella</i> (?) <i>vicina</i> Billings..... | | A | | | |
| <i>Rhynchospira</i> (?) <i>acadie</i> (Hall)..... | | | Ar | | |
| <i>Rhynchospira</i> (?) <i>helena</i> (Nettelroth)..... | | | N | | |
| <i>Rhynchospira</i> (?) <i>sinuata</i> Hall..... | | | Ar | | |
| <i>Rhynchotreta cuneata americana</i> Hall..... | | | N | | |
| <i>Scenidium pyramidale</i> Hall..... | | | N | | |
| <i>Schizophoria senecta</i> Hall and Clarke..... | | Cl | | | |
| <i>Schizotreta tenuilamellata</i> Hall..... | | | N | | |
| <i>Spirifer asperatus</i> Ringueberg..... | | | N | | |
| <i>Spirifer crispatus</i> Hall and Clarke..... | | | N | | |
| <i>Spirifer crispus</i> (Hisinger)..... | | | N | | To |
| <i>Spirifer crispus simplex</i> Hall..... | | | N | | |
| <i>Spirifer dubius</i> Nettelroth..... | | | N? | | |
| <i>Spirifer eudorus</i> Hall..... | | | N | | |
| <i>Spirifer foggi</i> Nettelroth..... | | | N | | |
| <i>Spirifer gibbosus</i> Hall..... | | | N | | |
| <i>Spirifer niagarensis</i> (Conrad)..... | | | N | | |
| <i>Spirifer niagarensis oligoptychus</i> Roemer..... | | | N | | |
| <i>Spirifer nobilis</i> Barrande..... | | | N | | |
| <i>Spirifer radiatus</i> Sowerby..... | | Cl | N | | |
| <i>Spirifer rostellum</i> Hall and Whitfield..... | | | N | | |
| <i>Spirifer simulior</i> Winchell and Marcy..... | | | N | | |
| <i>Spirifer subsulcatus</i> Hall..... | | | Ar | | |
| <i>Spirifer vanuxemi</i> Hall..... | | | | | To |
| <i>Streptis grayi</i> Davidson..... | | | N | | |
| <i>Stricklandinia anticostiensis</i> Billings..... | | A | | | |
| <i>Stricklandinia billingsana</i> Dawson..... | | | Ar | | |
| <i>Stricklandinia brevis</i> Billings..... | | A | | | |
| <i>Stricklandinia canadensis</i> Billings..... | | Cl | | | |
| <i>Stricklandinia castellana</i> White..... | | | N | | |
| <i>Stricklandinia chapmani</i> Hall and Clarke..... | | | N | | |
| <i>Stricklandinia davidsoni</i> Billings..... | | A | | | |
| <i>Stricklandinia deformis</i> Meek and Worthen..... | | | N | | |
| <i>Stricklandinia gaspensis</i> Billings..... | | | N | | |
| <i>Stricklandinia lens</i> (Sowerby)..... | | | N? | | |
| <i>Stricklandinia lirata</i> Billings..... | | A | | | |
| <i>Stricklandinia</i> (?) <i>louisvillensis</i> Nettelroth..... | | | N | | |
| <i>Stricklandinia melissa</i> Billings..... | | A | | | |
| <i>Stricklandinia multilirata</i> Whitfield..... | | | Gu | | |
| <i>Stricklandinia salteri</i> Billings..... | | A | | | |
| <i>Stricklandinia triplesiana</i> Foerste..... | | Cl | | | |
| <i>Stropheodonta acanthoptera</i> (Whiteaves)..... | | | N? | | |
| <i>Stropheodonta corrugata</i> Conrad..... | | Cl | | | |

TABLE V.—*Silurian Brachiopoda*—Continued.

| Species. | Eo-silurian. | | Mesosilurian. | | Neosilurian. |
|--|--------------|----------------------|---------------------------|--------------------------|--------------|
| | Medina. | Anti-costi, Clinton. | Guelph, Arisaig, Niagara. | Tentaculite, Water-lime. | |
| <i>Stropheodonta corrugata pluristriata</i> Foerste..... | | Cl | | | |
| <i>Stropheodonta (?) geniculata</i> (Shaler)..... | | A | | | |
| <i>Stropheodonta (?) gilpeni</i> (Dawson)..... | | | Ar | | |
| <i>Stropheodonta leda</i> (Billings)..... | | A | | | |
| <i>Stropheodonta maera</i> (Winchell and Marcy)..... | | | N | | |
| <i>Stropheodonta nearpassi</i> Barrett..... | | | | | Te |
| <i>Stropheodonta prisca</i> Hall..... | | Cl | | | |
| <i>Stropheodonta profunda</i> Hall..... | | Cl | N | | |
| <i>Stropheodonta textilis</i> Hall..... | | | | | To |
| <i>Stropheodonta (?) ventricosa</i> (Shaler)..... | | A | | | |
| <i>Strophomena (?) alterniradiata</i> Shaler..... | | A | | | |
| <i>Strophomena (?) antiquata</i> Sowerby..... | | A | | | |
| <i>Strophomena (?) arcuata</i> Shaler..... | | A | | | |
| <i>Strophomena (?) bipartita</i> Hall..... | | | | | Te |
| <i>Strophomena (?) doneti</i> Salter..... | | | MS | | |
| <i>Strophomena (?) elliptica</i> Conrad..... | | | N | | |
| <i>Strophomena (?) julia</i> Billings..... | | A | | | |
| <i>Strophomena (?) modesta</i> Conrad..... | | Cl? | | | |
| <i>Strophomena (?) orthididea</i> Hall..... | | Cl | | | |
| <i>Strophomena philomela</i> Billings..... | | A | | | |
| <i>Strophomena (?) reticulata</i> Shaler..... | | | N | | |
| <i>Strophomena (?) semiovalis</i> Shaler..... | | A | | | |
| <i>Strophomena (?) siluriana</i> Davidson..... | | | N | | |
| <i>Strophonella costatula</i> Hall and Clarke..... | | | N | | |
| <i>Strophonella (?) patenta</i> Hall..... | | Cl | | | |
| <i>Strophonella semiplicata</i> Hall..... | | | N | | |
| <i>Strophonella striata</i> Hall..... | | | N | | |
| <i>Trematospira camura</i> Hall..... | | | N | | |
| <i>Trimerella acuminata</i> Billings..... | | | Gu | | |
| <i>Trimerella bilingsi</i> Dall..... | | | Gu | | |
| <i>Trimerella dalli</i> Davidson and King..... | | | Gu | | |
| <i>Trimerella grandis</i> Billings..... | | | Gu | | |
| <i>Trimerella ohioensis</i> Meek..... | | | N | | |
| <i>Triplecia niagarensis</i> Hall and Clarke..... | | | N | | |
| <i>Triplecia ortonii</i> Meek..... | | Cl | | | |
| <i>Uncinulus stricklandi</i> (Sowerby)..... | | | N | | |
| <i>Whitfieldella billingsana</i> (Meek and Worthen)..... | | | N | | |
| <i>Whitfieldella cylindrica</i> Hall..... | | Cl | N | | |
| <i>Whitfieldella hyale</i> (Billings)..... | | | Gu | | |
| <i>Whitfieldella intermedia</i> (Hall)..... | | Cl | N | | |
| <i>Whitfieldella (?) julia</i> (Billings)..... | | A | | | |
| <i>Whitfieldella (?) naviformis</i> (Hall)..... | | Cl | N | | |
| <i>Whitfieldella nitida</i> Hall..... | | | N | | |
| <i>Whitfieldella nitida obolata</i> Hall..... | | | N | | |
| <i>Whitfieldella (?) nucleolata</i> (Hall)..... | | | | | Te |
| <i>Whitfieldella obolata</i> (Hall)..... | | × | | | |
| <i>Whitfieldella sulcata</i> (Vanuxem)..... | | | | | W |
| <i>Wilsonia kokomoensis</i> (Miller)..... | | | | | W |
| * <i>Wilsonia saffordi</i> Hall..... | | | N | | |
| <i>Wilsonia saffordi depressa</i> Nettelroth..... | | | N | | |
| <i>Wilsonia wilsoni</i> (Sowerby)..... | | | N | | |
| <i>Zygospira (?) mica</i> (Billings)..... | | A | | | |

TABLE V.—*Silurian Brachiopoda*—Continued.

| Species. | Eo-silurian. | Mesosilurian. | | Neosilurian. |
|--|--------------|---------------------|---------------------------|-------------------------|
| | Medina. | Anticosti, Clinton. | Guelph, Arisaig, Niagara. | Tentaculite, Waterlime. |
| <i>Zygospira (?) minima</i> Hall..... | | | N | |
| <i>Zygospira (?) paupera</i> Billings..... | | A | | |
| Number of Silurian species, 311. | | | | |
| Number of species in each division..... | 4 | 116 | 195 | 17 |
| Number of species common to the Medina and the other divisions..... | 0 | 0 | 0 | 0 |
| Number of species common to the Clinton and the other divisions..... | 0 | | 19 | 0 |
| Number of species common to the Niagara and the other divisions..... | 0 | 19 | | 2 |
| Number of species common to the Neosilurian and the other divisions..... | 0 | 0 | 2 | |
| Species common to the Silurian and Devonian systems, 5. | | | | |
| Number of species passing from each division into the Devonian..... | 0 | 2 | 5 | 0 |

TABLE VI.—*Devonian Brachiopoda.*

[C=Chemung; Co=Corniferous; ED=Eodevonian; G=Genesee; H=Hamilton; Hu=Huron; I=Ithaca; M=Marcellus; MD=Mesodevonian; ND=Neodevonian; P=Portage; S=Schoharie; Tu=Tully. Species preceded by an asterisk (*) are found in the Carboniferous also; by an obelisk (†), in the Silurian.]

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|--|---------------------|------------|---------------------------|------------------------------|---------------------------|--------------------|
| | Lower Hel-der-berg. | Oris-kany. | Scho-harie, Cornif-erous. | Tully, Hamil-ton, Marcellus. | Port-age, Huron, Genesee. | Chem-mung, Ithaca. |
| <i>Ambocœlia fimbriata</i> Claypole..... | | | | | P | |
| <i>Ambocœlia gregaria</i> Hall..... | | | | | | C |
| <i>Ambocœlia præumbona</i> Hall..... | | | | H | | |
| <i>Ambocœlia spinosa</i> Hall and Clarke..... | | | | H | | |
| <i>Ambocœlia umbonata</i> (Conrad)..... | | | Co | M, H | G | I, C |
| <i>Amphigenia curta</i> (Meek and Worthen)..... | | × | | | | |
| <i>Amphigenia elongata</i> (Vanuxem)..... | | × | Co | | | |
| <i>Amphigenia elongata subtrigonalis</i> Hall..... | | | Co | | | |
| <i>Amphigenia elongata undulata</i> Hall..... | | | Co | | | |
| <i>Anastrophia verneuili</i> (Hall)..... | × | | | | | |
| <i>Anoplia nucleata</i> Hall..... | | × | Co | | | |
| <i>Anoplotheca acutiplicata</i> (Conrad)..... | | × | Co | | | |
| <i>Anoplotheca camilla</i> (Hall)..... | | × | Co | M | | |
| <i>Anoplotheca concava</i> (Hall)..... | × | | | | | |
| <i>Anoplotheca dichotoma</i> (Hall)..... | | × | | | | |
| <i>Anoplotheca fimbriata</i> (Hall)..... | | × | | | | |
| <i>Anoplotheca flabellites</i> (Conrad)..... | | × | Co | | | |
| <i>Anoplotheca infrequens</i> (Walcott)..... | ED | | | | ND | |
| <i>Athyris angelica</i> Hall..... | | | | | | C |
| <i>Athyris angelica occidentalis</i> Whiteaves..... | | | | H | | |
| <i>Athyris brittsi</i> Miller..... | | | | MD | | |
| <i>Athyris cora</i> Hall..... | | | | H | | C? |
| <i>Athyris fultonensis</i> (Swallow)..... | | | Co | H | | |
| <i>Athyris minutissima</i> Webster..... | | | | | | C |
| <i>Athyris (?) ottervillensis</i> Miller..... | | | | MD | | |
| <i>Athyris parvula</i> Whiteaves..... | | | | H | | |
| <i>Athyris polita</i> Hall..... | | | | | | C |
| <i>Athyris spiriferoides</i> (Eaton)..... | | | Co | H | | |
| <i>Atrypa desquamata</i> Sowerby..... | | | | H | | |
| <i>Atrypa ellipsoidea</i> Nettelroth..... | | | Co | | | |
| <i>Atrypa hystrix</i> Hall..... | | | | | | C |
| <i>Atrypa hystrix elongata</i> Webster..... | | | | | | C |
| <i>Atrypa hystrix occidentalis</i> Hall..... | | | | MD | | |
| <i>Atrypa hystrix planesulcata</i> Webster..... | | | | | | C |
| <i>Atrypa missouriensis</i> Miller..... | | | | MD | | |
| <i>Atrypa pseudomarginalis</i> Hall..... | | | S | | | |
| † <i>Atrypa reticularis</i> (Linnæus)..... | × | | Co, S | H, Tu | | I, C |
| <i>Atrypa reticularis impressa</i> Hall..... | | | S | | | |
| <i>Atrypa reticularis nuntia</i> Hall and Whitfield..... | | | | H | | |
| <i>Atrypa reticularis ventricosa</i> Hall and Whitfield..... | | | | H | | |
| <i>Atrypa spinosa</i> Hall..... | | | Co | H | | C |
| <i>Atrypina imbricata</i> Hall..... | × | | | | | |
| <i>Barroisella subspatulata</i> (Meek and Worthen)..... | | | | | G | |
| <i>Beachia suessana</i> Hall..... | | × | | | | |
| <i>Bilobites varicus</i> (Conrad)..... | × | | | | | |
| <i>Camarophoria rhomboidalis</i> Hall and Clarke..... | | | Co | | | |
| <i>Camarospira eucharis</i> Hall..... | | | Co | | | |
| <i>Camarotechia barrandi</i> Hall..... | | × | | | | |

TABLE VI.—*Devonian Brachiopoda*—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|--|---------------------|------------|---------------------------|-------------------------------|----------------------------|-------------------|
| | Lower Hel-der-berg. | Oris-kany. | Scho-harie, Cornif-erous. | Tully, Hamil-ton, Marcel-lus. | Port-age, Huron, Gene-sec. | Che-mung, Ithaca. |
| <i>Camarotoechia billingsi</i> Hall..... | | | Co | | | |
| <i>Camarotoechia carica</i> Hall..... | | | | H | | |
| <i>Camarotoechia carolina</i> Hall..... | | | Co | | | |
| <i>Camarotoechia congregata</i> (Conrad)..... | | | | H | | |
| * <i>Camarotoechia contracta</i> Hall..... | | | | | P | C |
| <i>Camarotoechia contracta saxatilis</i> Hall..... | | | | H | | |
| <i>Camarotoechia dotis</i> Hall..... | | | | M, H | | |
| <i>Camarotoechia duplicata</i> Hall..... | | | | | | C |
| <i>Camarotoechia endlichi</i> (Meek). ? Devonian. | | | | | | |
| <i>Camarotoechia eximia</i> Hall..... | | | | | P | I, C |
| <i>Camarotoechia horsfordi</i> Hall..... | | | | M, H | | |
| <i>Camarotoechia orbicularis</i> Hall..... | | | | | | C |
| <i>Camarotoechia pleiopleura</i> (Conrad)..... | | × | | | | |
| <i>Camarotoechia prolifica</i> Hall..... | | | | M, H | | |
| * <i>Camarotoechia sappho</i> Hall..... | | | | M, H | | C |
| <i>Camarotoechia speciosa</i> Hall..... | | × | | | | |
| <i>Camarotoechia stephani</i> Hall..... | | | | | P | C |
| <i>Camarotoechia tethys</i> (Billings)..... | | | Co | | | |
| <i>Camarotoechia ventricosa</i> Hall..... | × | | | | | |
| <i>Centronella alveata</i> Hall..... | | | Co | | | |
| <i>Centronella glansfagea</i> Hall..... | | × | Co | | | |
| <i>Centronella glauca</i> Hall..... | | | | H | | |
| <i>Centronella impressa</i> Hall..... | | | | H | | |
| <i>Centronella</i> (?) <i>navicella</i> (Hall)..... | | | | | | C |
| <i>Centronella ovata</i> Hall..... | | | Co | | | |
| <i>Centronella tumida</i> Billings..... | | × | Co | | | |
| <i>Charonella scitula</i> Hall..... | | | Co | | | |
| <i>Chonetes acutiradiata</i> Hall..... | | | Co | | | |
| <i>Chonetes antiope</i> Billings..... | | × | | | | |
| <i>Chonetes arcuata</i> Hall..... | | | Co | | | |
| <i>Chonetes canadensis</i> Billings..... | | × | | | | |
| <i>Chonetes coronata</i> (Conrad)..... | | | | H | | |
| <i>Chonetes emmetensis</i> A. Winchell..... | | | | H | | |
| <i>Chonetes filistriata</i> Walcott..... | | ED | | | | |
| <i>Chonetes hemispherica</i> Hall..... | | | Co | | | |
| <i>Chonetes koninckiana</i> Norwood and Pratten..... | | | | MD | | |
| <i>Chonetes lepida</i> Hall..... | | | | M, H | G, P | I, C |
| <i>Chonetes lineata</i> (Conrad)..... | | | Co | M | | |
| * <i>Chonetes logani aurora</i> Hall..... | | | | Tu | | |
| <i>Chonetes manitobensis</i> Whiteaves..... | | | | | | ND |
| <i>Chonetes melonica</i> Billings..... | | × | | | | |
| <i>Chonetes mucronata</i> Hall..... | | × | Co | M, H | | |
| <i>Chonetes punctata</i> Simpson..... | × | | | | | |
| <i>Chonetes pusilla</i> Hall..... | | | | H | | |
| <i>Chonetes scitula</i> Hall..... | | | | M, H | P | I, C |
| * <i>Chonetes setigera</i> (Hall)..... | | | | M, H | G | C |
| <i>Chonetes subquadrata</i> Nettelroth..... | | | | H | | |
| <i>Chonetes vicina</i> (Castelnau)..... | | | | H | | |
| <i>Chonetes vandellana</i> Hall..... | | | Co | | | |
| <i>Chonostrophia complanata</i> Hall..... | | × | | | | |
| <i>Chonostrophia dawsoni</i> (Billings)..... | | × | | | | |

TABLE VI.—*Devonian Brachiopoda*—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|---|-------------------|-----------|-------------------------|-----------------------------|--------------------------|------------------|
| | Lower Helderberg. | Oriskany. | Schoharie, Corniferous. | Tully, Hamilton, Marcellus. | Portage, Huron, Genesee. | Chemung, Ithaca. |
| <i>Chonostrophia helderbergiæ</i> Hall..... | × | | | | | |
| <i>Chonostrophia reversa</i> (Whitfield)..... | | | Co | | | |
| <i>Christiania subquadrata</i> Hall..... | × | | | | | |
| <i>Conchidium knighti</i> Nettelroth..... | | | Co? | | | |
| <i>Conchidium</i> (?) <i>saliense</i> (Swallow)..... | | | | H? | | |
| <i>Cranæna iowensis</i> (Calvin)..... | | | | MD | | |
| <i>Cranæna romingeri</i> Hall..... | | | | H | | |
| <i>Crania agaricina</i> Hall and Clarke..... | × | | | | | |
| <i>Crania aurora</i> Hall..... | | | S | | | |
| <i>Crania bella</i> Billings..... | | ? | | | | |
| <i>Crania centralis</i> Hall..... | | | | | P | |
| <i>Crania crenistriata</i> Hall..... | | | Co | H | | |
| <i>Crania famelica</i> Hall and Whitfield..... | | | | H | | |
| <i>Crania favicola</i> Hall and Clarke..... | | | | MD | | |
| <i>Crania granosa</i> Hall and Clarke..... | | | | H | | |
| <i>Crania greenii</i> Miller..... | | | Co | | | |
| <i>Crania leoni</i> Hall..... | | | | | P | C |
| <i>Crania pulchella</i> Hall and Clarke..... | × | | | | | |
| <i>Crania sheldoni</i> White..... | | | | H | | |
| <i>Craniella hamiltoniæ</i> Hall..... | | | | M, H | | |
| <i>Cryptonella</i> (?) <i>circula</i> Walcott. Devonian. | | | | | | |
| ² <i>Cryptonella</i> (?) <i>eudora</i> Hall..... | | | | | | I, C |
| <i>Cryptonella</i> (?) <i>eximia</i> Hall..... | × | | | | | |
| <i>Cryptonella iphis</i> Hall..... | | | Co | | | |
| <i>Cryptonella lens</i> Hall..... | | | Co | | | |
| <i>Cryptonella ovalis</i> Miller..... | | | | H | | |
| <i>Cryptonella pinonensis</i> Walcott..... | | | | | | ND |
| <i>Cryptonella planirostra</i> Hall..... | | | | M, H | | |
| <i>Cryptonella rectirostra</i> Hall..... | | | | H | | |
| <i>Cyclorhina nobilis</i> Hall..... | | | | H | | |
| <i>Cyrtia cyrtinaformis</i> Hall and Whitfield..... | | | | | | C |
| <i>Cyrtia norwoodi</i> (Meek)..... | | | | MD | | |
| <i>Cyrtina affinis</i> Billings..... | | × | | | | |
| <i>Cyrtina billingsi</i> Meek..... | | | | H | | |
| <i>Cyrtina bicipitata</i> Hall..... | | | Co | | | |
| <i>Cyrtina crassa</i> Hall..... | | | Co | | | |
| <i>Cyrtina curvilineata</i> White..... | | | | H | | |
| <i>Cyrtina dalmani</i> Hall..... | × | | | | | |
| <i>Cyrtina davidsoni</i> Walcott..... | | | | MD | | ND |
| <i>Cyrtina hamiltonensis</i> Hall..... | | | Co | H | P | I |
| <i>Cyrtina hamiltonensis recta</i> Hall..... | | | | H | | C |
| <i>Cyrtina missouriensis</i> (Swallow)..... | | | | H | | |
| <i>Cyrtina</i> (?) <i>occidentalis</i> (Swallow)..... | | | | H | | |
| <i>Cyrtina rostrata</i> (Hall)..... | | × | Co | | | |
| <i>Cyrtina tiquetra</i> (Hall)..... | | | | H | | |
| <i>Cyrtina umbonata</i> (Hall)..... | | | | H | | |
| <i>Cyrtina umbonata alpenensis</i> Hall and Clarke..... | | | | H | | |
| <i>Dalmanella concinna</i> (Hall)..... | × | | | | | |
| <i>Dalmanella devonica</i> (Walcott)..... | | ED | | | | |
| <i>Dalmanella infera</i> (Calvin)..... | | | | | | C |
| <i>Dalmanella lenticularis</i> (Vanuxem)..... | | | Co | | | |

TABLE VI.—Devonian Brachiopoda—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|---|-------------------|-----------|-------------------------|-----------------------------|--------------------------|------------------|
| | Lower Helderberg. | Oriskany. | Schoharie, Corniferous. | Tully, Hamilton, Marcellus. | Portage, Huron, Genesee. | Chemung, Ithaca. |
| <i>Dalmanella lepida</i> Hall | | | | H | | |
| <i>Dalmanella perelegans</i> Hall | × | × | | | | |
| <i>Dalmanella planoconvexa</i> Hall | × | × | | | | |
| <i>Dalmanella quadrans</i> Hall | × | | | | | |
| <i>Dalmanella subcarinata</i> Hall | × | | | | | |
| <i>Dalmanella superstes</i> Hall and Clarke | | | | | | C |
| <i>Dalmanella tenuilineata</i> Hall | | | | | | C |
| <i>Delthyris consobrina</i> (d'Orbigny) | | | | H | | |
| <i>Delthyris mesacostalis</i> Hall | | | | | | I, C |
| <i>Delthyris perlamellosa</i> (Hall) | × | | | | | |
| <i>Delthyris raricosta</i> Conrad | | | Co | | | |
| <i>Delthyris sculptilis</i> Hall | | | | H | | |
| <i>Dielasma calvini</i> Hall and Whitfield | | | | | | C |
| <i>Dignomia alveata</i> Hall | | | | H | | |
| <i>Eatonia coulteri</i> Miller and Gurley | | × | | | | |
| <i>Eatonia eminens</i> Hall | × | | | | | |
| <i>Eatonia medialis</i> (Vanuxem) | × | × | | | | |
| <i>Eatonia peculiaris</i> (Conrad) | × | × | | | | |
| <i>Eatonia pumila</i> Hall | | × | | | | |
| <i>Eatonia singularis</i> (Vanuxem) | × | | | | | |
| <i>Eatonia sinuata</i> Hall | | × | | | | |
| <i>Eatonia</i> (?) <i>variabilis</i> Whiteaves | | | | H | | |
| <i>Eatonia whitfieldi</i> Hall | | × | | | | |
| <i>Eunella harmonia</i> Hall | | | Co | | | |
| <i>Eunella lincklæni</i> Hall | | | | M, H | | |
| <i>Eunella simulator</i> Hall | | | | H | | |
| <i>Eunella sullivanti</i> Hall | | | Co | | | |
| <i>Glossina leana</i> (Hall) | | | | H | | |
| <i>Glossina spatiosa</i> (Hall) | × | | | | | |
| <i>Glossina triangulata</i> (Nettelroth) | | | | H | | |
| <i>Gypidula comis</i> (Owen) | | | | MD | | |
| <i>Gypidula galeata</i> (Dalman) | × | | | | | |
| <i>Gypidula læviuscula</i> Hall | | | | MD | | |
| <i>Gypidula lotis</i> (Walcott) | | | | | | ND |
| <i>Gypidula munda</i> Calvin | | | | MD | | |
| <i>Gypidula pseudogaleata</i> (Hall) | × | | | | | |
| <i>Gypidula romingeri</i> Hall and Clarke | | | | H | | |
| <i>Gypidula subglobosa</i> (Meek and Worthen) | | | | H | | |
| <i>Hipparionyx proximus</i> Vanuxem | | × | | | | |
| <i>Hypothyris castanea</i> (Meek) | | | | MD | | |
| <i>Hypothyris cuboides</i> (Sowerby) | | | | Tu | | |
| <i>Hypothyris emmonsii</i> (Hall and Whitfield) | | | | MD | | |
| <i>Leiorhynchus dubium</i> Hall | | | | M | | |
| <i>Leiorhynchus globuliforme</i> (Vanuxem) | | | | | | C |
| <i>Leiorhynchus hecate</i> Clarke | | | | | G | |
| <i>Leiorhynchus irus</i> Hall | | | | | | C |
| <i>Leiorhynchus kelloggi</i> Hall | | | | H | | |
| <i>Leiorhynchus laura</i> Billings | | | | M, H | | |
| <i>Leiorhynchus lesleyi</i> Hall and Clarke | | | | | | ND |
| <i>Leiorhynchus limitare</i> (Vanuxem) | | | | M | | |
| <i>Leiorhynchus mesacostale</i> Hall | | | | | P | I, C |

TABLE VI.—Devonian Brachiopoda—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|--|-------------------|-----------|-------------------------|-----------------------------|--------------------------|------------------|
| | Lower Helderberg. | Oriskany. | Schoharie, Corniferous. | Tully, Hamilton, Marcellus. | Portage, Huron, Genesee. | Chemung, Ithaca. |
| <i>Leiorhynchus mysia</i> Hall | | | | M | | |
| <i>Leiorhynchus nevadense</i> Walcott | | | | MD | | |
| <i>Leiorhynchus quadricostatum</i> (Vanuxem) | | | | M | G | |
| <i>Leiorhynchus robustum</i> Hall and Clarke | | | | | | C |
| <i>Leiorhynchus sesquiplicatum</i> A. Winchell | | | | H | | |
| <i>Leiorhynchus sinuatum</i> Hall | | | | | | C |
| * <i>Leptæna rhomboidalis</i> (Wilckens) | × | × | Co | H | | C |
| <i>Leptæna rhomboidalis ventricosa</i> Hall | | × | | | | |
| <i>Leptæniscæ adnascens</i> Hall and Clarke | × | | | | | |
| <i>Leptæniscæ concava</i> Hall | × | | | | | |
| <i>Leptæniscæ tangens</i> Hall | × | | | | | |
| <i>Lindströmella aspidium</i> Hall | | | | H | | |
| <i>Lingula albapinensis</i> Walcott | | | | | | ND |
| <i>Lingula artemis</i> Billings | | ×? | | | | |
| <i>Lingula centrilineata</i> Hall | × | | | | | |
| <i>Lingula ceryx</i> Hall | | | S | | | |
| <i>Lingula complanata</i> Williams | | | | H | | I |
| <i>Lingula compta</i> Hall and Clarke | | | | H | | |
| <i>Lingula concentrica</i> Conrad | | | Co? | | | |
| * <i>Lingula cuyahoga</i> Hall | | | | | | C |
| <i>Lingula delia</i> Hall | | | | H | | |
| <i>Lingula densa</i> Hall | | | | H | | |
| <i>Lingula desiderata</i> Hall | | | Co | | | |
| <i>Lingula ligea</i> Hall | | | | H | P | |
| <i>Lingula ligea nevadensis</i> Walcott | | ED | | | | |
| <i>Lingula lonensis</i> Walcott | | ED | | | | |
| <i>Lingula lucretia</i> Billings | | ×? | | | | |
| <i>Lingula maida</i> Hall | | | | H | | |
| <i>Lingula manui</i> Hall | | | Co | | | |
| <i>Lingula minuta</i> Meek | | | | H | | |
| <i>Lingula nuda</i> Hall | | | | H | | |
| <i>Lingula perlata</i> Hall | × | | | | | |
| <i>Lingula punctata</i> Hall | | | | H | | I |
| <i>Lingula rectilatera</i> Hall | × | | | | | |
| <i>Lingula scutella</i> Hall and Clarke | | | | | | C |
| <i>Lingula spathata</i> Hall | × | | | | | |
| <i>Lingula spatulata</i> Vanuxem | | | | H | G, P | I |
| <i>Lingula thedfordensis</i> Whiteaves | | | | H | | |
| <i>Lingula triquetra</i> Clarke | | | | | P | |
| <i>Lingula whitii</i> Walcott | | ED | | | | |
| <i>Lingulella (?) paliformis</i> Hall | | | | H | | |
| <i>Lingulodiscina oxilis</i> (Hall) | | | | M | | |
| <i>Lissopleura æquivalvis</i> (Hall) | × | | | | | |
| <i>Martinia athyroides</i> A. Winchell | | | | H | | |
| <i>Martinia glaucerasi</i> (White) | | | | H | | |
| <i>Martinia (?) insolita</i> A. Winchell | | | | | Ha | |
| <i>Martinia maia</i> (Billings) | | | Co | | | |
| <i>Martinia meristoides</i> Meek | | | | H | | |
| <i>Martinia sublineata</i> Meek | | | | H | | |
| <i>Martinia subumbona</i> (Hall) | | | | M, H | P | |
| <i>Megalanteris condoni</i> (McChesney) | | × | | | | |

TABLE VI.—*Deronian Brachiopoda*—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|---|---------------------|------------|---------------------------|-------------------------------|----------------------------|-------------------|
| | Lower Hel-der-berg. | Oris-kany. | Scho-harie, Cornif-erous. | Tully, Hamil-ton, Marcell-us. | Port-age, Huron, Gene-see. | Che-mung, Ithaca. |
| Megalanteris ovalis Hall..... | | × | | | | |
| Merista elongata Hall..... | × | | | | | |
| Merista tennesseensis Hall..... | × | | | | | |
| Merista typa Hall..... | × | | | | | |
| Meristella arcuata Hall..... | × | | | | | |
| Meristella barrisi Hall..... | | | | M, H | | |
| Meristella bella (Hall)..... | × | | | | | |
| Meristella (?) blancha (Billings)..... | × | | | | | |
| Meristella elusia (Billings)..... | | | Co | | | |
| Meristella doris Hall..... | | | Co | | | |
| Meristella haskinsi Hall..... | | | | H | | |
| Meristella (?) houghtoni (A. Winchell)..... | | | | | Hu | |
| Meristella levis (Vanuxem)..... | × | | | | | |
| Meristella lata Hall..... | | × | | | | |
| Meristella lens (A. Winchell)..... | | | | H | | |
| Meristella lenta Hall..... | | × | | | | |
| Meristella meeki Hall..... | × | | | | | |
| Meristella meta Hall..... | | | | H | | |
| Meristella nasuta (Conrad)..... | | | Co | | | |
| Meristella princeps Hall..... | × | | | | | |
| Meristella rostrata Hall..... | | | | H | | |
| Meristella subquadrata (Hall)..... | × | | | | | |
| Meristella walcotti Hall and Clarke..... | | × | | | | |
| Metaplasia disparilis (Hall)..... | | | Co | | | |
| Metaplasia pyxidata (Hall)..... | | × | | | | |
| Newberria claypoli Hall..... | | | | H | | |
| Newberria johannis Hall..... | | | | MD | | |
| Newberria laevis (Meek)..... | | | | H | | |
| Newberria missouriensis Hall..... | | | | H | | |
| Nucleospira concentrica Hall..... | × | | | | | |
| Nucleospira concinna Hall..... | | | Co | H | | |
| Nucleospira elegans Hall..... | × | | | | | |
| Nucleospira ventricosa Hall..... | × | | | | | |
| Orbiculoidea alleghania (Hall)..... | | | | | | C |
| Orbiculoidea ampla Hall..... | | × | | | | |
| Orbiculoidea conradi (Hall)..... | × | | | | | |
| Orbiculoidea discus Hall..... | × | | | | | |
| Orbiculoidea doria (Hall)..... | | | | H | | |
| Orbiculoidea elmira (Hall)..... | | | | | | C |
| Orbiculoidea humilis (Hall)..... | | | | M, H | | |
| Orbiculoidea jervensis (Barrett)..... | | × | | | | |
| Orbiculoidea lodensis (Vanuxem)..... | | | | | G | |
| Orbiculoidea lodensis media Hall..... | | | | M, H | | C |
| Orbiculoidea marginalis (Whitfield)..... | | | | H | | |
| Orbiculoidea minuta Hall..... | | | | M, H | | |
| Orbiculoidea neglecta (Hall)..... | | | | | | C |
| Orbiculoidea randalli Hall..... | | | | H | | |
| Orbiculoidea seneca (Hall)..... | | | | H | | |
| Orbiculoidea tullia (Hall)..... | | | | Tu | | |
| Oriskania navicella Hall and Clarke..... | | × | | | | |
| Orthis (?) eryna Hall..... | | | Co | | | |

TABLE VI.—*Devonian Brachiopoda*—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|--|----------------------|------------|---------------------------|-------------------------------|----------------------------|-------------------|
| | Lower Hel-ders-berg. | Oris-kany. | Scho-harie, Cornif-erous. | Tully, Hamil-ton, Marcell-us. | Port-age, Huron, Gene-see. | Che-mung, Ithaca. |
| <i>Orthis</i> (?) <i>tenuistriata</i> Hall..... | | | | | P | |
| <i>Orthostrophia strophomenoides</i> Hall | × | | | | | |
| <i>Orthothetes anomala</i> (A. Winchell) | | | | H | | |
| <i>Orthothetes bellulus</i> Clarke | | | | M | | |
| <i>Orthothetes chemungensis</i> (Conrad)..... | | | | | | C |
| <i>Orthothetes chemungensis arctostriata</i> Hall | | | | M, H | P | |
| <i>Orthothetes chemungensis perversus</i> Hall | | | Co | H | | |
| <i>Orthothetes deformis</i> Hall | × | | | | | |
| <i>Orthothetes deformis sinuata</i> Hall and Clarke..... | × | | | | | |
| <i>Orthothetes flabellum</i> (Whitfield) | | | Co | | | |
| <i>Orthothetes pandora</i> (Billings) | | | Co | M | | |
| <i>Orthothetes prava</i> Hall..... | | | | | | ND? |
| <i>Orthothetes subplana</i> (Conrad)..... | × | | | | | |
| <i>Orthothetes woolworthana</i> Hall | × | | | | | |
| <i>Parazyga deweyi</i> Hall..... | × | | | | | |
| <i>Parazyga hirsuta</i> Hall..... | | | Co | H | | |
| <i>Pentagonia unisulcata</i> (Conrad) | | × | Co | H | | |
| <i>Pentamerella arata</i> (Conrad)..... | | | Co | | | |
| <i>Pentamerella borealis</i> (Meek)..... | | | | H | | |
| <i>Pentamerella dubia</i> Hall..... | | | | H? | | |
| <i>Pentamerella intralineata</i> (A. Winchell)..... | | | | H | | |
| <i>Pentamerella micula</i> Hall..... | | | | H? | | |
| <i>Pentamerella obsolescens</i> Hall..... | | | | H? | | |
| <i>Pentamerella pavillionensis</i> Hall | | | | H | | |
| <i>Pentamerella thusnelda</i> Nettelroth | | | Co | | | |
| <i>Pholidops arcuaria</i> Hall | | × | | | | |
| <i>Pholidops areolata</i> Hall..... | | | S | | | |
| <i>Pholidops bellula</i> Walcott..... | | ED | | | | |
| <i>Pholidops calceola</i> Hall and Clarke | | | Co | | | |
| <i>Pholidops greenii</i> Miller and Gurley..... | | | | H | | |
| <i>Pholidops hamiltoniae</i> Hall | | | | H | | |
| <i>Pholidops lepis</i> Hall and Clarke | | | Co | | | |
| <i>Pholidops oblata</i> Hall..... | | | | H | | |
| <i>Pholidops ovata</i> Hall | × | | | | | |
| <i>Pholidops patina</i> Hall and Clarke | | | Co | | | |
| <i>Pholidops quadrangularis</i> Walcott | | ED | | | | |
| <i>Pholidops terminalis</i> Hall | | × | | | | |
| <i>Pholidostrophia iowensis</i> (Owen)..... | | | Co | H | | |
| <i>Plectorthis</i> (?) <i>aurelia</i> (Billings)..... | | × | | | | |
| <i>Productella aretirostrata</i> Hall..... | | | | | | C |
| <i>Productella bialveata</i> Hall..... | | | | | | C |
| <i>Productella boydi</i> Hall | | | | | | C |
| <i>Productella costatula</i> Hall..... | | | | | | C |
| <i>Productella costatula strigata</i> Hall | | | | | | C |
| <i>Productella dumosa</i> Hall | | | | H | | |
| <i>Productella eriensis</i> Nicholson | | | Co | | | |
| <i>Productella exanthemata</i> Hall..... | | | Co | H | | |
| <i>Productella hallana</i> Walcott..... | | | | | | ND |
| <i>Productella hirsuta</i> Hall..... | | | | | | C |
| <i>Productella hirsuta rectispina</i> Hall..... | | | | | | C |
| <i>Productella hirsutiforme</i> (Walcott)..... | | | | | | ND |

TABLE VI.—*Devonian Brachiopoda*—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|--|---------------------|------------|---------------------------|-------------------------------|----------------------------|-------------------|
| | Lower Hel-der-berg. | Oris-kany. | Scho-harie, Cornif-erous. | Tully, Hamil-ton, Marcel-lus. | Port-age, Huron, Gene-see. | Che-mung, Ithaca. |
| <i>Productella lachrymosa</i> (Conrad)..... | | | | | | C |
| <i>Productella lachrymosa lina</i> (Conrad)..... | | | | | | C |
| * <i>Productella lachrymosa stigmata</i> Hall..... | | | | | | C |
| <i>Productella marquessi</i> Rowley..... | | | | H | | |
| <i>Productella murchisoniana</i> De Koninck..... | | | | H | | |
| <i>Productella navicella</i> Hall..... | | | Co | H | | |
| <i>Productella onusta</i> Hall..... | | | | | | C |
| <i>Productella papulata</i> Hall..... | | | | H | | |
| <i>Productella productoides</i> (Murchison)..... | | | | H | | |
| <i>Productella rarispina</i> Hall..... | | | | | | C |
| <i>Productella semiglobosa</i> Nettelroth..... | | | Co | | | |
| * <i>Productella speciosa</i> Hall..... | | | | | P | I, C |
| <i>Productella spinulicosta</i> Hall..... | | | Co | M, H | | |
| <i>Productella striatula</i> Hall..... | | | | | | C |
| <i>Productella subalata</i> Hall..... | | | | MD | | |
| <i>Productella tullia</i> Hall..... | | | | H | | |
| <i>Pugnax pugnus</i> Martin..... | | | | | P | I |
| <i>Pugnax pugnus altus</i> (Calvin)..... | | | | | | ND |
| <i>Rensselæria equiradiata</i> (Conrad)..... | × | | | | | |
| <i>Rensselæria cayuga</i> Hall and Clarke..... | | × | | | | |
| <i>Rensselæria eumberlandiæ</i> Hall..... | | × | | | | |
| <i>Rensselæria elliptica</i> Hall..... | × | | | | | |
| <i>Rensselæria intermedia</i> Hall..... | | × | | | | |
| <i>Rensselæria marylandica</i> Hall..... | | × | | | | |
| <i>Rensselæria mutabilis</i> Hall..... | × | | | | | |
| <i>Rensselæria ovoides</i> (Eaton)..... | | × | | | | |
| <i>Rensselæria ovalum</i> Hall and Clarke..... | | × | | | | |
| <i>Reticularia canandaigua</i> (Hall and Clarke)..... | | | | H | | |
| <i>Reticularia fimbriata</i> (Conrad)..... | | × | Co | M, H | | I |
| <i>Reticularia franklini</i> (Meek)..... | | | | H | | |
| <i>Reticularia knappiana</i> (Nettelroth)..... | | | Co | | | |
| <i>Reticularia levis</i> (Hall)..... | | | | | P | I |
| <i>Reticularia modesta</i> (Hall)..... | × | × | | | | |
| <i>Reticularia nevadensis</i> (Walcott)..... | | | | | | ND |
| <i>Reticularia (?) nympa</i> (Billings)..... | × | | | | | |
| <i>Reticularia præmatura</i> (Hall)..... | | | | | | C |
| <i>Reticularia subundifera</i> (Meek and Worthen)..... | | | | H | | |
| <i>Retzia (?) polyploera</i> A. Winchell..... | | | | | P | |
| <i>Retzia (?) subglobosa</i> Hall..... | | | S | | | |
| <i>Rhipidomella alsa</i> Hall..... | | | S | | | |
| <i>Rhipidomella assimilis</i> Hall..... | × | | | | | |
| <i>Rhipidomella cleobis</i> Hall..... | | | Co | | | |
| <i>Rhipidomella eumberlandiæ</i> Hall..... | | × | | | | |
| <i>Rhipidomella (?) euecata</i> (Owen)..... | | | | H | | |
| <i>Rhipidomella cyelas</i> Hall..... | | | | M, H | | |
| <i>Rhipidomella discus</i> Hall..... | × | | | | | |
| <i>Rhipidomella emiens</i> Hall..... | × | | | | | |
| <i>Rhipidomella goodwini</i> (Nettelroth)..... | | | | H | | |
| <i>Rhipidomella idonea</i> Hall..... | | | | H | | |
| <i>Rhipidomella leucosia</i> Hall..... | | | | H | | |
| <i>Rhipidomella livia</i> (Billings)..... | | | Co | | | |
| <i>Rhipidomella lucia</i> Billings..... | | × | | | | |

TABLE VI.—*Devonian Brachiopoda*—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|--|-------------------|-----------|-------------------------|-----------------------------|--------------------------|------------------|
| | Lower Helderberg. | Oriskany. | Schoharie, Corniferous. | Tully, Hamilton, Marcellus. | Portage, Huron, Genesee. | Chemung, Ithaca. |
| <i>Rhipidomella (?) mitis</i> (Hall)..... | | | S | | | |
| <i>Rhipidomella muscolosa</i> Hall..... | | × | | | | |
| <i>Rhipidomella oblata</i> Hall..... | × | | | | | |
| <i>Rhipidomella oblata emarginata</i> Hall..... | × | | | | | |
| <i>Rhipidomella peloris</i> Hall..... | | | S | | | |
| <i>Rhipidomella penelope</i> Hall..... | | | | H | | |
| <i>Rhipidomella pennsylvanica</i> (Simpson)..... | | | | | | C |
| <i>Rhipidomella semele</i> Hall..... | | | Co | | | |
| <i>Rhipidomella solitaria</i> Hall..... | | | | H | | |
| <i>Rhipidomella suborbicularis</i> Hall..... | | | | H | | |
| * <i>Rhipidomella thiemii</i> (White)..... | | | | | | C |
| <i>Rhipidomella tubulostriata</i> Hall..... | × | | | | | |
| <i>Rhipidomella vauuxemi</i> Hall..... | | | Co | M, H | | |
| <i>Rhynchonella acutiplicata</i> Hall..... | × | | | | | |
| <i>Rhynchonella allegania</i> Williams..... | | | | | | C |
| <i>Rhynchonella altiplicata</i> Hall..... | × | | | | | |
| <i>Rhynchonella ambigua</i> Calvin..... | | | | MD | | |
| <i>Rhynchonella aspasia</i> Billings..... | × | | | | | |
| <i>Rhynchonella bialveata</i> Hall..... | × | | | | | |
| <i>Rhynchonella dryope</i> Billings..... | | × | | | | |
| <i>Rhynchonella eminens</i> Hall..... | × | | | | | |
| <i>Rhynchonella excellens</i> Billings..... | | × | | | | |
| <i>Rhynchonella fitchana</i> Hall..... | | × | | | | |
| <i>Rhynchonella gainesi</i> Nettelroth..... | | | | H | | |
| <i>Rhynchonella huronensis</i> A. Winchell..... | | | | | Hu | |
| <i>Rhynchonella huronensis precipua</i> A. Winchell..... | | | | | Hu | |
| <i>Rhynchonella inaequiplicata</i> Hall..... | | | Co | | | |
| <i>Rhynchonella inutilis</i> Hall..... | × | | | | | |
| <i>Rhynchonella louisvillensis</i> Nettelroth..... | | | Co | | | |
| <i>Rhynchonella mainensis</i> Billings..... | × | | | | | |
| <i>Rhynchonella medea</i> Billings..... | | | Co | | | |
| <i>Rhynchonella multistriata</i> Hall..... | | × | | | | |
| <i>Rhynchonella oblata</i> Hall..... | | × | | | | |
| <i>Rhynchonella occidens</i> Walcott..... | | ED | | | | |
| <i>Rhynchonella planoconvexa</i> Hall..... | × | | | | | |
| <i>Rhynchonella principalis</i> Hall..... | | × | | | | |
| <i>Rhynchonella ramsayi</i> Hall..... | | × | | | | |
| <i>Rhynchonella raricosta</i> Whitfield..... | | | Co | | | |
| <i>Rhynchonella royana</i> Hall..... | | | Co | | | |
| <i>Rhynchonella rudis</i> Hall..... | × | | | | | |
| <i>Rhynchonella semiplicata</i> (Conrad)..... | × | | | | | |
| <i>Rhynchonella septata</i> Hall..... | | × | | | | |
| <i>Rhynchonella subacuminata</i> Webster..... | | | | | | C |
| <i>Rhynchonella sulcopicata</i> Hall..... | × | | | | | |
| <i>Rhynchonella tenuistriata</i> Nettelroth..... | | | Co | | | |
| <i>Rhynchonella transversa</i> Hall..... | × | | | | | |
| <i>Rhynchonella warrenensis</i> Swallow..... | | ED | | | | |
| <i>Rhynchospira electra</i> Billings..... | × | | | | | |
| <i>Rhynchospira (?) eugenia</i> Billings..... | | | Co | | | |
| <i>Rhynchospira formosa</i> Hall..... | × | | | | | |
| <i>Rhynchospira globosa</i> Hall..... | × | | | | | |

TABLE VI.—*Devonian Brachiopoda*—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|--|-------------------|-----------|-------------------------|-----------------------------|--------------------------|------------------|
| | Lower Helderberg. | Oriskany. | Scholarie, Corniferous. | Tully, Hamilton, Marcellus. | Portage, Huron, Genesee. | Chemung, Ithaca. |
| <i>Rhynchospira rectirostra</i> Hall..... | | × | | | | |
| <i>Rhynchotrema formosa</i> (Hall)..... | × | | | | | |
| <i>Remerella grandis</i> Vanuxem..... | | | | H | | |
| <i>Scenidium insignis</i> Hall..... | × | | | | | |
| <i>Schizobolus concentricus</i> (Vanuxem)..... | | | | | G | |
| <i>Schizocrania (?) helderbergia</i> Hall..... | × | | | | | |
| <i>Schizocrania superincretata</i> Barrett..... | × | | | | | |
| <i>Schizophoria carinata</i> Hall..... | | | | | | C |
| <i>Schizophoria macfarlanii</i> (Meek)..... | | | | MD | | ND |
| <i>Schizophoria manitobensis</i> Whiteaves..... | | | | | | ND |
| <i>Schizophoria multistriata</i> Hall..... | × | | | | | |
| <i>Schizophoria (?) peduncularis</i> Hall..... | × | | | | | |
| <i>Schizophoria propinqua</i> Hall..... | | | Co | | | |
| <i>Schizophoria striatula</i> (Schlotheim)..... | | | | MD | | ND |
| <i>Schizophoria tioga</i> Hall..... | | | | | P | C |
| <i>Schizophoria tulliensis</i> (Vanuxem)..... | | | | Tu | | |
| <i>Selenella gracilis</i> Hall and Clarke..... | | | Co | | | |
| <i>Seminula (?) rogersi</i> Hall and Clarke..... | | | Co | | | |
| <i>Spirifer acanthopterus</i> (Conrad)..... | | | | H | | |
| <i>Spirifer acuminatus</i> (Conrad)..... | | | Co | H | | |
| <i>Spirifer alaformis</i> de Verneuil..... | | | Co | | | |
| <i>Spirifer aldrichi</i> Etheridge. Devonian. | | | | | | |
| <i>Spirifer amarus</i> Swallow..... | | | | H | | |
| <i>Spirifer angustus</i> Hall..... | | | | H | P | |
| <i>Spirifer annæ</i> Swallow..... | | | | H | | |
| <i>Spirifer arcticus</i> Haughton. Devonian. | | | | | | |
| <i>Spirifer artisegmentus</i> Hall..... | | | Co | | | |
| <i>Spirifer arenosus</i> Conrad..... | | × | Co | | | |
| <i>Spirifer asper</i> Hall..... | | | | H | | |
| <i>Spirifer audaculus</i> (Conrad)..... | | | | M, H | | |
| <i>Spirifer audaculus macronotus</i> Hall..... | | | | H | | |
| <i>Spirifer belphegor</i> Conrad..... | | | | | G | |
| <i>Spirifer bidorsalis</i> A. Winchell..... | | | | H | | |
| <i>Spirifer billingsanus</i> Miller..... | | × | | | | |
| <i>Spirifer binnesialis</i> Hall..... | | | | | | ND |
| <i>Spirifer bynesi</i> Nettelroth..... | | | | H | | |
| <i>Spirifer concinnus</i> Hall..... | × | | | | | |
| <i>Spirifer consors</i> A. Winchell..... | | | | H | | |
| <i>Spirifer corticosus</i> Hall..... | | | | H | | |
| <i>Spirifer (?) costalis</i> Castellan..... | | | Co? | | | |
| <i>Spirifer cumberlandia</i> Hall..... | | × | | | | |
| <i>Spirifer cyclopterus</i> Hall..... | × | × | | | | |
| <i>Spirifer davisii</i> Nettelroth..... | | | | H | | |
| <i>Spirifer disjunctus</i> Sowerby..... | | | | | | C |
| <i>Spirifer disjunctus occidentalis</i> Whiteaves..... | | | | | | ND |
| <i>Spirifer disjunctus sulcifer</i> Hall and Clarke..... | | | | | | C |
| <i>Spirifer divaricatus</i> Hall..... | | | Co | H | | |
| <i>Spirifer duodenarius</i> Hall..... | | | Co | | | |
| <i>Spirifer duplicatus</i> (Conrad)..... | | | | H | | |
| <i>Spirifer engelmanni</i> Meek..... | | | | MD | | |
| <i>Spirifer ouruteines</i> Owen..... | | | | H | | |

TABLE VI.—*Devonian Brachiopoda*—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|--|---------------------|------------|----------------------------|---------------------------------|------------------------------|--------------------|
| | Lower Hel-der-berg. | Oris-kany. | Scho-harie, Cornif-erosus. | Tully, Hamil- ton, Marcel- lus. | Port- age, Huron, Gene- see. | Che- nung, Ithaca. |
| <i>Spirifer filicostus</i> A. Winchell..... | | | | H | | |
| <i>Spirifer formosus</i> Hall..... | | | | H | | |
| <i>Spirifer fornaculus</i> Hall..... | | | | H | | |
| <i>Spirifer fornax</i> Hall..... | | | | H | | |
| <i>Spirifer gaspensis</i> Billings..... | | × | | | | |
| <i>Spirifer granulosis</i> (Conrad)..... | | | | H | | |
| <i>Spirifer gregarius</i> Hall..... | | | Co | | | |
| <i>Spirifer grieri</i> Hall..... | | | Co | | | |
| <i>Spirifer hemicyclus</i> Meek and Worthen..... | | × | | | | |
| <i>Spirifer hobbsi</i> Nettelroth..... | | | | H | | |
| <i>Spirifer hungerfordi</i> Hall..... | | | | | | C |
| <i>Spirifer huronensis</i> A. Winchell..... | | | | | P | |
| <i>Spirifer intermedius</i> Hall..... | | × | | | | |
| <i>Spirifer inutilis</i> Hall..... | | | | | | ND |
| <i>Spirifer iowensis</i> Owen..... | | | | MD | | |
| <i>Spirifer kennicotti</i> Meek..... | | | | MD | | |
| <i>Spirifer macbridii</i> Calvin..... | | | | | | ND |
| <i>Spirifer maconathii</i> Nettelroth..... | | | | H | | |
| <i>Spirifer macrus</i> Hall..... | | | Co | | | |
| <i>Spirifer macropleurus</i> (Courad)..... | × | | | | | |
| <i>Spirifer macrothyris</i> Hall..... | | | Co | | | |
| <i>Spirifer manni</i> Hall..... | | | Co | | | |
| <i>Spirifer marcyi</i> Hall..... | | | | H | | |
| <i>Spirifer mesastrialis</i> Hall..... | | | | | P | I, C |
| <i>Spirifer multicostatus</i> Castelnau..... | | | Co? | | | |
| <i>Spirifer muchisoni</i> Castelnau..... | | × | | | | |
| <i>Spirifer nictavensis</i> Dawson..... | | × | | | | |
| <i>Spirifer octocostatus</i> Hall..... | × | | | | | |
| <i>Spirifer orestes</i> Hall and Whitfield..... | | | | | | C |
| <i>Spirifer paradoxus</i> (Schlotheim)..... | | | Co | | | |
| <i>Spirifer pennatus</i> (Atwater)..... | | | | M, H | | I |
| <i>Spirifer pennatus posterus</i> Hall and Clarke..... | | | | | | C |
| <i>Spirifer pennatus tulliensis</i> Williams..... | | | | Tu | | |
| <i>Spirifer perextensus</i> Meek and Worthen..... | | | Co | | | |
| <i>Spirifer pertenuis</i> Hall..... | | | | H | | |
| <i>Spirifer pharovicinus</i> A. Winchell..... | | | | | Hu | |
| <i>Spirifer pinonensis</i> Meek..... | | ED | | MD | | ND |
| <i>Spirifer pluto</i> Clarke..... | | | | | G | |
| <i>Spirifer rectiplicatus</i> (Conrad)..... | | ×? | | | | |
| <i>Spirifer saffordi</i> Hall..... | × | | | | | |
| <i>Spirifer segmentus</i> Hall..... | | | Co | | | |
| <i>Spirifer strigosus</i> Meek. Devonian. | | | | | | |
| * <i>Spirifer subattenuatus</i> Hall..... | | | | | | C |
| <i>Spirifer subdecussatus</i> Whiteaves..... | | | | H | | |
| <i>Spirifer submucronatus</i> Hall..... | | × | | | | |
| <i>Spirifer substrigosus</i> Webster..... | | | | | | C |
| <i>Spirifer subvaricosus</i> Hall and Whitfield..... | | | | H? | | |
| <i>Spirifer tennis</i> Hall..... | | | | H | | |
| <i>Spirifer tenuistriatus</i> Hall..... | × | | | | | |
| <i>Spirifer tribulis</i> Hall..... | | × | | | | |
| <i>Spirifer tullius</i> Hall..... | | | | H | | |

TABLE VI.—*Deronian Brachiopoda*—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|--|---------------------|------------|---------------------------|-------------------------------|------------------------------|--------------------|
| | Lower Hel-der-berg. | Oris-kany. | Scho-harie, Cornif-erous. | Tully, Hamil- ton, Marcellus. | Port- age, Huron, Gene- see. | Che- mung, Ithaca. |
| <i>Spirifer urbanus</i> Calvin | | | | H | | |
| <i>Spirifer varicosus</i> Hall | | | Co | | | |
| <i>Spirifer whitneyi</i> Hall | | | | | | C |
| <i>Spirifer williamsi</i> Hall and Clarke | | | | | | C |
| <i>Spirifer worthenanus</i> Schuchert | | × | | | | |
| <i>Spirifer wortheni</i> Hall | | | | H | | |
| <i>Stringocephalus burtini</i> DeFrance | | | | MD | | |
| <i>Strophalosia hystriacula</i> Hall | | | | | | C |
| <i>Strophalosia muricata</i> Hall | | | | | | C |
| <i>Strophalosia radicans</i> (A. Winchell) | | | | H | | |
| <i>Strophalosia rockfordensis</i> Hall | | | | | | C |
| <i>Strophalosia truncata</i> (Hall) | | | | M, H | P | I |
| <i>Stropheodonta alveata</i> Hall | | | Co | | | |
| <i>Stropheodonta arcuata</i> Hall | | | | | | C |
| <i>Stropheodonta beckii</i> Hall | × | | | | | |
| <i>Stropheodonta blainvillii</i> (Billings) | | ED | | | | |
| <i>Stropheodonta callawayensis</i> Swallow | | | | H | | |
| <i>Stropheodonta callosa</i> Hall | | | Co | | | |
| <i>Stropheodonta calvini</i> Miller | | | | | | C |
| <i>Stropheodonta canace</i> Hall and Whitfield | | | | | | C |
| <i>Stropheodonta cincta</i> A. Winchell | | | | H | | |
| <i>Stropheodonta concava</i> Hall | | | Co | H | | |
| <i>Stropheodonta (?) costata</i> Owen | | | | H | | |
| <i>Stropheodonta crebristriata</i> Hall | | | Co | | | |
| <i>Stropheodonta demissa</i> (Conrad) | | | | MD | | ND |
| <i>Stropheodonta demissa imitata</i> A. Winchell | | | | H | | |
| <i>Stropheodonta erratica</i> A. Winchell | | | | H | | |
| <i>Stropheodonta fieldeni</i> Etheridge | | ED | | | | |
| <i>Stropheodonta galatea</i> (Billings) | | ED | | | | |
| <i>Stropheodonta hemispherica</i> Hall | | | Co | | | |
| <i>Stropheodonta inaequiradiata</i> Hall | | | Co | | | |
| <i>Stropheodonta inaequistriata</i> (Conrad) | | | Co | M, H | | |
| <i>Stropheodonta indenta</i> (Conrad) | | | | | | |
| <i>Stropheodonta interstitialis</i> (Phillips) | | | | MD | | |
| <i>Stropheodonta interstitialis</i> (Vanuxem) | | | | | | I |
| <i>Stropheodonta iowensis</i> Owen | | | | | | ND? |
| <i>Stropheodonta irene</i> (Billings) | | | Co | | | |
| <i>Stropheodonta junia</i> Hall | | | | H | | |
| <i>Stropheodonta kemperi</i> Swallow | | | | H | | |
| <i>Stropheodonta lincklani</i> Hall | | × | | | | |
| <i>Stropheodonta macrostriata</i> (Walcott) | | ED | | | | |
| <i>Stropheodonta magnifica</i> Hall | | × | | | | |
| <i>Stropheodonta magniventra</i> Hall | | × | | | | |
| <i>Stropheodonta mnerouata</i> (Conrad) | | | | | P | I |
| <i>Stropheodonta navalis</i> Swallow | | | | H | | |
| <i>Stropheodonta navalis boonensis</i> Swallow | | | | H | | |
| <i>Stropheodonta parva</i> Owen | | | | H | | |
| <i>Stropheodonta parva</i> Hall | | | Co | | | |
| <i>Stropheodonta patersoni</i> Hall | | × | Co | | | |
| <i>Stropheodonta perplana</i> (Conrad) | | × | Co | H | | I, C |
| <i>Stropheodonta perplana nervosa</i> Hall | | | | | | I |

TABLE VI.—Devonian Brachiopoda—Continued.

| Species. | Eodevonian. | | Mesodevonian. | | Neodevonian. | |
|--|---------------------|------------|---------------------------|------------------------------|----------------------------|-------------------|
| | Lower Hel-der-berg. | Oris-kany. | Scho-harie, Cornif-erous. | Tully, Hamil-ton, Marcellus. | Port-age, Huron, Gene-see. | Che-mung, Ithaca. |
| <i>Stropheodonta perplana tulliensis</i> Williams..... | | | | Tu | | |
| <i>Stropheodonta planulata</i> Hall..... | × | | | | | |
| <i>Stropheodonta plicata</i> Hall..... | | | | H | | |
| <i>Stropheodonta tullia</i> (Billings)..... | | | Co | | | |
| <i>Stropheodonta variabilis</i> Calvin..... | | | | | | C |
| <i>Stropheodonta varistriata</i> (Conrad)..... | × | | | | | |
| <i>Stropheodonta varistriata arata</i> Hall..... | × | | | | | |
| <i>Stropheodonta vascularia</i> Hall..... | | × | | | | |
| <i>Strophomena</i> (?) <i>elongata</i> Conrad..... | × | | | | | |
| <i>Strophomena</i> (?) <i>gibbosa</i> Conrad..... | | | Co | | | |
| <i>Strophonella ampla</i> Hall..... | | | Co | | | |
| <i>Strophonella cæolata</i> Hall..... | | | | | | C |
| <i>Strophonella cavumbona</i> Hall..... | × | | | | | |
| <i>Strophonella</i> (?) <i>conradi</i> Hall..... | × | | | | | |
| <i>Strophonella crassa</i> Rowley..... | | | | H | | |
| <i>Strophonella geniculata</i> (Hall)..... | × | | | | | |
| <i>Strophonella headleyana</i> Hall..... | × | | | | | |
| <i>Strophonella leavenworthana</i> Hall..... | × | | | | | |
| <i>Strophonella punctulifera</i> (Conrad)..... | × | | | | | |
| <i>Strophonella</i> (?) <i>radiata</i> (Vanuxem)..... | × | | | | | |
| <i>Strophonella reversa</i> Hall..... | | | | | | C |
| <i>Strophonella schohariensis</i> Castelnau..... | | | Co? | | | |
| <i>Terebratula elia</i> Hall..... | | | | MD | | |
| <i>Terebratula jucunda</i> Hall..... | | | Co | | | |
| <i>Terebratula ontario</i> Hall..... | | | | H | | |
| <i>Terebratula traversensis</i> A. Winchell..... | | | | H | | |
| <i>Trematospira costata</i> Hall..... | × | | | | | |
| <i>Trematospira dubia</i> (Billings)..... | × | | | | | |
| <i>Trematospira equistriata</i> Hall and Clarke..... | × | | | | | |
| <i>Trematospira gibbosa</i> Hall..... | | | | H | | |
| <i>Trematospira hippolyte</i> (Billings)..... | × | | | | | |
| <i>Trematospira</i> (?) <i>liniuscula</i> A. Winchell..... | | | | H | | |
| <i>Trematospira maria</i> (Billings)..... | × | | | | | |
| <i>Trematospira multistriata</i> Hall..... | × | × | | | | |
| <i>Trematospira perforata</i> Hall..... | × | | | | | |
| <i>Trematospira simplex</i> Hall..... | × | | | | | |
| <i>Trematospira tennesseensis</i> Hall and Clarke..... | × | | | | | |
| <i>Trigleria gaudryi</i> Ehlerl..... | | × | | | | |
| <i>Trigleria</i> (?) <i>lepida</i> Hall..... | | | | H | | |
| <i>Trigleria</i> (?) <i>portlandica</i> (Billings)..... | × | | | | | |
| <i>Tropidoleptus carinatus</i> (Conrad)..... | | | | M, H | | |
| <i>Tropidoleptus occidens</i> Hall..... | | | | H | | |
| <i>Uncinulus abruptus</i> (Hall)..... | × | | | | | |
| <i>Uncinulus campbellanus</i> (Hall)..... | × | | | | | |
| <i>Uncinulus mutabilis</i> Hall..... | × | | | | | |
| <i>Uncinulus nobilis</i> (Hall)..... | × | | | | | |
| <i>Uncinulus nucleolata</i> (Hall)..... | × | | | | | |
| <i>Uncinulus pyramidatus</i> (Hall)..... | × | | | | | |
| <i>Uncinulus vellicata</i> Hall..... | × | | | | | |
| <i>Vitulina pustulosa</i> Hall..... | | | | H | | |
| <i>Whitfieldella</i> (?) <i>bisulcata</i> (Vanuxem)..... | × | | | | | |

TABLE VI.—*Devonian Brachiopoda*—Continued.

| Species. | EoDevonian. | | Mesodevonian. | | Neodevonian. | |
|---|-------------------|-----------|-------------------------|-----------------------------|--------------------------|------------------|
| | Lower Helderberg. | Oriskany. | Schoharie, Corniferous. | Tully, Hamilton, Marcellus. | Portage, Huron, Genesee. | Chemung, Ithaca. |
| Whitfieldella (?) harpalyce (Billings)..... | × | | | | | |
| Zygospira (?) subconcava Meek and Werthen..... | × | | | | | |
| Number of Devonian species, 663. | | | | | | |
| Number of species in each division..... | 129 | 104 | 128 | 238 | 41 | 117 |
| Number of species common to the Lower Helderberg and the other divisions..... | | 8 | 2 | 2 | 1 | 2 |
| Number of species common to the Oriskany and the other divisions..... | 8 | | 15 | 7 | 0 | 3 |
| Number of species common to the Corniferous and the other divisions..... | 2 | 15 | | 27 | 2 | 7 |
| Number of species common to the Hamilton and the other divisions..... | 2 | 7 | 27 | | 12 | 22 |
| Number of species common to the Genesee-Portage and the other divisions..... | 1 | 1 | 4 | 12 | | 17 |
| Number of species common to the Chemung and the other divisions..... | 2 | 4 | 7 | 24 | 17 | |
| Species common to the Devonian and Carboniferous systems, 11. | | | | | | |
| Number of species passing from each division into the Carboniferous..... | 1 | 1 | 1 | 4 | 3 | 10 |

TABLE VII.—Carboniferous and Permian Brachiopoda.

[B=Burlington; EC=Eocarboniferous; K=Keokuk; Ka=Kaskaskia; SL=St. Louis. Species preceded by an obelisk (†) are found in the Devonian also.]

| Species. | Eocarboniferous. | | | Meso- | Neo- |
|---|------------------|---------------------|-----------------------|-------------------------------|----------|
| | Kinderhook. | Keokuk, Burlington. | Kaskaskia, St. Louis. | Carboniferous. Coal Measures. | Permian. |
| <i>Acambona osagensis</i> (Swallow) | × | | | | |
| <i>Acambona prima</i> White..... | | B | | | |
| <i>Ambocelia minuta</i> White..... | × | | | | |
| <i>Ambocelia planoconvexa</i> (Shumard) | | | | × | × |
| <i>Athyris biloba</i> (A. Winchell)..... | × | | | | |
| <i>Athyris</i> (?) <i>corpulenta</i> (A. Winchell) | × | | | | |
| <i>Athyris densa</i> Hall and Clarke..... | | | SL | | |
| <i>Athyris hannibalensis</i> (Swallow)..... | × | | | | |
| <i>Athyris incrassata</i> Hall..... | | B | | | |
| <i>Athyris intervarica</i> McChesney..... | | B | | | |
| <i>Athyris</i> (?) <i>jacksoni</i> (Swallow)..... | | | | × | |
| <i>Athyris lamellosa</i> (L'Eveille)..... | × | K | | | |
| <i>Athyris missouriensis</i> (A. Winchell) | × | | | | |
| <i>Athyris monticola</i> (White)..... | EC | | | | |
| <i>Athyris ohioensis</i> (A. Winchell) | × | | | | |
| <i>Athyris papillioniformis</i> McChesney..... | | | Ka | | |
| <i>Athyris</i> (?) <i>perinflata</i> McChesney..... | | K | | | |
| <i>Athyris prouti</i> (Swallow) | × | | | | |
| <i>Athyris ultravarica</i> McChesney | | K | | | |
| <i>Aulacorhynchus millipunctata</i> (Meek and Worthen)..... | | | | × | |
| <i>Beecheria davidsoni</i> Hall and Clarke..... | | | | × | |
| <i>Camarophorella lenticularis</i> (White and Whitfield)..... | | B | | | |
| <i>Camarophoria</i> (?) <i>bisulcata</i> Shumard..... | | | | × | |
| <i>Camarophoria caput-testudinis</i> (White)..... | | B | | | |
| <i>Camarophoria explanata</i> (McChesney) | | | Ka | | |
| <i>Camarophoria occidentalis</i> Miller..... | | B | | | |
| <i>Camarophoria ringens</i> (Swallow)..... | | K | | | |
| <i>Camarophoria subcuneata</i> Hall..... | | | SL | | |
| <i>Camarophoria subtrigona</i> Meek and Worthen..... | | K | | | |
| <i>Camarophoria thera</i> Walcott..... | | EC | | | |
| <i>Camarophoria</i> (?) <i>wortheni</i> (Hall)..... | | | SL | | |
| † <i>Camarotæchia contracta</i> Hall..... | × | | | | |
| <i>Camarotæchia sagerana</i> (A. Winchell)..... | × | | | | |
| † <i>Camarotæchia sapho</i> Hall..... | × | | | | |
| <i>Centronella</i> (?) <i>allii</i> A. Winchell..... | × | | | | |
| <i>Centronella</i> (?) <i>crassicaudinalis</i> Whitfield..... | | | SL | | |
| <i>Centronella</i> (?) <i>flora</i> A. Winchell..... | × | | | | |
| <i>Chonetes geniculata</i> White..... | × | | | | |
| <i>Chonetes glabra</i> Geinitz..... | | | | × | |
| <i>Chonetes granulifera</i> Owen..... | | | | × | × |
| <i>Chonetes illinoensis</i> Worthen..... | | B | | | |
| <i>Chonetes logani</i> Norwood and Pratten..... | × | B | | | |
| † <i>Chonetes logani aurora</i> Hall..... | | B | | | |
| <i>Chonetes loganensis</i> Hall and Whitfield..... | × | | | | |
| <i>Chonetes mesolobus</i> Norwood and Pratten..... | | | | × | |
| <i>Chonetes michiganensis</i> Stevens..... | | | | × | |
| <i>Chonetes multicosta</i> A. Winchell..... | × | B | | | |
| <i>Chonetes ornata</i> Shumard..... | × | | | | |

TABLE VII.—Carboniferous and Permian Brachiopoda—Continued.

| Species. | Eocarboniferous. | | | Meso-carboniferous. | Neo-carboniferous. |
|---|------------------|---------------------|-----------------------|---------------------|--------------------|
| | Kinderhook. | Keokuk, Burlington. | Kaskaskia, St. Louis. | Coal Measures. | Permian. |
| <i>Chonetes parva</i> Shumard | | | | × | |
| <i>Chonetes permiana</i> Shumard | | | | × | |
| <i>Chonetes planumbona</i> Meek and Worthen | | K | | | |
| <i>Chonetes platynotus</i> White | | | | × | |
| <i>Chonetes pulchella</i> A. Winchell | × | | | | |
| <i>Chonetes setigera</i> (Hall) | × | | | | |
| <i>Chonetes shumardiana</i> de Koninck | | K | | | |
| <i>Chonetes tumida</i> Herrick | × | | | | |
| <i>Chonetes variolata</i> d'Orbigny | | | | × | |
| <i>Chonetes verneuilliana</i> Norwood and Pratten | | | | × | |
| <i>Chonetes verneuilliana utahensis</i> Meek | | | | × | |
| <i>Chonopectus fischeri</i> (Norwood and Pratten) | × | B | | | |
| <i>Cleiothyris clintonensis</i> (Swallow) | | | Ka | | |
| <i>Cleiothyris crassicaudalis</i> (White) | × | | | | |
| <i>Cleiothyris hirsuta</i> (Hall) | | | SL, Ka | | |
| <i>Cleiothyris missouriensis</i> (Swallow) | | | | × | |
| <i>Cleiothyris obmaxima</i> (McChesney) | | K | | | |
| <i>Cleiothyris obvia</i> (McChesney) | | | Ka | | |
| <i>Cleiothyris orbicularis</i> (McChesney) | | | | × | |
| <i>Cleiothyris reflexa</i> (Swallow) | | | SL | | |
| <i>Cleiothyris roisayi</i> (L'Eveille) | | K | SL, Ka | | |
| <i>Cleiothyris squamosa</i> (Worthen) | | | SL | | |
| <i>Crania chesterensis</i> Miller and Gurley | | | Ka | | Ka |
| <i>Crania levis</i> Keyes | × | | | | |
| <i>Crania modesta</i> White and St. John | | | | × | |
| <i>Crania (?) permiana</i> Shumard | | | | × | |
| <i>Crania reposita</i> White | | B | | | |
| <i>Crania rowleyi</i> Gurley | × | | | | |
| <i>Cryptacanthia compacta</i> White and St. John | | | | × | |
| <i>Cryptonella (?) eudora</i> Hall | × | | | | |
| <i>Cryptonella (?) inconstans</i> (Herrick) | × | | | | |
| <i>Cryptonella subelliptica</i> Hall and Clarke | × | | | | |
| <i>Cryptonella alta</i> Hall | × | | | | |
| <i>Cyrtina acutirostris</i> (Shumard) | × | | | | |
| <i>Cyrtina burlingtonensis</i> (Rowley) | | B | | | |
| <i>Cyrtina lachrymosa</i> Hall and Clarke | × | | | | |
| <i>Cyrtina neogenes</i> Hall and Clarke | | B | | | |
| <i>Cyrtina triplicata</i> Simpson | × | | | | |
| <i>Derbya affinis</i> Hall and Clarke | | | | × | |
| <i>Derbya bennetti</i> Hall and Clarke | | | | × | |
| <i>Derbya biloba</i> Hall | | | | × | |
| <i>Derbya broadheadi</i> Hall and Clarke | | | | × | |
| <i>Derbya (?) costatula</i> Hall and Clarke | | | Ka | | |
| <i>Derbya crassa</i> (Meek and Hayden) | | | | × | × |
| <i>Derbya cymbula</i> Hall and Clarke | | | | × | |
| <i>Derbya kaskaskiensis</i> (McChesney) | | | Ka | | |
| <i>Derbya keokuk</i> Hall | × | K | | | |
| <i>Derbya pratteni</i> (McChesney) | | | | × | |
| <i>Derbya robusta</i> (Hall) | | | | × | |
| <i>Derbya ruginosa</i> Hall and Clarke | | K | | | |

TABLE VII.—Carboniferous and Permian Brachiopoda—Continued.

| Species. | Eocarboniferous. | | | Meso-carboniferous. | Neo-carboniferous. |
|--|------------------|---------------------|-----------------------|---------------------|--------------------|
| | Kinderhook. | Keokuk, Burlington. | Kaskaskia, St. Louis. | Coal Measures. | Permian. |
| <i>Dielasma bovidens</i> (Morton)..... | | | | × | |
| <i>Dielasma burlingtonensis</i> White..... | × | | | | |
| <i>Dielasma formosa</i> Hall..... | | | SL | | |
| <i>Dielasma gorbyi</i> Miller..... | | K | | | |
| <i>Dielasma obovata</i> Hall and Clarke..... | | | | ×? | |
| <i>Dielasma occidentalis</i> (Miller)..... | × | | | | |
| <i>Dielasma</i> (?) <i>rowleyi</i> (Worthen)..... | | B | | | |
| <i>Dielasma sacculus</i> (Martin)..... | | | | × | |
| <i>Dielasma shumardana</i> Miller..... | | | Ka | | |
| <i>Dielasma turgida</i> (Hall)..... | | | Ka | | |
| <i>Enteletes hemiplicata</i> Hall..... | | | | × | × |
| <i>Eumetria</i> (?) <i>altirostris</i> (White)..... | × | | | | |
| <i>Eumetria marcyi</i> (Shumard)..... | | | SL, Ka | | |
| <i>Eumetria marcyi costata</i> Hall..... | | | Ka | | |
| <i>Eumetria woosteri</i> (White)..... | | | | ×? | |
| <i>Glossina flabellula</i> Hall and Clarke..... | × | | | | |
| <i>Glossina nebraskensis</i> (Meek)..... | | | | × | |
| <i>Glossina sedaliensis</i> (Miller)..... | × | | | | |
| <i>Glossina waverlyensis</i> (Herrick)..... | × | | | | |
| <i>Harttina anna</i> (Hartt)..... | | | | × | |
| <i>Hustedia</i> (?) <i>meekana</i> (Shumard)..... | | | | × | |
| <i>Hustedia mormoni</i> (Marcou)..... | | | | × | |
| <i>Hustedia</i> (?) <i>papillata</i> (Shumard)..... | | | | × | |
| <i>Hustedia</i> (?) <i>triangularis</i> (Miller)..... | × | | | | |
| <i>Leiorhynchus boonense</i> (Shumard)..... | | B | | | |
| <i>Leiorhynchus newberryi</i> Hall..... | × | | | | |
| <i>Leptaena rhomboidalis</i> (Wilckens)..... | × | | | | |
| <i>Lingula atra</i> Herrick..... | × | | | | |
| <i>Lingula carbonaria</i> Shumard..... | | | | × | |
| <i>Lingula crawfordsvillensis</i> Gurley..... | | K | | | |
| <i>Lingula cuyahoga</i> Hall..... | × | | | | |
| <i>Lingula gannensis</i> Herrick..... | × | | | | |
| <i>Lingula gorbyi</i> Miller..... | × | | | | |
| <i>Lingula balli</i> White..... | | B | | | |
| <i>Lingula indianensis</i> Miller and Gurley..... | | K | | | |
| <i>Lingula meeki</i> Herrick..... | × | | | | |
| <i>Lingula melie</i> Hall..... | × | | | | |
| <i>Lingula membranacea</i> A. Winchell..... | × | | | | |
| <i>Lingula mytiloides</i> Sowerby..... | | | | × | |
| <i>Lingula paracletus</i> Hall and Clarke..... | × | | | | |
| <i>Lingula parrishi</i> Miller..... | | | | × | |
| <i>Lingula tighti</i> Herrick..... | | | | × | |
| <i>Lingula umbonata</i> Cox..... | | | | × | |
| <i>Lingula varsoviense</i> Worthen..... | | | SL | | |
| <i>Lingulodiscina</i> (?) <i>connata</i> Walcott..... | | EC | | | |
| <i>Lingulodiscina newberryi</i> Hall..... | × | | | | |
| <i>Lingulodiscina pleurites</i> (Meek)..... | × | | | | |
| <i>Martinia glabra</i> (Martin)..... | | | | × | |
| <i>Martinia glabra contracta</i> Meek and Worthen..... | | | Ka | | |
| <i>Martinia laevigata</i> (Swallow)..... | | K | | | |

TABLE VII.—*Carboniferous and Permian Brachiopoda*—Continued.

| Species. | Eocarboniferous. | | | Meso- carbon- iferous. | Neo- carbon- iferous. |
|--|------------------|----------------------------------|-------------------------------|------------------------------|-----------------------------|
| | Kinder- hook. | Keo- kuk, Bur- lington. | Kaskas- kia, St. Louis. | Coal Meas- ures. | Per- mian. |
| <i>Meekella occidentalis</i> (Newberry)..... | | | | × | |
| <i>Meekella</i> (?) <i>occidentalis</i> (Swallow)..... | | | | × | |
| <i>Meekella pyramidalis</i> (Newberry)..... | | | | × | |
| <i>Meekella striatocostata</i> (Cox)..... | | | | × | × |
| <i>Meristella</i> (?) <i>incerta</i> Simpson..... | × | | | | |
| <i>Nucleospira barrisi</i> White..... | × | | | | |
| <i>Orbiculoidea</i> (?) <i>capax</i> (White)..... | × | | | | |
| <i>Orbiculoidea capuliformis</i> (McChesney)..... | | | | × | |
| <i>Orbiculoidea convexa</i> (Shumard)..... | | | | × | |
| <i>Orbiculoidea gallaheri</i> (A. Winchell)..... | × | | | | |
| <i>Orbiculoidea bertzeri</i> Hall and Clarke..... | × | | | | |
| <i>Orbiculoidea keokuk</i> (Gurley)..... | | K | | | |
| <i>Orbiculoidea illinoiensis</i> (Miller and Gurley)..... | | | | × | |
| <i>Orbiculoidea magnifica</i> Herrick..... | × | | | | |
| <i>Orbiculoidea manhattanensis</i> (Meek and Hayden)..... | | | | × | |
| <i>Orbiculoidea missouriensis</i> (Shumard)..... | | | | × | |
| <i>Orbiculoidea</i> (?) <i>munda</i> (Miller and Gurley)..... | | | | × | |
| <i>Orbiculoidea nitida</i> (Phillips)..... | | | | × | |
| <i>Orbiculoidea patellaris</i> (A. Winchell)..... | × | | | | |
| <i>Orbiculoidea saffordi</i> (A. Winchell)..... | EC | | | | |
| <i>Orbiculoidea sampsoni</i> (Miller)..... | × | | | | |
| <i>Orbiculoidea subtrigonalis</i> (McChesney)..... | | | | × | |
| <i>Orbiculoidea tenuilineata</i> (Meek and Hayden)..... | | | | × | |
| <i>Orbiculoidea utahensis</i> (Meek)..... | | | | × | |
| <i>Orbiculoidea varsoviensis</i> (Worthen)..... | | K | | | |
| <i>Orthis</i> (?) <i>flava</i> A. Winchell..... | × | | | | |
| <i>Orthothetes crenistrius</i> (Phillips)..... | | EC | | | |
| <i>Orthothetes desideratus</i> Hall and Clarke..... | × | | | | |
| <i>Orthothetes inequalis</i> (Hall)..... | × | | | | |
| <i>Orthothetes inflatus</i> (White and Whitfield)..... | × | | | | |
| <i>Orthothetes lens</i> (White)..... | × | | | | |
| <i>Orthothetes umbraculum</i> Authors..... | | EC | | × | |
| <i>Proboscidella</i> (?) <i>clava</i> (Norwood and Pratten)..... | | | | × | |
| <i>Productella arcuata</i> Hall..... | × | | | | |
| <i>Productella concentrica</i> (Hall)..... | × | | | | |
| <i>Productella lachrymosa stigmata</i> Hall..... | × | | | | |
| <i>Productella pyxidata</i> Hall..... | × | | | | |
| <i>Productella shumardana</i> Hall..... | × | | | | |
| <i>Productella speciosa</i> Hall..... | × | | | | |
| <i>Productus alternatus</i> Norwood and Pratten..... | | K | | | |
| <i>Productus altonensis</i> Norwood and Pratten..... | | | SL | | |
| <i>Productus auriculatus</i> Swallow..... | | | | × | |
| <i>Productus bisinuatatus</i> Hall..... | | | SL | | |
| <i>Productus blairi</i> Miller..... | × | | | | |
| <i>Productus boliviensis</i> d'Orbigny..... | | | | × | |
| <i>Productus boonensis</i> Swallow..... | | | | × | |
| <i>Productus boonensis elevata</i> Swallow..... | | | | × | |
| <i>Productus buchianus</i> de Koninek..... | | | | × | |
| <i>Productus burlingtonensis</i> Hall..... | | B | | | |
| <i>Productus carbonarius</i> de Koninek. Carboniferous. | | | | | |

TABLE VII.—Carboniferous and Permian Brachiopoda—Continued.

| Species. | Eocarboniferous. | | | Meso-carboniferous. | Neo-carboniferous. |
|---|------------------|---------------------|-----------------------|---------------------|--------------------|
| | Kinderhook. | Keokuk, Burlington. | Kaskaskia, St. Louis. | Coal Measures. | Permian. |
| <i>Productus confragosus</i> Conrad..... | | | | × | |
| <i>Productus cooperensis</i> Swallow..... | × | | | | |
| <i>Productus cora d'Orbigny</i> | | | | × | |
| <i>Productus cora mogoyoni</i> Marcou..... | | | | × | |
| <i>Productus coræformis</i> Swallow..... | | | SL | | |
| <i>Productus costatoides</i> Swallow..... | | | | × | |
| <i>Productus costatus</i> de Koninck..... | | | | × | × |
| <i>Productus curtirostratus</i> A. Winchell..... | × | | | | |
| <i>Productus delawari</i> Marcou..... | | EC | | | |
| <i>Productus depressus</i> Swallow..... | | K | | | |
| <i>Productus dolorosus</i> A. Winchell..... | × | | | | |
| <i>Productus duplicostatus</i> A. Winchell..... | × | | | | |
| <i>Productus fasciculatus</i> McChesney..... | | | Ka | | |
| <i>Productus fentonensis</i> Swallow..... | | K | | | |
| <i>Productus fimbriatus</i> Sowerby..... | | | SL? | ×? | |
| <i>Productus flexistrius</i> McCoy..... | | | Ka | | |
| <i>Productus giganteus</i> (Martin)..... | | | EC | | |
| <i>Productus gracilis</i> A. Winchell..... | × | | | | |
| <i>Productus gradatus</i> Swallow..... | | K | | | |
| <i>Productus granulatus</i> Phillips..... | | K | | | |
| <i>Productus hepar</i> Morton..... | | | | × | |
| <i>Productus hildrethanus</i> Norwood and Pratten..... | | | | × | |
| <i>Productus indianensis</i> Hall..... | | | SL | | |
| <i>Productus inflatus</i> McChesney..... | | | | × | |
| <i>Productus ivesi</i> Newberry..... | | | | × | |
| <i>Productus lævicostus</i> White..... | × | | | | |
| <i>Productus lasallensis</i> Worthen..... | | | | × | |
| <i>Productus latissimus</i> Sowerby..... | | | | × | ? |
| <i>Productus leuchtenbergensis</i> de Koninck..... | | | | × | ? |
| <i>Productus longispinus</i> Sowerby?..... | | | | × | |
| <i>Productus longus</i> Meek. Carboniferous..... | | | | | |
| <i>Productus magnicostatus</i> Swallow..... | | | | × | |
| <i>Productus magnus</i> Meek and Worthen..... | | K | | | |
| <i>Productus margaritaceus</i> Phillips..... | | | | × | |
| <i>Productus marginicinctus</i> Prout..... | | | SL | | |
| <i>Productus mesialis</i> Hall..... | | K | | | |
| <i>Productus mesolobus</i> Phillips. Carboniferous..... | | | | | |
| <i>Productus mexicanus</i> Shumard..... | | | | × | |
| <i>Productus morbillianus</i> A. Winchell..... | | B | | | |
| <i>Productus multistriatus</i> Meek. Carboniferous..... | | | | | |
| <i>Productus muricatus</i> Norwood and Pratten..... | | | | × | |
| <i>Productus nanus</i> Meek and Worthen..... | | | | × | |
| <i>Productus nebrascensis</i> Owen..... | | | | × | × |
| <i>Productus nevadensis</i> Meek..... | | | | × | |
| <i>Productus newberryi</i> Hall..... | × | | | | |
| <i>Productus newberryi annosus</i> Herrick..... | × | | | | |
| <i>Productus nodocostatus</i> Herrick..... | × | | | | |
| <i>Productus nodosus</i> Newberry..... | | | | × | |
| <i>Productus norwoodi</i> Swallow..... | | | | × | |
| <i>Productus occidentalis</i> Newberry..... | | | | × | |

TABLE VII.—Carboniferous and Permian Brachiopoda—Continued.

| Species. | Eocarboniferous. | | | Meso- | Neo- |
|--|------------------|---------------------|-----------------------|-------------------------------|-------------------------|
| | Kinderhook. | Keokuk, Burlington. | Kaskaskia, St. Louis. | Carboniferous. Coal Measures. | Carboniferous. Permian. |
| <i>Productus ovatus</i> Hall..... | | | SL | | |
| <i>Productus parvulus</i> A. Winchell..... | × | | | | |
| <i>Productus parvus</i> Meek and Worthen..... | | | Ka | | |
| <i>Productus pertenuis</i> Meek..... | | | | × | |
| <i>Productus phillipsi</i> Norwood and Pratten. Carboniferous. | | | | | |
| <i>Productus pileolus</i> Shumard..... | | | | × | |
| <i>Productus pocillum</i> Morton..... | | | | × | |
| <i>Productus popii</i> Shumard..... | | | | × | |
| <i>Productus punctatus</i> (Martin)..... | | | | × | |
| <i>Productus pustulosus</i> Phillips..... | | | | × | |
| <i>Productus raricostatus</i> Herrick..... | × | | | | |
| <i>Productus rushvillensis</i> Herrick..... | × | | | | |
| <i>Productus scabriculus</i> (Martin)..... | | | EC | × | |
| <i>Productus scitulus</i> Meek and Worthen..... | | | SL | | |
| <i>Productus semireticulatus</i> (Martin)..... | | K | SL | × | × |
| <i>Productus semireticulatus kansasensis</i> Swallow..... | | | | × | |
| <i>Productus semistriatus</i> Meek..... | | | | × | |
| <i>Productus subhorridus</i> Meek. Carboniferous. | | | | | |
| <i>Productus swalovi</i> Beecher..... | | | Ka | | |
| <i>Productus symmetricus</i> McChesney..... | | | | × | |
| <i>Productus tenuicostatus</i> Hall..... | | | SL | | |
| <i>Productus undiferus</i> de Koninck..... | | | | × | |
| <i>Productus viminalis</i> White..... | | B | | | |
| <i>Productus wortheni</i> Hall..... | | K | | | |
| <i>Productus weyprechtii</i> Toulou..... | | | | × | |
| <i>Ptychospira sexplicata</i> White and Whitfield..... | × | | | | |
| <i>Pugnax dawsonianus</i> (Davidson)..... | | | | × | |
| <i>Pugnax globulina</i> (Davidson)..... | | | | × | |
| <i>Pugnax grosvenori</i> Hall..... | | | SL | | |
| <i>Pugnax mutatus</i> Hall..... | | K | SL | | |
| <i>Pugnax ottumwa</i> (White)..... | | | SL | | |
| <i>Pugnax pugnus missouriensis</i> (Shumard)..... | × | | | | |
| <i>Pugnax rockymontanus</i> (Marcou)..... | | | | × | |
| <i>Pugnax striatocostatus</i> (Meek and Worthen)..... | × | | | | |
| <i>Pugnax swallovanus</i> (Shumard)..... | | | | × | |
| <i>Pugnax utah</i> (Marcou)..... | | | | × | |
| <i>Reticularia cooperensis</i> (Swallow)..... | × | | | | |
| <i>Reticularia guadalupeensis</i> (Shumard)..... | | | | × | |
| <i>Reticularia perplexa</i> (McChesney)..... | | | | × | |
| <i>Reticularia perplexa striatolineata</i> (Swallow)..... | | | | × | |
| <i>Reticularia pseudolineata</i> (Hall)..... | | B, K | | | |
| <i>Reticularia setigera</i> (Hall)..... | | | Ka | | |
| <i>Reticularia (?) teneraria</i> (Miller)..... | | B | | | |
| <i>Reticularia tenuispinata</i> (Herrick)..... | × | | | | |
| <i>Reticularia translata</i> (Swallow)..... | | | Ka | | |
| <i>Retzia (?) circularis</i> Miller..... | × | | | | |
| <i>Retzia (?) plicata</i> Miller..... | × | | | | |
| <i>Retzia (?) popeana</i> Swallow..... | × | | | | |
| <i>Rhipidomella burlingtonensis</i> Hall..... | | B | | | |
| <i>Rhipidomella clarkensis</i> (Swallow)..... | | K | | | |

TABLE VII.—Carboniferous and Permian Brachiopoda—Continued.

| Species. | Eocarboniferous. | | | Meso-carboniferous. | Neo-carboniferous. |
|--|------------------|---------------------|-----------------------|---------------------|--------------------|
| | Kinderhook. | Keokuk, Burlington. | Kaskaskia, St. Louis. | Coal Measures. | Permian. |
| Rhipidomella dalyana (Miller)..... | | B | | | |
| Rhipidomella dubia Hall..... | | | SL | | |
| Rhipidomella michelini (L'Eveille)..... | × | | | | |
| Rhipidomella missouriensis (Swallow)..... | × | | | | |
| Rhipidomella nevadensis (Meek). Carboniferous. | | | | | |
| Rhipidomella occasus Hall..... | × | | | | |
| Rhipidomella oweni Hall and Clarke..... | × | | | | |
| Rhipidomella pecos (Marcou)..... | | | | × | |
| Rhipidomella subelliptica (White and Whitfield)..... | × | | | | |
| Rhipidomella thiemii (White)..... | × | | | | |
| Rhipidomella vanuxemi pulchella Herrick..... | × | | | | |
| Rhynchonella acadensis Davidson..... | | | | × | |
| Rhynchonella algeri McChesney..... | | | | × | |
| Rhynchonella arctirostrata Swallow..... | | | SL | | |
| Rhynchonella barquensis A. Winchell..... | × | | | | |
| Rhynchonella camarifera A. Winchell..... | × | | | | |
| Rhynchonella carbonaria McChesney..... | | | | × | |
| Rhynchonella cooperensis Shumard..... | × | | | | |
| Rhynchonella eurekaensis Walcott..... | | | EC | | |
| Rhynchonella evangelina Hartt..... | | | | × | |
| Rhynchonella guadalupe Shumard..... | | | | × | |
| Rhynchonella heteropsis A. Winchell..... | × | | | | |
| Rhynchonella hubbardi A. Winchell..... | × | | | | |
| Rhynchonella ida Hartt..... | | | | × | |
| Rhynchonella illinoisensis Worthen..... | | | | × | |
| Rhynchonella indentata Shumard..... | | | | × | |
| Rhynchonella macra Hall..... | | | SL | | |
| Rhynchonella medialis Simpson..... | × | | | | |
| Rhynchonella metallica White..... | | | | × | |
| Rhynchonella micropora A. Winchell..... | × | | | | |
| Rhynchonella obsolescens Hall..... | × | | | | |
| Rhynchonella opposita White and Whitfield..... | × | | | | |
| Rhynchonella perrostellata Swallow..... | | | SL | | |
| Rhynchonella persinuata A. Winchell..... | × | | | | |
| Rhynchonella pleurodon (Phillips)..... | | | | × | |
| Rhynchonella ricinula Hall..... | | | SL | | |
| Rhynchonella striata Simpson..... | × | | | | |
| Rhynchonella subcircularis A. Winchell..... | × | | | | |
| Rhynchonella tetrptyx A. Winchell..... | × | | | | |
| Rhynchonella texana Shumard..... | | | | × | |
| Rhynchonella tuta Miller..... | | B | | | |
| Rhynchonella unica A. Winchell..... | × | | | | |
| Rhynchonella whitii A. Winchell..... | × | | | | |
| Rhynchopora pustulosa (White)..... | × | | | | |
| Rhynchospira (?) ashlandensis Herrick..... | × | | | | |
| Rhynchospira scansa Hall and Clarke..... | × | | | | |
| Romingerina julia (A. Winchell)..... | × | | | | |
| Schizophoria resupinata (Martin)..... | | EC | | | |
| Schizophoria resupinoides (Cox)..... | | | | × | |
| Schizophoria swallowi Hall..... | | B | | | |

TABLE VII.—Carboniferous and Permian Brachiopoda—Continued.

| Species. | Eocarboniferous. | | | Meso-carboniferous. | Neo-carboniferous. |
|--|------------------|---------------------|-----------------------|---------------------|--------------------|
| | Kinderhook. | Keokuk, Burlington. | Kaskaskia, St. Louis. | Coal Measures. | Permian. |
| <i>Seminula argentea</i> (Shepard)..... | | | | × | × |
| <i>Seminula caput-serpentis</i> (Swallow)..... | | | | × | |
| <i>Seminula charitonensis</i> (Swallow)..... | | | | × | |
| <i>Seminula claytoni</i> (Hall and Whitfield)..... | × | | | | |
| <i>Seminula dawsoni</i> Hall and Clarke..... | | | | × | |
| <i>Seminula formosa</i> (Swallow)..... | | K | | | |
| <i>Seminula hawni</i> (Swallow)..... | | | | × | |
| <i>Seminula maconensis</i> (Swallow)..... | | | | × | |
| <i>Seminula parva</i> (Swallow)..... | | K | | | |
| <i>Seminula persinuata</i> (Meek). Carboniferous. | | | | | |
| <i>Seminula (?) plattensis</i> (Swallow)..... | | | | × | |
| <i>Seminula singletonii</i> (Swallow)..... | | | | × | |
| <i>Seminula subquadrata</i> (Hall)..... | | | Ka | | |
| <i>Seminula trinuclea</i> Hall..... | | | SL | | |
| <i>Seminula wasatchensis</i> (White)..... | | | | × | |
| <i>Spirifer aenticostatus</i> de Koninck..... | | | | × | |
| <i>Spirifer agelaius</i> Meek..... | | EC | | | |
| <i>Spirifer albapimensis</i> Hall and Whitfield..... | × | | | | |
| <i>Spirifer annectans</i> Walcott..... | | EC | | | |
| <i>Spirifer buplicatus</i> Hall..... | × | | | | |
| <i>Spirifer boonensis</i> Swallow..... | | | | × | |
| <i>Spirifer cameratus</i> Morton..... | | | | × | |
| <i>Spirifer cameratus percerassus</i> Swallow..... | | | | × | |
| <i>Spirifer centronatus</i> A. Winchell..... | × | | | | |
| <i>Spirifer clavatus</i> McChesney..... | | B | | | |
| <i>Spirifer deltoidens</i> Herriek..... | × | | | | |
| <i>Spirifer desideratus</i> Walcott..... | | EC | | | |
| <i>Spirifer duplicostus</i> Phillips. Carboniferous. | | | | | |
| <i>Spirifer fastigatus</i> Morton. Carboniferous. | | | | | |
| <i>Spirifer (?) fimbriatus</i> Morton..... | | | | × | |
| <i>Spirifer forbesi</i> Norwood and Pratten..... | | B | | | |
| <i>Spirifer fultonensis</i> Worthen..... | | | | × | |
| <i>Spirifer grimesi</i> Hall..... | × | B | | | |
| <i>Spirifer imbrex</i> Hall..... | | B | | | |
| <i>Spirifer incertus</i> Hall..... | | B | | | |
| <i>Spirifer increbescens</i> Hall..... | | | Ka | | |
| <i>Spirifer increbescens americanus</i> Swallow..... | | | Ka | | |
| <i>Spirifer increbescens transversalis</i> Hall..... | | | Ka | | |
| <i>Spirifer kelloggi</i> Swallow..... | | K | | | |
| <i>Spirifer keokuk</i> Hall..... | | K | | | |
| <i>Spirifer keokuk shelbyensis</i> Swallow..... | | | SL | | |
| <i>Spirifer lateralis</i> Hall..... | | | SL | | |
| <i>Spirifer latior</i> Swallow..... | × | | | | |
| <i>Spirifer leidyi</i> Norwood and Pratten..... | | | SL | | |
| <i>Spirifer leidyi chesterensis</i> Swallow..... | | | Ka | | |
| <i>Spirifer leidyi merimaensis</i> Swallow..... | | | SL | | |
| <i>Spirifer littoni</i> Swallow..... | | | SL | | |
| <i>Spirifer logani</i> Hall..... | | K | | | |
| <i>Spirifer marcoui</i> Waagen..... | | | | × | |
| <i>Spirifer marionensis</i> Shumard..... | × | | | | |

TABLE VII.—Carboniferous and Permian Brachiopoda—Continued.

| Species. | Eocarboniferous. | | | Meso-carboniferous. | Neo-carboniferous. |
|--|------------------|---------------------|-----------------------|---------------------|--------------------|
| | Kinderhook. | Keokuk, Burlington. | Kaskaskia, St. Louis. | Coal Measures. | Permian. |
| <i>Spirifer meeki</i> Swallow | | B | | | |
| <i>Spirifer mexicanus</i> Shumard | | | | × | |
| <i>Spirifer missouriensis</i> Swallow | × | | | | |
| <i>Spirifer mortonanus</i> Miller | | K | | | |
| <i>Spirifer mundulus</i> Rowley | | B | | | |
| <i>Spirifer mysticensis</i> Meek | | EC | | | |
| <i>Spirifer neglectus</i> Hall | | K | | | |
| <i>Spirifer newberryi</i> Hall | × | | | | |
| <i>Spirifer novamexicanus</i> Miller | | B | | | |
| <i>Spirifer oregonensis</i> Shumard | | | | × | |
| <i>Spirifer osagensis</i> Swallow | × | | | | |
| <i>Spirifer ovalis</i> Phillips. Carboniferous. | | | | | |
| <i>Spirifer peculiaris</i> Shumard | × | | | | |
| <i>Spirifer rockymontanus</i> Marcou | | | | × | |
| <i>Spirifer rostellatus</i> Hall | | K | | | |
| <i>Spirifer rostratus</i> Morton | | | | × | |
| <i>Spirifer scobina</i> Meek. Carboniferous. | | | | | |
| <i>Spirifer sillanus</i> A. Winchell | × | | | | |
| <i>Spirifer striatiformis</i> Meek | × | | | | |
| <i>Spirifer stratus</i> (Martin) | × | B | | | |
| <i>Spirifer subæqualis</i> Hall | | | SL | | |
| † <i>Spirifer subattenuatus</i> Hall | × | | | | |
| <i>Spirifer subcardiformis</i> Hall | | | SL | | |
| <i>Spirifer suborbicularis</i> Hall | | K | | | |
| <i>Spirifer subrotundatus</i> Hall | × | | | | |
| <i>Spirifer sulciferus</i> Shumard | | | | × | |
| <i>Spirifer taneyensis</i> Swallow | × | | | | |
| <i>Spirifer tenuicostatus</i> Hall | | K | SL | | |
| <i>Spirifer tenuimarginatus</i> Hall | | K | | | |
| <i>Spirifer texanus</i> Meek | | | | × | |
| <i>Spirifer trigonalis</i> Martin | | | EC | | |
| <i>Spirifer vernonensis</i> Swallow | × | | | | |
| <i>Spirifer vernonensis ozarkensis</i> Swallow | × | | | | |
| <i>Spirifer waverlyensis</i> A. Winchell | × | | | | |
| <i>Spirifer winchelli</i> Herrick | × | | | | |
| <i>Spiriferina aciculifera</i> Rowley | × | | | | |
| <i>Spiriferina billingsi</i> Shumard | | | | × | |
| <i>Spiriferina binaeuta</i> A. Winchell | | B | | | |
| <i>Spiriferina clarksvillensis</i> A. Winchell | × | | | | |
| <i>Spiriferina cristata</i> (Schlotheim) | | | | × | |
| <i>Spiriferina depressa</i> Herrick | × | | | | |
| <i>Spiriferina gonionota</i> Meek | | | | × | |
| <i>Spiriferina norwoodana</i> (Hall) | | | SL | | |
| <i>Spiriferina octoplicata</i> (Sowerby) | | | | × | |
| <i>Spiriferina pulchra</i> Meek | | | | × | |
| <i>Spiriferina solidirostris</i> White | × | | | | |
| <i>Spiriferina spinosa</i> (Norwood and Pratten) | | | Ka | | |
| <i>Spiriferina subelliptica</i> (McChesney) | | K | | | |
| <i>Spiriferina subtexta</i> White | | B | | | |
| <i>Spiriferina transversa</i> (McChesney) | | | Ka | | |

TABLE VII.—Carboniferous and Permian Brachiopoda—Continued.

| Species. | Eocarboniferous. | | | Meso-carboniferous. | Neo-carboniferous. |
|--|------------------|---------------------|-----------------------|---------------------|--------------------|
| | Kinderhook. | Keokuk, Burlington. | Kaskaskia, St. Louis. | Coal Measures. | Permian. |
| <i>Streptorhynchus (?) multistriata</i> Meek and Hayden..... | | | | × | |
| <i>Streptorhynchus nrichi</i> Hall and Clarke..... | | | Ka | | |
| <i>Stricklandinia (?) subquadrata</i> Herrick..... | | | | × | |
| <i>Strophalosia beecheri</i> Rowley..... | × | | | | |
| <i>Strophalosia cymbula</i> Hall and Clarke..... | | K | | | |
| <i>Strophalosia (?) guadalupensis</i> (Shumard)..... | | | | × | |
| <i>Strophalosia keokuk</i> Lecher..... | | K | | | |
| <i>Strophalosia nummulina</i> A. Winchell..... | × | | | | |
| <i>Strophalosia scintilla</i> Beecher..... | × | | | | |
| <i>Strophalosia spondylifermis</i> (White and St. John)..... | | | | × | |
| <i>Strophomena (?) nassula</i> Conrad. Carboniferous. | | | | | |
| <i>Syringothyris angulata</i> Simpson..... | × | | | | |
| <i>Syringothyris carteri</i> (Hall)..... | × | B | | | |
| <i>Syringothyris extenuata</i> (Hall)..... | × | | | | |
| <i>Syringothyris gigas</i> (Troost). Lower Carboniferous. | | | | | |
| <i>Syringothyris herricki</i> Schuchert..... | × | | | | |
| <i>Syringothyris missouri</i> Hall and Clarke..... | × | | | | |
| <i>Syringothyris (?) plena</i> (Hall)..... | | B | | | |
| <i>Syringothyris randalli</i> Simpson..... | × | | | | |
| <i>Syringothyristexta</i> (Hall)..... | × | K | | | |
| <i>Terebratula bisaena</i> McChesney..... | | | Ka | | |
| <i>Terebratula brevilobata</i> Swallow..... | | | SL | | |
| <i>Terebratula inornata</i> McChesney..... | | K | SL | × | |
| <i>Terebratula lapillus</i> Morton..... | | | | × | |
| <i>Terebratula mexicana</i> Hall..... | | | | ×? | |
| <i>Terebratula perinflata</i> Shumard..... | | | | × | |
| <i>Terebratula subretziaforma</i> McChesney..... | | | Ka | | |
| <i>Terebratula swallowana</i> Miller..... | | | Ka | | |
| <i>Terebratula utah</i> Hall and Whitfield..... | × | | | | |
| <i>Torynifer criticus</i> Hall and Clarke..... | | | SL | | |
| Number of Carboniferous species, 478. | | | | | |
| Number of species in each division..... | 156 | 93 | 74 | 158 | 9 |
| Number of species common to the Kinderhook and the other divisions..... | | 9 | 0 | 0 | 0 |
| Number of species common to the Burlington-Keokuk and the other divisions..... | 9 | | 5 | 4 | 1 |
| Number of species common to the St. Louis-Kaskaskia and the other divisions..... | 0 | 5 | | 5 | 1 |
| Number of species common to the Coal Measures and the other divisions..... | 0 | 4 | 5 | | 9 |
| Number of species common to the Permian and the other divisions..... | 0 | 1 | 1 | 9 | |
| Nospecies pass from the Carboniferous into the Mesozoic. | | | | | |

TABLE VIII.—*Mesozoic Brachiopoda.*

| Species. | Triassic. | Jurassic. | Lower Cretaceous. | Upper Cretaceous. |
|--|-----------|-----------|-------------------|-------------------|
| <i>Cistella beecheri</i> Clark | | | | × |
| <i>Cistella plicatilis</i> Clark.....? | | | | × |
| <i>Discina (?) pileolus</i> Whiteaves | | | × | |
| <i>Discina (?) semipolita</i> Whiteaves..... | | | | × |
| <i>Discina (?) vancouverensis</i> Whiteaves..... | | | | × |
| <i>Kingena leonensis</i> (Conrad) | | | × | |
| <i>Kingena wacoensis</i> (Roemer)..... | | | × | |
| <i>Lingula brevirostris</i> Meek and Hayden | | × | | |
| <i>Lingula nitida</i> Meek and Hayden..... | | | | × |
| <i>Lingula shumardi</i> Cragin..... | | | × | |
| <i>Lingula subspatulata</i> Hall and Meek | | | | × |
| <i>Rhynchonella æquiplicata</i> Gabb | × | | | |
| <i>Rhynchonella gnathophora</i> Meek..... | | × | | |
| <i>Rhynchonella halli</i> Gabb | × | | | |
| <i>Rhynchonella lacunosa</i> (Schlotheim) | | × | | |
| <i>Rhynchonella lacunosa arctica</i> Oppel | | × | | |
| <i>Rhynchonella lingulata</i> Gabb..... | × | | | |
| <i>Rhynchonella maudensis</i> Whiteaves..... | | | | × |
| <i>Rhynchonella myrina</i> Hall and Whitfield | | × | | |
| <i>Rhynchonella plicatilis</i> (Sowerby)..... | | | | × |
| <i>Rhynchonella schucherti</i> Stanton..... | | | | × |
| <i>Rhynchonella tayloriana</i> Lea. Habana, Cuba | | × | | |
| <i>Rhynchonella whitneyi</i> Gabb..... | | | | × |
| <i>Spiriferina (?) alia</i> Hall and Whitfield | × | | | |
| <i>Spiriferina borealis</i> Whiteaves | × | | | |
| <i>Spiriferina homfrayi</i> (Gabb) | × | | | |
| <i>Spiriferina obtusa</i> (Gabb)..... | × | | | |
| <i>Terebratella californica</i> Stanton | | | | × |
| <i>Terebratella (?) dubitanda</i> (Cooper) | | | | × |
| <i>Terebratella (?) imbricata</i> (Cooper) | | | | × |
| <i>Terebratella obesa</i> Gabb | | | | × |
| <i>Terebratella plicata</i> (Say)..... | | | | × |
| <i>Terebratella vanuxemi</i> Lyell and Forbes | | | | × |
| <i>Terebratula angusta</i> Hall and Whitfield | × | × | | |
| <i>Terebratula dorenbergi</i> Felix. Mexico | | × | | |
| <i>Terebratula harlani</i> Morton | | | | × |
| <i>Terebratula helena</i> Whitfield..... | | | | × |
| <i>Terebratula humboltensis</i> Gabb | × | | | |
| <i>Terebratula liardensis</i> Whiteaves | × | | | |
| <i>Terebratula poeyana</i> Lea. Habana, Cuba..... | | × | | |
| <i>Terebratula repellini</i> d'Orbigny. Mexico | | × | | |
| <i>Terebratula robusta</i> Whiteaves | | × | | |
| <i>Terebratula semisimplex</i> White | × | | | |
| <i>Terebratula</i> cfr. <i>zieteni</i> Loriol. Mexico..... | | × | | |
| <i>Terebratulina atlantica</i> (Morton) | | | | × |
| <i>Terebratulina filosa</i> Conrad | | | | × |
| <i>Terebratulina floridana</i> (Morton) | | | | × |
| <i>Terebratulina guadalupæ</i> (Roemer)..... | | | | × |
| <i>Waldheimia (?) catorcensis</i> Aguilera. Mexico..... | | × | | |
| Number of Mesozoic species, 49. | | | | |
| Number of species in each system..... | 11 | 13 | 4 | 22 |

TABLE IX.—Cenozoic and Recent Brachiopoda.

| Species. | CENOZOIC. | | RECENT. | |
|---|-----------|----------|--------------------------------------|-------------------------------------|
| | Eocene. | Neocene. | North and Central American Atlantic. | North and Central American Pacific. |
| <i>Discinisca lugubris</i> (Conrad) | | × | | |
| <i>Discinisca multilineata</i> (Conrad) | | × | | |
| <i>Hemithyris psittacea</i> (Chemnitz)..... | | × | | |
| <i>Rhynchonella wilmingttonensis</i> (Lyell and Sowerby)..... | × | | | |
| <i>Terebratula canipes</i> Ravenel | × | | | |
| <i>Terebratula carneoides</i> Guppy. Trinidad..... | × | | | |
| <i>Terebratula demissoirostra</i> Conrad | × | | | |
| <i>Terebratula lecta</i> Guppy. Trinidad..... | × | | | |
| <i>Terebratula nitens</i> (Conrad) | | × | | |
| <i>Terebratula trinitatis</i> Guppy. Trinidad | × | | | |
| <i>Terebratulina gracilis</i> (Schlotheim)..... | × | | | |
| <i>Terebratulina lachryma</i> (Morton)..... | × | | | |
| <i>Terebratulina tejonensis</i> Stanton..... | × | | | |
| <i>Waldheimia kennedyi</i> Dall | | × | | |
| Number of species in each division..... | 9 | 5 | | |
| <i>Atretia gnomon</i> Jeffrys..... | | | × | |
| <i>Cistella cistellula</i> (Wood)..... | | | × | |
| <i>Dallina floridana</i> (Pourtales)..... | | | × | |
| <i>Discinisca atlantica</i> (King)..... | | | × | |
| <i>Discinisca eumingi</i> (Broderip) | | | | × |
| <i>Frieleia halli</i> Dall..... | | | | × |
| <i>Glottidia albida</i> (Hinds) | | | × | × |
| <i>Glottidia antillarum</i> (Reeve)..... | | | | × |
| <i>Glottidia audebarti</i> (Broderip)..... | | | | × |
| <i>Glottidia palmeri</i> Dall..... | | | | × |
| <i>Hemithyris craneana</i> Dall | | | | × |
| <i>Hemithyris psittacea</i> (Chemnitz) | | | × | × |
| <i>Kraussina pisum</i> (Lamarck)..... | | | | × |
| <i>Lacqueus californicus</i> (Koch)..... | | | | × |
| <i>Lacqueus jeffreysi</i> Dall | | | | × |
| <i>Lacqueus vancouverensis</i> Davidson | | | | × |
| <i>Liothyryna bartletti</i> (Dall)..... | | | × | |
| <i>Liothyryna clarkeana</i> Dall | | | × | |
| <i>Macandrevia americanum</i> Dall | | | | × |
| <i>Macandrevia craniella</i> Dall..... | | | | × |
| <i>Macandrevia cranium</i> (Müller)..... | | | × | |
| <i>Macandrevia diamantina</i> Dall | | | × | × |
| <i>Magasella aleutica</i> Dall | | | | × |
| <i>Magasella labradorensis</i> (Sowerby) | | | × | |
| <i>Magasella radiata</i> Dall..... | | | × | × |
| <i>Platidia anomioides</i> (Phillippi) | | | | × |
| <i>Terebratalia obsoleta</i> Dall | | | | × |
| <i>Terebratalia occidentalis</i> Dall | | | | × |
| <i>Terebratalia transversa</i> (Sowerby) | | | | × |
| <i>Terebratella frielii</i> Davidson | | | × | |
| <i>Terebratella pulvinata</i> (Gould)..... | | | | × |
| <i>Terebratella spitzbergensis</i> Davidson | | | × | |
| <i>Terebratulina caput-serpentis</i> (Linné)..... | | | | × |
| <i>Terebratulina küensis</i> Dall and Pillsbry | | | | × |
| <i>Terebratulina murrayi</i> Davidson..... | | | × | |
| <i>Terebratulina septentrionalis</i> Couthouy..... | | | × | |
| Number of species in each ocean..... | | | 15 | 24 |

TABLE X.—*South American fossil Brachiopoda.*

[J=Jurassic. Species preceded by an asterisk (*) are found in North America also.]

| Species. | Cambrian. | Ordovician. | Silurian. | Devonian. | Carboniferous. | Jurassic, Triassic. | Cretaceous. | Tertiary. |
|--|-----------|-------------|-----------|-----------|----------------|---------------------|-------------|-----------|
| * <i>Ambocoelia planoconvexa</i> (Shumard) | | | | | × | | | |
| * <i>Amphigenia elongata</i> (Vanuxem) | | | | × | | | | |
| <i>Anabia paraia</i> Clarke | | | × | | | | | |
| * <i>Anoplothecha flabellites</i> (Conrad) | | | | × | | | | |
| * <i>Camarotoechia dotis</i> Hall | | | | × | | | | |
| <i>Centronella</i> (?) <i>arcii</i> A. Ulrich | | | | × | | | | |
| <i>Centronella</i> (?) <i>silvetii</i> A. Ulrich | | | | × | | | | |
| <i>Chonetes amazonica</i> Derby | | | | | × | | | |
| <i>Chonetes</i> (?) <i>arcii</i> A. Ulrich | | | | × | | | | |
| <i>Chonetes comstockii</i> Rathbun | | | | × | | | | |
| <i>Chonetes curuacensis</i> Rathbun | | | | × | | | | |
| <i>Chonetes falklandica</i> (Morris and Sharpe) | | | | × | | | | |
| <i>Chonetes freitassii</i> Rathbun | | | | × | | | | |
| * <i>Chonetes glabra</i> Geinitz | | | | | × | | | |
| * <i>Chonetes granulifera</i> Owen | | | | | × | | | |
| <i>Chonetes herbert-smithi</i> Rathbun | | | | × | | | | |
| <i>Chonetes onettiana</i> Rathbun | | | | × | | | | |
| <i>Chonetes racki</i> A. Ulrich | | | | × | | | | |
| <i>Chonetes stübeli</i> A. Ulrich | | | | × | | | | |
| * <i>Chonetes variolata</i> d'Orbigny | | | | | × | | | |
| * <i>Chonostrophia complanata</i> Hall? | | | | × | | | | |
| * <i>Cleiothyris roissyi</i> (L'Eville) | | | | | × | | | |
| <i>Clitambonites ascendens</i> (Pander?) | | × | | | | | | |
| <i>Cyrtina</i> (?) <i>curupira</i> Rathbun | | | | × | | | | |
| <i>Dalmanella</i> (?) <i>nettoana</i> (Rathbun) | | | | × | | | | |
| <i>Derbya correanus</i> (Derby) | | | | | × | | | |
| <i>Dielasma hochstetteri</i> (Toula) | | | | | × | | | |
| <i>Dielasma itaitubensis</i> (Derby) | | | | | × | | | |
| <i>Enteletes andii</i> (d'Orbigny) | | | | | × | | | |
| <i>Enteletes gaudryi</i> (d'Orbigny) | | | | | × | | | |
| <i>Glossina dubia</i> (d'Orbigny) | | × | | | | | | |
| <i>Glossina trentonensis</i> (Conrad?) | | × | | | | | | |
| <i>Hartina coutinhoana</i> (Derby) | | | | | × | | | |
| * <i>Hustedia mormoni</i> (Marcou) | | | | | × | | | |
| <i>Leptæna</i> (?) <i>stelzneri</i> Kayser | | × | | | | | | |
| <i>Lingula coheni</i> A. Ulrich | | | | × | | | | |
| <i>Lingula erereusis</i> Rathbun | | | | × | | | | |
| <i>Lingula gracana</i> Rathbun | | | | × | | | | |
| <i>Lingula metensis</i> Terquem | | | | | | J | | |
| <i>Lingula munsteri</i> d'Orbigny | | × | | | | | | |
| <i>Lingula plagemanni</i> Mörlicke | | | | | | J | | |
| <i>Lingula rodriguezii</i> Rathbun | | | | × | | | | |
| * <i>Lingula spatulata</i> Vanuxem | | | | × | | | | |
| <i>Lingula stautoniana</i> Rathbun | | | | × | | | | |
| <i>Lingula submarginata</i> d'Orbigny | | × | | | | | | |
| <i>Lingula truncata</i> Sowerby | | | | | | | × | |
| <i>Meristella riskowyi</i> A. Ulrich | | | | × | | | | |
| <i>Notothyris</i> (?) <i>smithii</i> Derby | | | | × | | | | |
| <i>Orbiculoidea baini</i> Morris and Sharpe | | | | × | | | | |
| * <i>Orbiculoidea lodensis</i> (Vanuxem) | | | | × | | | | |

PROLIFERATION OF THE PROLIFERATING AND PROLIFERATING OF THE PROLIFERATING PROLIFERATING

Substance unaltered.—In the Protoplasmic and Telodermic tubes similar lines their mutual positions and in other parts of the external area between the tubular. In passing to the dorsal side they divide into four, and produce in each shall be the pairs of prothoracic arms extending to the anterior and posterior telodermis. By multiplication these arms shall divide the shall. In the Telodermic tube are the essential members of the as seen in the dorsal shall and arranged the anterior telodermis showing the valves while the posterior pair serves to open the valves. In the Arthropoda there is a single pair of telodermis placed near the anterior extremity of the dorsal area.

Anterior region.—That portion of the shall is fixed to the telodermis and unguis the pedicel opening.

Apex.—The plates of dorsal shall prothorax. It may be the most prothorax portion of the shall or may be situated near the telodermis side.

Respiratory Shell and Claria.—The respiratory respiratory apparatus of the Spiriferous and Telodermic tubes.

Cardinal area.—A mass of two small rounded prothoracic areas on each side of the telodermis, distinctly set off from the prothoracic portions of the shall. It is best developed in the dorsal valve of prothorax branching, but is also present in the dorsal valve and generally in a rudimentary condition in many vertebrate species. See telodermis.

Cardinal processes.—The prolongations of the dorsal area.

Cardinal process.—A narrowly notched prothoracic structure projecting at the center of the dorsal area of the dorsal area in vertebrate branching. It is attached to the telodermis and may be later contraction serve to open the valves anteriorly.

Cardinal duplex.—The paired surfaces extending from the telodermis slopes to the hinge margin.

Cardinal Branch.—A plate in appearance similar to the telodermis, covering the external portion of the cardinal process in many Prothorax. Its development does not begin until after hatching or later growth, and is probably secreted by the dorsal muscle area.

Claria.—Processes on the dorsal hinge plate of the Telodermis and some Prothorax, to which are attached the lower valves and telodermis. These usually form the lower walls of the dorsal valves, and may be supported by septal plates.

Cardinal Shell and Claria.—The dorsal equivalent of the ventral spirillum, being formed by the coalescence or union of the dorsal plates in the Telodermis.

Delthyrium (Hall and Clarke).—The triangular aperture transecting medially the cardinal area, or the posterior surface from the apex to the posterior margin of the ventral valve, through some portion of which the pedicle passes. It has also been termed the *fissure* or *foramen*. The delthyrium may or may not be closed by a deltidium or deltidial plates.

Deltidium.—A plate of one piece which grows over the delthyrium of many Protremata and some Neotremata. In the early larval stage of Thecidium this plate begins as a secretion from the dorsal side of the body segment, and becomes ankylosed to the ventral valve in the phylembionic stage, subsequent additions being secreted by the body wall and pedicle. The convex or concave central portion of the ventral cardinal area in some Atremata is not homologous with the deltidium. It is but a part of the area, and does not have its origin in the prodeltidium, as in Thecidium.

Deltidial plates.—Two plates growing medially from the walls of the delthyrium after neanic growth. These usually unite medially, and close the delthyrium more or less completely. They are restricted to the Telotremata, and are secreted by extensions of the ventral mantle lobe. Hall and Clarke introduced the terms *deltarium* and *deltaria* for the same plates, and for the coalesced condition of the deltaria, Bronn's *pseudodeltidium*.

Dental plates.—Vertical plates supporting the teeth of the ventral valve.

Dental sockets.—Excavations in the dorsal cardinal margin in which the teeth of the ventral valve articulate. The inner wall of the socket is elevated and forms the base of the crural plate.

Diductor muscles.—In the Protremata and Telotremata the principal pair of diductor muscles has the larger end attached to the ventral valve near the anterior edge of the visceral area, while the other end has its insertion on the anterior portion of the cardinal process. There is another pair of small accessory diductor muscles, but these are seldom shown in fossil shells. By contraction these muscles open the valves.

Dorsal valve.—Usually the smaller and imperforate valve and the one to which the brachia are always attached. *Brachial, hamal, socket, and entering valves* are other terms more rarely employed.

Ephebic (Hyatt, emend. Bather and Buckman).—Designating the mature shell.

Foramen.—A small circular passage through the deltidium or deltidial plates, either below or at the apex of the ventral valve. Sometimes the foramen encroaches by abrasion upon the umbo of the ventral valve.

Genital markings.—Radial markings or pits within the posterior portion of the visceral space, indicating the position and extent of the genitalia.

Gerontic (Hyatt, emend. Bather and Buckman).—Designating old age. It is indicated in the ontogeny of many species of brachiopods by extreme thickness of the valves, obesity, or by numerous, crowded growth lines near the anterior margin, a condition which sometimes produces truncation and absence of striae at the margin.

Hinge line.—The line along which articulation takes place.

Jugum (Hall and Clarke).—The transverse band and its accessory processes uniting the spiralia. When this band is medially incomplete the parts are termed *jugal processes*.

Lateral areas.—That portion of the shell on each side of the ventral axis.

Listrium (Hall and Clarke).—In some Neotremata a plate closing the progressive track of the pedicle opening or pedicle cleft, posterior to the apex of the ventral valve.

Longitudinal axis.—A median line through the shell from the beak to the opposite margin.

Loop.—The calcareous brachial supports of the Terebratulacea. It is usually composed of descending and ascending lamellæ, united by a transverse band.

Median septum.—An internal vertical plate commonly developed along the vertical axis and between the muscles of the ventral valve. Sometimes there is also a dorsal median septum. Lateral septa are rarely developed.

Neanic (Hyatt, emend. Bather and Buckman).—Designating youthfulness, or the stage in which specific characters begin to develop.

Nepionic (Hyatt).—Designating the smooth-shell stage succeeding the protogulum.

Pallial sinuses.—Two convergent or divergent primary sinuses of the circulatory system, traversing the mantle and originating in the posterior medial region. They usually have numerous secondary branches, and both often leave impressions in the shell.

Pedicle.—The flexible muscular organ of the ventral valve by means of which brachiopods may be attached to extraneous objects.

Pedicle muscles.—In the Protremata and Telotremata one pair originates on the ventral valve at points just outside and behind the diductors and another on the dorsal valve behind the posterior adductors, while the opposite ends of both are attached to the pedicle. Besides these, there is an unpaired muscle lying at the base of the pedicle, attaching it closely to the ventral valve.

Platform.—See *Spondylium*.

Posterior region.—That portion of the shell back of the transverse axis and toward the beak, or apex.

Primary lamellæ.—The primary descending bands of the spiralia, the posterior ends being attached to the crura.

Prodeltidium (Hall and Clarke restricted).—The third shell plate developed in the earlier embryonic growth of species of Atremata,

Neotremata, and Protremata, and subsequently becoming more or less firmly attached to either the dorsal (Atremata) or ventral valve.

Protegium (Beecher).—The initial shell of brachiopods. It is smooth and of microscopic size, in outline being semicircular or arcuate, and without cardinal areas.

Protractor muscles.—In the Lingulacea one pair has the ventral ends fastened at the anterior extremity of the visceral area, extending backward and inserted near the lateral margin of the dorsal valve, outside the rotators. A second pair originates just behind the adductors of the ventral valve, and is inserted posterior to the first pair. These muscles draw the dorsal valve forward. They are apparently present in the Obolidae and Trimerellidae, but their position is different.

Pseudodeltidium.—Properly this term applies only to the united condition of the deltidid plates in the Protremata and Telotremata. It is provisionally applied to the concave or convex medial portion of the cardinal areas in Atremata and Protremata.

Retractor muscles.—In the Atremata these extend from the outer lateral margins of the visceral area in the ventral valve to its anterior extremity in the dorsal valve, and serve to readjust the dorsal shell.

Rotator muscles.—In Lingulacea these are situated posteriorly just in advance of the umbonal muscle, two on one side and one on the other. By their contraction the dorsal valve turns alternately first in one direction and then in the other.

Septal plates.—Plates supporting the crural processes, also known as *crural plates*.

Spondylium.—A plate in the Pentameracea, formed by the union of converging dental plates, to the upper surface of which are attached the adductor, diductor, and pedicle muscles. The spondylium may rest upon the ventral valve or may be supported by a median septum. This plate is rarely present in the Telotremata, but more commonly in the Atremata, where it is known as the *platform*. There is sometimes developed in the dorsal valve a plate similar in appearance to the spondylium, but different in origin, and known as the *cruralium*.

Spiralia (Beecher).—The calcareous spiral brachial supports in the Spiriferacea. A connecting jugum may be present or absent.

Syrinx.—A tubular structure developed in the delthyrium of some Spiriferacea, opening ventrally and partially inclosing the pedicle.

Teeth.—Two processes of the ventral valve of articulate brachiopods, serving for articulation.

Transverse axis.—A line through the shell from right to left, midway between the beak and anterior margin.

Umbo.—The elevated or prominent portion of the valve anterior to the apex.

Umbonal muscle.—A single muscle situated in the umbonal region of most Atremata. By its contraction the valves are opened anteriorly. In *Obolus* this muscle divides toward the ventral valve.

Umbonal slopes.—The inclined surfaces about the umbo and opposite the cardinal slopes.

Ventral valve.—The valve situated on the ventral side of the animal, and having in youth or maturity a delthyrium or pedicle opening through which the pedicle is protruded, except in Iphidea, Obolella, Lingula, etc., where the pedicle protrudes between the valves. When the shell is cemented to foreign bodies it is always by the ventral valve. It is usually the larger and deeper of the two valves. *Pedicle, larger, dental, neural, and receiving valves* are synonymous terms.

CHAPTER III.

BIOLOGIC DEVELOPMENT OF THE BRACHIOPODA.

ORDINAL DEVELOPMENT.

ATREMATA.

This order, which began in the Lower Cambrian, is represented by 199 species, or over 10 per cent of American Paleozoic brachiopods. Its greatest representation, both in species and genera, was during the Cambrian and Ordovician eras. A very marked decline set in during the Silurian and Devonian, with almost extinction in the Carboniferous, where only *Lingula* and its subgenus *Glossina* occur.

The terminal families Trimerellidæ and Lingulidæ contain species which attain the greatest individual growth. Lingulidæ has the longest phylogenetic history. It is the last important and most specialized family of the Atremata, and manifests the greatest persistency and specific differentiation. *Lingula*, the essential genus of the family, lived at least from the Ordovician system through all succeeding time, and is represented in modern seas. During this enormous period the only change observable is that in the ancient forms the viscera occupied a little more and the brachia somewhat less space.

In the more primitive types of Atremata, Obolacea, the shell is usually much thicker and less chitinous than in the higher or derived families, Lingulacea. The shell is thickest in the Trimerellidæ and thinnest in the Lingulidæ. From their mode of occurrence in rocks it seems probable that Paterinidæ, Obolidæ, and Trimerellidæ (=Obolacea) never lived in the mud or sand of the sea bottom, as did Lingulidæ, Lingulasmatidæ, and probably Lingulellidæ (=Lingulacea).¹ The oboloids in all probability had short pedicles, while the linguloids have very long pedicles. The long, flexible, tubular pedicle of *Lingula*, associated with the buried habit of the animal, apparently explains

¹Since all the species of Obolacea are known only as fossils, it may seem hazardous to ascribe to them a mode of living different from that of *Lingula*. These shells had short peduncles, are round or oval, sometimes very gibbous, always comparatively thick shelled, and not decidedly phosphatic. The writer has never observed any species of this superfamily in situ transverse to sedimentation, or in other words "on edge." In the Lingulacea the peduncle is very long, and the shells are elongate quadrangular, triangular, spatulate, or acuminate, and, as a rule, are decidedly thin and phosphatic. Recent *Lingulas* all live partially buried in the sea bottom, and not infrequently fossil species are found in situ, on edge, with their apices downward. *Lingulops* and *Lingulasma* also have been observed situated on edge. The round, thick shells of Obolacea are strongly contrasted with the elongate thin shells of Lingulacea. These peculiarities are in all probability due to mechanical causes. The Linguloids, with their long, powerful, and flexible peduncles, are buried in the sediments, while the posteriorly pointed shell is an adaptation to the same end, caused by the frequent peduncular pulling on that part of the valves.

the cause for the thinness of the shell and the long, narrow, attenuated form of its valves.

The ontogeny of *Obolella* and *Lingula* shows that one branch developed directly from the *Paterinidæ* to *Obolidæ* and *Trimerellidæ*, while another branch began in the *Obolidæ*. The derived branch continued to diverge by changing the thick round shells of the radical stock into thin spatulate or elongate subquadrate valves, first in the *Lingulellidæ* and culminating in the *Lingulidæ*. The latter family then gave rise to *Lingulasmatidæ*, which, in accordance with the law of morphologic equivalents, developed some of the internal diagnostic characters of the terminal family of the first phylum in the platform of the *Trimerellidæ*.

Hall and Clarke refer the genera of *Lingulasmatidæ* to *Trimerellidæ*, and thus the latter family, as understood by them, embraces two stocks having widely separated origins. This is peculiar, since they clearly understand the independent origin of these stocks, as will be seen by the following quotation, but more particularly by their diagram.¹

There is no single feature in the entire group of the edentulous brachiopods so striking as the great platforms in *Trimerella* and its allies, and it is rarely that so beautiful and well established an illustration of the attainment of such a remarkable resultant along two distinct lines of development can be presented.

The writer holds that a natural family can have but one stock, a stock can have but one origin.

Nonfunctional articular processes are developed in this order in a number of genera and at various times. Such are slightly developed in *Trimerella* and *Monomorella*, and more strongly in *Tomasina*, *Barroisella*, and *Spondylobolus*. In the *Neotremata*, articulation is also approached in *Trematobolus*, and in *Crania* a false hinge is sometimes developed in Ordovician species. A cardinal process so characteristic of the *Protremata* and *Telotremata* is faintly developed in *Neobolus*, *Lakmina*, and *Trimerella* of the *Atremata*.

NEOTREMATA.

The order *Neotremata* begins in the Lower Cambrian, and is represented by 156 species, or over 8 per cent of the brachiopods of the American Paleozoic. It has considerably fewer species than the *Atremata*, and exhibits a lack of specific differentiation, such as form and surface ornamentation. This probably is largely due to the fact that the pedicle is very short, or even obsolete, in this order, and that the pedicle foramen is subcentral, producing in the *Trematidæ* and *Craniidæ* more or less of a parasitic growth, while in the families *Discinidæ* and *Acrotretidæ* the great majority of species are circular or oval, with more or less cone-shaped shells.

As in the *Atremata*, great tenacity of life is also manifested in this order, since its two essential families, *Discinidæ* and *Craniidæ*, have representatives throughout all time since the Ordovician system.

¹ Paleontology of New York, Vol. VIII, Part I, 1892, p. 165.

Greatest representation in both genera and species was during the Ordovician, after which generic differentiation was practically restricted to the Discinidæ and Craniidæ. Crania persisted throughout the post-Ordovician, and for longevity equals the atrematous genus *Lingula*.

The percentage of widely dispersed species is about the same as in the Atremata, and likewise is greatest in those families with the longest phylogenetic history, as Acrotretidæ, Discinidæ, and Craniidæ.

Development was along two lines. In one a broad fissure (the most primitive condition of the pedicle opening in this order) is retained as a mature character (Trematidæ). Later geologically, and at the maturity of the individual in derived forms, the fissure is gradually closed posteriorly, leaving a long, narrow slit, at one end of which the pedicle emerges (Discinidæ). The other line (Acrotretacea) probably developed and inherited holoperipheral growth in the ventral valve, very rapidly producing a small subcentral circular foramen, since this feature is already well developed in the Lower Cambrian Acrotretidæ, and in advance of the greatest development of the Discinidæ. It is probably this second branch that gave origin to the degraded family Craniidæ. The protogulum in the dorsal valve of Acrotretacea is probably always marginal, whereas in the Discinacea it is always more or less central.

It is remarkable that Crania, so unlike other living brachiopods and occurring abundantly in the seas of to-day, has never been completely studied developmentally or ontogenetically. The taxonomic position of the Craniidæ is therefore not actually determined, and Hall and Clarke incline to follow Waagen in regarding the Craniacea as equivalent in rank to the Atremata and Neotremata. These authors write:¹

It is nevertheless to be observed that no trace of a former pedicle-slit incision or perforation is found on mature or immature shells, and it would be difficult to comprehend in what manner such an essential modification of the shell could be wholly concealed by later growth. Were the pedicle marginal in primitive growth stages, and subsequently atrophied, the obliteration of the marginal opening by later resorption and growth would be a readily intelligible process. There is, hence, in this default of evidence, a good reason to doubt the close affinities of Crania and Pholidops to the Diacaulia [= Neotremata]. Present knowledge would seem to indicate that they were primarily of the type of the Mesocaulia [= Atremata], and that their resemblance to the Diacaulia is wholly of secondary growth. Waagen's term for this group, Gastropegmata (or Craniacea), may therefore prove to be equivalent to each of these other two divisions.

Brachiopod embryology demands a pedicle in the early stages of Crania. The ventral valve carries the pedicle, and it is always this valve which is attached by cementation or otherwise. The writer has observed in Yale University Museum a specimen of *Pholidops orata* with a cicatrix of attachment, around which point growth is holoperipheral, as in all Neotremata. Specimens of Pholidops are sometimes preserved with both valves in position and delicately attached to Bryozoa,

¹ Paleontology of New York, Vol. VIII, Part II, 1895, p. 325.

from the Falls of the Ohio. These are believed to be actual and not chance attachments. In *Crania* cementation occurs very early and is complete, causing all obliteration of the protogulum and subsequent stages of growth in the ventral shell. That cementation does obliterate nearly all the younger characters is also shown in the remarkable genera *Richthofenia* and *Ostrea*. On the interior of *Pholidops* and *Crania* the four large muscular scars, which are more those of the Neotremata than of the Atremata, are arranged medially, in the center of which, probably, was the pedicle opening. Some proof of this is seen in the excavated, posteriorly terminating muscular pit of *Crania ignabergensis*, which, if carried through the valve, will make the pedicle opening subcentral and surrounded by shell deposit. If an *Acrotreta*, *Linnarssonia*, or *Conotreta* became cemented, there would result practically a *Crania*. In no atrematous brachiopod is there the slightest indication of cementation, but where shell fixation does occur it is always (excepting in *Zugmeyeria* and *Thecocyrtella*) in such as have the pedicle very early surrounded by shell matter, as in the *Strophomenidæ* and *Productidæ*. For these reasons the characters of *Craniacea* seem more in accord with the Neotremata than with the Atremata. The characters of *Craniacea* are certainly not of ordinal importance, and possibly not even of superfamily value.

In the development of its pedicle foramen the family *Siphonotretidæ* is unlike any other of this order. During neanic growth the pedicle opening was posterior to the protogulum, but later it gradually moves anteriorly through the shell by resorption, producing a narrow slit similar in appearance to that of the *Discinidæ*. A pedicle foramen of the same nature is also developed in *Eichwaldia* and *Dictyonella* of the Protremata. As yet no explanation has been given as to the causes producing this aberrant development. The writer suggests that since these animals had delicate peduncles, with the shell elongate oval and sometimes cone-shaped in form, they probably stood nearly upright on their pedicles in early growth. Shell accretion being more rapid anteriorly, with the ventral side of the animal the larger and heavier, a tendency was initiated for the shell to lean against the ventral side of the peduncle. This pressure would produce resorption of the ventral shell anterior to the pedicle, and eventually, this tendency becoming hereditary, the ventral valve would lie nearly flat, with the pedicle emerging at a great angle subcentrally.

PROTREMATA.

This order is represented by 738 species, or nearly 40 per cent of American Paleozoic brachiopods, and is eminently characteristic of the post-Cambrian Paleozoic systems. Like the Atremata and Neotremata, it is represented in the Lower Cambrian. It was not, however, until Ordovician times that the Protremata attained very rapid evolution. In the Cambrian there are but 4 genera and 22 species, while in

the Ordovician there are 20 genera and 173 species, a specific increase of more than seven and one-half times the number in the Cambrian. Greatest generic differentiation occurred during the Silurian, where 30 genera appear. Then began a steady decline, with extinction in the Carboniferous of North America. In the Triassic of Europe this order is sparingly represented by small species, and is there essentially restricted to the family Thecidiidæ, which continues to have living representatives in the Mediterranean Sea.

The widely distributed species gradually increase in percentage from 14 in the Cambrian to 36 in the Carboniferous, and are most marked in the family Productidæ. This family is one of the last of the order to originate.

The largest of all brachiopods occur in this order, in the families Pentameridæ and Productidæ, exceeding the Spiriferidæ of the Trematata. In the former family greatest size is attained in the Silurian during the acme of the order, and in the Productidæ in the Carboniferous system. *Productus giganteus* of the Lower Carboniferous is the giant of all brachiopods, attaining a diameter of nearly 1 foot. In both these families the earliest species are small, but certain groups gradually attain larger and larger size with geologic time. Upon the appearance of the giants, vitality of the families, as exemplified in specific differentiation and robustness of individuals, is at its highest. After this these families rapidly decline, and the species dwarf far more rapidly than they developed to the climax.

In the Protremata, as in the two previous orders, greatest specific differentiation does not occur in the radical families, but in those of later development. The Kutorginidæ, Clitambonitidæ, and Billingsellidæ are the radical and, geologically, the oldest families of the Protremata. These are best but sparingly developed in the Cambrian, whereas the younger families, Pentameridæ, Strophomenidæ, Productidæ, and Orthidæ, contain over 95 per cent of the species and nearly 90 per cent of the genera. Orthidæ and Strophomenidæ, beginning in the Cambrian, are best developed in the Ordovician and Silurian systems, respectively; while Productidæ, originating in the Silurian, attained a climax in the Carboniferous. The latter family was one of the last of the Protremata to originate and has the shortest geologic history and least generic differentiation, yet many of its species have greater geographic dispersion.

The Protremata are clearly divisible into two phyla, Strophomenacea and Pentameracea. The former superfamily has the greater number of species, and is characterized by the nondevelopment of a spondylium or cruralium. The Pentameracea has, in addition to the deltidium, an internal spoon-shaped plate, or spondylium, serving for the attachment of muscles, and a discrete or united cruralium. The superfamily Strophomenacea in North America has 608 species, and represents the most primitive phylum, since it is far better developed in the Cambrian than

is the Pentameracea, and has almost without exception a straight cardinal area. The Pentameracea has 127 species, and its earliest forms also have straight hinge-lines in the 16 species of the families Clitambonitidæ and Syntrophiidæ; but the rostrate family Pentameridæ, which attained maximum development in the Silurian, has 87 species. The Strophomenacea has living species, while the Pentameracea disappeared with the Permian. The cause for the rapid extinction of the latter is probably due to the high degree of specialization expressed by the spondylium.

Two well-marked types of shell form are developed in this order. By far the most prominent is the group which includes the long-hinge families Kutorginidæ, Clitambonitidæ, Billingsellidæ, Strophomenidæ, Productidæ, Thecidiidæ, and Orthidæ. The other group, represented by Pentameridæ, is largely rostrate in form, but occasionally also develops a straight hinge line. This, however, is never so prominent as in the former group. In the Telotremata the general form is rostrate, but very notable exceptions are present in the families Spiriferidæ and Terebratellidæ, and occasionally in the Rhynchonellidæ and Athyridæ. The form of the shell, however, has no great taxonomic value, and can not be accorded more than generic rank. The predominating type of shell form within an order probably has phyletic value, since the oldest protrematous shells are long-hinged, while the telotrematous shells are usually rostrate. Nevertheless, as indicated above, in the derived forms of both orders there are notable exceptions, and these changes are probably always induced by shortening or lengthening of the peduncles. Since Orthorhynchula has a well-developed cardinal area, it is not in itself "evidence of the first significance as indicating the source from which the extensive group of the Rhynchonellas originated."¹ The oldest rhynchonelloids are rostrate shells (*Protorhyncha? minor* and *P.? ambigua* of the Lower Cambrian), and the ontogeny of several species of Rhynchonella and of Zygospira has not revealed a long-hinged stage with cardinal areas. There is, therefore, no conclusive proof for the deduction of Hall and Clarke, "that some of the Rhynchonellidæ, early in their [geologic] history, occasionally retain a well-defined cardinal area, and that, in default of other evidence, the presence of this character may be regarded as indicative of the common origin of Orthis, the Strophomenidæ, and the Rhynchonellas."²

In this order far more than in any other is found the closure of the pedicle passage and atrophy of the pedicle, together with peculiar special adaptations which entirely or partially replace the functions of the pedicle. In the family Productidæ the ventral shell develops more or less abundant tubular spines, either along the cardinal line or over the entire valve. These are always most abundant in, or are

¹Paleontology of New York, Vol. VIII, Part II, 1895, p. 336.

²Ibid., p. 342. For further remarks bearing on this subject, see pages 93-95 on the significance of the prodeltidium.

restricted to, the posterior region. The functions of the spines are to hold the animal to its place of habitation, for there is no apparent pedicle opening in these shells when mature. In others of the same family the ventral apex is cemented to extraneous objects (*Strophalosia*), and in still others the spines clasp the object of support when small (*Strophalosia goldfussi* and *Etheridgina*). In the *Strophomenidæ* the older species all seem to have functional pedicles throughout life, but in the Devonian, forms occur in which the apex is cemented to foreign objects (*Leptaenisca*). Some of the Middle and Upper Devonian *Stropheodontas* show no trace of a pedicle opening when adult. In the Carboniferous cementation is far more common, and occurs in *Derbya* and *Streptorhynchus*; and when taken in connection with *Strophalosia*, *Chonostrophia*, *Aulosteges*, and *Richthofenia*, it is seen that nearly all the contemporaneous species of this order have developed other methods for fixation than the normal one. In *Richthofenia* calcareous cementation is complete, and the modifications resulting therefrom have so changed the shell that the lower or fixed valve is very suggestive of a cyathophylloid coral, not only in form but even in shell structure.

The chief cause for atrophy of the pedicle lies not only in the fact that this organ, in all long-hinged brachiopods, is short, but more particularly in the fact that throughout this order, and in the *Acrotretacea* of the *Neotremata*, the young shells always have the pedicle completely surrounded by shell, and thus to a great extent limit its growth. Even among the *Orthidæ*, where the species geologically older often have thick pedicles, which is indicated by the large open delthyrium, they gradually diminish in size throughout the Paleozoic. In the *Strophomenidæ* the pedicle is never a thick organ, and shortly after this family gives rise to the *Productidæ*, in *Chonetes*, the first appearance of cementation takes place. This mode of attachment constantly increases in the different phyla to the end of the family histories. In the *Productidæ* the early inheritance of a weak pedicle soon leads to its complete loss by the additional fixation developed. This additional fixation has its first appearance in the cardinal spines of *Chonetes*, which are periodically developed by mantle extensions. The degeneracy of the pedicle, once well established, is inherited at earlier and earlier periods by acceleration. The spines become more numerous, and are finally developed over the entire ventral valve. In the dorsal valve, the spines are never so long as in the ventral valve, and often are not developed at all, but are replaced by numerous concentric overlapping lamellæ. As the spines begin to develop more numerous and longer, the ventral valve attains more convexity, with a strongly incurved beak and the complete loss of a pedicle opening. *Productus*, therefore, does not stand erect on the cardinal areas, as in *Chonetes*, but lies on the ventral shell, anchored by the numerous spines. The spines are of the same nature as the shells, and never flexible. When

they came in contact with hard objects during their growth, they followed along or clasped the object of support.

The slender shell-incaised pedicle of the Strophomenacea probably leads to the growth of long, straight hinges for additional support, further weakening the pedicle and necessitating accessory fixation in four of its families, and finally occasioning in many species complete loss of this organ at the maturity of the individual. With the exception of the Thecidiidæ, the order Protremata has become nearly extinct since the Jurassic era.

TELOTREMATA.

This order, though but 2 Cambrian and 20 Ordovician forms are known, is represented by 766 species, or about 41 per cent of all American Paleozoic brachiopods. It is as well developed specifically as the Protremata, and exhibits a far greater variety of structures. Telotremata was probably the last order to originate, and has the greatest number and variety of living species. Its highest development is in the Devonian, where 369 species in 50 genera occur, while 109 species are known from the Silurian, a growth more than five times greater than that of the Ordovician system. Here, too, as in the Protremata, considerable time was consumed in establishing a few primitive characters, and these are no sooner obtained than an almost sudden development of great specific and generic differentiation takes place.

It is highly probable that no telotrematous Paleozoic genus continued to live through half the geologic time that *Lingula* and *Crania* did. *Rhynchonella*, a primitive genus of this order, is often said to have continued since the Ordovician, and *Terebratula* since the Devonian, era. This is now very doubtful, since Hall and Clarke have demonstrated that in all of the Paleozoic forms of these genera where it has been possible to examine their interiors none belong to *Rhynchonella* or *Terebratula*. In this catalogue both genera are recognized as occurring in the Paleozoic, but this is due to the fact that the internal structure of those species is not known.

Telotremata has three distinct types of brachial supports, which readily serve to differentiate 3 superfamilies. The simplest, *Rhynchonellacea*, has but crura, and is represented in the American Paleozoic by 14 genera and 202 species, of which 66 are widely distributed. The superfamily *Terebratulacea*, having more or less simple V or W shaped brachial supports, is present with 19 genera and 78 species, of which 23 are widely distributed. In the structurally more complex superfamily *Spiriferacea*, having spiral brachial supports, there are 41 genera and 466 species, and of these 161 become widely distributed. This again confirms the previously noted fact that the groups latest developed have the greatest generic and specific differentiation. In *Spiriferacea* this likewise occurred in the family *Athyridæ*.

If the percentage of widely distributed species within a superfamily is a criterion of its vitality, it will be seen that the Rhynchonellacea begin in the Ordovician with 50 per cent and decline to 23 per cent in the Carboniferous. The Spiriferacea, also beginning in the Ordovician, have 50 per cent of their species widely distributed, becoming reduced to 20 per cent in the Carboniferous. On the other hand, the Terebratulacea were not widely dispersed in the Silurian, whereas in the Devonian their distribution reached nearly 30, increasing to 34 per cent in the Carboniferous. Since no statistics of the European Mesozoic and Cenozoic species of this nature are available, the writer can not determine whether or not the Rhynchonellacea continue to decline with such rapidity. It is known, however, that this superfamily has declined considerably in the Cenozoic and late Mesozoic. After the Triassic the Spiriferacea are essentially represented by Spiriferina, yet it too died out with the Jurassic, while the Terebratulacea, which manifested progressively greater vitality during the Paleozoic, are believed to have continued so nearly throughout the Mesozoic into late Cretaceous time. Since then, however, they have also declined.

In the ontogeny of *Dielasma* and *Zygospira*—loop-bearing and spire-bearing genera respectively—Dr. Beecher and the writer have shown that the Terebratulacea may not have been the last superfamily to develop, as was formerly supposed, and that it may have given rise, during early Ordovician times, to the spire-bearing superfamily Spiriferacea. The Terebratulacea probably originated in the Rhynchonellacea, though no loop-bearing species are known until the spire-bearing forms are well advanced, or until early in the Devonian system. While some of the largest species of Terebratulacea are found in the Devonian of America and Europe, yet throughout the Paleozoic this superfamily is not a conspicuous one. In the Jurassic and Cretaceous systems of Europe, however, great specific differentiation and abundant individual development took place. There is but 1 species of this superfamily in the American Silurian, while the Devonian has 50 species in 15 genera, an increase fifty times greater than that of the Silurian. In the Carboniferous a sharp decline set in, and the superfamily is reduced to 30 species and 8 genera.

These facts suggest that either the superfamily Terebratulacea did not originate in American seas or—which seems less probable—that diminutive species occur whose interior characters have escaped detection. Further, since the earliest American primitive genera, *Rensseleria* and *Trigleria* of the Lower Devonian, have very large species, neither these nor *Centronella* can be the earliest adult representatives of this superfamily. When quite young, *Zygospira*, also, has a “centronella-like loop,” and it is possible that the primitive Terebratulacea had their origin before the earliest appearance of *Zygospira*, or during the earliest part of the middle Ordovician era.

The great majority of telotrematous genera are rostrate in form, but

at different times and in separate phyla straight cardinal areas are more or less well developed. In America, the oldest members of this order (*Protorhyncha? minor* and *P.? ambigua*, members of the family Rhynchonellidae) occur in the Lower Cambrian. In these species, and in the great majority of this family, there is no cardinal area; but occasionally this character is present, the earliest conspicuous example being the Ordovician genus *Orthorhynchula*. Among the Paleozoic Terebratulacea cardinal areas are seldom developed. A conspicuous exception, however, occurs in *Tropidoleptus*. But in the Mesozoic and Ceneozoic, in the family Terebratellidae, cardinal areas are very often present, and in living forms are accompanied by a short pedicle. It is, moreover, in the Spiriferacea, the youngest superfamily of the Telotremata to originate, that the greatest development of cardinal areas takes place. The oldest genera of the Spiriferacea are all rostrate, as in the Ordovician *Zygospira*, *Catazyga*, and *Cyclospira*. In the Silurian the Spiriferidae tend to develop rapidly long, straight, and wide cardinal areas, attaining greatest development in the Devonian and early Carboniferous. This excessive development of cardinal areas is no doubt due to the shortening and decline of the pedicle, since in the Triassic system forms occur in which cementation is complete (*Zugmeyeria* and *Theococcyrtella*). Cardinal areas are also developed in other families of the Spiriferacea, but in no case can such be traced to Ordovician long-hinged ancestors.

In this order, more than in the Protremata, internal specialization of the brachia has progressed from a simple to a highly complex condition. In the Protremata, in its latest developed superfamily, Pentameracea, crura are also present, of the same phase of development attained by the Rhynchonellacea, the most primitive superfamily of the Telotremata. In this order, however, there are, with but few exceptions, no internal special structures, as spondylia. The specialization in the Telotremata is expressed in the progressive complication of the calcareous brachial supports. In the most primitive species of the Rhynchonellacea no crura are present (*Protorhyncha*), but in all later forms these appendages are well developed, and finally in the Trias and Jura attain very great length in *Rhynchonellina*. In the next more complicated superfamily, Terebratulacea, the crura in the primitive members have united anteriorly, thus forming the simple unchanging loop of *Centronella* and *Rensseleria*, which is also known to occur in the very young of some species of the highest superfamily, the Spiriferacea. The geological history of the loop has shown that the brachia have been constantly changing, causing more or less complete resorption of the hard parts and adaptation to later requirements. The progressive development of the loop is also repeated ontogenetically and more or less fully in living terebratuloids.

In *Zygospira*, the oldest known genus of the suborder Spiriferacea, the primitive loop of *Centronella* is reproduced in the earliest phase in

the development of its brachidium. This is partially resorbed and changed in form, and to it is then added laterally the two spirals and medially the simple or, in the higher forms, the complex processes, or jugum. The volutions of the spirals in the oldest genera geologically are very few, but subsequently they become more numerous, and attain their maximum in the long-hinged Devonian and Carboniferous spirifers, where 35 volutions have been observed, with 24 in *Atrypa*.

The form of the paired spirals varies but little except under the necessity of conforming to the interior cavity of the valves. Their inclination and direction is a feature of much significance when considered with reference to the development of the entire shell. It is the loop, or to employ a term more appropriate in view of the homologies of the spire-bearing and loop-bearing shells, the *jugum*, however, which is subject to the most frequent variations in form, and which serves as the generic index. When the spirals are directed outward toward the lateral margins of the valves, the jugum seems to be much more variable than in shells where the spirals are introverted or take some intermediate position. In the latter there is a much greater variation in the position of the loop upon the primary lamellæ than occurs in the former.¹

GENERAL DEVELOPMENT.

In the preceding pages it is shown that the four types of pedicle openings which serve as the prime characters in distinguishing the four orders, *Atremata*, *Neotremata*, *Protremata*, and *Telotremata*, are present in the oldest division of the Cambrian, the *Olenellus* zone. From the pre-Cambrian sedimentary rocks, or Algonkian system, practically no fossils are known, though there is evidence in them that life existed. The fact that the *Olenellus* zone has a varied marine fauna alone indicates that the sea during Algonkian times must have swarmed with living things. When the enormous time represented by the great thickness of North American pre-Cambrian sediments is considered, or that of Bohemia, it is evident that ample time elapsed for life to attain the degree of complexity manifested in the basal Cambrian zone. Kayser says that this pre-Cambrian time was "probably so long that the beginning of the Cambrian period may be considered as comparatively a recent event."² Van Hise, in writing on the same subject, says:³

If geological history were to be divided into three approximately equal divisions, these divisions would not improbably be the time of the Archean, the time of the clastic series between the Archean and the Cambrian, and the time of Cambrian and post-Cambrian. In this connection it is well to recall that many years ago Logan suggested that the thickness of the Laurentian and Huronian may surpass that of all succeeding formations, and that the appearance of the so-called Primordial fauna may be considered as a comparatively modern event.

In the Lower Cambrian there are not many species of brachiopods, nor is the specific differentiation in any order very varied, indicating

¹ Hall and Clarke, Paleontology of New York, Vol. VIII. Part II, 1895, p. 343.

² Text-Book of Comparative Geology, 1893, p. 13.

³ Sixteenth Ann. Rept. U. S. Geol. Survey, Part I, 1896, p. 760.

either that evolution in pre-Cambrian eras was much slower than subsequently or that the class had its origin late in the Algonkian. Cambrian brachiopods usually differ fundamentally from one another, and do not appear to have been persistent, as but 4 of the 22 genera pass into the Ordovician. Differentiation also appears to have been slow during the Lower and Middle Cambrian, but toward the close of this system species begin to be more numerous and varied. In Middle Ordovician times all the orders and superfamilies are well established except Terebratulacea. The zenith of the class was attained in the Silurian and Devonian eras, but decline began during late Devonian, and steadily continued to the close of the Paleozoic. But 7 of the Carboniferous genera are known to have survived the break between the Paleozoic and Mesozoic. During the latter time the spire-bearing brachiopods pass out of existence, while the great Paleozoic superfamily Strophomenacea is represented by a few small species of the Thecidiidae, which continue to be represented up to the present time. After the Cretaceous system the orders Atremata, Neotremata, and Protremata are represented only by *Lingula*, *Discina*, *Discinisca*, *Crania*, and *Thecidium*. The Terebratulidae may have had their inception below the middle of the Ordovician, but are not a pronounced Paleozoic group. However, in the Jurassic and Cretaceous systems the rocks abound with the shells of this family, and from that time on they are the chief representatives of the class. *Lingula* and *Crania* are present in the Ordovician, and, as far as can be determined, have persisted to the present time.

Of the 49 families and subfamilies constituting the class, 43 became differentiated in the Paleozoic, and of these 30 disappeared with it, while but 13 continued from the Paleozoic into the Mesozoic. Of Paleozoic families, 6 are represented by living species, viz, *Lingulidae*, *Discinidae*, *Craniidae*, *Thecidiidae*, *Rhynchonellidae*, and *Terebratulidae*.

Of the 327 genera now in use, 227 had their origin in Paleozoic seas, or nearly 70 per cent of the entire class, and of this great number but 8 are positively known to pass into the Mesozoic, viz, *Lingula*, *Orbiculoidea*, *Crania*, *Rhynchonella*, *Spiriferina*, *Athyris*, *Terebratula*, and *Hemiptychina*. Besides these, *Streptorhynchus*, *Cyrtina*, *Retzia*, *Martinia*, and *Martiniopsis*, are mentioned as occurring in the Triassic, but these species probably in great part belong to other genera.

The Atremata, which contains the oldest and the simplest forms structurally, is represented by 29 genera, while the Neotremata and Protremata have 30 and 89, respectively. Telotremata is the last order to appear, and has by far the greatest number of genera, 179.

The chronogenetic history of brachiopods shows that the four orders begin with smooth shells, and that subsequently various kinds of surface ornamentation are developed or disappear with varying degrees of rapidity. The ontogeny of strongly plicated and lamellose shells, wherever observed, begins with smooth shells. All new surface characters

are first introduced during adolescent growth or senility, and these by the law of acceleration appear earlier and earlier in later species. In the Lower Cambrian there are species of *Billingsella* with a few broad undulations in the shell, but in the Middle Cambrian the plications are pronounced and cover half or more than half the anterior portion of the valves, while in the Upper Cambrian these folds appear upon the umbones. In the oldest rostrate pentameroids the shells are either smooth or have a few folds (*Camarella*), which become more distinct in *Parastrophia*, and culminate in numerous sharp plications in *Anastrophia*. The rhynchonelloids, beginning in *Protorthis* of the Lower Cambrian as smooth shells, gradually become more and more plicated in the Silurian and Devonian, yet in the Triassic many species again appear nearly smooth.

STRUCTURAL CHARACTERS.

THE PROTEGULUM.

The order *Atremata* is the radical brachiopodous stock, which early in its history gave origin more or less directly to the other three orders of brachiopods. Beecher has observed:¹

That all brachiopods, so far as studied by the writer, have a common form of embryonic shell, which may be termed the protegulum. The protegulum is semi-circular or semielliptical in outline, with a straight or arcuate hinge line, and no hinge area. A slight posterior gaping is produced by the ventral valve being usually more convex than the brachial. The modifications noted are apparently due to accelerated growth, by which characters primarily nealagic [=neanic] become so advanced in the development of the individual as to be impressed finally upon the embryonic shell. This feature is well shown in the development of *Orbiculoidea* and *Disciniscia*.

As the protegulum has been observed in about 40 genera, representing nearly all the leading families of the class, its general presence may be safely assumed. [In structure it is corneous and imperforate and varies in size from 0.05 to 0.60mm. The] prototype preserving throughout its development the main features of the protegulum, and showing no separate or distinct stages of growth [is found in the Lower Cambrian genus *Paterina*]. The resemblance of this form to the protegulum of other brachiopods is very marked and significant, as it represents a mature type having only the common embryonal features of other genera.

Since the above was written Mr. C. D. Walcott has shown that the type species of *Paterina* has a well-developed cardinal area, and that it is synonymous with *Iphidea*.² The latter, however, is generally assumed to have an apical pedicle opening as in the *Acrotretida*. This is now known not to be the case. The supposed perforation is but a slight depression or short groove in the apex of the ventral valve, and does not pass through the shell. *Iphidea* is therefore in harmony with *Paterina*, since both have more or less well-developed cardinal areas. The theoretical *Paterina* or prototype of the protegulum is therefore

¹ Am. Jour. Sci., April, 1891, 3d series, Vol. XLI, pp. 344-346.

² Proc. U. S. Nat. Mus., Vol. XIX, 1897, pp. 707-713.

not yet known. It is evident, however, from the material Mr. Walcott possesses, that Iphidea-like forms will be discovered in which the cardinal area is undeveloped and in harmony with the protogulum. It is in this sense that the terms Paterina and paterina stage are used throughout this work.

THE PRODELTIDIUM.

The term prodehdtidium is applied by Hall and Clarke to the third shell plate originating on the dorsal side of the body wall in the cephalula stage of *Thecidium mediterraneum*, the only living species of Protremata. This plate, however, is not restricted to that order, but has been observed by authors as also occurring in the Atremata and Neotremata. The term prodehdtidium is here applied to this embryonic plate wherever it occurs unmodified.

Beecher has shown that the prodehdtidium in the Protremata is the first cause for the development of the deltidium so characteristic of this order. That this plate is also present in the Neotremata is apparent from the description of a brachiopod larva of *Discina* (= *Discinisea*) given by Fritz Mueller. These larvæ were captured in abundance off Desterro or Santa Cathrina, Brazil, but Mueller was not so successful as Kovalevsky and others in securing the earlier larval stages of other genera developing in the brood pouch, and therefore nothing is known as to the place of origin of the prodehdtidium in Neotremata. Since, however, the prodehdtidium is also present in young *Lingula* of the order Atremata, where it is wholly attached to the interior of the dorsal shell, it appears safe to assume that this plate invariably develops on the dorsal side of the thoracic segment of embryonic brachiopods, and later becomes attached either to the dorsal (Atremata) or ventral valve (Neotremata and Protremata), except where, as in the Telotremata, it does not occur.

Before taking up the phylogenetic significance of the prodehdtidium, it will be advisable to state what is known of this plate in the Atremata and Neotremata. Since it was first discovered by Fritz Mueller in the Neotremata, where also it is best developed, and subsequently was homologized by Brooks with a similar plate in Glottidia, it will here be given first consideration. Mueller writes:¹

Mit ihrem Hinterrande dem ausgebuchteten Hinterrande der Bauchschale anliegend, gewahrt man zwischen den Schalen eine *querovale Platte*, 0.06 mm. lang, 0.11 breit, mit dunklerem, oft braunröthlich gefärbtem, ringförmigen Rande. Sie haftet an der Bauchschale, deren Bewegungen sie folgt, und steht mit der Rückenschale nur durch Muskeln in Verbindung.

There is, then, in this *Discinisea*, a transversely oval plate somewhat loosely attached to the ventral shell near its posterior margin, the movements of which it follows. Mueller adds:²

Die querovale Platte tritt unter der bis zum Vorderrande der Rückenschale vorgeschobenen Bauchschale vor, beginnt sich nach hinten zu verlängern und ein faseriges Ansehen zu zeigen (Stiel?); sie folgt, nach wie vor, den Bewegungen der Bauchschale.

¹ Archiv Anat., Physiol., 1860, p. 74.

² Ibid., p. 78.

Since in this stage of *Discinisca* there is no pedicle present, Mueller apparently was disposed to regard the prodeltidium as the equivalent of the pedicle. That this is an erroneous interpretation seems certain, for in his second paper he states: ¹

Die bis dahin zwischen den Schalen verborgene querovale Platte (der Stiel) tritt hervor, indem sie sich wie es scheint, um dem ausgebuchteten Hinterrande des Bauchschale vollständig herumdreht und so ihr vorderer Rand zum hinteren wird.

In *Glottidia* the pedicle does not appear until sometime after the prodeltidium is developed, and it seems reasonable to assume from the description of Mueller that, on the development of the pedicle, the prodeltidium is pushed and turned backward, and between this and the notched ventral margin the pedicle passes. The pedicle opening at this stage is therefore surrounded by shell matter, anteriorly by the protegulum and posteriorly by the prodeltidium, characters duplicated in *Thecidium*. In the latter genus the prodeltidium develops into the deltidium, whereas, according to Mueller, this plate subsequently disappears in *Discinisca*. Brooks, also, is not disposed to accept Mueller's interpretation of this plate as the pedicle, since he writes: ²

If it is the same [the transversely oval plate of *Discinisca* and the dorsal semicircular plate of *Glottidia*], Mueller is certainly in error in his suggestion that it is the peduncle, for there is no connection between the two structures.

In *Glottidia' pyramidata*, Brooks has shown that the prodeltidium is also present, yet here it does not become attached to the ventral shell, but is firmly fastened to the dorsal valve, and this apparently was consummated in the paternia stage. Brooks writes:

I was not able to learn anything of the significance of the semicircular plate shown in figures 1 and 3. It is found only in the dorsal valve, and is either a mark upon its inner surface or a plate between the body and the valve. According to Fritz Mueller, the Brachiopod larva studied by him possessed a similar structure. * * * The embryo of *Lingula* is so small and thin that if this were a separate plate, it would be rather difficult to prove without seeing it move, or find it bent outward. In the absence of such evidence, we seem warranted in concluding that it is a similar structure to the movable plates of Mueller's larva, although, in *Lingula* at least, it is in connection with the dorsal, not the ventral valve.

No one has yet mentioned the presence of the prodeltidium in living Telotremata, and it may prove to be absent in this order, as it is not developed in the three species carefully studied by Morse, Kovalevsky, and Shipley.

Recapitulation.—The prodeltidium is present in *Atrēmata*, *Neotremata*, and *Protremata*. In the embryonic brachiopods developing this plate it is first found on the dorsal side of the body wall, and later is ankylosed to the ventral shell in *Protremata* (*Thecidium*). In the *Neotremata*, the earliest embryonic stages of which are not known, it is found completely developed and loosely attached to the ventral shell, anterior to the posterior margin. It subsequently turns backward to

¹ Archiv für Naturgesch., 1861, p. 54.

² Chesapeake Zoological Laboratory, session of 1878; Johns Hopkins University, 1879.

the posterior margin of the same valve, and the pedicle is believed to emerge between the plate and the valve (*Discinisca*). The prodeltidium is therefore alike in final position in the Neotremata and Protremata. In the Atremata this plate is either attached by its entire surface or by the posterior margin only to the dorsal shell, as in *Glottidia*, where the earliest embryonic stages are also unknown. The prodeltidium is likewise dorsal in the cephalula stage of *Thecidium* (Protremata), but subsequently is attached to the ventral shell, yet in reality remains dorsal to the animal. In *Glottidia* (Atremata) this plate remains attached to the dorsal valve, and in nowise affects the pedicle opening, as in the Neotremata and Protremata. In the Telotremata the prodeltidium has not been observed, nor has any fossil species in this order shown the least trace of a deltidium, and wherever the delthyrium is closed it is always by plates growing medially from its walls, secreted by the mantle and never by the peduncle. Therefore, when the prodeltidium remains stationary or with the dorsal valve, it is not known that this plate affects the original pedicle opening (Atremata and Telotremata), but when subsequently attached to the ventral valve and partly surrounds the pedicle with shell matter, it completely modifies the primitive pedicle opening by restricting it to the ventral shell (Neotremata and Protremata). In the derived or later-appearing families of the Neotremata and Protremata the effects of foraminal modification initiated by the prodeltidium may be wholly lost, as in *Craniidae* and *Orthiidae*.

SIGNIFICANCE OF THE PRODELTIIDIUM.

The deltidium is the chief character of ordinal importance in the Protremata, and since this plate is attached to the ventral valve, yet originates in the dorsal prodeltidium, it seems reasonable to assume that if similar developmental conditions are found in other orders such orders would possess closer phylogenetic relationship than those having differing conditions. It has been shown that the prodeltidium is also attached to the ventral valve in the Neotremata, and so far both orders show relationship in their earliest embryonic growth. Beecher has shown that the protegulum or initial shell of the Protremata is discinoid in form and more like that of the Neotremata than that of the Atremata or Telotremata. He writes:¹

Discinisca shows a subcircular ventral protegulum with a pedicle notch, and the evidence of any hinge in the dorsal protegulum is very slight. The discinoid character appearing in the second and third nepionic stage of the Paleozoic *Orbiculoidea* has become so accelerated in Neozoic and recent *Discinisca* as to produce a discinoid protegulum.

The strophomenoid shells usually retain a normal protegulum in the dorsal valve, but from the acceleration of the discinoid stage in the ventral valve the protegulum, has an abbreviate hinge and arcuate hinge line. (P. 346.)

The nepionic stage of *Leptana rhomboidalis* is represented by a shell without radii, having a comparatively large pedicle opening in the ventral valve and a large deltidium. The hinge is not well defined and the shell is discinoid in form. * * *

¹Am. Jour. Sci., 3d series, Vol. XLI, 1891, p. 346; Vol. XLIV, 1892, pp. 150-151.

The external characters as expressed by both valves are manifestly nearer to Kutorgina than to any telotremate genus. * * * It should be noted, however, that the young of *Chonetes*, *Productus*, *Strophodonts*, *Orthothetes*, *Leptena*, *Plectambonites*, and *Strophomena*, all have little or no indication of a straight hinge line, and that the extension of this member takes place during later nealoeic and epeheolic growth. (Pp. 150-151.)

By far the greatest number of Neotremata occurring in the Lower Cambrian are species of the family Aerotretidae. To the writer it has always seemed strange to suppose that this family has been derived through the Trematidae, but the above interpretation of the prodeltidium in *Discinisca* indicates that the turning of this plate posterior to the pedicle at once led to holoperipheral growth in some of these early forms. In some species of the Aerotretidae there is a true deltidium. In *Aerotherle* the cardinal area is flat, without any trace of a deltidium, whereas in *Aerotreta* and *Conotreta*, which have high cardinal areas, there is a narrow concave depression bisecting it. These deltidia, whether convex or concave, are in all probability initiated by the prodeltidium, as in the Protremata. In the family Trematidae there appears to be nothing homologous with the deltidium, since the plates situated in the apex of the wide triangular fissure of *Schizocrania* and *Lingulodiscina* seem to be formed anterior to the pedicle and subsequent to its movement posteriorly with growth, and not posterior to the pedicle, as in the Aerotretidae. These plates in the Trematidae should probably be homologized with the listrium of the Discinidae.

The complete harmony of the muscular system in the Protremata and Telotremata is no evidence in itself that the latter were derived from the former. The occurrence at the base of the Cambrian of very primitive species of the four brachiopod orders is proof that divergence took place very early in the history of the class, and while there is little knowledge of the muscles in either *Iphidea*, *Kutorgina*, or *Protorhyncha* (*P. ? minor* and *P. ? ambigua*), the earliest genera of *Atremata*, *Protremata*, and *Telotremata*, respectively, there is some evidence for supposing them to be as in the type embryo stage of living species. The high degree of specialization attained by *Lingula* (*Atremata*), as exemplified by the burrowing habit, long peduncle, and absence of valve articulation, is the cause for their complex muscular system, while the development of a functional hinge in the *Protremata* and *Telotremata* has led to the retention of very primitive conditions or to the simplification and harmony of the muscles throughout these two orders.

The presence of a terminal intestinal opening in the living species of the *Atremata* and *Neotremata* and its general absence in those of the *Protremata* and *Telotremata* is no longer held to have phylogenetic significance, as many of the Paleozoic species of the two latter orders afford good evidence of such having been present in the median line as in living *Crania*.¹

¹ See p. 113.

The known protegula, or initial shells, of the Neotremata and Protremata have been shown to be harmonious, and to differ from the normal unmodified protegula of the Atremata and Telotremata. The paterina stage in the two last-named orders is followed by the "obolella stage" in the highest families of the Atremata (Lingulellidæ and Lingulidæ), and probably throughout the Telotremata, since it has been observed in a number of Ordovician and Silurian Rhynchonellacea, Spiriferacea, and recent Terebratulinas.¹ In the Neotremata and Protremata the paterina stage is not followed by the obolella stage, but usually by holoperipheral growth, except where the pedicle slit remains for a time wholly uninclosed by shell matter.²

In tabulated form the above-presented facts appear thus:

Table of fundamental brachiopod characters ordinally arranged.

| Character. | Atremata. | Telotremata. | Neotremata. | Protremata. |
|---|--------------------------------|---|--|--|
| 1. Prodeltidium in type embryo. | With dorsal valve. | Absent | With ventral valve. | With ventral valve. |
| 2. Prodeltidium affecting pedicle opening. | None | None | Modified in primitive forms. | Modified throughout. |
| 3. Deltidium present | None | None | Present in primitive forms. | Present throughout. |
| 4. Protegulum..... | Present..... | Present..... | Present..... | Present. |
| 5. Obolella stage.... | Present..... | Present..... | Absent..... | Absent. |
| 6. Anns | Present..... | In many early geologic species. | Present..... | Present in pentameroids. |
| 7. Chemical nature of shell. | Phosphatic and calcareous. | Calcareous..... | Phosphatic and calcareous. | Calcareous. |
| 8. Cardinal area.... | Present, but usually small. | Not generally present. | Present in primitive forms only. | Generally present. |
| 9. Similarity of valves. | Very much alike.. | Unlike. | Very unlike. | Unlike. |
| 10. Articulation | Often present, not functional. | Functional | Rarely present, not functional. | Functional. |
| 11. Nature and function of pedicle.. | Affixing and burrowing. | Generally present, affixing; shell rarely cemented. | Generally present, affixing; cementation complete. | Affixing or obsolete; cementation or anchoring spines present. |
| 12. Brachia, with or without internal skeleton. | Without..... | With or without.. | Without. | With or without. |

It now appears evident that the two great divisions of brachiopods heretofore based on the presence or absence of functional articulation have no phylogenetic significance, and as they "do not appear to have a primary developmental basis in nature, * * * they fail to express the true relationships of the various groups included in them."³

¹See papers by Beecher and Clarke, Brooks, Morse, Beecher and Schuchert, and Winchell and Schuchert.

²See Am. Jour. Sci., 3d series, Vol. XLIV, 1891, pp. 150-151.

³Beecher, Am. Jour. Sci., 3d series, Vol. XLI, 1891, p. 353; also see Vol. XLIV, 1892.

Articulation was developed along two independent lines, and therefore the terms Lyopomata and Arthropomata have no phylogenetic significance. The presence or absence of articulating processes was at one time considered a fixed line, on either side of which all brachiopods could be arranged, but now articulation is known to be nearly functional in several lyopomatous genera, as in *Spondylobolus*, *Trimerella*, *Monomorella*, *Tomasina*, *Barroisella*, of the *Atremata*, and in *Trematobolus* of the *Neotremata*. Among the *Arthropomata*, articulation is hardly functional in *Kutorgina*, *Schizopholis*, *Eichwaldia*, and *Dictyonella*. However, it appears probable that two superorders exist, each having two orders. *Atremata* and *Telotremata* are the more primitive groups, and agree in the following fundamental characters: Prodeltidium attached to the dorsal valve or absent; pedicle opening primarily unmodified, and generally closed later by calcareous plates secreted by the ventral mantle extensions; presence of a functional pedicle throughout the life of the individual (except in *Thecospira*, *Theco-cyr-*

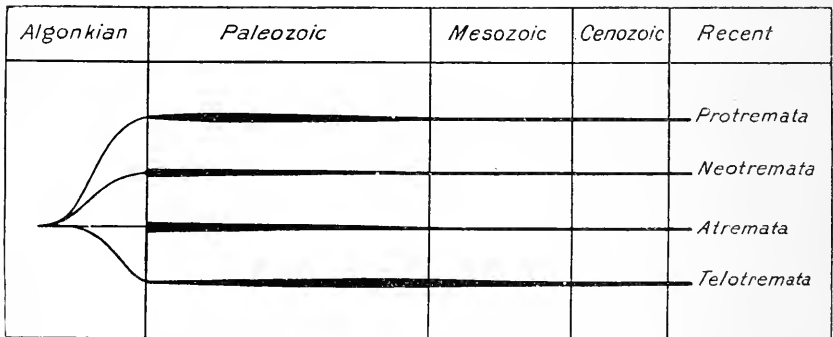


FIG. 1.—Diagram giving the geological distribution of brachiopod orders.

tella, and *Bittnerula*); general presence of the "obolella stage" in the ontogeny of atremate and telotremate species, and the development of complicated calcareous brachial supports in the derived order. The *Neotremata* and *Protremata* agree in having the prodeltidium attached to the ventral valve with complete nepionic modification of the pedicle opening; delthyrium often closed by a single plate secreted by the pedicle and never by mantle extensions; the pedicle is very often lost before maturity is attained, along with the development of new anchoring adaptations; absence of the "obolella stage" and complicated calcareous brachial supports.

Owen's superorders *Lyopomata* and *Arthropomata* have no basis in nature, and should be dropped. It is to be hoped that students will determine the complete embryology of *Lingula*, *Discuisca*, *Crania*, *Rhynchonella*, and *Terebratulina*, for until more of the ontogeny of some species of these genera is known, no satisfactory relationship which the orders bear to one another can be established. However, it appears probable that *Atremata* and *Telotremata* have superordinal relationship

differing from that of the Neotremata and Protremata. If the characters above pointed out are of superordinal value, it will be convenient to refer to these divisions as *Homocaulia* and *Idiocaulia*, respectively.¹

DEVELOPMENT OF CARDINAL AREAS AND ARTICULATION.

The earliest suggestion of cardinal areas occurs in Iphidea of the Atremata and in the Acrotretidæ of the Neotremata. In none of these forms, however, is there a true cardinal area comparable with those of the Protremata and Telotremata, since it is not bisected by a delthyrium, nor are deltidial plates developed. A convex pseudodeltidium is often present, but this feature is not homologous with the deltidium of the higher forms. It is due to holoperipheral growth and interference by the pedicle. In the dorsal valves of primitive genera in both the Atremata and Neotremata growth is hemiperipheral, but in the ventral valve of Iphidea, the most primitive known genus of Atremata, and in the Acrotretidæ of the Neotremata, growth is holoperipheral.

The ontogeny of many species of Protremata shows that this order had its origin in some atrematous paterina-like genus. This must have occurred in pre-Cambrian times, since in the Lower Cambrian there are several species of *Billingsella*, a highly developed protrematous genus when compared with the theoretical Paterina. *Kutorgina cingulata* Walcott, also of the Lower Cambrian, is a more primitive species than any *Billingsella*, and it gives evidence as to the course of evolution from the inarticulate paterina-like ancestor to this rudimentary, articulate, long-hinged genus. *K. cingulata* in connection with the Indian genus *Schizopholis* Waagen shows that the opening between the widely gaping valves of Paterina, which was entirely occupied by the pedicle, was partially closed by a gradual thickening of the lateral walls, and there was slowly developed a primitive, ventral, cardinal area. This area and the articulating processes in *K. cingulata* are very rudimentary, and are situated at the lateral extremity of the cardinal area; thus this species still retains a very large open delthyrium, much as in the theoretical Paterina. In *Schizopholis* this wide fissure is reduced to a narrow triangular delthyrium by the development of a true cardinal area, and the articulating processes are now no longer at the lateral extremities, as in *Kutorgina*, but are situated more medially. Naturally, in the older Cambrian, complete articulation did not obtain, as in post-Cambrian times. Some of the oldest protrematous species, such as *K. cingulata*, *Billingsella whitfieldi*, and possibly others, also retain considerable phosphatic material in their shells, but in later and more highly specialized species the shell is decidedly calcareous.

Some of the species of Iphidea have the ventral posterior region

¹Ὅμοσ (homos), ἰδίος (idios), and καυλός (kaulos) = stem or pedicle common to both valves and pedicle restricted to one valve, respectively. These characters may be retained throughout life or restricted to the nepionic and neanic stages of growth.

more drawn out beyond the dorsal posterior margin than others. If this rostrate condition were carried a little farther and the pseudodeltidium resorbed, there would practically result a telotremate shell duplicated by the neanic condition of many rostrate Telotremata. The articulation would at first be nearly obsolete and situated extremely lateral, as in the Protremata, but as the cardinal area became greater the teeth would attain a more medial position. While there are no known genera to fill in the gap between the theoretical Paterina and Protorhyncha (*P. minor* and *P. ambigua*), yet the hiatus between the Atremata and Telotremata is not greater than between theoretical Paterina and Kutorgina, or between the Atremata and Protremata.

DEVELOPMENT AND SIGNIFICANCE OF THE DELTIDIUM.

The most characteristic mature feature of ordinal importance which distinguishes Protremata from the other three orders is found in the plate that more or less completely covers the delthyrium. However, in two of the families of this order, Pentameridæ and Orthidæ, this plate is generally wanting in the mature individual, since here it usually develops only during early growth, and later is lost by abrasion or hidden beneath the incurved beak. Again, in the Acrotretidæ of the Neotremata, and in Iphidea of the Atremata, a deltidium-like plate is also often developed, but as these shells are strongly phosphatic it is not difficult to distinguish the ordinal position of any shells with a true deltidium. In *Lacazella mediterranea*, the only living species of Protremata, this plate has its origin in the cephalula stage along with the rudiments of the dorsal and ventral valves, when the embryo is yet free and swimming about by the aid of cilia. The dorsal shell and the prodeltidium appear first, and are secreted by the rudimentary dorsal mantle and the dorsal surface of the body, which subsequently becomes the pedicle. The ventral shell appears last, and is then widely separated from the dorsal valve. Between the two valves is the thick and short pedicle, on the dorsal surface of which still remains the third plate, or prodeltidium. Subsequently the latter is anchylosed to the posterior margin of the ventral valve. The prodeltidium is also known in the Atremata and Neotremata, yet in the Telotremata this embryonic third plate does not exist, but a covering to the delthyrium is developed sometime after the animal has become attached. In its origin this covering is wholly different from the deltidium of the Protremata, which has its beginning in the prodeltidium and grows down from the shell apex over the delthyrium, while the deltidial plates of Telotremata grow out medially from the walls of the delthyrium. The deltidial plates are secreted by extensions of the ventral mantle, and at no period of development has the pedicle any share in their formation. It is not always easy to distinguish mature protrematous and telotrematous shells on the basis of these characters alone, but the young of both orders are

easily classified by the covered or open delthyria, respectively. In some of the Telotremata, toward maturity the deltidial plates anchylose medially posterior to the pedicle, or they may surround the pedicle, thus resembling the deltidium, but, since their origin is quite different, they are termed "pseudodeltidia." Such pseudodeltidia in *Cyrtia*, *Cyrtina*, and some spirifers resemble the deltidium of *Clitambonites*. Even the median line of anchylosis is often obliterated by the continuous secretion of the completely united prolongations of the ventral mantle lobe. In the *Pentameridæ* the deltidium is generally absent, as in the *Orthidæ*, but in *Pentamerus* and *Conchidium* it is often retained as a thin, fragile, concave plate. This reversal in form from the generally prevalent, convex, or flat deltidium may be due to the rostrate and arched ventral umbones so common in these genera. In the aberrant rostrate genus *Dictyonella*, which has an arched ventral umbone, a concave plate is also present, between which and the shell the pedicle passes and emerges upon the umbone, as in the *Siphonotretidæ*. It is not certainly known that this plate in *Dictyonella* is a deltidium, but its form and position in the rostral cavity are very suggestive of that organ in *Pentamerus* and *Conchidium*. The peculiar umbonal pedicle opening in *Dictyonella* also finds its equivalent in *Leptæna*.

THE CHILIDIUM.

The chilidium is a convex plate often covering the cardinal process of the dorsal valve in the Protremata. It is particularly well developed in the families *Clitambonitidæ* and *Strophomenidæ*, and is not to be confounded with the deltidium, since it first makes its appearance not earlier than neanic growth, and apparently is a secretion of the dorsal mantle lobe. The origin of the chilidium and of the deltidium is therefore wholly different, and both have very dissimilar phyletic significance.

ORIGIN AND FUNCTION OF THE SPONDYLIUM.

The spondylium is an internal ventral plate traversing the posterior portion of the animal. The upper surface of this plate is usually transversely marked by striae, which, in the *Pentameracea* have three distinct curvatures in passing over it.

Since their position and the area occupied agree with the muscular scars of this valve in *Orthis*, they are here regarded as homologous with the adductors, diductors, and adjustors of that genus. In *Lingulasma*, *Lingulops* and the trimerellids the muscular scars are not found in front nor underneath, but on the "platform" of those genera. The platform, therefore, is homologous with the spondylium of *Clitambonites* and *Pentamerus*. * * * The portion of the valve immediately beneath the spondylium, and occasionally the sides of the septum, are strongly marked by the genital sinuses. Since there is no space posterior to these markings for the attachment of the muscles, this clearly indicates that they were situated on the upper surface of the spondylium.¹

¹ Winchell and Schuchert, Final Rept. Minn. Geol. Survey, Vol. III, Part I, June, 1893, p. 378.

The spondylium is developed as the "platform" in Lingulasmatidæ and Trimerellidæ of the Atremata; as a "spondylium" in Pentameracea of the Protremata, and in Cyrtina, Camerospira, Merista, and Dicamara, of the Telotremata. In the Atremata and Telotremata, spondylia-bearing species are not numerous, but the individuals are usually abundant, often of large size, and generally are of short geologic duration.

The development of the spondylium or its morphologic equivalent probably had its origin in an excessive deposit of testaceous matter about the bases of the powerful adductors, diductors, and pedicle muscles. Growth of the individual necessitates the progressive anterior movement of the muscles, and when these are large there is but little or no space left between or outside of them for the viscera and genitalia, which are therefore crowded farther and farther anteriorly. This condition naturally produces constant pressure of the genitalia against the anterior base of the forming spondylium, and since pressure causes resorption or diverts testaceous deposition, it follows that these organs will gradually produce cavities for their relief beneath this plate. In the older species of the Trimerellidæ and in all of the Lingulasmatidæ displacement of the genitalia does not appear to have been excessive, as the platforms are but slightly excavated. However, in the terminal genus *Trimerella* the genitalia chambers are very deep, and these are present in both valves. Throughout the Pentameracea the spondylium is a thin, freely terminating or medially supported plate, and never solid as in the older species of the Trimerellidæ. It is likewise thin and excavated in the order Telotremata.

Hall and Clarke advance quite a different explanation as to the origin of the spondylium. They write:¹

The *spondylium* is an area of muscular implantation. In its early or incipient condition it is evident that it originates from the convergence and coalescence of the dental lamellæ, and forms a receptacle for the proximal portion of the pedicle, and for the capsular or pedicle muscles. * * * Considering this structure in its incipient condition, where, as in *Orthis*, it is represented only by the convergent dental plates which usually unite with, or rest upon the bottom of the valve, and inclose only the base of the pedicle and its muscles, it will be evident that the plate is actually but a modification of the original pedicle-sheath. It is evidently the inner moiety of this sheath surrounding the pedicle, which has become involved or inclosed by the growth of the pedicle-valve, and further modified by the development of articulating processes where it comes in contact with the brachial valve. It therefore follows, as a natural inference, that wherever the spondylium is present, whether in the incipient condition or in the more advanced stage of development in which it supports all the muscles of the valve, it is, or, at some period of growth, has been accompanied by the *external* portion of the sheath, which is termed the deltidium. Thus the spondylium appears to be but the complement of the deltidium, or the original plate formed upon the body of the embryo, and that portion of the adult shell to which the term deltidium has been applied, is the other part of the original or primitive deltidial plate or pedicle-sheath.

¹ Paleontology of New York, Vol. VIII, Part II, 1895, p. 332.

The writer also previously entertained this view, but when it became known that spondylia are developed where no dental lamellæ exist, as in the Lingulasmatidæ and Trimerellidæ of the Atremata; that spondylia are never present in the Neotremata, where a pedicle-sheath is sometimes well developed, as in the Acrotretidæ; and finally, that a spondylium is even present where no deltidium ever existed, as in the two first-mentioned families, and in *Cyrtina*, *Camerospira*, *Merista*, and *Dicamara* of the Telotremata, such an explanation became untenable. The fact that solid or excavated spondylia exist in three orders, two of which never developed a pedicle-sheath (Atremata and Telotremata), and one had no dental lamellæ (Atremata), is good evidence that the prodeltidium primarily had nothing to do with the development of spondylia. Further, no spondylia are developed in the Cambrian until long after the deltidium was well established, and therefore the spondylium can not be "but a modification of the original pedicle-sheath." However, it is very probable that when the dental lamellæ in the Protremata became sufficiently wide to join the ventral shell, crowding all the muscles of this valve into a small area, these took advantage of the inner sides of the dental lamellæ for insertion, and thus a continuous layer of testaceous matter was deposited within the rostral cavity. With growth, the muscles move forward and press against the genitalia, which causes resorption or nondeposition for their relief. No spondylia appear before the Upper Cambrian, and here also are the first completely developed dental lamellæ. The so-called Lower Cambrian *camarellas* have no completely developed dental lamellæ, and are related to the rhynchonelloid genus *Protorhyncha*, and to *Protorthis billingsi*, which also has no spondylium.¹ Therefore, the further conclusion of Hall and Clarke can not be accepted, that, "where the teeth are wholly without dental lamellæ, or where such lamellæ do not extend to the bottom of the valve, it seems necessary to regard them as instances of degeneracy or resorption of the primitive spondylium."²

It seems clear to the writer that since the "shoe-lifter" plate, or spondylium, in *Merista* and *Dicamara* is for muscular insertion, this plate in the ventral valve of these genera is the morphic equivalent of the spondylium in the Pentameracea, and that the dorsal muscular plate in *Dicamara* is the equivalent of the cruralium, and can not "be interpreted as an entirely different structure from the spondylium."³ It is true that the spondylia of these genera are not exactly like those of the Pentameracea, but since this plate in the Atremata is not formed by the union of dental lamellæ, as these do not exist in this order, there is no reason for rejecting the terminology for these plates in *Merista* and *Dicamara*.

¹*Camarella minor* and *C. antiqua* are more closely related to *Protorhyncha* than to any other genus. Of *Orthis billingsi*, the type of *Protorthis*, very good casts of specimens in the Cornell University Museum are in the National Museum, which show that this genus also has no spondylium, and that its characters are those of *Billingsella*.

²Hall and Clarke, *ibid.*, p. 333.

³*Ibid.*, p. 335.

CRURA AND CRURALIUM.

Calcareous processes for the support of the brachia are also developed in the Protremata, in the superfamily Pentameracea, but never to the same degree attained by the Spiriferacea or Terebratulacea of the Telotremata. In the Protremata these supports are first developed in the Syntrophiidae, and attain their greatest length in the Pentameridae. Since the two parts often unite medially, forming a plate for muscular insertion either resting upon the valve or supported by a septum, this has been termed a cruralium by Hall and Clarke, to distinguish it from the spondylium of the ventral valve. When the parts remain separate, and are therefore not for muscular insertion, they are homologous with and the equivalent of the crura in the Rhynchonellidae. The crura of the Pentameracea and Rhynchonellacea arise independently, and are therefore morphologic equivalents.

MORPHOLOGIC EQUIVALENTS.

Because of the presence of similar or identical morphological structures in different groups of mature brachiopods, it is unsafe, on the basis of these alone, to suppose such to have close relationship. The spondylium has been shown to originate independently in three orders: Atremata, Protremata, and Telotremata. Identical mature loops have resulted in different ways in two stocks of the same family, one boreal (Dallinae) and the other austral (Magellaniae). Flat and more or less wide cardinal areas develop independently of one another in Protremata and Telotremata (Spiriferacea). Cementation of valves takes place at different and widely separated geologic epochs in Neotremata, Protremata, and Telotremata, and shell plications arise from smooth stocks in Pentameracea, Rhynchonellacea, Spiriferacea, and Terebratulacea. Natural phylogenies can only be established upon ontogenies checked by chronogenesis or geologic succession.

SUMMARY.

In North America there are 1,859 Paleozoic, 49 Mesozoic, and 14 Cenozoic species of fossil Brachiopoda. There are 116 species in the Cambrian, 319 in the Ordovician, 311 in the Silurian, 663 in the Devonian, and 478 in the Carboniferous.

The remarkable scarcity of post-Paleozoic species in America is supposed to be due not so much to the general decline of the class as to great orographic movements during the close of the Paleozoic, which produced complete barriers against the introduction of species from other areas.

Specific differentiation was most rapid in the Ordovician, having exceeded the Cambrian representation more than three times.

Thirty per cent of all American Paleozoic species had wide geographic distribution, which is most pronounced in the Devonian and

Carboniferous systems. One hundred and twenty-one American species are also found on other continents.

Widely dispersed species are least common in the most primitive order, *Atremata*, and greatest in the highest orders, *Protremata* and *Telotremata*. The difference, however, is but 7 per cent.

The order *Atremata* is represented by 199 species, or over 10 per cent of the American Paleozoic representation. In the *Neotremata* it is 156, or over 8 per cent. The *Protremata* have 738 species, or nearly 40 per cent; and the *Telotremata* 766 species, or about 41 per cent.

The order *Atremata* is best developed in species and genera in the Cambrian and Ordovician systems; the *Neotremata* in the Ordovician; the *Protremata* in the Ordovician, Silurian, and Devonian; and the *Telotremata* in the Devonian. The climax of differentiation is therefore chronologically related to phylogenetic or sequential origin.

Since the four orders of Brachiopoda are present in the Lower Cambrian, ordinal differentiation must have taken place in pre-Cambrian times. The two more primitive orders, *Atremata* and *Neotremata*, have in *Lingula* and *Crania*, respectively, genera with longest life histories. This probably is due not so much to their primitive structures as to their modes of living.

The last order to originate, *Telotremata*, has the greatest number of generic and superfamily characters, and probably also of species.

The last superfamily to appear, *Spiriferacea*, manifests most rapid evolution and is the second one to die out, being preceded by the *Pentameracea*. These two superfamilies are the most highly specialized in the orders to which they belong, and their great specialization may be the cause of their early disappearance.

The trunk families of later origin throughout the class manifest the greatest specific and generic differentiation and the widest specific dispersion, and have species of the largest size and often of longer geologic persistence.

The oldest or most primitive families nearly always have short geologic duration (except *Rhynchonellidae*) and the least generic and specific differentiation, and commonly the individuals are of small size.

The largest of all brachiopods occur in the families *Pentameridae*, *Productidae*, and *Spiriferidae*, at a time when the class was at the height of differentiation.

Large specific size is probably often gradually attained in genetic lines, and is due to favorable food conditions. The gigantic brachiopods always occur in the later-developed trunk families, and just before their decline in differentiation.

But 8 genera are known to pass from the Paleozoic to the Mesozoic. There are in all 327 brachiopod genera, 227 of which are Paleozoic. The *Atremata* have 29 genera, the *Neotremata* 30, the *Protremata* 89, and the *Telotremata* 179.

All brachiopods begin with smooth shells and protegula.

The prodeltidium, or third embryonic shell plate, is known in the Atremata, Neotremata, and Protremata. In the Atremata this becomes attached to the dorsal valve, while in the Telotremata it is apparently not developed at all. In the Protremata it becomes attached to the ventral valve, as in Neotremata. In the two last-named orders it modifies the pedicle opening. For this and other ontogenetic and morphologic characters, Owen's terms Lyopomata and Arthropomata are abandoned. The Atremata and Telotremata are provisionally arranged under the superordinal term *Homocaulia*, and the Neotremata and Protremata under *Idiocaulia*.

Morphologic equivalents, or similar structural features, are developed independently, as follows: A spondylium in Obolacea, Lingulacea, Pentameracea, and rarely in Spiriferacea; crural processes in Pentameracea and Rhynchonellacea; functional articulation in Protremata and Telotremata; straight, more or less long, cardinal areas from rostrate forms in Rhynchonellacea, Spiriferacea, and Terebratulacea; rostrate shells from long cardinal areas in Pentameracea, and loss of pedicle and ventral shell cementation in Craniacea, Strophomenacea, and Spiriferacea.

CHAPTER IV.

MORPHOLOGY OF THE BRACHIA.

By CHARLES E. BEECHER.¹

The diagnostic value of the brachidium, or calcareous arm supports, of brachiopods has long been recognized, and forms one of the chief characters for generic and family subdivision among the Terebratulacea and Spiriferacea. This character fails in all other brachiopods, which have simply fleshy arms, unsupported by calcareous skeletons. There is, however, generally the most obvious analogy and intimate relationship between the arms themselves and the brachidium, so that whenever either structure can be ascertained it furnishes important data aiding in the determination of the systematic position of any genus within a family or order.

The growth of the arms, or lophophore, in recent genera may be divided into distinct stages, which often have a direct correlation with other important features of the shell. In many cases it is also possible to infer the form and arrangement of the brachia in fossil genera from markings on the interior of the valves and from the calcareous arm supports, and thus to obtain the chronogenetic as well as the morphogenetic history of these organs.

The most detailed accounts of arm development are given by Brooks⁵ for *Glottidia*, by Morse¹¹ for *Terebratulina*, and by Kovalevski¹⁰ for *Cistella* and *Thecidea*. These results, combined with original observations by the writer^{1,2} and occasional descriptions of arm structure by Davidson⁷ and other authors, are sufficient to include and properly interpret all the leading varieties of structure.

As shown by Brooks,⁵ the tentacles, or cirri, in *Glottidia* originate on the dorsal side of the oral disk. They grow in pairs, one on each side of a central lobe. New tentacles are added between the first pair formed and the median lobe. Thus the cirri farthest removed from the median lobe are the oldest. Tentacles are added rapidly until the first are extended to a semicircle, and then progressively the whole disk becomes surrounded by a circle of these organs. The further introduction of cirri can only take place by the enlargement of the oral disk or through the deformation of the circle by lobes, loops, or extensions. In *Glottidia*, *Lingula*, *Dicrinisca*, *Crania*, and *Rhynchonella* the two points of tentacular increase, originally together and on

¹The references to the literature will be found at the end of this chapter.

opposite sides of a median lobe, or tentacle, gradually separate, and the further multiplication of tentacles results in strap-shaped extensions on each side, which finally assume a coiled form, due to the limited space in which they grow. Therefore the arms in adult individuals of these genera have a single ciliated edge, extending from their free extremities to the sides of the oral disk, and, continuing posteriorly, unite on the ventral side of the disk behind the mouth. Each ciliated edge in the adult lophophore apparently has two approximate rows of alternating cirri (Hancock⁹), but as they were originally a single row in early stages, this appearance is evidently the result of a crowding of the cirri or a crumpling of the edge.

Kovalevski¹⁰ has shown that in *Cistella* the tentacles also originate in pairs on each side of the dorso-median line, without a central tentacle or lobe. The same mode of increase has been shown by the writer² to be present in *Magellania* and *Terebratalia*. In young stages of *Cistella*, *Terebratulina*, *Magellania*, and other terebratuloid genera, as well as in *Thecidea*, after the circle of tentacles is complete the two points at which new ones are added do not separate, but remain close together throughout the life of the animal. In this case the ciliated margin is lengthened by means of lobation and looping, and often by the final growth of a single, median, coiled arm, ciliated on both margins. *Gwynia* illustrates the completed circle of tentacles about the mouth. Adult *Cistella* shows an advance in having the anterior margin of the lophophore introverted, making it bilobed. *Megathyris* is slightly more complicated by two additional lobes. This simple method of increase is further elaborated in the *Thecidiidæ*. In the higher genera, especially among the *Terebratulidæ*, the maximum is reached by means of a median, unpaired, coiled arm, as in *Magellania* and *Terebratulina*.

The development of the different types and varieties of arm structure is presented in the accompanying figures (figs. 2-6), which are necessarily somewhat diagrammatic in order to show the features clearly, but the essential structure can readily be verified from consultation of the works cited or from a study of actual specimens. In the case of fossil forms, such as *Dielasma*, the *Atrypidæ*, and *Athyridæ*, the brachial supports have sufficient analogy with the arm structures of *Terebratulina* and *Rhynchonella* to warrant their interpretation as given. Also the spiral impressions on the valves of *Davidsonia*, and those occasionally present in *Leptaena* and *Productus*, clearly point to the possession of coiled arms by these genera.

CLASSIFICATION OF BRACHIAL STRUCTURES.

From what has already been shown it is seen that the various types of lophophores admit of a simple classification into stages and groups. It is proposed to give to these distinctive names, which may be used with facility in making comparisons and correlations. They may be found

useful, also, in designating the kind of brachial complexity attained in any genus the arm structure of which can be determined, thus helping to fix its place in a genetic scale. It should be emphasized, however, that the form and complexity of the ciliated margin of the lophophore can have a taxonomic value only within comparatively narrow limits. This at once becomes evident when the arms of *Lingula*, *Discinisca*, *Crania*, *Rhynchonella*, and all the *Spiriferacea* are considered. Each has spiral arms, which were probably developed through similar changes of form, and yet each is genetically distinct, as shown by all the other leading characters. But when this classification of arm structures is applied within a family or genus, or even when made the basis of comparison among some closely related families, it is sometimes possible to reach very satisfactory conclusions relating to the systematic position of various forms.

LEIOLOPHUS STAGE.

It is hardly necessary to direct attention to the embryonic brachial structure before the growth of any of the tentacles, or cirri, on the edge of the lophophore, while the animal is in the typembryonic stage. For the sake of designating all the stages, this may be called the *leiolophus* stage, though it has no special significance beyond indicating the beginning of the lophophore.

TAXOLOPHUS STAGE.

The first stage in which a true brachial structure is manifest is an early larval form, often the protegulum stage, when the tentacular portion of the lophophore is a simple arc, or crescent. This may be called the *taxolophus*. The tentacles are few in number, and increase takes place on each side of the median line, dorsally, in front of the mouth. In figs. *2a, e, 3a, f, 5a* this character is clearly shown. The tentacles at the ends of the arc are the oldest, and new ones are being formed in the middle portion. In *Thecidea*, *Cistella*, and *Magellania* the tentacles of the *taxolophus* are centripetal, due to the edge of the lophophore being near the margin of the shell; while in *Terebratulina*, *Discinisca*, and *Lingula* they are centrifugal, due to the smaller and central lophophore.

So far as known, there is no adult living form which has the *taxolophian* brachial structure. It may have been present in adult *Iphidea* of the Cambrian.

TROCHOLOPHUS STAGE.

By the continual addition of new cirri and the pushing back of the old ones, the fringed margin of the lophophore passes from a crescentic to a circular form, thus making a complete ring about the mouth. This may be termed the *trocholophus* stage. It appears in the late larval and early adolescent stages of *Thecidea* (fig. *2b*), *Cistella* (fig. *2f*), *Magellania* and *Terebratalia* (fig. *3b*), *Terebratulina* (fig. *3g*), *Glottidia* (fig. *5b*),

and *Disciniscia*, and, like the former stages, is undoubtedly common to all brachiopods, except, perhaps, *Iphidea*.

Gwynia is an adult living representative of this stage, and never develops any higher type of brachial structure. *Dyscolia* also belongs here, since it has a discoid lophophore surrounded by a marginal fringe of tentacles (Fischer and Ehlert⁹). It is possibly a little more advanced than *Gwynia*, as it has a slight median anterior notch, suggesting the beginning of the bilobed structure of the next higher type.

The absence of septum, hinge-plate, and dental plates are other primitive characters belonging to *Dyscolia*.

SCHIZOLOPHUS STAGE.

After the completion of the trocholophus stage in all brachiopods, except such simple forms as *Gwynia* and *Discolia*, no further increase

in the cirrated edge of the lophophore can occur without some deformation of the circle. This is first accomplished by an introversion of the anterior median edge, thus dividing the lophophore into two lobes, and suggesting the name *schizolophus* for this type. (See figs. 2*e, g, 3c, h, 5c.*)

Several brachiopods retain the schizolophian brachia as an adult character. Of these, *Cistella* is perhaps the best example, as it agrees exactly with an early stage of arm structure among the Terebratulidæ, which has been called the *cistelliform*

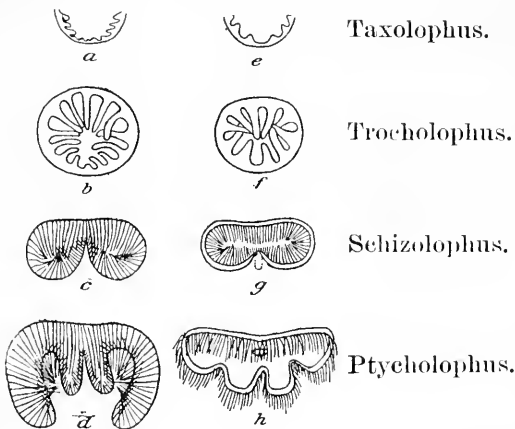


FIG. 2.—Stages of growth of the lophophore in *Thecidea*, *Cistella*, and *Megathyris*. *a, b, c, d*, stages in the growth of the lophophore in *Thecidea* (*Lacazella mediterranea*, enl. (*a-c* after Kovalevski, *d* after Lacaze-Duthiers). *e, f*, early stages of lophophore of *Cistella neapolitana*, enl. (after Kovalevski). *g*, adult lophophore of *Cistella* (*C. cistellula*), enl. (after Davidson). *h*, labial appendages of *Megathyris decollata*, enl. (after Davidson).

stage (fig. 3*c*). *Terebratulina* (fig. 3*h*), *Glottidia* (fig. 5*c*), and other higher forms, also have corresponding schizolophian stages, but are without the median septum. *Lacazella mediterranea* presents a similar larval structure, and in *L. barretti* it is retained to maturity. The fossil genera *Davidsonella* and *Thecidella* of the Thecidiidæ, and *Zellania* of the Terebratulidæ, never developed beyond the schizolophus stage, and they must therefore be considered as quite primitive genera in their respective families.

From this point the further development and complication of arm structure proceeds in three distinct diverging lines, producing the

three characteristic types of brachia of all the higher brachiopods, as exemplified in Thecidea, Terebratulina, and Rhynchonella.

PTYCHOLOPHUS STAGE.

The simplest of the types of brachia just cited is developed out of the schizolophus by the additional lobation, or looping, of the primary lobes, making a structure which may be called the *ptycholophus*. *Megathyris* and *Lacazella mediterranea* both have 4 lobes (fig. 2*d, h*); *Thecidea radiata* has 6; *T. vermicularis* and *Eudesella mayale*, 8; *E. digitata*, 10; Pterophloios and Oldhamina, about 20. Lobation in some (Thecidea) is produced by the forking or branching of the median septum; in others (Pterophloios) the septum remains simple while the lateral borders of the lophophore are lobed.

ZUGOLOPHUS AND PLECTOLOPHUS STAGES.

All the higher Terebratulacea reach the final growth of the lophophore through an intermediate stage which from its form may be called the *Zugolophus*—fig. 3*d, i*. *Eucalathis* and *Platidia* (?*Tropidoleptus*) are apparently adult representatives of this stage, while *Kraussina* and probably *Bouchardia* are slightly more advanced by the growth of a short median, coiled arm, and lead to the next highest, or plectolophus, stage, in which there is a well-developed spiral arm with a fringe of cirri on each edge—fig. 3*e, j*.

A long loop pointed in front like *Reusselæria* and *Centronella* could not have supported a median arm, as the pallial cavity is thus fully occupied, and the development of the brachidium in the Terebratellida shows that the central space between the branches of the loop is to accommodate such an organ. The same is doubtless true of *Dielasma*, which first has a *Centronella*-like loop, and through the subsequent resorption of the anterior portion the ascending branches are formed

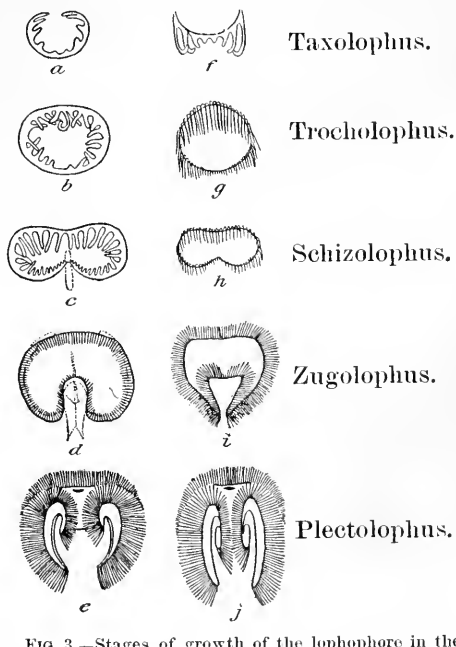


FIG. 3.—Stages of growth of the lophophore in the Terebratellida and Terebratulida. *a, b, c, d, e*, five stages in the development of the lophophore in the Terebratellida. *a-d*, *Terebratalia obsoleta*, enl. (after Beecher?). *e*, *Magallania kerguelensis*, nat. size (after Davidson?). *f, g, h, i, j*, development of lophophore in the Terebratulida. *f-i*, early stages in *Terebratulina septentrionalis*, enl. (after Morse¹¹). *j*, adult *Terebratulina cancellata* (after Davidson?).

and space allowed for the median arm—fig. 4a-d. In a spire-bearing genus like *Zygospira* this is more obvious, for here the transverse process or jugum is clearly the result of the growth and resorption of the centronel-

liform loop to admit the spiralia.



FIG. 4.—Metamorphoses of the brachidium in *Diclasma turgida*, enl. (after Beecher and Schuchert).

The calcareous loop in *Terebratulina* and *Liothyrina* is only a posterior basal support, and does not repeat the outline of the cirrated margin of the lophophore, exclusive of the arm. Therefore it is impossible in these and closely allied genera to infer the stage of development of the lophophore from the loop alone. *Dyscolia* is an excellent example, since the loop is the same as in *Terebratulina*; but the lophophores are quite distinct in each, the former being of the trocholophus type and the latter belonging to the plecolophus.

SPIROLOPHUS STAGE.

The last type to be noticed is the one in which there are two separate coiled arms, each with a row of cirri on one edge only—fig. 5d, e. It embraces the greater part of the families of brachiopods in the orders Telotremata and Protremata, and includes all the living species in the orders Atremata and Neotremata.

In the early stages of development of the spiral lophophore there is an agreement with the early stages of the families already noticed, and the taxolophus, trocholophus, and schizolophus stages may be determined—fig. 5a, b, c. The separation and growth of the spiral arms seem to be due to the widening or expansion of the median lobe or tentacle, on each side of which is the formative tissue for new cirri. This is very apparent in the young *Discinisea* described by Muller,¹² and the *Glottidia* described by Brooks.⁵

The brachidium in *Zygospira* passes through a series of changes which have been described in detail elsewhere.⁴ These metamorphoses are of great assistance in understanding the development and comparative morphology of this feature in other groups of the Spiriferacea. The earliest stage observed (fig. 6a) has the form of a simple terebratuloïd loop, which, from its resemblance to *Centronella*, was called the

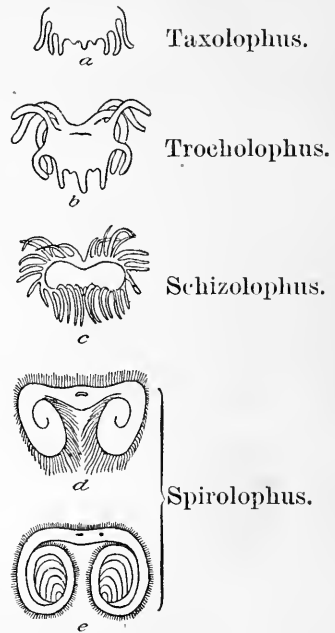


FIG. 5.—Early stages of lophophore of *Glottidia* and adult brachia in *Lingula* and *Hemithyris*. a, b, c, early stages of lophophore of *Glottidia audebarti*, enl. (after Brooks). d, adult brachia in *Lingula* (after Woodward). e, adult brachia in *Hemithyris psittacea* (after Hancock).

centronelliform stage. Since approximately this form of brachidium is also characteristic of the young of recent terebratuloids, it may be taken in *Zygospira* as indicative of the trocholophus stage of brachial development. With this as a starting point for comparison, the further correlation of the succeeding stages is very simple.

The first resorption of the end of the loop in *Zygospira* produced a schizolophus condition, and further resorption carried the brachidium to a stage closely resembling *Dielasma* (fig. 6*b*). The dielasmatiform stage has already been explained as due to the requirements of space for the growth of the coiled brachia. Next, the initial calcification of the spiral arms resulted in the extension of the descending branches beyond the jugum (fig. 6*c*), and, lastly, complete calcification manifests the spirolophus structure and produced the characteristic brachidium of the Spiriferacea.

The Atrypidæ and the Athyridæ seem to stand to each other in the same relation as the Terebratulidæ and Terebratulidæ. In the first the descending branches are widely separated and follow the edges of the valves; in the second the descending branches are close together. This difference in the Spiriferacea produces the converging cones of the Atrypidæ (fig. 6*d*) and the diverging cones of the Athyridæ, Spiriferidæ, Retziidæ (fig. 6*e*), etc.

It seems doubtful whether the fleshy portions of the brachia in the Meristellidæ and Athyridæ possessed additional characters expressing the complexity and elaboration reached by the jugal processes, even when the lamellæ were duplicated, as in *Koninckina* and *Kayseria*.

From the above descriptions and illustrations it appears that the mode of growth of the cirrated lophophore, or brachia, is alike in the larval stages of all brachiopods. They first develop tentacles in pairs on each side of the median line in front of the mouth (taxolophus stage). New tentacles are continually added at the same points, until, by pushing back the older ones, they form a complete circle about the mouth (trocholophus stage), later becoming introverted in front (schizolophus stage). From this common and simple structure all the higher types of brachial complication are developed through one of two methods: (1) The growing points of the lophophore, or points at which new tentacles are formed, remain in juxtaposition; or (2) they separate. Complexity in the first is produced (*a*) by lobation, as in

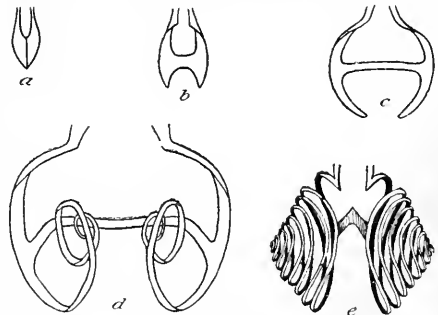


FIG. 6.—Metamorphoses of brachidium of *Zygospira* and adult brachidium of *Rhynchospira*. *a, b, c, d*, metamorphoses of brachidium of *Zygospira recurvirostra*, enl. (after Beecher and Schuchert). *e*, Brachidium of *Rhynchospira evax* (after Beecher and Clarke).

Megathyris, Endesella, Pterophloios, Thecidea, etc. (ptycholophus type), and (b) by looping (zugolophus) and the growth of a median, unpaired coiled arm (plectolophus), as in *Magellania*, *Terebratulina*, etc.; in the second (c) by the growth of two, separate, coiled extensions or arms, one on each side of the median line (spirolophus), as in *Lingula*, *Crania*, *Disciniscia*, *Rhynchonella*, *Leptaena*, *Davidsonia*, *Spirifer*, *Athyris*, *Atrypa*, etc.

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CHAPTER V.

CLASSIFICATION OF THE BRACHIOPODA.

HISTORICAL.

Fabius Columna, in 1616, and Martin Lister, in 1678, were the first to describe brachiopods, calling them *Conchæ anomia*. Grundler, in 1774, was, however, the first to give a good illustration of a brachiopod in *Terebratulina caput-serpentis*. In 1818 Lamarek recognized 5 genera, including the operculate coral *Calceola*. Other genera were added by Sowerby, Dalman, and Defrance, from 1820 to 1830, and in the early forties about 1,500 species had been defined. In 1849 King recognized 49 genera in 16 families, and Bronn, in 1862, knew nearly 2,000 species and 51 genera. At present there are probably no fewer than 6,000 species known in 321 genera, grouped in 31 families, 9 superfamilies, 4 orders, and 2 superorders.

Since 1858 the class Brachiopoda has been divided by nearly all systematists into two orders, based on the presence or absence of articulating processes. These two divisions were recognized by Deshayes as early as 1835, but not until twenty-three years later were the names *Lyopomata* and *Arthropomata* given to them by Owen. These terms have been generally adopted by authors, though some prefer *Inarticulata* and *Articulata* of Huxley, or Bronn's *Ecardines* and *Testicardines*. Bronn, in 1862, and King, in 1873, while retaining these divisions, considered the presence or absence of an anal opening more important than articulation, and accordingly proposed the terms *Pleuropygia* and *Apygia*, and *Trententerata* and *Clistenterata*, respectively. In many Paleozoic genera of *Clistenterata* it has been shown that an anal opening was also present, and therefore the absence or presence of this organ is not of superordinal value. Beecher writes:¹

The dorsal beaks of *Amphigenia*, *Athyris*, *Cleiothyris*, *Atrypa*, and *Rhynchonella* are usually notched or perforate. The perforation comes from the union of the crural plates above the floor of the beak leaving a passage through to the apex. A similar opening occurs between the cardinal processes in *Strophomena*, *Stropheodonta*, and allied genera, and the chilidium may also be furrowed, as in *Leptæna rhomboidalis*. This character is evidently in no way connected with the pedicle opening, but points to the existence, in the early articulate genera, of an anal opening dorsal to the axial line, as in the recent *Crania*. This dorsal foramen was described and figured by King

¹ Am. Jour. Sci., 3d series, Vol. XLIV, 1892, p. 147. See also King, A Monograph of the Permian Fossils of England, 1850; and Ehlert, Fischer's Manuel de Conchyliologie, Appendice, 1887.

in 1850, Hall in 1860, and by several authors since, and has commonly been termed a visceral foramen. Ehlert suggests that it was probably occupied by the terminal portion of the intestine. The persistence of the foramen seems to indicate an anal opening.

Hall and Clarke state:¹

It has become evident, from a study of the hinge plate, that the so-called visceral foramen which perforates it, and which is often present in *Athyris*, *Rensselaeria*, *Cryptonella*, etc., is a remnant of this aperture, the remainder of the median opening having become filled by a testaceous secretion. There is every reason to believe that the visceral foramen was actually traversed by the lower alimentary canal, and if this were true, then the deep and narrow median chamber bounded by the cranial plates must also have inclosed the terminal portion of the intestine.

In 1834 Von Buch also divided the class into two sections, founded on the mode of attachment. The first section contained all brachiopods fixed by a pedicle to foreign bodies, while the second was restricted to those forms in which there is no pedicle at maturity, the entire lower or ventral valve being cemented to other objects, as in *Crania*. The first section was again divided into three groups, on the basis of the pedicle: (*a*) Pedicle emerging from between the valves, as in *Lingula*; (*b*) ventral valve perforated for the protrusion of the pedicle; and (*c*) uncemented shells without a pedicle opening. The third group, however, is identical with *b*, since *Leptaena*, *Productus*, and *Strophomena*, genera referred to section *c*, do possess a pedicle opening. While this classification lacks a complete understanding of the features in question, it is remarkable that Von Buch nearly sixty years ago, and Deslongchamps twenty-eight years later, recognized some of the principles upon which the classification of the Brachiopoda is now established, viz, the nature of the pedicle opening.

Up to 1846 the general external features of brachiopods served the majority of authors as the essential basis for generic differentiation. In that year, however, King pointed out that more fundamental and constant characters exist in the interior of the shell, a fact which soon came to be generally recognized, mainly through the voluminous writings of Thomas Davidson.

In 1848 Gray, probably stimulated by King's paper, divided the Brachiopoda into two subclasses, *Ancylopoda* and *Helictopoda*. These divisions rest entirely on the basis of the structure and the presence or absence of calcareous supports. The *Ancylopoda* are distinguished in having the "oral arms recurved and affixed to fixed appendages on the disk of the ventral [dorsal] valve," while in *Helictopoda* "they are regularly spirally twisted when at rest." The brachia, however, in all recent species, are recurved and more or less spirally enrolled, except in some gerontic forms of loop-bearing genera, as *Cistella* and *Gwynia*. Therefore *Helictopoda*, as far as the brachial structure is concerned, will also include the *Ancylopoda*. In fact, to the former Gray referred only the terebratuloids, if *Thecidia* is

¹ Paleontology of New York, Vol. VIII, Part II, 1895, p. 334.

excluded, while the Ancylopoda contained all other brachiopods, both articulate and inarticulate forms. These subclasses are further divided, on the basis of the brachia, into four orders: Ancylobrachia, Cryptobrachia, Sclerobrachia, and Sarcicobrachia. Of these the first only has value as a superfamily, since it includes the "loop-bearing" genera, or Terebratulacea. The other orders have so heterogeneous an assemblage of forms as to be of no permanent value.

Beyond the introduction of new families, no further attempt was made by writers to divide the Brachiopoda into other orders than Lyopomata and Arthropomata until 1883, when Waagen published his great work on the fossils of this class from the Salt Range group of India. He found it "absolutely necessary" to further divide the Lyopomata and Arthropomata into seven suborders. The basis for these suborders has no underlying principle of general application, yet the majority of the divisions are of permanent value, for each contains an assemblage of characters not to be found in any of the others. Waagen's genealogy of the Arthropomata, with *Orthis* as the prototype, falls at once to the ground, since the comprehensive studies of the genus *Orthis* by Hall and Clarke have shown that it is questionable "whether any of these primordial forms can be included under *Orthis* according to the strict definition of the term or even under any of the subdivisions"¹ proposed by them. There are, however, a few species in the Upper Cambrian which seem to agree with such *dalmanellas* as *O. subaequata*, but these originated long after many undoubted *Protremata* and *Telotremata* had lived in the Lower and Middle Cambrian. *Lingula*, on the other hand, was usually regarded as the prototype of all brachiopods, but this is also impossible, since a number of inarticulate genera flourished for ages before *Lingula* was developed.

PRINCIPLES OF CLASSIFICATION.

No classification can be natural and permanent unless based on the history of the class (chronogenesis) and the ontogeny of the individual. However, as long as the structure of the early Paleozoic genera of Brachiopoda remained practically unknown and the ontogeny untouched, nothing of a permanent nature could be attempted. In the recent volumes by Hall and Clarke many of these early genera are clearly defined, so that their structures and geologic sequence are now far more accurately known. The ontogenetic study of Paleozoic species was initiated in 1891 by Beecher and Clarke, and was continued by Beecher and Schuchert. These results, combined with those derived from the development of some recent species, and published by Kovalovsky, Morse, Shipley, Brooks, Beecher, and others, confirm the conclusions reached through chronogenesis. Moreover, the application by Beecher of the law of morphogenesis, as defined by Hyatt, and the

¹ Paleontology of New York, Vol. VIII, Part I, 1892, p. 218.

recognition and establishment of certain primary characters have resulted in the discovery of a fundamental structure of general application for the classification of these organisms. It has for its basis the nature of the pedicle opening and the stages of shell growth. On these characters Beecher has divided the class into four orders—the *Atremata*, *Neotremata*, *Protremata*, and *Telotremata*.¹

Hall and Clarke² reject Beecher's ordinal terms *Atremata* and *Neotremata* for the subordinal names *Mesokaulia* and *Daikaulia* of Waagen, on the ground of priority, and because the latter terms are "an admirable expression of the significance of the pedicle passage." If some of Waagen's subordinal terms are elevated to ordinal rank and amended by Hall and Clarke, then these terms are no longer Waagen's, but should be credited to Hall and Clarke. Such being the case, the law of priority demands the retention of Beecher's terms, as they do not conflict with those of Waagen but with the secondary definition and rank accorded them by Hall and Clarke.

On the other hand, Dall claims³ that "names of higher rank than genera are not subject to the rule of strict priority, on account of the mutability of their limits." Again, if Waagen's subordinal terms (and there are seven of them) are to be elevated to ordinal rank—i. e., if the characters upon which they are established are ordinal characters—then all should be elevated alike in rank. Besides the two mentioned above, Hall and Clarke accept also *Gasteropegmata* and *Helicopegmata*. The latter, however, they retain as suborders, and would do likewise with *Kampylopegmata* if Gray's term *Ancylobrachia* of earlier date did not cover the same group of brachiopods; while *Gasteropegmata*, having certainly no greater value than a superfamily, is elevated to an order. Again, they accept Beecher's *Protremata*, when Waagen's suborder *Aphaneropegmata* could as well be raised to ordinal rank and adapted so as to include the former, since Waagen based the latter upon families having the diagnostic character of the *Protremata*, namely, the well-developed *deltidium*. However, a far more important reason why Waagen's terms should not be elevated to ordinal rank and made to displace Beecher's names is that the latter clearly understood the value of the different ordinal characters and defined them excellently, which definitions are accepted by Hall and Clarke. He pointed out the most primitive shelled condition in the *protegulum*, and found this first shell-growth stage in all the important families in the class. He observed that not the mere pedicle slit of the *Daikaulia* is the ordinal character for *Neotremata*, but the way in which growth proceeds to form this derived pedicle slit from the open pedicle notch of primitive forms. He was the first to interpret the true morphologic

¹Development of the Brachiopoda, Part I, Am. Jour. Sci., 3d series, Vol. XLI, 1891; Part II, *ibid.*, Vol. XLIV, 1892.

²Paleontology of New York, Vol. VIII, Part II, summary, 1895.

³Trans. Wagner Free Institute of Science, Phila., Vol. III, Part III, 1895, p. 565, Rule XII.

meaning of the deltidium and deltidial plates, and subsequently, from the works of others, chiefly Kovalevsky, was able to demonstrate the great morphologic significance of the deltidium. Without any injustice to the monumental work of Waagen—and there is no more careful work on the Brachiopoda—it can safely be asked, Were Waagen's suborders based on a fundamental morphologic character of general importance throughout or on ontogeny? Mesokaulia and Daikaulia are the only two of the seven suborders having, as now understood, the required ordinal characters, and these divisions were established by Waagen on the form, general expression, and the position of the pedicle, and not on the morphologic development of the pedicle opening. Four of the other five suborders are based on superfamily and the fifth on family characters. Five of Waagen's seven suborders, therefore, are here retained as superfamilies, and practically in the sense of their author.

Since orders are established on the nature of the pedicle opening, persistent internal characters of the shell are, as a rule, used for superfamily purposes. Such are the absence or presence of a spondylium (Strophomenacea and Pentameracea, respectively); the absence or presence of calcareous brachial supports, and their nature (crura only in the Rhynchonellacea, loop in the Terebratulacea, and spirals in the Spiriferacea).

Families within the superfamilies are based upon a combination of external and internal generic characters common to many genera, or even to one genus. Such characters are: Outer form; nature and position of muscles (Obolidae, Lingulidae, etc.); internal plates (Trimerellidae, Lingulasmaticidae, Pentameridae); peculiarities of the cardinal process (Orthidae, Strophomenidae); imperfection or perfection or persistent peculiarities of ordinal and superfamily characters (Orthidae, Trematidae, Discinidae, Siphonotretidae, etc.); simplicity or complexity of the jugum (Hindellinae, Diplospirinae, etc.); and occasionally the nature of the shell structure (Rhynchospirinae). When families are large it is not rare to find groups of genera having a common origin which have characters in common but not differentiated sufficiently to introduce new characters of family importance. In such cases it is advisable to divide the family into subfamilies, which facilitates systematic review and discussion. Such is the case in the large families Strophomenidae, Terebratulidae, Terebratellidae, Spiriferidae, and Atlyridae.

No division, however, has any value unless the group contains forms of but one phylum. A phylum, or line of descent, can not originate twice. It happens, however, that the same or nearly the same combination of mature characters is developed along different phyla. When this occurs the ontogeny will show it. It is therefore not correct to group these different stocks as belonging to one family. For instance,

the Trimerellidæ and Lingulasmaticidæ have family structures in common and were referred to the same family. Ontogeny and chronogenesis, however, show that the former family originated directly in the Obolidæ, while the latter was not evolved from the linguloid phylum until the Obolidæ had given origin to the Lingulellidæ and the Lingulidæ. Again, the family Terebratellidæ, probably during early Mesozoic times, divided, one stock drifting into boreal and another into austral regions. These two stocks agree in the earliest shelled condition and at maturity, but between these two stages of growth the austral group (Magellaniinæ) passes through a series of loop metamorphoses different from that through which the boreal group (Dallinæ) passes. Therefore it is unnatural to include both in one subfamily, as was formerly done.

It was by the application of the above-mentioned principles that the writer, in 1893, arranged all brachiopod genera under the four orders instituted by Beecher. Since then this subject has received considerable attention, and the many Cambrian brachiopods brought together by Walcott have been examined as to their generic structures. These studies have led to some changes in the classification which follows, the most important being that the order Telotremata could not have originated in the Pentameriidæ, since no Pentameracea are known in the Cambrian until long after that order had representation. The divisions Lyopomata and Arthropomata, introduced by Deshayes and Owen, have been abandoned for reasons given in previous pages.

CLASSIFICATION AND SYNONYMY.¹

Class BRACHIOPODA Cuvier, 1802; Duméril, 1

Spirobranchiophora Gray, 1821; Palliobranhiata Blainville, 1824; Branchiopoda Risso, 1826 (not Latreille); Brachiopodidæ Broderip, 1839; Branchionopoda Agassiz, 1847; Brachionoecephala Bronn, 1862; Spirobranchia Bronn, 1862; Branchionobranhia Paetel, 1875.

Bivalved Molluscoidea with inequivalved, equilateral shells attached to extraneous objects by a posterior prolongation of the body, or pedicle, (1) throughout, (2) during a portion of life, or (3) cemented ventrally. Valves ventral and dorsal. In composition, phosphatic or calcareous, or both. Animal consisting of two pallial membranes intimately related to the shell. Within the mantle cavity at the sides of the mouth are inserted the two, more or less long, oral, usually spirally enrolled, ciliated brachia, which are variously modified, and are supported in the two terminal superfamilies by an internal calcareous skeleton, or brachidium, attached to the dorsal valve. Anus present or absent. Central nervous system consisting of an œsophageal ring, with weakly

¹ All names in small type and indented are synonyms of the term in larger type immediately preceding.

developed brain and infracesophageal ganglionic swellings. Blood-vascular system probably present, with the sinuses developed into vascular dilatations at the back of the stomach and elsewhere. Sexes separate. Exclusively inhabitants of the sea. The class is present in the Lower Cambrian, attained maximum development in the Silurian and Devonian, and is represented by about 140 living species. During this time, probably upward of 6,000 fossil and recent species have been developed, and these are distributed in 328 genera, grouped in 31 families, 10 superfamilies, and 4 orders.

Order **ATREMATA** Beecher, 1891.¹

Mesokaulia, or Lingulacea (partim) Waagen, 1885.

Inarticulate Brachiopoda with the pedicle emerging freely between the two valves, the opening being more or less shared by both. Growth taking place mainly around the anterior and lateral margins, never inclosing or surrounding the pedicle. Aperture unmodified. Prodeltidium attached to dorsal valve.

Superfamily **OBOLACEA** Schuchert, 1896.²

Rounded or semicircular and more or less lens-shaped, thick-shelled, primitive Atremata, fixed by a short pedicle throughout life to extraneous objects.

1.³ Family **PATERINIDÆ** Schuchert, 1893 (emend.).⁴

Obolacea with the dorsal valve semicircular and the ventral sub-circular in outline. Posterior region more or less closed by cardinal areas.

Iphidea Billings, 1872.

Paterina Beecher, 1891.

Volborthia von Möller, 1873.

2. Family **OBOLIDÆ** King, 1846.

Obolina Gill, 1871.

Thick-shelled Obolacea of nearly circular or ovoid outline, biconvex, usually smooth, with rudimentary cardinal areas traversed by shallow

¹Since in this classification no superordinal terms are for the present adopted, it will be well to give here all such terms used by authors and others which are of lower rank and not readily referred as synonyms to their proper places:

Ancylobrachia Ancylopoda, Helictopoda, Sarcicobrachia Gray, 1848; Lyopomata and Arthropomata Owen, 1858; Pleuropygia, Sarcicobranchiona, Selerobranchiona Bronn, 1862; Articulata and Inarticulata Huxley, 1864; Clistenterata and Tretenterata King, 1873.

²Text book of Paleontology, by Zittel and Eastman, 1896, p. 305. Also see page 78 of this bulletin.

³The numbers and letters before a family or subfamily term indicate the phyletic relations which these have to one another within a superfamily. The phylogeny of the families, however, is more clearly represented in the diagram on Pl. I, facing p. 134.

⁴Recent discoveries have shown that Iphidea has no pedicle opening, and should include forms referred to Paterina. Therefore this family is of doubtful value, and is provisionally retained for the reception of genera more primitive in structure than those of the Obolidae.

pedicle grooves. Muscular scars distinct, consisting of two pairs of adductors and three of sliders, or adjustors.

Obolella Billings, 1861.

Dicellonius Hall, 1871.

Elkania Ford, 1886.

Billingsia Ford, 1886.

Neobolus Waagen, 1885.

Botsfordia Matthew, 1893.

?*Spondylobolus* McCoy, 1852.

Obolus Eichwald, 1829.

Ungula Pander, 1830.

Ungulites Bronn, 1848.

Aulontreta Kutorga, 1848.

Euobolus Mickwitz, 1896.

Aeritis Volborth, 1869.

Schmidtia Volborth, 1869 (not Bals-
Criv., 1863).

Thysanotos Mickwitz, 1896.

Leptembolon Mickwitz, 1896.

3. Family TRIMERELLIDÆ Davidson and King, 1874.

Large, thick-shelled, inequivalved Obolacea, with the ventral cardinal area usually very prominent, triangular, and transversely striated. Adjustors and anterior adductor muscles elevated upon solid or deeply excavated platforms, or spondylia.

?*Lakmina* Ehlert, 1887.

Davidsonella Waagen, 1885 (not Mu-
nier-Chalmas, 1880).

Lingulobolus Matthew, 1896.

Sphaerobolus Matthew, 1896.

Dinobolus Hall, 1871.

Conradia Hall, MS., 1862.

Obolellina Billings, 1871.

Ungulites Quenstedt, 1871 (not Bronn,
1848).

Monomorella Billings, 1871.

Trimerella Billings, 1862.

Gotlandia Dall, 1870.

Rhinobolus Hall, 1874.

Superfamily LINGULACEA Waagen, 1885 (restricted).¹

Elongate, thin-shelled, burrowing, derived Atremata, with a more or less long, worm-like, tubular, flexible pedicle.

1. Family LINGULELLIDÆ Schuchert, 1893.

Spatulate, inequivalved Lingulacea, structurally intermediate between the Obolidae and Lingulidae.

Lingulella Salter, 1866.

Lingulepis Hall, 1863.

Leptobolus Hall, 1871.

?*Paterula* Barrande, 1879.

Cyclus Barrande, 1879.

?*Mickwitzia* Schmidt, 1888.

¹Waagen's term Mesokautia, or Lingulacea, is based upon the families Obolidae, Trimerellidae, and Lingulidae. Since this term has value, and to avoid proposing another, Lingulacea is here restricted to the latter family and two others recently proposed. Waagen in using this term gave a dual series; the second one is here adopted to conform in euphony with other superfamily terms.

2. Family LINGULIDÆ Gray, 1840.

Lingulidæ Gill, 1871.

Attenuate, subquadrate or spatulate, almost equivalved Lingulacea, derived through Lingulellidæ, with a more or less long, tubular, flexible pedicle. Muscles highly differentiated and consisting of six pairs, two of adductors, and four of sliders, or adjustors.

Lingula Bruguière, 1792.

Pharetra Bolton, 1798.

Lingularius Duméril, 1806.

Glossina Phillips, 1848.

Dignomia Hall, 1871.

Glottidia Dall, 1870.

Barroisella Hall and Clarke, 1892.

Tomasina Hall and Clarke, 1892.

3. Family LINGULASMATIDÆ Winchell and Schuchert, 1893.

Platform-bearing Lingulacea derived through Lingulidæ.

Lingulops Hall, 1871.

Lingulasma Ulrich, 1889.

Lingulelasma Miller, 1889.

Order TELOTREMATA Beecher, 1891.

Sclerobrachia Gray, 1848; Kamylopegmata (partim) Waagen, 1883; Pegmatobranchiata (partim) Neumayr, 1883.

Articulate Brachiopoda, with the pedicle opening shared by both valves in nepionic and early neanic stages, usually confined to one valve in later stages, and becoming more or less modified by deltidial plates in ephebic stages. Brachia supported by calcareous crura, loops, or spiralia. Prodeltidium absent.

Superfamily RHYNCHONELLACEA Schuchert, 1896.¹

Rostracea Schuchert, 1893; Ancistropegmata (partim) Zittel, 1895.

Rostrate, primitive Telotremata, with or without crura.

1. Family PROTORHYNCHIDÆ Schuchert, 1896.¹

Primitive Rhynchonellacea, without deltidial plates or crura.

Protorhyncha Hall and Clarke, 1893.

2. Family RHYNCHONELLIDÆ Gray, 1848.

Hypothyridæ (partim) King, 1850; Rhynchonellinæ Gill, 1871; Waagen, 1883.

Rhynchonellacea with more or less long crura.

¹Text-book of Paleontology, by Zittel and Eastman, 1896, p. 323.

- Orthorhynchula Hall and Clarke, 1893.
 Rhynchotrema Hall, 1860.
 Stenochisma Conrad, 1839; Hall, 1867.
 Rhynchotreta Hall, 1879.
 Camarotoechia Hall and Clarke, 1893.
 Plethorhynchus Hall and Clarke, 1893.
 Leiorhynchus Hall, 1860.
 Wilsonia Kayser, 1871.
 Uncinulina Bayle, 1878.
 Uncinulus Bayle, 1878.
 Hypothyris King, 1846 (not Phillips, 1841).
 Pugnax Hall and Clarke, 1893.
 Eatonia Hall, 1857.
 Cyclorhina Hall and Clarke, 1893.
 Rhychopora King, 1856.
 Rhychoporina Ehlert, 1887.
- Terebratuloidea Waagen, 1883.
 Rhynchonella Fisher de Waldheim, 1809.
 Oxyrhynchus Lillwyd, 1699 (not Aristotle).
 Rhyngonella Bronn, 1849.
 Bicornes Quenstedt, 1851.
 Rhynchonellopsis Bose, 1891.
 Halorella Bittner, 1890.
 Austriella Bittner, 1890.
 Norella Bittner, 1890.
 Peregrinella Ehlert, 1887.
 Rhynchonellina Gemmelaro, 1871.
 Dimerella Zittel, 1870.
 Acanthothyris d'Orbigny, 1850.
 Hemithyris d'Orbigny, 1847.
 Frieleia Dall, 1895.
 Cryptopora Jeffreys, 1869.
 Atretia Jeffreys, 1876.
 Neatretia Ehlert, 1891.

Superfamily **TEREBRATULACEA** Waagen, 1883 (restricted).¹

Ancylopoda, Cryptobrachia, and Ancylobrachia (partim) Gray, 1848; Kamylopegmata Waagen, 1883; Ancylopegmata Zittel, 1895.

Derived Telotremata with the brachia supported by calcareous, primitive, or metamorphosed loops.

Section A. *TEREBRATULA*.

Terebratulacea with the loops unsupported by a median dorsal septum at any stage of growth. Brachial cirri directed outward in larval stages.

1. Family **CENTRONELLIDÆ** Hall and Clarke, 1895.²

Centronellinae Waagen, 1882; Beecher, 1893; Rensseleridae Hall and Clarke, 1895.

Terebratulas with the loop developing direct and composed of two descending lamellae, uniting in the median line and forming a broad, arched plate.

¹Terebratulacea Waagen is used here in preference to Ancylobrachia Gray, in violation of the law of priority, for the sake of euphony.

²Since Beecher's "Revision of the families of loop-bearing Brachiopoda" (Trans. Conn. Acad., Vol. IX, 1893), it has been shown by Beecher and Schuchert (Proc. Biol. Soc. Washington, Vol. VIII, 1893) that the loop in the family Terebratulidae, as limited in the former paper, does in part pass through a short series of metamorphoses. This necessitates the removal of Centronellinae from the family Terebratulidae, since its loops remain essentially without change throughout growth.

Rensseleria Hall, 1859.

Beachia Hall and Clarke, 1893.

Newberria Hall, 1891.

Rensselandia Hall, 1867.

Oriskania Hall and Clarke, 1893.

Trigeria (Bayle, 1875?) Hall and Clarke, 1893.

?Scaphiocœlia Whitfield, 1891.

Centronella Billings, 1859.

Cryptonella Hall, 1863 (not 1861 and 1867).

Chascothyris Holzapfel, 1895.

Selenella Hall and Clarke, 1893.

Romingerina Hall and Clarke, 1893.

Juvavella Bittner, 1888.

Juvavellina Bittner, 1896.

Nucleatula (Zugmayer) Bittner, 1890.

Dinarella Bittner, 1892.

?Lissoplenra Whitfield, 1896.

2. Family TEREBRATULIDÆ Gray, 1840.

Terebratulas developing originally a Centronella-like loop, and thence by a short series of metamorphoses resulting at maturity in a free loop of varying form.

Subfamily STRINGOCEPHALINÆ Dall, 1870.

Stringocephalidæ King, 1850; Davidson, 1853.

Terebratulidæ with a "long loop, following the margin of the dorsal valve, not recurved in front. Probably no median coiled arm" (Beecher).¹

Stringocephalus DeFrance, 1827.

2a. Subfamily MEGALANTERINÆ Waagen, 1882.

Terebratulidæ with a long loop having ascending branches.

Megalanteris Ehlert, 1887.

Meganteris Sness, 1855.

?Cryptacanthia White and St. John, 1868.

Cryptonella Hall (1861?), 1867.

Harttina Hall and Clarke, 1893.

2aⁿ. Subfamily TEREBRATULINÆ Dall, 1870.

Terebratulidæ with a short loop. "A median unpaired coiled arm exists in recent genera" (Beecher).

Eunella Hall and Clarke, 1893.

Cranæna Hall and Clarke, 1893.

Dielasma King, 1859.

Epithyris King, 1850 (not Phillips, 1841).

Seminula McCoy, 1855 (not 1844).

Dielasmina Waagen, 1882.

Notothyris Waagen, 1882.

Zugmeyeria Waagen, 1882.

Dictyothyris Douvillé, 1880.

Glossothyris Douvillé, 1880.

Pygope Link, 1830.

¹The ontogenetic history of Stringocephalus is not known. Its mature loop, however, is so different from that of the Centronellidæ that it appears probable that this appendage passed through a short series of changes, and therefore the reference of this subfamily to the Terebratulidæ.

Beecheria Hall and Clarke, 1893.

Hemiptychina Waagen, 1882.

Rhætina Waagen, 1882.

Terebratula Klein, 1753.

Terebratula Lhwyd, 1699.

Sacculus Lhwyd, 1699.

Lampas Menschen, 1787.

Terebratularius Duméril, 1806.

Nucleata Quenstedt, 1871.

Musculus Quenstedt, 1871 (not Klein, 1753).

Diphyites Schroter, 1799.

Pugites de Ham, 1833.

Antinomia Catullo, 1850.

Propygope Bittner, 1890.

Liothyrina Ehlert, 1887.

Epithyris Deslongchamps, 1862 (not King, 1848).

Gryphus Megerle, 1811 (not Brisson, 1760).

Liothyris Douvillé, 1880 (not Conrad, 1875).

Terebratulina d'Orbigny, 1847.

? Disculina Deslongchamps, 1884.

2a^b. Subfamily DISCOLIINÆ Beecher, 1893.

Discoliidae Fischer and Ehlert, 1892.

Terebratulidae with the "loop short and continuous with the ciliated edge of the lophophore. No coiled median arm" (Beecher).

Discolia Fischer and Ehlert, 1890. ? Agulhasia King, 1871.

Eucalathis Fischer and Ehlert, 1890.

Section B. TEREBRATELLA.

Terebratulacea with the loop supported by a median dorsal septum throughout life, or only in the younger stages. Brachial cirri directed inward during larval stages. This section has two phyla having a common origin now geographically separated in two provinces, one austral, the other boreal.

1. Family TEREBRATELLIDÆ King, 1850 (emend Beecher, 1893).

Waldheimiidae Douvillé, 1880; Waldheimiinae Waagen, 1882.

Terebratulacea with the "loop in the higher genera composed of two primary and two secondary lamellæ, passing through a series of distinct metamorphoses while attached to a dorsal septum" (Beecher).

1. Subfamily TROPIDOLEPTINÆ Schuchert, 1896.¹

Terebratellidae with the loop consisting of two slender descending branches, uniting with a high, vertical septum. Apparently the ancestral stock for the Terebratellidae.

Tropidoleptus Hall, 1859.

¹ Text-book of Paleontology, by Zittel and Eastman, 1896, p. 330.

1a. Subfamily MEGATHYRINÆ Dall, 1870 (emend Beecher, 1893).

Argiopidæ King, 1850; Megathyridæ Ehlert, 1887; Argiopidæ Davidson, 1884; Argiopinæ Davidson, 1887.

Terebratellidæ in which the "loop is composed of descending branches only, passing in the highest genus through stages correlative with Gwynia, Cistella, and Megathyris. The lower genera do not complete the series" (Beecher). The original stock for the two following subfamilies:

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| Megathyris d'Orbigny, 1847. | | Gwynia King, 1859. |
| Argiope Deslongchamps, 1842 (not Savigny and Andouin, 1827). | | Cistella Gray, 1850. |
| Zellania Moore, 1854. | | |

1a^a. Subfamily DALLINÆ Beecher, 1893.¹

Platidiinæ Dall, 1870.

Terebratellidæ with the "loop composed of descending and ascending lamellæ, passing in the highest genera through metamorphoses comparable to the adult structure of Platidia, Ismenia, Mühlfeldtia, Terebratalia, and Dallina. The lower genera, therefore, do not progress to the final stages" (Beecher). Recent genera restricted to boreal seas.

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| Dallina Beecher, 1893. | | Eudesia King, 1850. |
| Macandrevia King, 1859. | | Orthotoma Quenstedt, 1871. |
| Terebratalia Beecher, 1893. | | Trigonella Quenstedt, 1871. |
| Lacqueus Dall, 1870. | | Flabellothyris Deslongchamps, 1884. |
| Frenula Dall, 1871. | | Zeilleria Bayle, 1878. |
| Frenulina Dall, 1895. | | Fimbriothyris Deslongchamps, 1884. |
| Mühlfeldtia Bayle, 1880. | | Microthyris Deslongchamps, 1884. |
| Megerlia King, 1850 (not Robineau Desvoidy, 1830). | | Ornithella Deslongchamps, 1884. |
| Platidia Costa, 1852. | | Aulacothyris Douvillé, 1880. |
| Morrisia Davidson, 1852. | | Camerothyris Bittner, 1890. |
| Ismenia King, 1850 (not Dall, 1871). | | Epicyrta Deslongchamps, 1884. |
| Kingina Davidson, 1852. | | Cincta Quenstedt, 1871. !! |
| Kingia Schoenbach, 1867. | | Antiptychina Zittel, 1883. |
| Trigonosemus Koenig, 1825. | | Plesiothyris Douvillé, 1880. |
| Fissurirostra d'Orbigny, 1847. | | ?Hynniphoria Suess, 1858. |
| Fissirostra d'Orbigny, 1847. | | ?Cruratula Bittner, 1890. |
| Delthyridea King, 1850. | | ?Orthoidea Friren, 1875. |
| Lyra Cumberland, 1816. | | |
| Terebrirostra d'Orbigny, 1817. | | |

¹ Since many of the fossil genera here referred to this family have not been studied in the light of Beecher's and Ehlert's recent researches, it is not known that all belong to this boreal stock.

1a^b. Subfamily **MAGELLANINÆ** Beecher, 1893.

Waldheimiæ (partim) Douvillé, 1880; Terebratellinæ and Magasinæ Davidson, 1887; Magasidæ (partim) d'Orbigny, 1847; King, 1850; Rhynchoridae (partim) King, 1850; Mühlfeldtinæ Ehlert, 1887; Kraussininae Dall, 1870; Kraussidæ Davidson, 1870.

Terebratellidæ with the "loop composed of descending and ascending branches, passing in the higher genera through metamorphoses comparable to the adult structure of Bouchardia, Magas, Magasella, Terebratella, and Magellania. The lower genera become adult before reaching the terminal stages" (Beecher). Recent genera are restricted to austral seas.

Magellania Bayle, 1880.

Waldheimia King, 1850 (not Brulle, 1846).

Neothyris Douvillé, 1880.

Terebratella d'Orbigny 1847.

Delthyris Menke, 1830 (not Dalman, 1828).

Ismenia King, 1850 (not Dall, 1870).

Waltonia Davidson, 1850.

Magasella Dall, 1870.**Rhynchorina** Ehlert, 1887.**Magas** Sowerby, 1816.

Megerlina Deslongchamps, 1884.

Bouchardia Davidson, 1849.

Pachyrhynchus King, 1850.

Kraussia Davidson, 1859.

Kraussia Davidson, 1852 (not Dana, 1852).

Cænothyris Douvillé, 1880.

Mannia Dewalque, 1874.

? Rhynchora Dalman, 1828.

Superfamily **SPIRIFERACEA** Waagen, 1883.

Helicopegmata Waagen, 1883.

Telotre mata with the adult brachia supported by calcareous spiral lamellæ or spiralia.

1. Family **ATRYPIDÆ** Gill, 1871.

Atrypidæ Dall, 1877.

Spiriferacea with the crura directly continuous with the primary lamellæ, which diverge widely and have the spiral cones between them. Jugum simple, complete or incomplete.

1a. Subfamily **ZYGOSPIRINÆ** Waagen, 1883.

Anazygidæ Davidson, 1884; Zygospiridæ Hall and Clarke, 1895.

Atrypidæ with a simple jugum either posteriorly or anteriorly directed. Spiralia with their apices toward the median dorsal region.

Zygospira Hall, 1862.

Stenocisma Hall, 1864 (not Conrad, 1839; Hall, 1867).

Anazyga Davidson, 1882.

Orthonomæa Hall, 1858.

Hallina Winchell and Schuchert, 1892.

Protozyga Hall and Clarke, 1893.

Catazyga Hall and Clarke, 1893.

Atrypina Hall and Clarke, 1893.

Glassia Davidson, 1882.

? Clintonella Hall and Clarke, 1893.

Subfamily *DAYINÆ* Waagen, 1883.

Atrypidæ with the jugum drawn out posteriorly into a simple short process. Spiralia laterally directed.

Dayia Davidson, 1882.

1a. Subfamily *ATRYPINÆ* Waagen, 1883.

Atrypidæ with the jugum situated extremely posterior, complete in young stages, but at maturity discontinuous. Spiralia dorso-medially directed.

Atrypa Dalman, 1828.

Cleiothyris Phillips, 1841 (not King, 1830).

Spirigerina d'Orbigny, 1874.

Gruenewaldtia Tschernyschew, 1885.

?*Karpinskya* Tschernyschew, 1885.

2. Family *SPIRIFERIDÆ* King, 1846 (emend Davidson).

Martiniinæ and *Reticulariinæ* Waagen, 1883; *Spiriferinidæ* Davidson, 1884.

Spiriferacea with the crura directly continuous with the bases of the primary lamellæ, which are situated between the laterally directed spiralia. Jugum simple, complete or incomplete.

2a. Subfamily *SUESSIINÆ* Waagen, 1883.

Spiriferidæ with the jugum continuous and more or less V-shaped. Shell structure punctate.

Cyrtina Davidson, 1858.

Theocyrtella Bittner, 1892.

Cyrtotheca Bittner, 1890 (not Salter).

Spiriferina d'Orbigny, 1847.

Suessia Deslongchamps, 1854.

Subfamily *UNCITINÆ* Waagen, 1883.

Spiriferidæ (?) with the jugum as in *Suessiinæ*. Just within the posterior margin of the dorsal valve are pouch-like plates. Deltidial plates united, deeply concave. Subfamily anomalous.

Uncites DeFrance, 1825.

?*Uncinella* Waagen, 1883.

2b. Subfamily *TRIGONOTRETINÆ* Schuchert, 1893.

Delthyrinæ (partim) Waagen, 1883.

Spiriferidæ with the jugum at maturity discontinuous, represented by two short jugal processes, one attached to each primary lamella.

?*Cyclospira* Hall and Clarke, 1893.

Spirifer Sowerby, 1815.

Choristites Fisher de Waldheim, 1825.

Trigonotreta Koenig, 1825; Meek and Hayden, 1864.

Spiriferus Blainville, 1827.

Spirifera J. de C. Sowerby, 1835.

Brachythyris McCoy, 1844.

Fusella McCoy, 1844.

Hysteroolithus Quenstedt, 1871.

Cyrtia Dalman, 1828.

Syringothyris Winchell, 1863.

Spirifer Meek and Hayden, 1861.

Delthyris Dalman, 1828.

Martiniia McCoy, 1844.

Martiniopsis Waagen, 1883.

Mentzelia Quenstedt, 1871.

Ambocœlia Hall, 1860.

Reticularia McCoy, 1844.

Verneuilia Hall and Clarke, 1893.

?*Metaplasia* Hall and Clarke, 1893.

3. Family ATHYRIDÆ Phillips, 1841.

Nucleospiridæ Davidson, 1882; Koninekinidæ Davidson, 1853.

Spiriferacea with the bases of the primary lamellæ situated between the spiralia, and sharply recurved dorsally at their junction with the crura. Spiralia more or less laterally directed. Jugum complete, V-shaped, with the apex drawn out into a simple, bifurcated, or otherwise modified process.

3a. Subfamily RHYNCHOSPIRINÆ Schuchert, 1894.

Retziinæ Waagen, 1883; Retziidæ and Rhyneospiridæ Hall and Clarke, 1895.

Athyridæ with the single process of the jugum commonly recurved, but sometimes bifurcated. Shell structure distinctly punctate.

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| Homœospira Hall and Clarke, 1893. | Parazyga Hall and Clarke, 1893. |
| Rhyneospira Hall, 1859. | Acambona White, 1862. |
| Ptychospira Hall and Clarke, 1893. | Hustedia Hall and Clarke, 1893. |
| Enmetria Hall, 1864. | Retzia King, 1850. |
| Trematospira Hall, 1857. | Trigeria Bayle, 1878. |

3^a. Subfamily HINDELLINÆ Schuchert, 1894.

Cœlospiridæ and Nucleospiridæ Hall and Clarke, 1895.

Athyridæ in which the jugum has a single process which may be simple, or it articulates in a ventral septal socket, and sometimes (rarely) is sharply recurved terminally. Shell structure impunctate.

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| { Hindella Davidson, 1882. | Anoplothecca Sandberger, 1856. |
| | Bifida Davidson, 1882. |
| { Whitfieldella Hall and Clarke, 1893. | Cœlospira Hall, 1863. |
| | Leptoœcellia Hall, 1857, 1859. |
| Meristina Davidson, 1882 (not Hall, 1867). | Vitulina Hall, 1860. |
| Nucleospira Hall, 1858. | ?Anabia Clarke, 1893. |
| Hyattella Hall and Clarke, 1893. | |

3^b. Subfamily ATHYRINÆ Waagen, 1883.

Athyridæ in which the single process of the jugum bifurcates. The branches may or may not terminate between the first and second volutions of the spiralia.

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| Meristina Hall, 1867. | Cleiothyris King, 1840 (not Phil- lips, 1841). |
| Athyris Davidson, 1853 (not McCoy, 1844). | Seminula McCoy, 1844. |
| Whitfieldia Davidson, 1882. | Spirigerella Waagen, 1883. |
| Glassina Hall and Clarke, 1893. | Anomactinella Bittner, 1890. |
| Athyris McCoy, 1844. | Pomatospirella Bittner, 1892. |
| Spirigera d'Orbigny, 1847. | Amphitomella Bittner, 1890. |
| Euthyris Quenstedt, 1871. | Tetractinella Bittner, 1890. |
| Actinoconchus McCoy, 1844. | Plicigera Bittner, 1890. |
| Torynifer Hall and Clarke, 1895. | Pentactinella Bittner, 1890. |

3^c. Subfamily **DIPLOSPIRINÆ** Schuchert, 1894.

Athyridæ (partim) Hall and Clarke, 1895.

Athyridæ with the jugal bifurcations very long, lying between the volutions of the spiralia, and continuing with these to their outer ends. Sometimes there is an additional jugal process which articulates with the ventral valve, or recurves and joins the jugum.

Kayseria Davidson, 1882.

Diplospirella Bittner, 1890.

Euraetinella Bittner, 1890.

Pezidella Bittner, 1890.

Anisactinella Bittner, 1890.

? Didymospira Salomon.

3^{bb}. Subfamily **KONINKININÆ** Waagen, 1883.

Koninekinidæ Davidson, 1853; Amphiclininæ Waagen, 1883; Diplospidæ and Diplospiridæ Munier-Chalmas, 1880.

Athyridæ with jugum and spiralia essentially as in Diplospiridæ. The spiralia in Koninekininæ, however, are not laterally directed as in the former group, but point ventrally, this being due to the concave form of the dorsal shell.

Koninekina Sness, 1853.

Amphiclina Laube, 1865.

Koninekella M.-Chalmas, 1880.

Koninekodonta Bittner, 1893.

? Thecospira Zugmeyer, 1880.

? Amphiclinodonta Bittner, 1890.

3^{ba}. Subfamily **MERISTELLINÆ** Waagen, 1883.

Meristellidæ Hall and Clarke, 1895.

Athyridæ in which the jugal bifurcations do not enter the spiralia, but recurve and join near their origin.

Meristella Hall, 1860.

Charionella Billings, 1861.

? Pentagonia Cozzens, 1846.

Goniocœlia Hall, 1861.

Dicamara Hall and Clarke, 1893.

Merista Sness, 1851.

Camarium Hall, 1859.

Dioristella Bittner, 1890.

? Camarospira Hall and Clarke, 1893.

Order **NEOTREMATA** Beecher, 1891.

Circular or oval, more or less cone-shaped, inarticulate Brachiopoda, with the pedicle opening restricted throughout life to the ventral valve. Pedicle aperture modified by a deltidium or listrium. Prodeltidium attached to the ventral valve.

Superfamily **ACROTRETACEA** Schuchert, 1896.¹

Daikaulia (partim) Waagen, 1885; Diacanlia Hall and Clarke, 1895.

Neotremata with phosphatic shells and a more or less well-developed pseudodeltidium. Dorsal protégulum marginal.

¹Text-book of Paleontology, by Zittel and Eastman, 1896, p. 308.

1. Family ACROTRETIDÆ Schuchert, 1893.

Acrotretacea with the pedicle opening posterior to the protogulum.

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| Acrothele Linnarsson, 1876. | Conotreta Walcott, 1889. |
| Linnarssonia Walcott, 1885. | ? Mesotreta Kutorga, 1848. |
| Discinopsis (Matthew) Hall and Clarke, 1892. | ? Orbicella d'Orbigny, 1849. Keyserlingia Pander, 1861. |
| Aerotreta Kutorga, 1848. | ? Helmersenia Pander, 1861. |

2. Family SIPHONOTRETIDÆ Kutorga, 1848.

Acrotretacea with the pedicle opening passing by resorption anteriorly through the protogulum and the umbo of the shell.

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|---------------------------------|----------------------------|
| Yorkia Walcott, 1897. | Protosiphon Matthew, 1897 |
| Trematobolus Matthew, 1893. | Schizambon Walcott, 1884. |
| Siphonotreta de Verneuil, 1845. | Schizambonia Ehlert, 1887. |

Superfamily DISCINACEA Waagen, 1885.

Daikanlia (partim) Waagen, 1885; Diacanlia (partim) Hall and Clarke, 1895.

Neotremata with phosphatic shells, a listrium, but with no deltidium. Dorsal protogulum usually subcentral.

1. Family TREMATIDÆ Schuchert, 1893.

Primitive Discinacea, in which the posterior margin of the ventral valve has a triangular pedicle notch throughout life. A listrium is usually present.

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| Discinolepis Waagen, 1885. | Schizobolus Ulrich, 1886. |
| Trematis Sharpe, 1847. | Lingulodiscina Whitfield, 1890. |
| Orbicella Hall and Whitfield, 1875 (not d'Orbigny, 1849). | Ehlertella Hall and Clarke, 1890. |
| Schizoerania Hall and Whitfield, 1875. | ? Monobolina Salter, 1865. |

2. Family DISCINIDÆ Gray, 1840.

Orbientida McCoy, 1844.

Derived Discinacea with an open pedicle notch in early life in the posterior margin of the ventral valve, which is closed posteriorly during neanic growth, leaving a more or less long, narrow slit partially closed by the listrium.

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|---|---|
| Orbiculoidea d'Orbigny, 1847. | Discina Lamarek, 1819. |
| Schizotreta Kutorga, 1848. | Orbicula Sowerby, 1830 (not Cuvier, 1798). |
| Lindstromella Hall and Clarke, 1890. | Discinisea Dall, 1871. |
| Remerella Hall and Clarke, 1890. | |

Superfamily **CRANIACEA** Waagen, 1885.¹

Gasteropegmata Waagen, 1885.

Cemented calcareous Neotremata without pedicle or anal openings at maturity.

Family **CRANIADÆ** King, 1846.

Orbicula Deshayes, 1830; Craniadæ Gray, 1840.

Craniacea with the pedicle functional probably only during neopionic growth. -

Crania Retzius, 1781.

- Nummulus Stoeboens, 1732.
 Ostracites Benth, 1776.
 Criopus Poli, 1791.
 Criopoderma Poli, 1795.
 Orbicula Cuvier, 1798 (not Sowerby, 1830).
 Orbicularius Duméril, 1806.
 Craniolites Schlotheim, 1820.
 Discina Turton, 1832 (not Lamarek, 1819).
 Criopoderma ^{Wahlenberg, 21} ~~Agassiz, 1830~~
 Choniopora Schaueroth, 1854.

Craniella Ehlert, 1888.

Cardinocrania Waagen, 1885. ?

Ancistrocrania Dall, 1877.

Cranopsis Dall, 1871 (not A. Adams).

Cranisens Dall, 1871.

Siphonaria Quenstedt, 1851 (not Sowerby).

Pholidops Hall, 1860.

Craniops Hall, 1859.

Pseudocrania McCoy, 1851.

Palæocrania Quenstedt, 1871.
 Eithwald, 1854Order **PROTREMATA** Beecher, 1891.

Derived, articulate Brachiopoda, with the pedicle opening restricted to the ventral valve throughout life or during early growth. Prodeltidium originating on the dorsal side of the body wall in the cephalula stage, and later anchylosed to the ventral shell, thus initiating the development of a deltidium. Pedicle aperture modified by the deltidium. Brachia unsupported by a calcareous skeleton except in the Pentameracea where there are crura.

Superfamily **STROPHOMENACEA** Schuchert, 1896.²

Lineicardines (partim) and Denticardines (partim) Bronn, 1862; Aphaneropegmata (partim), Productacea, Coralliopsida, and Kampylopegmata (partim) Waagen, 1883; Elentherobranchiata (partim) Neumayr, 1883; Cryptobrachia (partim) Gray, 1848; Theacea Schuchert, 1893.

Primitive Protremata without spondylia and cruralia.

Family **KUTORGINIDÆ** Schuchert, 1893.

Primitive Strophomenacea with incipient cardinal areas, great delthyrial opening, and very rudimentary articulating processes and deltidium.

Kutorgina Billings, 1861 (emend Walcott) | ?Schizopholis Waagen, 1885.

¹The writer believes that when the young growth stages of Crania are studied it will be shown that the Craniacea have the superfamily characters of Acrotretacea rather than those of Discinacea.

²Text-book of Paleontology, by Zittel and Eastman, 1896, p. 312.

? Family EICHWALDIIDÆ Schuchert, 1893.¹

Primitive or aberrant, rostrate Strophomenacea, with narrow lateral grooves and ridges for articulation. Delthyrium closed by a concave plate (?deltidium). Pedicle emerging through the ventral umbone and moving with growth anteriorly by resorption through the shell, as in Siphonotretidæ.

Eichwaldia Billings, 1858.

| Dictyonella Hall, 1867.

1. Family BILLINGSSELLIDÆ Schuchert, 1893.

Strophomenacea with well-developed cardinal areas and deltidium. Cardinal process obsolete or very rudimentary. Articulation fairly well developed.

Billingsella Hall and Clarke, 1892.

Protorthis Hall and Clarke, 1892.

2. Family STROPHOMENIDÆ King, 1846.

Strophomenacea with well-developed cardinal areas, deltidium, chlidium, cardinal and articulating processes.

2a. Subfamily RAFINESQUININÆ Schuchert, 1893.

Leptænaea Braun, 1840; Orthisidæ (partim) d'Orbigny, 1847; Davidsonidæ King, 1850; Davidsoninæ Gill, 1871; Strophomeninæ (partim) Gill, 1871; Waagen, 1884; Cadomellinæ Munier-Chalmas, 1887; Leptænidæ Hall and Clarke, 1895.

Strophomenoids with ventral valve convex and dorsal concave, except in Strophonella. The relative form of the valves is the reverse of the Orthothetinae.

Rafinesquina Hall and Clarke, 1892.

| Pholidostrophia Hall and Clarke, 1892.

Leptæna Dalman, 1828.

| Strophonella Hall, 1879.

Leptagonia McCoy, 1844.

| Amphistrophia Hall and Clarke, 1892.

Strophomena Meek, 1873 (not Blainville, 1825).

| Cadomella M.-Chalmas, 1887.

Plectambonites Ehlert, 1887 (not Pander, 1830).

| Leptella Hall and Clarke, 1892.

| Plectambonites Pander, 1830.

Stropheodonta Hall, 1852.

| Leptæna Davidson, 1853; Ehlert, 1877 (not Dalman, 1828).

Brachyprion Shaler, 1865.

| Leptænisca Beecher, 1890.

Douvillina Ehlert, 1887.

| Christiania Hall and Clarke, 1892.

Leptostrophia Hall and Clarke, 1892.

| Davidsonia Bouchard, 1847.

¹In 1893 the writer referred this family with doubt to the Rhynchonellacea. The absence of crural plates in Eichwaldia forbids that disposition. If the concave plate closing the umbonal pedicle passage is a deltidium, there can be no doubt that this family belongs to the Protremata. Students should search for the very young of Eichwaldia or Dictyonella, since it is through ontogeny alone that the true systematic position of this family will be determined.

2^b. Subfamily ORTHOTHETINÆ Waagen, 1884.

Strophomeniinae (partim) Waagen, 1884.

Strophomenoids with the ventral valve convex during early growth, becoming subsequently concave.

? Orthidium Hall and Clarke, 1892.

Strophomena Blainville, 1825.

Hemipronites Meek, 1872 (not Pander, 1830).

Orthothetes Fischer de Waldheim, 1837.

Orthis King, 1850 (not Dalman, 1828).

Hipparionyx Vanuxem, 1842.

Streptorhynchus King, 1850.

Derbya Waagen, 1884.

Kayserella Hall and Clarke, 1892.

Meekella White and St. John, 1870.

Triplecia Hall, 1859.

Dicraniscus Meek, 1872.

Mimulus Barrande, 1879.

Streptis Davidson, 1881.

3. Family THECIDIIDÆ Gray, 1840.

Cemented Strophomenacea in which the interior of the shell is impressed with variously indented brachial furrows.

3^a. Subfamily LYTTONINÆ Waagen, 1883.

Thecidiidæ with the brachial markings common to both valves.

Lyttonia Waagen, 1883.

Leptodus Kayser, 1882.

Oldhamina Waagen, 1883.

3^b. Subfamily THECIDIINÆ Dall, 1870.

Thecidiidæ with the brachial markings restricted to the dorsal valve.

Thecidia DeFrance, 1822.

Thecidium Sowerby, 1824.

Lacazella M.-Chalmas, 1880.

Thecidiopsis M.-Chalmas, 1887.

Thecidella M.-Chalmas, 1887.

Eudesella M. Chalmas, 1880.

Pterophloios Gümbel, 1861.

Bactrynum Emmerich, 1855.

(In error. Not Bactrillium Heer.)

Davidsonella M.-Chalmas, 1880.

2^a. Family PRODUCTIDÆ Gray, 1840.

Productina Giebel, 1846.

Strophomenacea with hollow anchoring spines.

2^a^{aa}. Subfamily CHONETINÆ Waagen, 1884.

Chonetidæ Bronn, 1862; Hall and Clarke, 1895.

Productidæ with the anchoring spines restricted to the ventral cardinal margin.

Chonetes Fischer de Waldheim, 1837.

Leptæna McCoy, 1844 (not Dalman, 1828).

Anoplia Hall and Clarke, 1892.

Chonetella Waagen, 1884.

Chonostrophia Hall and Clarke, 1892.

Chonetina Krotow, 1888.

Chonetella Krotow, 1884 (not Waagen, 1884).

2a^{ab}. Subfamily **PRODUCTINÆ** Waagen, 1884.

Productidæ with the anchoring spines more or less abundant over the ventral valve and sometimes also over the dorsal valve.

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|--|------------------------------------|
| Daviesiella Waagen, 1884. | Etheridgina Ehlert, 1887. |
| Productella Hall, 1867. | Chonopectus Hall and Clarke, 1892. |
| Productus Sowerby, 1812. | Strophalosia King, 1844. |
| Pyxis Chemnitz, 1784. | Orthothrix Geinitz, 1847. |
| Producta G. B. Sowerby, 1825. | Leptenalosia King, 1845. |
| Arbusculites Murray, 1831. | Aulosteges von Helmersen, 1847. |
| Profonia Linck, 1830 (not Rafinesque). | ? Aulacorhynchus Dittmar, 1871. |
| Marginifera Waagen, 1884. | Isogramma Meek and Worthen, 1873. |
| Proboscoidella Ehlert, 1887. | |

2a^{ac}. Family **RICHTHOFENIDÆ** Waagen, 1885.

Strophomenacea probably derived through the Productidæ, and remarkably modified by ventral cementation. The form of the shell is that of cyathophylloid corals with an operculiform dorsal valve. Shell structure cystose.

Richthofenia Kayser, 1881.

1a. Family **ORTHIDÆ** Woodward, 1852.

Orthisidæ (partim) d'Orbigny, 1847; Orthinæ and Enteletinæ Waagen, 1884.

Strophomenacea usually with large open delthyria; deltidium only developed in younger growth stages.

| | |
|--|---|
| Orthis Dalman, 1828. | { Dinorthis Hall and Clarke, 1892. { Plesiomys Hall and Clarke, 1892. { Orthostrophia Hall, 1883. { Dalmanella Hall and Clarke, 1892. { Heterorthis Hall and Clarke, 1892. { Bilobites Linné, 1775. { Dicaelosia King, 1850. Rhipidomella Ehlert, 1890. { Rhipidomys Ehlert, 1887 (not Wagner). |
| Orthambonites Pander, 1830. | |
| { Plectorthis Hall and Clarke, 1892. | |
| { Hebertella Hall and Clarke, 1892. | |
| { Schizophoria King, 1850. | |
| { Orthotichia Hall, 1892. | |
| { Enteletes Fischer de Waldheim, 1830. | |
| Syntrielasma Meek, 1865. | |
| Platystrophia King, 1850. | |
| Orthotropia Hall and Clarke, 1895. | |

Superfamily **PENTAMERACEA** Schuchert, 1896.¹

Trullacea Schuchert, 1893; Ancistropegmata (partim) Zittel, 1895; Aphanerpegmata (partim) and Productacea (partim) Waagen, 1883; Eleutherobranchiata (partim) Neumayr, 1883.

Derived Protremata with spondylia to which are attached the adductor, diductor, and ventral pedicle muscles. Commonly cruralia are present.

1. Family **CLITAMBONITIDÆ** Winchell and Schuchert, 1893.

Orthisidæ (partim) d'Orbigny, 1849; Orthisinæ Waagen, 1884.

Primitive Pentameracea with long, straight cardinal areas and a well-developed deltidium. No cruralium.

¹ Text-book of Paleontology, by Zittel and Eastman, 1896, p. 320.

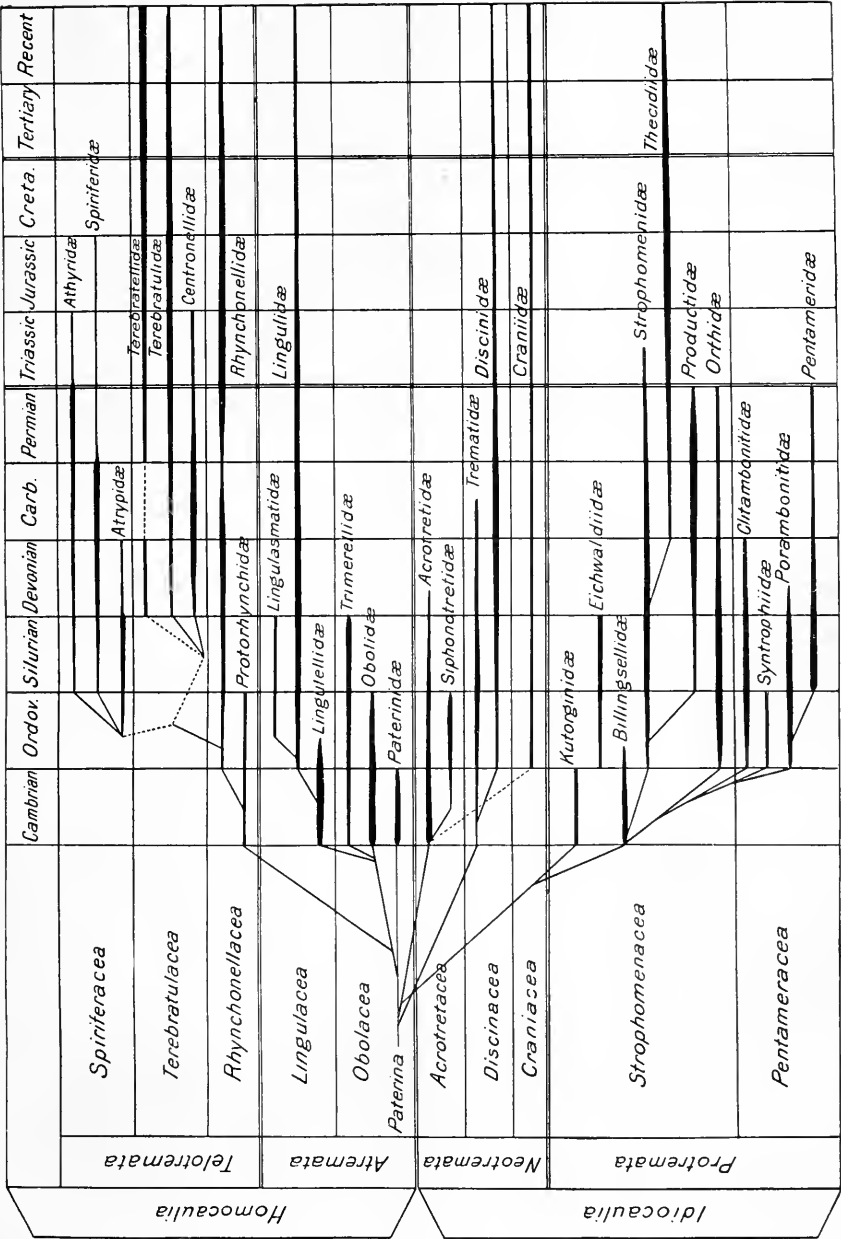


DIAGRAM ILLUSTRATING GEOLOGIC DISTRIBUTION OF FAMILIES.

Clitambonites Pander, 1830.

Pronites Pander, 1830.

Gonambonites Pander, 1830.

Orthisina d'Orbigny, 1847.

Polytœchia Hall and Clarke, 1892.

Hemipronites Pander, 1830.

Scenidium Hall, 1860.

Mystrophora Kayser, 1871.

2. Family SYNTROPHIIDÆ Schuchert, 1896.¹

Stricklandiniidæ (partim) Hall and Clarke, 1895.

Primitive Pentameracea with long, straight cardinal areas, deltidia, and cruralia.

Syntrophia Hall and Clarke, 1892-93.

2a. Family PORAMBONITIDÆ Davidson, 1853.²

Porambonitinae Gill, 1871; Porambonitidæ (partim) Nœtling, 1883; Camarellidæ (partim) Hall and Clarke, 1895.

Pentameracea intermediate in structure between the Syntrophiidæ and Pentameridæ, in that the deltidium and the straight cardinal areas of the former family tend to obsolescence, particularly the deltidium. The Porambonitidæ approach the latter family in tending to develop a rostrate shell. Cruralium present.

Camarella Billings, 1859 (emend Hall and Clarke, 1893).

Parastrophia Hall and Clarke, 1893.

Anastrophia Hall, 1867.

Brachymerus Shaler, 1865 (not Dejean, 1834).

Branconia Gagel, 1890.

Porambonites Pander, 1830.

Priambonites Agassiz, 1847.

Isorhynchus King, 1850.

Nœtlingia Hall and Clarke, 1893.

?Lycophoria Lahusen, 1885.

2b. Family PENTAMERIDÆ McCoy, 1844.

Hypothyridæ (partim) King, 1850; Pentameridæ Hall, 1867; Camerophoriinae Waagen, 1883; Pentamerinae Gill, 1871; Waagen, 1883; Porambonitidæ (partim) Nœtling, 1883; Stenochismatinae and Conchidiinae Ehlert, 1887; Camarellidæ (partim), Stricklandiniidæ (partim), and Amphigenidæ Hall and Clarke, 1895.

Rostrate Pentameracea rarely with straight cardinal areas. Deltidium commonly absent, but sometimes present as a concave plate, being the reverse of the ordinary form of the deltidium and due to the incurved beaks. Cruralium present.

Stricklandinia Billings, 1863.

Stricklandia Billings, 1859.

Pentamerus Sowerby, 1813.

Pentastère Blainville, 1824.

Capellinia Hall and Clarke, 1893.

Pentamerella Hall, 1867.

Gypidula Hall, 1867.

Sieberella Ehlert, 1887.

Camarophorella Hall and Clarke, 1893.

Amphigenia Hall, 1867.

Conchidium Linné, 1753.

Antirhynchonella Quenstedt, 1871.

Zdimir Barrande, 1879.

Gypidia Dalman, 1828.

Clorinda Barrande, 1879.

Barrandella Hall and Clarke, 1893.

Enantiosphen Widborne (Holzapfel), 1893.

Camarophoria King, 1846.

Stenochisma Dall, 1877; Ehlert, 1887 (not Conrad, 1839).

¹ Text book of Paleontology, by Zittel and Eastman, 1896, p. 320.² Since Hall and Clarke's family Camarellidæ (1895), after removing Camarophoria and Camarophorella, is based upon the same family characters as those of the Porambonitidæ (1853), as Porambonites is now interpreted, Davidson's family is retained on the ground of priority.

Synopsis of the divisions of Brachiopoda higher than genera.

| <i>Superorders.</i> | <i>Orders.</i> | <i>Superfamilies.</i> | <i>Families.</i> |
|---|---|--|--|
| | Pedicel opening common to both valves throughout life. No deltidial plates. Inarticulate. (Atremata.) | Shells rounded. Pedicle short. Animal not burrowing. (Obolacea.) | Valves semicircular; pedicle opening more or less large = Paterinidae. |
| | | | Valves rounded, posteriorly acuminate; pedicle opening small = Obolidae. |
| Pedicel common to both valves throughout life or only in youthful growth. (Homocaulia.) | Pedicel opening common to both valves only in youthful growth. Deltidial plates usually present. (Telotremata.) | Shells elongate. Pedicle long. Animal burrowing. (Lingulacea.) | Valves round or oval, thick, with solid or excavated platforms = Trimerellidae. |
| | | | Shells thin, elongate, with oboloid interiors = Lingulellidae. |
| | | Brachia supported by crura. (Rostreaea.) | Shells thin, elongate, with muscular system highly specialized = Lingulidae. |
| | | Brachia supported by loops. (Terebratulacea.) | Shells elongate, with solid platforms = Lingulasmatidae. |
| | | Brachia supported by spiralia. (Spiriferacea.) | Shells primitive. No deltidial plates; articulation rudimentary = Protorhynchidae. |
| | | | Articulation and deltidial plates well developed = Rhynchonellidae. |
| | | | Loops free, developing direct; no metamorphoses = Centronellidae. |
| | | | Loops free, developing indirect = Terebratulidae. |
| | | | Loops attached to a median septum; developing indirect = Terebratellidae. |
| | | | Crura directly continuous with bases of primary lamellae between which are the spiralia = Atrypidae. |
| | | | Crura directly continuous with bases of primary lamellae which are between the spiralia = Spiriferidae. |
| | | | Bases of primary lamellae between the spiralia, and sharply recurving dorsally at their junction with the crura = Athyridae. |

Synopsis of the divisions of Brachiopoda higher than genera—Continued.

| <i>Superorders.</i> | <i>Orders.</i> | <i>Superfamilies.</i> | <i>Families.</i> | | |
|--|--|--|--|--|---|
| Pedicel restricted to ventral valve throughout life. Inarticulate. (Neotremata.) | Pedicel restricted to ventral valve throughout life. Inarticulate. (Neotremata.) | Pedicel aperture modified by a deltidium. (Acrotretacea.) | Pedicel opening small, circular, posterior to protegulum = Acrotretidae. | | |
| | | | Pedicel fissure narrow, elongate, anterior to protegulum = Siphonotretidae. | | |
| | | Pedicel slit modified by a listrium. (Discinacea.) | Pedicel fissure marginal, open posteriorly = Trematidae. | | |
| | Pedicel fissure narrow, elongate, closed posteriorly = Discinidae. | | | | |
| | Pedicel restricted to ventral valve throughout life or only in youthful growth. (Idiocalia.) | Pedicel restricted to ventral valve throughout life or only in youthful growth. (Idiocalia.) | Pedicel suppressed. (Craniacea.) | Shells partially or completely cemented to foreign bodies = Craniidae. | |
| | | | | Pedicel opening large; deltidium and articulation incipient. No crural process = Kutorginidae. | |
| | | Pedicel restricted to ventral valve throughout life or only in youthful growth. (Idiocalia.) | Pedicel restricted to ventral valve throughout life or only in youthful growth. (Idiocalia.) | Shells without spondylia and cruralia. (Strophomenacea.) | Rostrate, aberrant Strophomenacea = Eichwaldiidae. |
| | | | | | Cardinal areas and deltidium well developed. No cardinal process = Billingsellidae. |
| | | | | | Cardinal areas, deltidium, chilidium, and cardinal process well developed = Strophomenidae. |
| | | | | | Strophomenidae with impressed brachial furrows = Thecidiidae. |
| Valves more or less covered with hollow, anchoring spines = Productidae. | | | | | |
| Cone-shaped productoids completely modified by cementation = Rielthofenidae. | | | | | |
| Delthyrium usually large, open; deltidium developed only in early growth = Orthidae. | | | | | |
| Large, straight cardinal areas with prominent deltidium. No cruralia = Clitambonitidae. | | | | | |
| Pedicel restricted to ventral valve throughout or a portion of life. Articulate. (Protremata.) | Pedicel restricted to ventral valve throughout or a portion of life. Articulate. (Protremata.) | Shells with spondylia and cruralia. (Pentameracea.) | Straight cardinal areas, prominent deltidium, and short cruralia = Syntrophiidae. | | |
| | | | Shells intermediate in structure between Syntrophiidae and Pentameridae = Parambonitidae. | | |
| | | | Shells rostrate, commonly without deltidium. Cruralia well developed = Pentameridae. | | |

CHAPTER VI.

INDEX AND BIBLIOGRAPHY OF AMERICAN FOSSIL BRACHIOPODA.

- ACAMBONA** White. Genotype *A. prima* White.
Acambona White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 27, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 119;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 797.
- Acambona osagensis*** (Swallow). Chouteau (L. Carb.).
Retzia osagensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 653.
Acambona? *osagensis* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 120, pl. 51, figs. 38, 39.
Retzia? *osagensis* Keyes, Geol. Survey Missouri, V, 1895, p. 94.
Loc. Cooper and Benton counties, Missouri.
- Acambona prima*** White. Burlington (L. Carb.).
Acambona prima White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 27, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 119, pl. 51, figs. 40, 41.
Eumetria prima Miller, North American Geol. and Pal., 1889, p. 346.
Loc. Burlington, Iowa.
Obs. It is probable that this species is identical with *A. osagensis*.
- ACROTHELE** Linnarsson. Genotype *A. coriacea* Linnarsson.
Acrothele Linnarsson, Bilang till Kgl. Svenska Vetens.-Akad. Handl., III, 1876, p. 20.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 107.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 98, 167;—Eleventh Ann. Rep. N. Y. State Geologist, 1892, p. 249.
- Acrothele bellula*** Walcott. Middle Cambrian.
Acrothele bellula Walcott, Proc. U. S. National Mus., XIX, 1897, p. 716, pl. 60, figs. 4-16.
Loc. Cowans Creek, Cherokee County, Alabama.
- Acrothele decipiens*** Walcott. Lower Cambrian.
Acrothele decipiens Walcott, Proc. U. S. National Mus., XIX, 1897, p. 716, pl. 60, fig. 2.
Loc. Near Stoner's, York County, Pennsylvania.
- Acrothele* (?) *dichotoma*** Walcott. Lower Cambrian.
Acrothele? *dichtoma* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 14, pl. 9, fig. 11;—Bull. U. S. Geol. Survey, 30, 1886, p. 107.
Loc. Eureka district, Nevada.
- Acrothele matthewi*** (Hartt). Middle Cambrian.
Lingula matthewi Hartt, Dawson's Acadian Geology, 2d ed., 1868, p. 644, fig. 221;—*Ibidem*, 3d ed., 1874, p. 644, fig. 221.
Acrothele matthewi Matthew, Trans. Royal Soc. Canada, III, 1886, p. 39, pl. 5, fig. 15.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 99, pl. 3, fig. 29.—Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 128, pl. 5, figs. 6, 7, 8.
Loc. Portland, New Brunswick; Mannels Brook, Conception Bay, Newfoundland.

- Acrothele matthewi costata** Matthew. ?Middle Cambrian.
Acrothele matthewi var. *costata* Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 128, pl. 5, fig. 9.
Loc. Hanford Brook, New Brunswick.
- Acrothele matthewi lata** Matthew. Middle Cambrian.
Acrothele matthewi var. *lata* Matthew, Trans. Royal Soc. Canada, III, 1886, p. 41, pl. 5, fig. 17.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 3, figs. 26-28.
Loc. Portland, New Brunswick.
- Acrothele matthewi prima** Matthew. Middle Cambrian.
Acrothele matthewi var. *prima* Matthew, Trans. Royal Soc. Canada, III, 1886, p. 41, pl. 5, fig. 16.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 3, fig. 25.
Loc. Hanford Brook, New Brunswick.
- Acrothele subsidua** (White). Lower and Middle Cambrian.
Acrotreta? *subsidua* White, Wheeler's Geogr. Geol. Expl. and Surv. west 100 Merid., Prelim. Rep., 1874, p. 6;—*Ibidem*, Final Rep., IV, 1875, p. 34, pl. 1, fig. 3.
Acrothele subsidua White, Proc. U. S. National Mus., III, 1880, p. 47.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 108, pl. 9, fig. 4;—Tenth. Ann. Rep. U. S. Geol. Survey, 1891, p. 608, pl. 70, fig. 1.—Beecher, American Jour. Sci., XLI, 1891, p. 357, pl. 17, fig. 12.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 100, pl. 3, figs. 30, 31.
Loc. Antelope Spring, Utah; Pioche, Nevada.
- ACROTRETA** Kutorga. Genotype *A. subconica* Kutorga.
Acrotreta Kutorga, Verhand. Kais. Min. Gessel. zu St. Petersburg, 1848, p. 275.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 16.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 101, 166;—Eleventh Ann. Rep. N. Y. State Geologist, 1892, p. 250.
- Acrotreta attenuata* Meek = *A. gemma*.
- Acrotreta baileyi** Matthew. Middle and Upper Cambrian.
Acrotreta baileyi Matthew, Trans. Royal Soc. Canada, III, 1886, p. 36, pl. 5, fig. 13.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 102, pl. 3, figs. 32-34.—Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 43, pl. 12, fig. 7d.
Loc. Hanford Brook and Long Reach, New Brunswick.
- Acrotreta gemma** Billings. Lower to Upper Cambrian.
Acrotreta gemma Billings, Pal. Fossils, I, 1865, p. 216, fig. 201.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 17, pl. 1, fig. 1; pl. 9, fig. 9;—Bull. U. S. Geol. Survey, 30, 1886, p. 98, pl. 8, fig. 1;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 608, pl. 67, fig. 5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 102, figs. 55-57.—Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 126.
Acrotreta subconica Meek, Hayden's Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 463.
Acrotreta attenuata Meek, *Ibidem*, 1873, p. 463.
Acrotreta pyxidicula White, Wheeler's Geogr. Geol. Expl. and Survey west 100 Merid., Prelim. Rep., 1874, p. 9;—*Ibidem*, Final Rep., IV, 1875, p. 53, pl. 3, fig. 3.
Loc. Near Portland Creek, Newfoundland; Enreka and White Pine mining districts, Nevada.
- Acrotreta gemma depressa** Walcott. Middle Cambrian.
Acrotreta gemma var. *depressa* Walcott, Proc. U. S. National Mus., XI, 1888, p. 441.
Loc. Mount Stephen, British Columbia.

- Acrotreta gemmula** Matthew. Middle Cambrian.
Acrotreta gemmula Matthew, Trans. Royal Soc. Canada, X, 1894, p. 87, pl. 16, fig. 2;—Trans. N. Y. Acad. Sci., XIV, 1895, p. 126, pl. 5, fig. 5.
Loc. St. Martius, New Brunswick.
- Acrotreta gulielmi* Matthew = *Discinopsis gulielmi*.
- Acrotreta microscopica** (Shumard). Middle Cambrian.
Discina microscopica Shumard, American Jour. Sci., XXXII, 2d ser., 1861, p. 221.
Loc. Occurs abundantly in Burnett and Llano counties, Texas.
- Acrotreta pyxidicula* White = *Acrotreta gemma*.
- Acrotreta subconica* Meek (non Kutorga) = *Acrotreta gemma*.
- Acrotreta* (?) *subsidua* White = *Acrothele subsidua*.
- Ægilops** Hall. A genus of pelecypods.
- AMBOCÆLIA** Hall. Genotype *Orthis umbonata* Conrad.
Ambocælia Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 71, figs. 1-3; p. 72, figs. 4-6.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., 172, 1864, p. 20.—Hall, Pal. New York, IV, 1867, p. 258—Davidson, Suppl. British Sil. Braeh., Palæontographical Soc., 1882, p. 131.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 85.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 54;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 761.
- Ambocælia fimbriata** Claypole. Portage (Dev.).
Ambocælia fimbriata Claypole, Proc. American Phil. Soc., XXI, 1883, p. 232.
Loc. Perry County, Pennsylvania.
- Ambocælia gemmula* McChesney = *Ambocælia planoconvexa*.
- Ambocælia gregaria** Hall. Chemung (Dev.).
Orthis unguiculatus Hall (non Phillips), Geol. New York; Rep. Fourth Dist., 1843, p. 267, fig. 5.
Ambocælia gregaria Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 81;—Fifteenth Rep. *Ibidem*, 1862, p. 186.—Williams, Bull. U. S. Geol. Survey, 3, 1884, p. 11.
Ambocælia umbonata var. *gregaria* Hall, Pal. New York, IV, 1867, p. 261, pl. 44, figs. 19-25.
Loc. New York; Pennsylvania, and Virginia.
Obs. See *Martinia subumbona*.
- Ambocælia minuta** White. Kinderhook (L. Carb.).
Ambocælia (*Spirifer*?) *minuta* White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 26.
Loc. Hamburg, Illinois, and Hannibal, Missouri.
- Ambocælia planoconvexa** (Shumard). Upper Carboniferous.
Spirifer planoconvexa Shumard, Geol. Rep. Missouri, 1855, p. 202.—Geinitz, Carbon u. Dyas in Nebraska, 1866, p. 42, pl. 3, figs. 10-18.
Ambocælia gemmula McChesney, New Pal. Fossils, 1860, p. 41;—*Ibidem*, 1865, pl. 1, fig. 3.
Spirifer (*Martinia*) *planoconvexa* Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., 172, Pt. I, 1864, p. 20, figs. a-c.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 184, pl. 4, fig. 4; pl. 8, fig. 2.
Martinia planoconvexa McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 34, pl. 1, fig. 3.

Ambocœlia planoconvexa (Shumard)—Continued.

Spirifera (Martinia) *planoconvexa* Derby, Bull. Cornell Univ., I, 1874, p. 19, pl. 8, figs. 12, 16, 18; pl. 9, fig. 7.—White, Wheeler's Geogr. Geol. Expl. and Survey west 100 Merid., IV, 1875, p. 135, pl. 10, fig. 3;—Thirteenth Rep. Indiana State Geol., 1884, p. 134, pl. 32, figs. 23, 24.—Herrick, Bull. Denison Univ., II, 1887, p. 46, pl. 1, fig. 12.—Keyes, Geol. Survey Missouri, V, 1895, p. 85.

Ambocœlia planoconvexa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 56, pl. 39, figs. 10-15.

Loc. Missouri; Iowa; Illinois; Ohio; Indiana; Kansas; Nebraska; New Mexico; Elko Mountain, Nevada; Bomjardim and Itaituba, Brazil.

Ambocœlia præumbona Hall.

Hamilton (Dev.).

Orthis præumbona Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 167.

Ambocœlia præumbona Hall, Thirteenth Rep. Ibidem, 1860, p. 71;—Pal. New York, IV, 1867, p. 262, pl. 44, figs. 1-6.

Loc. Seneca, Cayuga, and Canandaigua lakes, New York.

Ambocœlia spinosa Hall and Clarke.

Hamilton (Dev.).

Ambocœlia spinosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 56, 363, pl. 39, figs. 16-18.—Clarke, Thirteenth Ann. Rep. N. Y. State Geologist,

1895, p. 177, pl. 4, figs. 6-8.

Loc. Livingston County, New York.

Ambocœlia subumbona Hall=*Martinia subumbona*.**Ambocœlia umbonata** (Conrad).

Marcellus-Chemung (Dev.).

Orthis umbonata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 264, pl. 14, fig. 4.—Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 167, figs. 1-3.

Orthis nucleus Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 180, fig. 8.

Ambocœlia umbonata Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 71;—Pal. New York, IV, 1867, p. 259, pl. 44, figs. 7-18.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 86, pl. 17, figs. 25, 26.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pl. 29, fig. 17; pl. 39, figs. 4-9.

Martinia umbonata Herrick, Geol. Ohio, VII, 1895, pl. 20, fig. 3.

Loc. New York; Pennsylvania; Falls of Ohio.

Ambocœlia umbonata gregaria Hall=*Ambocœlia gregaria*.**AMPHIGENIA** Hall.Genotype *Pentamerus elongatus* Vanuxem.

Amphigenia Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 163;—Pal. New York, IV, 1867, pp. 374, 382.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 252;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 848.

Amphigenia curta (Meek and Worthen).

Oriskany (Dev.).

Stricklandinia elongata var. *curta* Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 402, pl. 8, fig. 1; pl. 9, fig. 5.—? Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 254.

Loc. Union County, Illinois.

Amphigenia elongata (Vanuxem). Oriskany and Up. Helderberg (Dev.).

Pentamerus elongatus Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 132, fig. 1.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, Tables of Organic Remains. *Megauteris elongatus* Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 123, figs. 1, 2.

Rensseleria elongata Hall, Twelfth Rep. Ibidem, 1859, p. 38;—Pal. New York, III, 1859, p. 453.

Stricklandia elongata Billings, Canadian Jour., VI, 1861, p. 267, figs. 91, 92.

Amphigenia elongata (Vauuxem)—Continued.

Stricklandinia elongata Billings, Geol. Canada, 1863, p. 371, fig. 390.

Amphigenia elongata Hall, Pal. New York, IV, 1867, p. 383, pl. 58A, figs. 21-24; pl. 59, figs. 1-11.—Billings, Canadian Nat. Geol., n. ser., VII., 1874, p. 240.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 34.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 253, pl. 73, figs. 16-20; pl. 74, figs. 1-9; pl. 76, fig. 9.

Loc. New York; Michigan; Cayuga, Ontario; Rio Maecurand Rio Curna, Brazil.

Amphigenia elongata subtrigonalis Hall.

Up. Helderberg (Dev.).

Meganteris subtrigonalis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 123.

Amphigenia elongata var. *subtrigonalis* Hall, Pal. New York, IV, 1867, p. 384.

Loc. Erie County, New York.

Amphigenia elongata undulata Hall.

Up. Helderberg (Dev.).

Amphigenia elongata var. *undulata* Hall, Pal. New York, IV, 1867, p. 384, pl. 58A, figs. 25-27.

Loc. Mackinac, Michigan.

AMPHISTROPHIA Hall and Clarke. Genotype *Strophonella striata* Hall.

Amphistrophia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 283.

Obs. Proposed as a subgenus of *Strophonella*.

ANABAIA Clarke.Genotype *A. paraia* Clarke.

Anabaia Clarke, Pal. New York, VIII, Pt. II, 1893, p. 141.—Hall and Clarke, Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 805.

Anabaia paraia Clarke.

Silurian.

Anabaia paraia Clarke, Pal. New York, VIII, Pt. II, 1893, p. 141, figs. 124-127.

Loc. Rio Trombetas, Province of Para, Brazil.

ANASTROPHIA Hall.Genotype *Pentamerus verneuili* Hall.

Brachymerus Shaler (non Dej., 1834), Bull. Mus. Comp. Zool., 4, 1865, p. 69.

Anastrophia Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 163;—Pal.

New York, IV, 1867, p. 374.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 47.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 224;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 839.

Anastrophia brevirostris (Sowerby?) Hall.

Niagara (Sil.).

Terebratula brevirostris Sowerby, Murchison's Sil. System, 1839, p. 631, pl. 13, fig. 15.

Atrypa brevirostris? Hall, Pal. New York, II, 1852, p. 278, pl. 58, fig. 1.

Pentamerus brevirostris Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.

Rhynchonella brevirostris Billings, Geol. Canada, 1863, p. 315, fig. 324.

Loc. Lockport, New York.

Obs. Compare with *Anastrophia interplicata*. If a pentameroid, this species is probably identical with *Anastrophia interplicata* Hall.

Anastrophia hemiplicata W. and S.=*Parastrophia hemiplicata*.**Anastrophia internascens** Hall.

Niagara (Sil.).

Anastrophia verneuili Hall (non Hall, 1859), Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., Doc. ed., 1876, pl. 26, figs. 41-49.

Anastrophia internascens Hall, *Ibidem*, 1879, p. 168, pl. 26, figs. 41-49;—Eleventh Rep. State Geol. Indiana, 1882, p. 311, pl. 26, figs. 41-49.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 47, pl. 32, figs. 17-20.—Beecher and Clarke, Mem. N. Y. State Mus., 1, 1889, p. 32, pl. 3, figs. 14-16.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 224, pl. 63, fig. 30.

Loc. Waldron, Indiana; Louisville, Kentucky; Milwaukee, Wisconsin.

Anastrophia interplicata (Hall). Niagara (Sil.).

Atrypa interplicata Hall, Pal. New York, II, 1852, p. 275, pl. 57, fig. 2.

Pentamerus interplicatus Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.

Anastrophia interplicata Miller, American Pal. Fossils, 1877, p. 104.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 224.

Loc. Lockport, New York; Louisville, Kentucky; Wisconsin.

Obs. See *A. brevirostris*.

Anastrophia reversa Miller = **Parastrophia reversa**.**Anastrophia scofieldi** W. and S. = **Parastrophia scofieldi**.**Anastrophia verneuili** Hall, 1876 (non 1859) = **Anastrophia internascens**.**Anastrophia verneuili** (Hall). Lower Helderberg (Dev.).

Atrypa lacunosa Vanuxem (non Sowerby), Geol. N. Y.; Rep. Third Dist., 1842, p. 117, fig. 3, and p. 119.

Pentamerus verneuili Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 104, figs. 1, 2;—Pal. New York, III, 1859, p. 260, pl. 48, fig. 1.—Billings, Geol. Canada, 1863, p. 957, fig. 453.

Anastrophia verneuili Miller, N. American Geol. Pal., 1889, p. 334.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 224, pl. 63, figs. 31–38; pl. 84, figs. 43, 44.

Loc. Eastern New York; Perry County, Tennessee; Petermann Fiord, Greenland.

Anazyga recurvirostra Davidson = **Zygospira recurvirostris**.**ANOPLIA** Hall and Clarke. Genotype **Leptæna nucleata** Hall.

Anoplia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 309;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 293.

Anoplia nucleata Hall. Oriskany and Corniferous (Dev.).

Leptæna nucleata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 47.

Leptæna? nucleata Hall, Pal. New York, III, 1859, p. 419, pl. 94, fig. 1.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 393, pl. 8, fig. 8.

Anoplia nucleata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 309, pl. 15A, figs. 17, 18; pl. 20, figs. 14–17.

Loc. Albany County, New York; Alexander County, Illinois; Cayuga, Ontario.

Obs. It is probable that *Productella nucleata* Nicholson is a synonym of this species.

ANOPLOTHECA Sandberger (emend Hall and Clarke). Genotype **Productus lamellosus** Sandberger = **Terebratula venusta** Schuur.

Anoplotheca F. Sandberger, Sitzb. d. k. k. Akad. d. Wissens., math.-naturw. Classe, XVI, 1853, p. 5; XVIII, p. 102.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 129, figs. 113–121.

Leptocœlia Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 108;—Twelfth Rep., *Ibidem*, 1859, p. 32, figs. 1, 2, 4;—Pal. New York, III, 1859, p. 447.—Billings, Canadian Jour., VI, 1861, p. 351.—Hall, American Jour. Sci., XXXVI, 1863, p. 14.—Rominger, American Jour. Sci., XXXV, 1863, p. 84.—Hall, Pal. New York, IV, 1867, p. 365.—Dall, American Jour. Conch., VII, 1871, p. 60.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 151.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 136.

Cœlospira Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 59;—Trans. Albany Institute, IV, 1863, p. 146;—Pal. New York, IV, 1867, p. 328.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 134, figs. 122, 123.

Bifida Davidson, Supplement to British Dev. Brach., Palæontographical Soc., 1882, p. 27.

Anoplotheca, *Cœlospira*, and *Leptocœlia* Hall and Clarke, Thirteenth Ann. Rep. N. Y. State Geologist, 1895, pp. 801–803.

ANOPLOTHECA Sandberger (emend Hall)—Continued.

Obs. Hall and Clarke have shown that *Anoplotheca* and *Bifida* are synonymous terms and that *Cœlospira* is also structurally identical. The latter name, however, they retain as a subgenus of *Anoplotheca*. While the brachydium is not yet fully known in *Leptocœlia*, all its other characters are the same as those of *Cœlospira*. Under these circumstances it appears best, for the present at least, to refer all American species of *Leptocœlia* and *Cœlospira* to *Anoplotheca*.

Anoplotheca acutiplicata (Conrad). Corniferous (Dev.).

Atrypa acutiplicata Conrad, Fifth Ann. Rep. N. Y. Geol. Survey, 1841, p. 54.—Hall, Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, pl. 11, fig. 17.

Leptocœlia acutiplicata Hall, Pal. New York, IV, 1867, p. 365, pl. 67, figs. 30-39.

Cœlospira acutiplicata Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 136, pl. 53, figs. 32-39.

Loc. Waterville, Cassville, East Victor, etc., New York.

Anoplotheca camilla (Hall). Oriskany and Up. Helderberg (Dev.).

Cœlospira concava Hall (non Hall 1863), Pal. New York, IV, 1867, p. 329.

Cœlospira camilla Hall, *Ibidem*, 1867, pl. 52, figs. 13-19;—Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 168.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 136, pl. 53, figs. 24-31.

Loc. Caledonia, New York; county of Haldimand, Ontario.

Anoplotheca concava (Hall). Lower Helderberg (Dev.).

Leptocœlia concava Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 107;—Pal. New York, III, 1859, p. 245, pl. 38, figs. 1-7.—Billings, Canadian Jour., VI, 1861, p. 352, fig. 127;—Geology Canada, 1863, p. 369, fig. 383; p. 957, fig. 451.

Cœlospira concava Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 60;—Trans. Albany Institute, IV, 1863, p. 146.—Meek, American Jour. Sci., 2d ser., XL, 1865, p. 33.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 134, figs. 122, 123; pl. 53, figs. 20-23.

Loc. Albany and Schoharie counties, New York; Kennedy Channel, Arctic region.

Anoplotheca dichotoma (Hall). Oriskany (Dev.).

Leptocœlia dichotoma Hall, Pal. New York, III, 1859, p. 452, pl. 103B, figs. 3.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 137.

Loc. Cumberland, Maryland.

Obs. Possibly the young of *Anoplotheca flabellites*.

Anoplotheca fimbriata (Hall). Oriskany (Dev.).

Leptocœlia fimbriata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 33, fig. 3;—Pal. New York, III, 1859, p. 450, pl. 103B, fig. 2.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 137, pl. 53, figs. 47-52, 54, 55.

Loc. Cumberland, Maryland.

Anoplotheca flabellites (Conrad). Oriskany and Corniferous (Dev.).

Atrypa flabellites Conrad, Fifth Ann. Rep. N. Y. Geol. Survey, 1841, p. 55.

Atrypa palmata Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 276, pl. 10, fig. 5.

Orthis palmata Sharpe and Salter, Trans. Geol. Soc. London, 2d ser., VII, 1856, p. 207, pl. 26, figs. 7-10.

Leptocœlia propria Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 108.

Leptocœlia flabellites Hall, Twelfth Rep. *Ibidem*, 1859, p. 33, figs. 1, 2, 4;—Pal. New York, III, 1859, p. 449, pl. 103B, fig. 1; pl. 106, fig. 1.—Billings, Canadian Jour., VI, 1861, p. 351, fig. 126;—Geology Canada, 1863, p. 369, fig. 382.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 397, pl. 8, fig. 3.—Billings, Pal. Fossils, II, 1874, p. 42, pl. 3, figs. 5, 6.—Steinmann, American Naturalist, XXV, 1891, p. 856.—A. Ulrich, N. Jahrb. f. Mineral., Beilageband,

Anoplothecha flabellites (Conrad)—Continued.

VIII, 1892, p. 60, pl. 4, figs. 9, 10–13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 137, pl. 53, figs. 40–46, 53.—Von Ammon, Zeits. Gesells. für Erdk., Berlin, XXVIII, 1893, p. 363, fig. 7.

Orthis aymara Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 68, pl. 4, fig. 14.

Orthis palmata Sharpe and Salter, Trans. Geol. Soc. London, 2d ser., VII, 1856, p. 207, pl. 26, figs. 7–10.

Loc. Schoharie, etc., New York; county of Haldimand, Ontario; Gaspé; Cumberland, Maryland; Union County, Illinois; Bolivia; Tanquarassu, Matto Grosso, Brazil; Falkland Islands; South Africa.

Anoplothecha hemispherica (Sowerby).

Clinton (Sil.).

Atrypa hemispherica Sowerby, Murchison's Silurian System, 1839, p. 639, pl. 20, fig. 7.—Hall, Pal. New York, II, 1852, p. 74, pl. 23, fig. 10.—Billings, Geology Canada, 1863, p. 318, fig. 337.

Atrypa hemispherica? Hall, Geology, N. Y.; Rep. Fourth Dist., 1843, p. 73, fig. 4. *Leptocælia hemispherica* Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 152, pl. 32, figs. 21–23, 36–39.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 325, pl. 6, figs. 18, 19.

Atrypa flabella Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 68.

Cælospira? *hemispherica* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 136, pl. 82, figs. 1–4 (? pl. 52, fig. 16).

Loc. England; Rochester, Sodus, and Walcott, New York; Louisville, Kentucky; Cumberland Gap, Tennessee; Ringgold, Georgia; Collinsville, Alabama; Arisaig, Nova Scotia (Ami); Anticosti.

Anoplothecha infrequens (Walcott).

Lower and Upper Devonian.

Trematospira infrequens Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 151, pl. 4, fig. 3.

Loc. Lone Mountain, Nevada.

Obs. The exterior is like that of *A. flabellites*.

Anoplothecha planoconvexa (Hall).

Clinton (Sil.).

Atrypa planoconvexa Hall, Pal. New York, II, 1852, p. 75, pl. 23, fig. 11.—Billings, Geology Canada, 1863, p. 318, fig. 336.

Leptocælia planoconvexa Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.—Nicholson and Hinde, Canadian Jour., n. ser., XIV, 1874, p. 144.

Cælospira? *planoconvexa* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 136, pl. 52, fig. 15; pl. 53, figs. 11–16.

Loc. Flamborough Head, Ontario; Niagara of Wisconsin (Whitfield).

Anoplothecha plicatula (Hall).

Clinton (Sil.).

Atrypa plicatula Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 71, fig. 4;—Pal. New York, II, 1852, p. 74, pl. 23, fig. 9.

Leptocælia? *plicatula* Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Rhynchonella plicata Miller, N. American Geol. Pal., 1889, p. 369.

Cælospira? *plicatula* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 136, pl. 52, figs. 12–14; pl. 82, fig. 5.

Loc. Reynales Basin, New York; Niagara of Wisconsin (Whitfield).

ATHYRIS McCoy (emend Hall and Clarke).Genotype *Terebratula concentrica* von Buch.

Athyris McCoy, Carb. Fossils Ireland, 1844, pp. 128, 146.—Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 73.—Billings, Canadian Jour., V, 1860,

ATHYRIS McCoy (emend Hall and Clarke)—Continued.

p. 273;—*Ibidem*, VI, 1861, p. 138;—*Pal. Fossils*, I, 1862, p. 144.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, pp. 152, 258;—*Pal. New York*, IV, 1867, p. 282.—Billings, *American Jour. Sci.*, XLIV, 1867, p. 48.—Herrick, *Bull. Denison Univ.*, IV, 1888, p. 14.—Nettelroth, *Kentucky Fossil Shells*, Mem. Kentucky Geol. Survey, 1889, p. 87.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 83, fig. 57 on p. 86;—*Thirteenth Ann. Rep. N. Y. State Geologist*, 1895, p. 777.

Spirigera d'Orbigny, *Paris Acad. Sci., Comptes Rendus*, XXV, 1847, p. 268.

Euthyris Quenstedt, *Petrefactenkunde Deutschlands*, 1871, p. 442.

Athyris americana Swallow = *Cleiothyris roissyi*.

Athyris angelica Hall.

Chemung (Dev.).

Athyris angelica Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 99;—Fifteenth Rep. *Ibidem*, 1862, pl. 3, figs. 10-13, 24;—*Pal. New York*, IV, 1867, p. 292, pl. 47, figs. 9-20.—Walcott, *Mon. U. S. Geol. Survey*, VIII, 1884, p. 148.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 90, pl. 45, figs. 26-30.

Loc. Phillipsburg, Rockville, etc., New York; Meadville, Pennsylvania; Eureka district, Nevada.

Athyris angelica occidentalis Whiteaves.

Hamilton (Dev.).

Athyris angelica occidentalis Whiteaves, *Cont. Canadian Pal.*, I, 1891, p. 227, pl. 32, fig. 3.

Loc. Athabasca River, Canada.

Athyris ashlandensis Herrick = *A. lamellosa*.

Athyris biloba (A. Winchell).

Kinderhook (L. Carb.).

Spirigera biloba A. Winchell, *Proc. Acad. Nat. Sci. Philadelphia*, 1865, p. 118.

Loc. Rockford, Indiana.

Obs. This species is not well established and is based upon a single ventral valve.

Athyris blancha Billings = *Meristella blancha*.

Athyris borealis Billings = *Catazyga erratica*.

Athyris brittsi Miller.

Middle Devonian.

Athyris brittsi Miller, *Eighteenth Ann. Rep. Geol. Survey Indiana*, 1894, p. 311, pl. 9, figs. 16-18.

Loc. Near Otterville, Missouri.

Obs. Probably the same as *A. spiriferoides*.

Athyris caputserpentis Swallow = *Seminula caputserpentis*.

Athyris charitonensis Swallow = *Seminula charitonensis*.

Athyris chloe Billings = *Parazyga hirsuta*.

Athyris clara Billings = *Meristella nasuta*.

Athyris claytoni Swallow = *Seminula claytoni*.

Athyris clintonensis Swallow = *Cleiothyris clintonensis*.

Athyris clusia Billings = *Meristella clusia*.

Athyris concentrica Billings (non von Buch) = *A. spiriferoides*.

Athyris congesta Conrad = *Hyatella congesta*.

Athyris cora Hall.

Hamilton and Chemung ? (Dev.).

Athyris cora Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 94;—Fifteenth Rep. *Ibidem*, 1862, pl. 3, figs. 15, 16;—*Pal. New York*, IV, 1867, p. 291, pl. 47, figs. 1-7.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 90, pl. 45, figs. 6-10.

Loc. Delphi, New York.

- Athyris (?) corpulenta** (A. Winchell). Kinderhook (L. Carb.).
Spirigera corpulenta A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 6.
Loc. Burlington, Iowa.
- Athyris crassicardinalis** White=Cleiothyris crassicardinalis.
- Athyris crassirostra** Billings=Whitfieldella cylindrica.
- Athyris cylindrica** Billings=Whitfieldella cylindrica.
- Athyris densa** Hall and Clarke. St. Louis (L. Carb.).
Athyris densa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 364, pl. 46, figs. 6-12.
Loc. Washington County, Indiana; Colesburg, Kentucky.
Obs. Compare with *Centronella* (?) crassicardinalis.
- Athyris differentis** McChesney=Seminula argentea.
- Athyris eborea** A. Winchell=A. vittata.
- Athyris euzona** Swallow=Seminula formosa.
- Athyris (?) formosa** Swallow=Seminula formosa.
- Athyris fultonensis** (Swallow). Corniferous and Hamilton (Dev.).
Spirigera fultonensis Swallow, Trans. St. Louis Acad. Sci., I, July or August, 1860, p. 650.
Spirigera minima Swallow, Ibidem, 1860, p. 649.
- Athyris vittata** Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 89;—
 Pal. New York, IV, 1867, p. 289, pl. 46, figs. 1-4.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 502, pl. 4, figs. 8, 9;—Tenth Rep. State Geol. Indiana, 1881, p. 134, pl. 4, figs. 8, 9.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 87, pl. 16, figs. 25-32.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 228.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 90, figs. 62, 63; pl. 45, figs. 1-5.—Keyes, Geol. Survey Missouri, V, 1895, p. 90, pl. 41, fig. 1.
Spirigera eborea A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 94.
Loc. Callaway County, Missouri; Iowa City and New Buffalo, Iowa; Falls of Ohio; Alpena, Michigan; Lake Winnipegosis, Manitoba.
Obs. Specimens of *S. fultonensis* Swallow and *S. eborea* Winchell in the writer's collection prove to be the same as *A. vittata* Hall.
- Athyris hannibalensis** (Swallow). Chouteau (L. Carb.).
Spirigera hannibalensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 649.
Athyris hannibalensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 90, pl. 46, figs. 13-15.—Keyes, Geol. Survey Missouri, V, 1895, p. 90, pl. 40, fig. 9.
Loc. Clarksville, Hannibal, etc., Missouri; Sciotoville, Ohio.
Obs. Meek was inclined to regard this species the same as *A. lamellosa*. It is, however, distinct. See *A. missouriensis*.
- Athyris harpalyce** Billings=Whitfieldella harpalyce.
- Athyris hawni** Swallow=Seminula hawni.
- Athyris headi** Billings=Catazyga headi.
- Athyris headi anticostiensis** Billings=Catazyga erratica.
- Athyris headi borealis** Billings=Catazyga erratica.
- Athyris hirsuta** Hall=Cleiothyris hirsuta.
- Athyris incrassata** Hall. Burlington (L. Carb.).
Athyris incrassata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 600, pl. 12, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 90, pl. 46, fig. 21; pl. 83, fig. 39.
Athyris incrassatus Keyes, Geol. Survey Missouri, V, 1895, p. 91, pl. 41, fig. 10.
Loc. Burlington, Iowa; Quincy, Illinois; Hannibal, Missouri.

Athyris intermedia Nicholson = *Whitfieldella intermedia*.

***Athyris intervarica* McChesney.** Burlington (L. Carb.).

Athyris intervarica McChesney, Descriptions New Pal. Foss., 1861, p. 78.

Loc. Burlington, Iowa.

Obs. May be the same as *A. lamellosa* L'Eveillé.

***Athyris* (?) *jacksoni* (Swallow).** Upper Coal Measures.

Spirigera jacksoni Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 651.

Loc. Cass County, Missouri.

Athyris julia Billings = *Whitfieldella julia*.

Athyris junia Billings = *Hyattella junia*.

***Athyris lamellosa* (L'Eveillé).** Waverly-Keokuk (L. Carb.).

Spirifer lamellosus L'Eveillé, Mém. Soc. Géol. de France, II, 1835, p. 39, figs. 21-23.

Athyris lamellosa Meek, Pal. Ohio, II, 1875, p. 283, pl. 14, fig. 6.—Herrick, Bull. Denison Univ., III, 1888, p. 49, pl. 2, fig. 7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 90, pl. 46, figs. 16-20.

Athyris ashlandensis Herrick, Bull. Denison Univ., IV, 1888, p. 24, pl. 3, fig. 6;—Geol. Ohio, VII, 1895, pl. 23, fig. 10.

Loc. Europe; Sciotoville, and Licking County, Ohio; Lebanon, Kentucky; Crawfordsville, Indiana; New Mexico.

Obs. See *A. intervarica* McChesney.

Athyris lara Billings = *Atrypa lara*.

Athyris maconensis Swallow = *Seminula maconensis*.

Athyris maia Billings = *Martimia maia*.

Athyris minima Swallow = *A. fultonensis*.

***Athyris minutissima* Webster.** Chemung (Dev.).

Athyris minutissima Webster, American Nat., XXII, 1888, p. 1015.

Loc. Near Rockford, Iowa.

Athyris missouriensis Swallow = *Cleiothyris missouriensis*.

***Athyris missouriensis* (A. Winchell).** Chouteau (L. Carb.).

Spirigera missouriensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 117.

Loc. Louisiana, Missouri; Medina County, Ohio.

Obs. Should be compared with *A. hannibalensis*.

***Athyris monticola* (White).** Lower Carboniferous.

Spirigera monticola White, Wheeler's Geogr. Geol. Expl. and Survey west 100 Merid., Prel. Rep., 1874, p. 16;—Final Rep. Ibidem, IV, 1875, p. 91, pl. 5, fig. 11.

Loc. Mountain Spring, Nevada.

Athyris naviformis Billings = *Whitfieldella naviformis*.

Athyris nitida Billings = *Whitfieldella nitida*.

Athyris obmaxima McChesney = *Cleiothyris obmaxima*.

Athyris obvia McChesney = *Cleiothyris obvia*.

***Athyris ohioensis* (A. Winchell).** Waverly (L. Carb.).

Spirigera ohioensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 118.

Athyris ohioensis Herrick, Bull. Denison Univ., III, 1888, p. 49, pl. 2, fig. 1.

Loc. Akron and Sciotoville, Ohio.

Athyris orbicularis McChesney = *Cleiothyris orbicularis*.

Athyris (?) ottervillensis Miller.

Middle Devonian.

Athyris ottervillensis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 314, pl. 9, figs. 14, 15.

Loc. Near Otterville, Missouri.

Athyris papilioniformis McChesney.

Kaskaskia (L. Carb.).

Athyris spiriferoides McChesney (non Eaton, 1831), Descriptions New Pal. Foss., 1860, p. 46.

Athyris? *papilioniformis* McChesney, *Ibidem*, 1865, pl. 6, fig. 4;—Trans. Chicago Acad. Sci., I, 1868, p. 33, pl. 6, fig. 4.

Loc. Fountain Bluff, Illinois.

Athyris parvirostris Meek and Worthen = *Cleiothyris roissyi*.**Athyris parvula** Whiteaves.

Hamilton (Dev.).

Athyris parvula Whiteaves, Cont. Canadian Pal., I, 1891, p. 228, pl. 32, figs. 4, 5.

Loc. Athabasca River, Canada.

Athyris pectinifera? Swallow (non Sowerby) = *Cleiothyris roissyi*.**Athyris (?) perinflata** McChesney.

Keokuk (L. Carb.).

Athyris perinflata McChesney, Descriptions New Pal. Foss., 1861, p. 81.

Loc. Naavoo, Illinois.

Athyris persinuata Meek = *Seminula persinuata*.**Athyris planosulcata** American authors (non Phillips) = *Cleiothyris roissyi*.**Athyris plattensis** Swallow = *Seminula plattensis*.**Athyris polita** Hall.

Chemung (Dev.).

Atrypa polita Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, Tables of Organic Remains, 65, fig. 5.

Athyris? *polita* Hall, Pal. New York, IV, 1867, p. 293, pl. 47, figs. 21-33.

Athyris polita Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 46, figs. 1-5

Loc. Jasper, Randolph, and Albion, New York.

Athyris*prinstana Billings = *Hindella prinstana*.**Athyris prouti** (Swallow).

Chouteau (L. Carb.).

Spirigera prouti Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 649.

Athyris prouti Keyes, Geol. Survey Missouri, V, 1895, p. 91.

Loc. St. Louis County, etc., Missouri.

Athyris reflexa Swallow = *Cleiothyris reflexa*.**Athyris roissyi** = *Cleiothyris roissyi*.**Athyris singletoni** Swallow = *Seminula singletoni*.**Athyris (?) solitaria** Billings.

Anticosti (Sil.).

Athyris solitaria Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 48.

Loc. Anticosti.

Athyris spiriferoides McChesney (non Eaton) = *A. papilioniformis*.**Athyris spiriferoides** (Eaton).

Corniferous and Hamilton (Dev.).

Terebratula spiriferoides Eaton, American Jour. Sci., XXI, 1831, p. 137;—Geological Text-book, 1832, p. 46.

Atrypa concentrica Conrad (non von Buch), Ann. Rep. Geol. Survey New York, 1838, p. 111.—Hall, Geol. New York; Rep. Fourth Dist, 1843, p. 198, fig. 5.

Spirifera spiriferoides Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 153, figs. 1, 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 828, fig. 667.

Athyris spiriferoides Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 93, figs. 1-4;—Fifteenth Rep. *Ibidem*, 1862, p. 180, figs. 1-4;—Pal. New York, IV, 1867, p. 285, pl. 46, figs. 5-31.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 89, figs. 60, 61; pl. 45, figs. 11-27.

Athyris spiriferoides (Eaton)—Continued.

Athyris concentrica Billings, Canadian Jour., VI, 1861, p. 145, figs. 54-57;—Geol. Canada, 1863, p. 373, fig. 399; p. 385, fig. 421.

Loc. New York; Pennsylvania; Maryland; Virginia; Cayuga and Widder, Canada.

Athyris squamosa Worthen = *Cleiothyris squamosa*.

Athyris sublamellosa Hall = *Cleiothyris roissyi*.

Athyris subquadrata Hall = *Seminula subquadrata*.

Athyris subtilita Hall = *Seminula argentea*.

Athyris trinucleus Hall = *Seminula trinucleus*.

Athyris trisinuatus McChesney = *Meristina trisinuata*.

Athyris tumida Roemer = *Meristina tumida*.

Athyris (?) tumidula Billings.

Anticosti (Sil.).

Athyris tumidula Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 47.

Loc. Anticosti.

Obs. Probably a species of *Whitfieldella*.

Athyris (?) turgida Shaler.

Anticosti (Sil.).

Athyris turgida Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 69.—Miller, N. American Geol. Pal., 1889, p. 335.

Loc. Anticosti.

Athyris ultravarica McChesney.

Keokuk (L. Carb.).

Athyris ultravarica McChesney, Descriptions New Pal. Fossils, 1861, p. 79.

Loc. Keokuk, Iowa.

Athyris umbonata Billings = *Hindella umbonata*.

Athyris unisulcata Billings = *Pentagonia unisulcata*.

Athyris vittata Hall = *A. fultonensis*.

ATRYPA Dalman.Genotype *Anomia reticularis* Linnæus.

Atrypa Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, p. 102.—Billings, Canadian Nat. Geol., I, 1856, p. 134;—Canadian Jour., VI, 1861, p. 264.—Whitfield, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 141, pl. 1.—Hall, Pal. New York, IV, 1867, p. 312.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 88.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 163;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 818.

Atrypa æquiradiata Conrad = *Rensselæria æquiradiata*.

Atrypa acutiplicata Conrad = *Anoplothea acutiplicata*.

Atrypa acutirostrum Hall = *Rhynchonella acutirostris*.

Atrypa affinis Vanuxem = *A. reticularis*.

Atrypa atilis Hall = *Camarotæchia plena*.

Atrypa ambigua Hall = *Camarella ambigua*.

Atrypa aprinis Hall = *Homœospira apriniformis*.

Atrypa arata Conrad = *Pentamerella arata*.

Atrypa aspera American authors = *A. spinosa*.

Atrypa aspera occidentalis Hall = *A. hystrix occidentalis*.

Atrypa bidens Hall = *Rhynchonella bidens*.

Atrypa bidentata Hall = *Rhynchonella bidentata*

Atrypa bisulcata Hall (non Vanuxem) = *Cyclospira bisulcata*.

Atrypa bisulcata Vanuxem (non Hall) = *Whitfieldella bisulcata*.

Atrypa brevirostris Hall = *Anastrophia brevirostris*.

- Atrypa calvini* Nettelroth = *A. rugosa*.
Atrypa camura Hall = *Trematospira camura*.
Atrypa capax Conrad = *Rhynchotrema capax*.
Atrypa chemungensis Conrad = *A. reticularis*.
Atrypa circulus Hall = *Parastrophia hemiplicata*.
Atrypa comis Owen = *Gypidula comis*.
Atrypa concentrica Conrad, and Hall = *Athyris spiriferoides*.
Atrypa concinna Hall = *Nucleospira concinna*.
Atrypa congesta Conrad = *Hyattella congesta*.
Atrypa congregata Conrad = *Camarotoechia congregata*.
Atrypa contracta Hall = *Camarotoechia contracta*.
Atrypa corallifera Hall = *Dictyonella corallifera*.
Atrypa crassirostrum Hall = *Whitfieldella cylindrica*.
Atrypa cuboides Vanuxem, and Hall = *Hypothyris cuboides*.
Atrypa cuneata Hall = *Rhynchotretra cuneata americana*.
Atrypa cuspidata Hall = *Triplecia cuspidata*.
Atrypa cylindrica Hall = *Whitfieldella cylindrica*.
Atrypa deflecta Hall = *Zygospira deflecta*.
Atrypa dentata Hall = *Rhynchotrema dentata*.

***Atrypa desquamata* Sowerby.**

Middle Devonian.

Atrypa desquamata Sowerby, Trans. Geol. Soc., 2d ser., V, 1840, pl. 56, figs. 19, 20.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 150, pl. 14, fig. 4.

Loc. Europe; Petoskey, Michigan; Eureka district, Nevada.

- Atrypa disparilis* Hall = *Atrypina disparilis*.
Atrypa dubia Hall = *Protorhyncha dubia*.
Atrypa dumosa Hall = *A. spinosa*.
Atrypa duplicata Hall = *Camarotoechia duplicata*.

***Atrypa ellipsoidea* Nettelroth.**

Corniferous (Dev.).

Atrypa ellipsoidea Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 90.

Loc. Falls of Ohio.

- Atrypa elongata* Conrad = *Rensseleria ovoides*.
Atrypa emacerata Hall = *Rhynchonella emacerata*.
Atrypa equiradiata Hall = *Camarotoechia equiradiata*.
Atrypa exigua Hall = *Zygospira exigua*.
Atrypa eximia Hall = *Camarotoechia eximia*.
Atrypa extans Emmons = *Triplecia extans*.
Atrypa flabella Shaler = *Anoplothecha hemispherica*.
Atrypa flabellites Conrad = *Anoplothecha flabellites*.
Atrypa galeatus Dalman = *Gypidula galeata*.

***Atrypa(?) gibbosa* Hall.**

Clinton (Sil.).

Atrypa gibbosa Hall, Pal. New York, II, 1852, p. 79, pl. 20, fig. 10.

Loc. Clinton, New York.

- Atrypa globuliformis* Vanuxem = *Leiorhynchus globuliforme*.
Atrypa hemiplicata Hall = *Parastrophia hemiplicata*.
Atrypa hemispherica Sowerby = *Anoplothecha hemispherica*.
Atrypa hirsuta Hall = *Parazyga hirsuta*.

Atrypa hystrix Hall.

Chemung (Dev.).

Atrypa hystrix Hall, Geology N. Y.; Rep. Fourth Dist., 1843, p. 271, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 829, fig. 681.—Hall, Pal. New York, IV, 1867, p. 326, pl. 53A, figs. 15-17.—Whitfield, Geol. Wisconsin, IV, 1882, p. 333, pl. 26, fig. 5.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 55, fig. 23.

Loc. Steuben County, New York; Pennsylvania; Rockford, Iowa; Milwaukee, Wisconsin.

Obs. See *A. spinosa*.

Atrypa hystrix elongata Webster.

Chemung (Dev.).

Atrypa hystrix var. *elongata* Webster, American Nat., XXII, 1888, p. 1104.

Loc. Near Rockford, Iowa.

Atrypa hystrix occidentalis Hall.

Middle Devonian.

Atrypa aspera var. *occidentalis* Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 515, pl. 6, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 55, figs. 18-20.

Atrypa aspera Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 403, pl. 13, fig. 7.

Loc. Independence, Davenport, etc., Iowa; Rock Island, Illinois.

Obs. This variety is probably more closely related to *A. hystrix* than to *A. aspera*.

Atrypa hystrix planosulcata Webster.

Chemung (Dev.).

Atrypa hystrix var. *planosulcata* Webster, American Nat., XXII, 1888, p. 1104.

Loc. Near Rockford, Iowa.

Atrypa imbricata Hall (non Sowerby) = *A. nodostriata*.

Atrypa impressa Hall = *A. reticularis impressa*.

Atrypa impressa Shaler (non Hall) = *A. reticularis*.

Atrypa increbescens Hall = *Rhynchotrema inaequalis*.

Atrypa intermedia Hall = *Whitfieldella intermedia*.

Atrypa interplicata Hall = *Anastrophia interplicata*.

Atrypa laevis Vanuxem = *Meristella laevis*.

Atrypa lacunosa Vanuxem = *Anastrophia verneuili*.

Atrypa lamellata Hall = *Rhynchonella lamellata*.

Atrypa(?) lara (Billings).

Anticosti (Sil.).

Athyris lara Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 47.

Atrypa lara Davidson, Suppl. British Sil. Brach., Paleontographical Soc., 1882, p. 121.

Loc. Anticosti.

Obs. Said to have a true *Atrypa* loop and spires. The exterior is smooth. Probably the type of a new genus.

Atrypa laticorugata Foerste.

Clinton (Sil.).

Atrypa laticorugata Foerste, Geol. Ohio, VII, 1895, p. 591, pl. 57A, fig. 16.

Loc. Dayton, Ohio.

Atrypa laticostata Hall (non Phillips) = *Camarotoechia contracta*.

Atrypa lentiformis Vanuxem = *A. reticularis*.

Atrypa limitaris Hall = *Leiorhynchus limitare*.

Atrypa (?) lingulata Nicollet.

Lower Carboniferous.

Atrypa lingulata Nicollet, Rep. Hydrog. Basin Up. Miss. River, 1843, p. 167.

"Subfusiform; valves nearly equally convex; inferior valve with a longitudinal sinus; base projecting in the middle, the margin of the projection truncated. St. Louis, and also the bluff beneath Rockwell, Illinois."

Atrypa marginalis (Dalman).

Niagara (Sil.).

Terebratula marginalis Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, p. 59, pl. 6, fig. 6.

Atrypa marginalis Roemer, Sil. Fauna west. Tennessee, 1860, p. 69, pl. 5, fig. 10.—Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 46.—Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 197.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 314, pl. 6, figs. 8, 9;—Geol. Ohio, VII, 1895, p. 591, pl. 25, figs. 6, 9; pl. 31, figs. 8, 9.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 55, figs. 24, 25.

Trematospira matthewsoni McChesney, Descriptions New Pal. Foss., 1860, p. 71;—Trans. Chicago Acad. Sci., I, 1868, p. 32, pl. 7, fig. 3.

Atrypa nodostriata Foerste (non Hall), Bull. Denison Univ., I, 1885, p. 90, pl. 13, fig. 9.

Atrypa marginalis var. *multistriata* Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 316, pl. 6, fig. 8.

Loc. Europe; Anticosti; Dayton, Ohio; Hanover, Indiana; Louisville, Kentucky; Decatur County, Tennessee; Bridgeport, Illinois.

Atrypa masonii (Salter).

Silurian.

Rhynchonella masonii Salter, Sutherland's Jour. Voyage Baffins Bay, etc., II, 1852, p. cxxxi, pl. 5, fig. 5.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 596.

Loc. Near Wellington Channel, Bessels Bay, lat. 81° 6'.

Atrypa medialis Vanuxem = *Eatonia medialis*.

Atrypa mesacostalis Hall = *Leiorhynchus mesacostale*.

Atrypa missouriensis Miller.

Middle Devonian.

Atrypa missouriensis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 315, pl. 9, figs. 19-21.

Loc. Near Otterville, Missouri.

Atrypa modesta Hall = *Zygospira modesta*.

Atrypa nasuta Conrad = *Meristella nasuta*.

Atrypa naviformis Hall = *Whitfieldella naviformis*.

Atrypa neglecta Hall = *Camarotoechia neglecta*.

Atrypa nitida Hall = *Whitfieldella nitida*.

Atrypa nitida oblata Hall = *Whitfieldella oblata*.

Atrypa nodostriata Foerste (non Hall) = *A. marginalis*.

Atrypa nodostriata Hall.

Clinton and Niagara (Sil.).

Atrypa imbricata Hall (non Sowerby), Geol. N. Y.; Rep. Fourth Dist., 1843, Tab. Organic Remains, 13, fig. 1.

Atrypa nodostriata Hall, Pal. New York, II, 1852, p. 272, pl. 56, fig. 2.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 133, pl. 7, figs. 12-14.

Loc. Lockport, New York; Yellow Springs, Ohio; Louisville, Kentucky; Wisconsin.

Atrypa nucleolata Hall = *Whitfieldella nucleolata*.

Atrypa nucleus Hall = *Triplecia nucleus*.

Atrypa nustella Castelnau = *Eatonia peculiaris*.

Atrypa oblata Hall = *Whitfieldella oblata*.

Atrypa obtusiplicata Hall = *Camarotoechia obtusiplicata*.

Atrypa octocostata Conrad = *Pentamerella arata*.

Atrypa palmata Morris and Sharpe = *Anoplotheca flabellites*.

Atrypa peculiaris Conrad = *Eatonia peculiaris*.

Atrypa phoca (Salter).

Silurian.

Rhynchonella phoca Salter, Sutherland's Jour. Voyage Baffins Bay, etc., II, 1852, p. cccxvi, pl. 5, figs. 1-3.

Atrypa phoca Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 576.

Loc. Cape Riley, Cornwallis, Seal Islands, Bessels Bay, lat. 81° 6', and Dobbins Bay, lat. 79° 41', Arctic America.

Atrypa planoconvexa Hall = *Anoplothecha planoconvexa*.

Atrypa pleiopleura Conrad = *Camartoechia pleiopleura*.

Atrypa plena Hall = *Camartoechia plena*.

Atrypa plicata Hall = *Rhynchonella plicata*.

Atrypa plicatella Hall = *Rhynchonella plicatella*.

Atrypa plicatula Hall = *Anoplothecha plicatula*.

Atrypa plicifera Hall = *Camartoechia plena*.

Atrypa polita Hall = *Athyris polita*.

Atrypa prisca Vanuxem = *A. reticularis*.

Atrypa pseudomarginalis Hall.

Up. Helderberg (Dev.).

Atrypa pseudomarginalis Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 84;—Fifteenth Rep. *Ibidem*, 1862, p. 189;—Pal. New York, IV, 1867, p. 327, pl. 53, figs. 1, 2.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1895, pl. 55, figs. 26, 27.

Loc. Schoharie, New York.

Atrypa quadricostata Hall, 1843 = *Leiorhynchus quadricostatus*.

Atrypa quadricostata Hall, 1852 = *Hyattella congesta*.

Atrypa rectiplicata Conrad = *Spirifer rectiplicatus*.

Atrypa recurvirostris Hall = *Zygospira recurvirostris*.

Atrypa reticularis (Linnaeus).

Silurian and Devonian.

Anomia reticularis Linné, *Systema Naturæ*, ed. xii, I, 1767, p. 1132.

Atrypa chemungensis Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 265.—Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 182, fig. 4.

Hipparionyx consimilaris Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 132, fig. 2.

Atrypa affinis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 88, fig. 12.—Hall, *Ibidem*, Rep. Fourth Dist., 1843, p. 88, fig. 12.

Atrypa prisca Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 139, fig. 5.—Hall, *Ibidem*, Rep. Fourth Dist., 1843, p. 175, fig. 5; p. 198, fig. 4.—Owen, Geol. Expl. Iowa, Wisconsin, Illinois, 1844, pl. 12, figs. 2, 10.—Billings, Canadian Nat. Geol., I, 1856, p. 474, pl. 7, fig. 11.

Atrypa lentiformis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 163, fig. 3; p. 161.—Hall, *Ibidem*, Rep. Fourth Dist., 1843, p. 215, fig. 3.

Strophomena ithacensis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 174, fig. 2. (On the authority of Professor Williams.)

Atrypa tribulis Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 271, fig. 3.

Terebratula prisca Castelnau, *Essai Syst.*, Sil. l'Amérique Septentrionale, 1843, p. 40, pl. 13, fig. 8.

Terebratula reticularis Hall, American Jour. Sci., 2d ser., XX, 1849, p. 227.—Yandell and Shumard, *Cont. Geol. Kentucky*, 1847, p. 10.

Atrypa reticularis Hall, Pal. New York, II, 1852, p. 72, pl. 23, fig. 8; p. 270, pl. 55, fig. 5.—Billings, Canadian Nat. Geol., I, 1856, p. 137, pl. 2, fig. 10.—Hall, Geol. Survey Iowa, II, 1858, p. 515;—Pal. New York, III, 1859, p. 253, pl. 42, fig. 1.—Roemer, Sil. Fauna west. Tennessee, 1860, p. 69, pl. 5, fig. 9.—Billings, Canadian Jour., VI, 1861, p. 264, figs. 84-87;—Geol. Canada, 1863, p. 318,

Atrypa reticularis (Linnæus)—Continued.

fig. 335; p. 384, fig. 416.—Hall, Pal. New York, IV, 1867, p. 316, pl. 52, figs. 1-3, 7-12; pl. 53, figs. 3-19; pl. 53A, figs. 22, 23.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 97, pl. 13, fig. 13.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 432, pl. 13, fig. 11.—Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 347, pl. 1, fig. 6;—King's U. S. Geol. Survey Expl. 40th Parl., IV, 1877, p. 38, pl. 1, fig. 7; pl. 3, fig. 6.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 596.—Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 162, pl. 25, figs. 44-47.—White, Sec. Ann. Rep. Indiana Bureau Statistics and Geol., 1880, p. 502, pl. 5, figs. 7-9;—Tenth Rep. State Geol. Indiana, 1881, p. 134, pl. 5, figs. 7-9;—*Ibidem*, Eleventh Rep., 1882, p. 304, pl. 25, figs. 44-47.—Whitfield, Geol. Wisconsin, IV, 1882, p. 333, pl. 26, fig. 6.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 150, pl. 14, fig. 6.—Beecher and Clarke, Mem. New York State Mus. Nat. Hist., I, 1889, p. 51, pl. 4, figs. 12-20.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Survey, 1889, p. 91, pl. 14, figs. 12-23; pl. 15, fig. 1.—Foster, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 314.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 289, pl. 37, fig. 8.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 165, fig. 153; pl. 55, figs. 1-17.—Herrick, Geol. Ohio, VII, 1895, pl. 20, fig. 7.

Atrypa impressa Shaler (non Hall), Bull. Mus. Comp. Zool., 4, 1865, p. 68.

Loc. A characteristic fossil of the Silurian and Devonian throughout the world.

Atrypa reticularis impressa Hall.

Schoharie grit (Dev.).

Atrypa impressa Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 122, figs. 1-7;—Pal. New York, IV, 1867, p. 315, pl. 51, figs. 1-9.

Loc. Schoharie, Clarksville, etc., New York.

Atrypa reticularis niagarensis Nettelroth.

Niagara (Sil.).

Atrypa reticularis var. *niagarensis* Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 92, pl. 32, figs. 5-8, 44-47.

Loc. Jefferson County, Kentucky; Clarke County, Indiana.

Atrypa reticularis nuntia Hall and Whitfield.

Hamilton (Dev.).

Atrypa reticularis Hall, Pal. New York, IV, 1867, p. 316, pl. 51, figs. 10-21.

Atrypa reticularis var. *nuntia* Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 199.

Loc. Falls of Ohio.

Atrypa reticularis ventricosa Hall and Whitfield.

Hamilton (Dev.).

Atrypa reticularis Hall, Pal. New York, IV, 1867, p. 316, pl. 52, figs. 4-6.

Atrypa reticularis var. *ventricosa* Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 199.

Loc. Falls of Ohio.

Atrypa robusta Hall = *Rhynchonella robusta*.

Atrypa rostrata Hall = *Meristella rostrata*.

Atrypa rugosa Hall.

Niagara (Sil.).

Atrypa rugosa Hall, Pal. New York, II, 1852, p. 271, pl. 56, fig. 1.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 171.

Rhynchonella rugosa Billings, Geol. Canada, 1863, p. 315, fig. 321.

Atrypa calvini Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 89, pl. 32, figs. 64-66.

Loc. Lockport, New York; Anticosti; Osgood, Indiana; Louisville, Kentucky.

Atrypa scitula Hall = *Charionella scitula*.

Atrypa semiplicata Conrad = *Rhynchonella semiplicata*.

Atrypa singularis Vanuxem = *Eatonia singularis*.

Atrypa sordida Hall = *Rhynchonella sordida*.

***Atrypa spinosa* Hall.**

Corniferous-Chemung (Dev.).

Atrypa spinosa Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 200, figs. 1, 2.—Whitfield, Geol. Wisconsin, IV, 1882, p. 333, pl. 26, figs. 7, 8.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 55, figs. 21, 22.

Atrypa dumosa Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 271, fig. 1.

Atrypa aspera Hall (non Schlothelm), Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 168.—Rogers, Geol. Pennsylvania, II, 1858, Pt. II, p. 828, fig. 671.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 96, pl. 13, fig. 12.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 88, pl. 14, figs. 1-11.

Atrypa aspera vel aspera Hall, Pal. New York, IV, 1867, p. 322, pl. 53A, figs. 1-14, 18, 24, 25.

Atrypa aspera? Meek. Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 348, pl. 1, fig. 2.

Atrypa reticularis var. *aspera* Whiteaves, Cont. Canadian Pal., I, 1891, pp. 229, 289.

Loc. New York; Pennsylvania; Maryland; Virginia; Kentucky; Ohio; Illinois; Iowa; Wisconsin; Ontario; Lockhart and Athabasca rivers, etc., Northwest Territory, Canada.

Obs. The Corniferous limestone specimens of *A. spinosa* are not always easily distinguished from *A. reticularis*. The fewer plications of the former, however, will usually distinguish it from the latter species. This tendency to fewer plications is more marked in the Hamilton formation and attains its climax in the Chemung, where the species is known as *A. hystrix*.

Atrypa subtrigonalis Hall = *Rhynchonella subtrigonalis*.

Atrypa sulcata Vanuxem = *Whitfieldella sulcata*.

Atrypa tenuilineata Hall = *Dalmanella tenuilineata*.

Atrypa tribulis Hall = *A. reticularis*.

Atrypa unguiformis Hall = *Hipparionyx proximus*.

Atrypa unisulcata Conrad = *Pentagonia unisulcata*.

ATRYPINA Hall and Clarke. Genotype *Leptocœlia imbricata* Hall.

Atrypina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 161, fig. 152;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 815.

***Atrypina clintoni* Hall and Clarke.**

Clinton (Sil.).

Atrypina clintoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 162, pl. 53, figs. 7, 17-19; pl. 83, fig. 6.

Loc. Orleans County, New York.

***Atrypina disparilis* (Hall).**

Niagara (Sil.).

Atrypa disparilis Hall, Pal. New York, II, 1852, p. 277, pl. 57, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 53, figs. 1-4.

Leptocœlia disparilis Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 77.

Trematospira? *disparilis* Hall, Sixteenth Rep., Ibidem, 1863, p. 60;—Trans. Albany Institute, IV, 1863, p. 146.

Cœlospira disparilis Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 162, pl. 25, figs. 39-43;—Eleventh Rep. State Geol. Indiana, 1882, p. 363, pl. 25, figs. 39-43.—Beecher and Clarke, Mem. New York State Mus. Nat. Hist., I, 1889, p. 64, pl. 5, figs. 17-23.

Loc. Wolcott, New York; Waldron, Indiana.

Obs. Davidson in 1882 regarded this species the same as *Atrypa barrandei* of Europe.

Atrypina imbricata Hall.

Lower Helderberg (Dev.).

Leptocœlia imbricata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 108;—Pal. New York, III, 1859, p. 246, pl. 38, figs. 8-13.—Billings, Geol. Canada, 1863, p. 957, fig. 452.

Trematospira imbricata Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 60;—Trans. Albany Institute, IV, 1863, p. 146.—Keyes, Geol. Survey Missouri, V, 1895, p. 96.

Trematospira ? *imbricata* Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 381, pl. 7, fig. 2.

Atrypina imbricata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 53, figs. 5, 6, 8-10.

Loc. Albany and Schoharie counties, New York; Perry County, Missouri.

Atrypina intermedia (Hall).

Arisaig (Sil.).

Leptocœlia intermedia Hall, Canadian Nat. Geol., V, 1860, p. 147, fig. 5.—Dawson, Acadian Geology, 3d ed., 1878, p. 598, fig. 202.

Loc. Arisaig, Nova Scotia.

Avicula desquamata Hall=*Obolella crassa*.**AULACORHYNCHUS** Dittmar.Genotype *A. pachti* Dittmar.

Aulacorhynchus Dittmar, Verhand. Kais. Mineral. Gessel. St. Petersburg, 2d ser., VII, 1871, p. 1, pl. 1, figs. 1-13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 311;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 904.

Isogramma Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 568.

Aulacorhynchus millipunctatum (Meek and Worthen). Up. Coal Meas.

Chonetes ?? *millipunctata* Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1870, p. 35;—Geol. Survey Illinois, V, 1873, p. 566, pl. 25, fig. 3.

Isogramma millipunctata Meek and Worthen, *Ibidem*, 1873, p. 568.

Aulacorhynchus millipunctatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 312, pl. 83, figs. 14, 15.

Chonetes millipunctatus Keyes, Geol. Survey Missouri, V, p. 54.

Loc. Marion County, Illinois; Kansas City, Missouri.

Anulosteges guadalupensis Shumard=*Strophalosia guadalupensis*.**Anulosteges spondyliformis** White and St. John=*Strophalosia spondyliformis*.**Barrandella** Hall and Clarke=*Clorinda*.**BARROISELLA** Hall and Clarke.Genotype *Lingula subspatulata*

Meek and Worthen (non Hall and Meek).

Barroisella Hall and Clarke, Pal. New York, Extract, VIII, Pt. I, 1890, p. 62;—Pal. New York, VIII, Pt. I, 1892, pp. 62, 64;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 230.

Barroisella subspatulata (Meek and Worthen).

Black Slate (Dev.).

Lingula subspatulata Meek and Worthen (non Hall and Meek), Geol. Survey Illinois, III, 1868, p. 437, pl. 13, fig. 1.

Lingula subspatulata ? A. Winchell, Proc. American Phil. Soc., XII, 1870, p. 248.

Barroisella subspatulata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 63, pl. 2, figs. 14-16 and p. 164.

Loc. Jonesboro, Illinois; Louisville and Lebanon, Kentucky; Rockford, Indiana.

BEACHIA Hall and Clarke.Genotype *Meganteris suessana* Hall.

Beachia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 260;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 850.

Beachia suessana Hall.

Oriskany (Dev.).

Meganteris suessana Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 100.

Rensseleria suessana Hall, Pal. New York, III, 1859, p. 459, pl. 107, figs. 1-15.

Beachia suessana Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 260, pl. 77, figs. 1-11.

Loc. Cumberland, Maryland; near Rondout, New York.

BEECHERIA Hall and Clarke. Genotype *B. davidsoni* Hall and Clarke.

Beecheria Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 300;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 866.

Beecheria davidsoni Hall and Clarke.

Upper Carboniferous.

Beecheria davidsoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 300, fig. 224, pl. 79, figs. 33-36.

Loc. Windsor, Nova Scotia.

BILLINGSSELLA Hall and Clarke.Genotype *Orthis pepina* Hall=*O. coloradoensis* Shumard.

Billingsella and *Protorthis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 230, 231;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 273.

Obs. *Protorthis* was founded on *Orthis billingsi* Hartt, a species rarely found in good preservation. The diagnostic character was supposed to be the presence of a rudimentary spondylium and the absence of a deltidium. In the National Museum collection, however, there are two artificial casts of the ventral valve made from Hartt's original specimens and other material collected by Mr. Walcott, showing *O. billingsi* to be without a spondylium. The rostral plate is the deltidium distorted by pressure to which these shells have been subjected. The only character of generic importance is that the geologically older species of *Billingsella* have a more rudimentary or nearly obsolete cardinal process than the type species. This difference, however, hardly justifies the retention of *Protorthis*.

Billingsella alberta (Walcott).

Middle Cambrian.

Orthisina alberta Walcott, Proc. U. S. National Mus., XI, 1888, p. 442.

Loc. Mount Stephan, British Columbia.

Billingsella billingsi (Hartt).

Middle Cambrian.

Orthis billingsi Hartt, Dawson's *Acadian Geology*, 2d ed., 1868, p. 644, fig. 223.—Walcott, Bull. U. S. Geol. Survey, 10, 1881, p. 17, pl. 1, fig. 1.—Matthew, Trans. Royal Soc. Canada, III, 1886, p. 43.

Orthis? *billingsi* Matthew, *Ibidem*, VIII, 1891, p. 131.

Protorthis billingsi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 219, 232, pl. 7A, figs. 14-20.

Loc. St. John, New Brunswick.

Billingsella coloradoensis (Shumard).

Upper Cambrian.

Orthis coloradoensis Shumard, Trans. St. Louis Acad. Sci., I, 1860, p. 627.

Orthis pepina Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 134, pl. 6, figs. 23-27;—Trans. Albany Institute, V, 1867, p. 113.—Whitfield, Geol. Wisconsin, IV, 1882, p. 170, pl. 1, figs. 4, 5.

Orthis? (*Orthisina?*) *pepina* Hall, Second Ann. Rep. New York State Geologist, 1883, pl. 37, figs. 16-19.

Billingsella pepina Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 230, pl. 7, figs. 16-19; pl. 7A, figs. 7-9.

Orthis (*Billingsella*) *pepina* Sardeson, Bull. Minnesota Acad. Nat. Sci., IV, 1896, p. 96.

Loc. Barnett County, Texas; Lake Pepin, Minnesota; St. Croix River and Berlin, Wisconsin.

- Billingsella festinata** (Billings). Lower Cambrian.
Orthisina festinata Billings, Pal. Fossils, I, 1861, p. 10, figs. 11, 12;—Geol. Vermont, II, 1861, p. 949, figs. 350–352;—American Jour. Sci., 2d ser., XXXIII, 1862, p. 105;—Geology Canada, 1863, p. 284, fig. 289.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 120, pl. 7, fig. 7;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 613, pl. 72, fig. 7.
Billingsella festinata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 230.
Loc. Swanton, Vermont; York, Pennsylvania.
- Billingsella (?) grandæva** (Billings). Calciferous (Ord.).
Orthisina grandæva Billings, Canadian Nat. Geol., IV, 1859, p. 349, fig. 1;—Geology Canada, 1863, p. 113, fig. 21.
Billingsella? *grandæva* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 231.
Loc. Mingan Island, Gulf of St. Lawrence.
- Billingsella latourensis** (Matthew). Middle Cambrian.
Kutorgina latourensis Matthew, Trans. Royal Soc. Canada, III, 1886, p. 42, pl. 5, fig. 18.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 93, 95, 233, pl. 4, figs. 18–20.
Loc. Portland, New Brunswick.
- Billingsella (?) laurentina** (Billings). Anticosti (Sil.).
Orthis laurentina Billings, Geol. Survey Canada; Rep. for 1856, 1857, p. 297;—Pal. Fossils, I, 1862, p. 138, fig. 115.
Billingsella? *laurentina* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 231, 238, pl. 7A, figs. 1–6.
Loc. Anticosti.
- Billingsella orientalis** (Whitfield). Lower Cambrian.
Orthisina orientalis Whitfield, Bull. American Mus. Nat. Hist., I, 1884, p. 144, pl. 14, fig. 6.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 120, pl. 7, fig. 6;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 613, pl. 72, fig. 8.
Billingsella orientalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 230.
Loc. Georgia and Swanton, Vermont.
- Billingsella (?) primordialis** (Whitfield). Calciferous (Ord.).
Streptorhynchus? *primordiale* Whitfield, Bull. American Mus. Nat. Hist., I, 1886, p. 301, pl. 24, fig. 7.
Billingsella? *primordiale* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 231.
Loc. Fort Cassin, Vermont.
- Billingsella quacoensis** (Matthew). Middle Cambrian.
Orthis quacoensis Matthew, Trans. Royal Soc. Canada, III, 1886, p. 43, pl. 5, fig. 20.
Orthis? *quacoensis* Matthew, Ibidem, VIII, 1891, p. 131.
Protorthis quacoensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 232, pl. 7A, fig. 21.
Loc. Portland and St. Martins, New Brunswick.
- Billingsella transversa** (Walcott). Lower Cambrian.
Orthisina? *transversa* Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 121, pl. 7, fig. 5;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 613, pl. 72, fig. 9.
Billingsella transversa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 230.
Loc. Georgia, Vermont.
- Billingsella whitfieldi** (Walcott). Lower Cambrian.
Kutorgina whitfieldi Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 18, pl. 9, fig. 4.
Loc. Eureka district, Nevada.
- Billingsia Ford** (non de Koninck, 1876)=*Elkania*.

BILOBITES Linnaeus.Genotype *Anomia biloba* Linnaeus.

- Bilobites* Linnaeus, *Systema Naturæ*, ed. Muller, VI, 1775, p. 325.—Hall, *Bull. Geol. Soc. America*, I, 1889, p. 21.—Beecher, *American Jour. Sci.*, 3d ser., XLII, 1891, p. 51.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 204, 223;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 269.
- Dicelosis* King, *Mon. Permian Fossils England*, *Pal. Soc.*, 1850, p. 106.

Bilobites acutilobus (Ringueberg).

Niagara (Sil.).

- Orthis acutiloba* Ringueberg, *Proc. Acad. Nat. Sci. Philadelphia*, 1888, p. 134, pl. 7, fig. 5.
- Bilobites acutilobus* Beecher, *American Jour. Sci.*, 3d ser., XLII, 1891, p. 52, pl. 1, fig. 1.
- Loc.* Lockport, New York.

Bilobites bilobus (Linnaeus).

Niagara (Sil.).

- Anomia biloba* Linnaeus, *Systema Naturæ*, ed. XII, 1767, p. 1154.
- Delthyris sinuatus* Hall, *Geol. New York*; *Rep. Fourth Dist.*, 1843, p. 105, fig. 8.
- Spirifer bilobus* Hall, *American Jour. Sci.*, 2d ser., XX, 1849, p. 228;—*Pal. New York*, IV, 1852, p. 260, pl. 54, fig. 1.
- Orthis biloba* Hall, *Twelfth Rep. New York State Geol.*, 1859, p. 85;—Eleventh Rep. State Geol. Indiana, 1882, p. 286, pl. 27, fig. 16.
- Bilobites bilobus* Beecher, *American Jour. Sci.*, 3d ser., XLII, 1891, p. 52, pl. 1, fig. 28.
- Bilobites biloba* Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 190, 204, 205, 223, pl. 5B, figs. 11–14.
- Loc.* Lockport, New York; Waldron, Indiana; Wisconsin.

Bilobites varicus (Conrad).

Lower Helderberg (Dev.).

- Delthyris bilobata* Conrad (not *Orthis bilobata* Sowerby), *Second Ann. Rep. New York Geol. Survey*, 1838, pp. 112, 118.
- Delthyris varica* Conrad, *Jour. Acad. Nat. Sci. Philadelphia*, VIII, 1842, p. 262, pl. 14, fig. 20.
- Orthis varica* Hall, *Pal. New York*, III, 1859, p. 179, pl. 24, fig. 1.
- Orthis (Dicelosis) varica* Hall, *Second Ann. Rep. New York State Geol.*, 1883, pl. 35, figs. 38–42.
- Bilobites varicus* Beecher, *American Jour. Sci.*, 3d ser., XLII, 1891, p. 52, pl. 1, figs. 3–27.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 204, 223, pl. 5B, figs. 15–19.
- Loc.* Albany and Schoharie counties, New York; Decatur County, Tennessee; St. Blandine, New Brunswick.

BOTSFORDIA Matthew.Genotype *Obolus pulcher* Matthew.

- Obolus (Botsfordia)* Matthew, *Trans. Royal Soc. Canada*, VIII, 1891, p. 148; X, p. 90.

Botsfordia pulchra Matthew.

Middle Cambrian.

- Obolus pulcher* Matthew, *Canadian Record of Science*, III, 1889, p. 306;—*Trans. Royal Soc. Canada*, VII, 1890, p. 151, pl. 8, figs. 1, 2.
- Obolus (Botsfordia) pulcher* Matthew, *Trans. Royal Soc. of Canada*, VIII, 1891, p. 148.
- Obolus? pulcher* Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 81, 183, pl. 4K, fig. 22.
- Obolus (Botsfordia) pulchra* Matthew, *Trans. Royal Soc. Canada*, X, 1894, p. 90, pl. 16, fig. 3.
- Botsfordia pulchra* Matthew, *Trans. New York Acad. Sci.*, XIV, 1895, p. 115, pl. 3.
- Loc.* Canton Island, New Brunswick.

Brachymerus Shaler (non Dejean, 1834) = *Anastrophia*.*Brachymerus reversus* Shaler = *Parastrophia reversa*.

Brachyprion Shaler=Stropheodonta.

Brachyprion geniculatum Shaler=Stropheodonta geniculata.

Brachyprion leda Shaler=Rafinesquina leda.

Brachyprion ventricosum Shaler=Stropheodonta ventricosa.

CAMARELLA Billings. Genotype *C. volborthi* Billings.

Camarella Billings, Canadian Nat. Geol., IV, 1859, p. 301;—*Ibidem*, VI, 1861, p. 316.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 122.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 48.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 219;—Thirteenth Annu. Rep. New York State Geologist, 1895, p. 838.

Camarella ambigua (Hall). Trenton (Ord.).

Atrypa ambigua Hall, Pal. New York, I, 1847, p. 143, pl. 33, figs. 8, 9.

Triplesia? *ambigua* Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 65.

Camarella ambigua Miller, American Pal. Foss., 1879, p. 107.

Loc. Middleville, New York.

Camarella antiquata Billings=Protorhyncha antiquata.

Camarella bisulcata Emmons=Cyclospira bisulcata.

Camarella bernensis Sardeson=Parastrophia hemiplicata.

Camarella breviplicata Billings. Calciferous (Ord.).

Camarella breviplicata Billings, Pal. Fossils, I, 1865, p. 304, fig. 295.

Loc. Stanbridge, Quebec, Canada.

Camarella calcifera Billings=Syntrophia calcifera.

Camarella circularis Miller=Parastrophia hemiplicata.

Camarella(?) costata Billings. Calciferous (Ord.).

Camarella? *costata* Billings, Pal. Fossils, I, 1865, p. 305, fig. 296.

Loc. Stanbridge, Quebec, Canada.

Camarella hemiplicata Billings=Parastrophia hemiplicata.

Camarella lenticularis Billings. Anticosti (Sil.).

Camarella lenticularis Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 45.

Loc. Anticosti.

Camarella longirostris Billings. Chazy (Ord.).

Camarella longirostra Billings, Canadian Nat. Geol., IV, 1859, p. 302; p. 445, fig. 23;—Geol. Canada, 1863, p. 127, fig. 53.

Loc. Mingen Islands, Gulf of St. Lawrence.

Camarella minor Walcott=Protorhyncha minor.

Camarella ops Billings=Parastrophia ops.

Camarella owatonnensis Sardeson=Cyclospira bisulcata.

Camarella panderi Billings. Black River (Ord.).

Camarella panderi Billings, Canadian Nat. Geol., IV, 1859, p. 302;—Geol. Canada, 1863, p. 143, fig. 78.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 220, pl. 62, figs. 19-23.

Loc. Panquettes Rapids, Canada; Curdsville, Kentucky.

Camarella parva Billings. Calciferous (Ord.).

Camarella parva Billings, Pal. Fossils, I, 1865, p. 219.

Camarella parva? Matthew, Trans. Royal Soc. Canada, XI, 1893, p. 103, pl. 7, fig. 9.

Loc. Table Head and Portland Creek, Newfoundland; near St. John, New Brunswick.

- Camarella polita** Billings. Calciferous (Ord.).
Camarella polita Billings, Pal. Fossils, I, 1865, p. 305, fig. 297 on p. 304.
Loc. Stanbridge, Quebec, Canada.
- Camarella reversa** Billings=*Anastrophia reversa*.
- Camarella varians** Billings. Calciferous-Chazy (Ord.).
Camarella varians Billings, Canadian Nat. Geol., IV, 1859, p. 445, fig. 24;—Geol. Canada, 1863, p. 127, fig. 52;—Pal. Fossils, I, 1865, p. 220.
Loc. Mingan Islands, Gulf of St. Lawrence; Table Head and Portland Creek, Newfoundland; Chazy, New York.
- Camarella volborthi** Billings. Black River (Ord.).
Camarella volborthi Billings, Canadian Nat. Geol., IV, 1859, p. 301;—Geol. Canada, 1863, p. 113, fig. 77.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 220, pl. 62, figs. 11–18; pl. 84, fig. 42.
Loc. Panquettes Rapids, Ontario, Canada.
- Camarium** Hall=*Merista*.
- Camarium elongatum** Hall=*Merista typus*.
- Camarium meeki** Hall=*Meristella meeki*.
- Camarium princeps** Hall=*Meristella princeps*.
- Camarium typus** Hall=*Merista typus*.
- CAMAROPHORELLA** Hall and Clarke.
 Genotype *Pentamerus lenticularis* White and Whitfield.
Camarophorella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 215;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 838.
- Camarophorella lenticularis** (White and Whitfield). Burlington (L. Carb.).
Pentamerus lenticularis White and Whitfield, Jour. Boston Soc. Nat. Hist., VIII, 1862, p. 295.
Camarophorella lenticularis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 215, pl. 62, figs. 46–48.
Loc. Burlington, Iowa.
- CAMAROPHORIA** King. Genotype *Terebratula schlotheimi* von Buch.
Camarophoria King, Ann. Mag. Nat. Hist., XVIII, 1846, p. 89;—Mon. Permian Foss. England, Pal. Soc., 1850, p. 113.—Hall, Pal. New York, IV, 1867, p. 435.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 212;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 837.
Stenochisma (Ehlert (non Conrad), Fischer's Manuel Conchyliologie, 1887, p. 1309.
- Camarophoria(?) bisulcata** Shumard. Upper Carboniferous.
Camarophoria(?) bisulcata Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 296, pl. 11, fig. 2.
Loc. Gnadalupe Mountains of New Mexico and Texas.
- Camarophoria caput-testudinis** (White). Burlington (L. Carb.).
Rhynchonella caput-testudinis White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 23.
Camarophoria caput-testudinis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 215.
Loc. Burlington, Iowa.
Obs. Probably identical with *C. ringens* Swallow.
- Camarophoria eucharis** Hall=*Camarospira eucharis*.
- Camarophoria explanata** (McChesney). Kaskaskia (L. Carb.).
Rhynchonella explanata McChesney, Descriptions New Pal. Foss., 1860, p. 50;—Trans. Chicago Acad. Sci., I, 1868, p. 30, pl. 6, fig. 7.

Camarophoria explanata (McChesney)—Continued.

Pugnax explanatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 60, figs. 43-45.

Loc. Chester, Illinois; Princeton, Kentucky.

Obs. Specimens of this species in Mr. Ulrich's collection prove it to be a *Camarophoria*.

Camarophoria giffordi Worthen = *Enteletes hemiplicatus*.**Camarophoria globulina** Geinitz (non Phillips) = *Pugnax utah*.**Camarophoria globulina** Davidson = *Pugnax globulina*.**Camarophoria occidentalis** Miller.

Burlington (L. Carb.).

Camarophoria occidentalis Miller, Jour. Cincinnati Soc. Nat. Hist., IV, 1881, p. 8, pl. 7, fig. 7.

Loc. Lake Valley district, New Mexico.

Camarophoria osagensis Swallow = *Pugnax utah*.**Camarophoria ringens** (Swallow).

Keokuk (L. Carb.).

Rhynchonella ringens Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 653.—Keyes, Geol. Survey Missouri, V, 1895, p. 102.

Camarophoria ringens Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 214.

Loc. Callaway County, Missouri.

Obs. Compare with *C. caput-testudinis* and *Rhynchonella striata*. The writer has seen specimens of *R. ringens* from Callaway County, Missouri, Swallow's original locality.

Camarophoria rhomboidalis Hall and Clarke.

Corniferous (Dev.).

Camarophoria rhomboidalis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 366, pl. 62, figs. 25-29.

Loc. Cass County, Indiana.

Camarophoria subcuneata Hall.

St. Louis (L. Carb.).

Rhynchonella subcuneata Hall, Trans. Albany Institute, IV, 1858, p. 11;—Geol. Survey Iowa, I, Pt. II, 1858, p. 658, pl. 23, fig. 3.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 51, pl. 6, figs. 47-49.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 333, pl. 29, figs. 47-49.—Herrick, Bull. Denison Univ., III, 1888, p. 39, pl. 7, fig. 23.—Keyes, Geol. Survey Missouri, V, 1895, p. 102.

Camarophoria subcuneata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pl. 62, figs. 31-37.

Loc. Spergen Hill and Bloomington, Indiana. In the Waverly at Granville, Ohio, according to Herrick.

Obs. See *Rhynchonella arctirostrata*.

Camarophoria subtrigona Meek and Worthen.

Keokuk (L. Carb.).

Rhynchonella subtrigona Meek and Worthen, Proc. Acad. Nat. Sci., Philadelphia, 1860, p. 451.—Keyes, Geol. Survey Missouri, V, 1895, p. 102.

Rhynchonella parvini McChesney, Descriptions New Pal. Foss., 1861, p. 83;—*Ibidem*, 1865, pl. 6, fig. 2.

Camarophoria subtrigona Meek and Worthen, Geol. Survey Illinois, II, 1866, p. 251, pl. 18, fig. 7.—McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 31, pl. 6, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 214, pl. 62, figs. 38-43.

Camarophoria ringens Hall and Clarke (non Swallow), *Ibidem*, 1893, pl. 84, fig. 5.

Loc. Keokuk, Iowa; Nauvoo and Warsaw, Illinois.

Camarophoria swallowana Shumard = *Pugnax swallowana*.**Camarophoria thera** (Walcott).

Lower Carboniferous.

Rhynchonella thera Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 223, pl. 7, fig. 6.

Loc. Eureka district, Nevada.

- Camarophoria(?) wortheni** (Hall). Warsaw (L. Carb.).
Rhynchonella wortheni Hall, Trans. Albany Institute, IV, 1858, p. 11.
Camarophoria? *wortheni* Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 54, pl. 6, figs. 35-39.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 334, pl. 29, figs. 35-39.
Camarophoria wortheni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 214.
Loc. Alton, Illinois.
- CAMAROSPIRA** Hall and Clarke. Genotype *Camarophoria eucharis* Hall.
Camarospira Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 82;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 776.
- Camarospira eucharis** Hall. Corniferous (Dev.).
Camarophoria eucharis Hall, Pal. New York, IV, 1867, p. 368, pl. 57, figs. 40-45.
Camarospira eucharis Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 82, pl. 50, figs. 46-52.
Loc. Ontario, Canada; Cass County, Indiana.
- CAMAROTÆCHIA** Hall and Clarke. Genotype *Atrypa congregata* Conrad.
Camarotæchia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 189;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 826.
- Camarotæchia(?) acinus** Hall. Niagara (Sil.).
Rhynchonella acinus Hall, Trans. Albany Institute, IV, 1863, p. 215;—Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 163, pl. 26, figs. 7-11;—Eleventh Rep. State Geol. Indiana, 1882, p. 306, pl. 26, figs. 7-11.—Nesselroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 73, pl. 26, figs. 6, 13, 14, and pl. 32, figs. 13-16.—Beecher and Clarke, Mem. New York State Mus., I, 1880, p. 35, pl. 1, figs. 9-11.
Camarotæchia? *acinus* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 190.
Loc. Waldron, Indiana; Louisville, Kentucky.
- Camarotæchia(?) acinus convexa** (Foerste). Clinton (Sil.).
Rhynchonella acinus var. *convexa* Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 318, pl. 6, fig. 13;—Geol. Ohio, VII, 1895, p. 593, pl. 31, fig. 13.
Loc. Hanover, Indiana.
- Camarotæchia æquiradiata** Hall. Clinton (Sil.).
Atrypa equiradiata Hall, Pal. New York, II, 1852, p. 70, pl. 23, fig. 5.
Rhynchospira? *equiradiata* Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 77.
Rhynchonella æquiradiata Miller, N. American Geol. Pal., 1889, p. 367.
Camarotæchia æquiradiata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 190.
Protorhyncha æquiradiata Hall and Clarke, *Ibidem*, 1895, pl. 56, figs. 7-9.
Loc. Oneida County, New York; Arisaig, Nova Scotia.
- Camarotæchia (Plethorhyncha) barrandei** Hall. Oriskany (Dev.).
Rhynchonella barrandi Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 82, figs. 1-3; p. 84, fig. 4;—Pal. New York, III, 1859, p. 442, pl. 103, figs. 3-8.
Plethorhyncha barrandi Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 191.
Loc. Albany and Schoharie counties, New York.
- Camarotæchia billingsi** Hall. Corniferous (Dev.).
Rhynchonella thalia Billings (non d'Orbigny, 1847), Canadian Jour., V, 1860, p. 272, figs. 23-25;—Geol. Canada, 1863, p. 370, fig. 386.
Rhynchonella (*Stenocisma*) *billingsi* Hall, Pal. New York, IV, 1867, p. 336, pl. 54, figs. 9-13.

Camarotoechia billingsi Hall—Continued.

Camarotoechia billingsi Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 192, pl. 57, fig. 3.

Loc. New York; Columbus, Ohio; Ontario.

Camarotoechia carica Hall.

Hamilton (Dev.).

Rhynchonella (*Stenocisma*) *carica* Hall, *Pal. New York*, IV, 1867, p. 344, pl. 54A, figs. 21-23.

Camarotoechia carica Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 192.

Loc. Hamilton, Madison County, New York.

Camarotoechia carolina Hall.

Corniferous (Dev.).

Rhynchonella (*Stenocisma*) *carolina* Hall, *Pal. New York*, IV, 1867, p. 337, pl. 34, figs. 14-19.

Rhynchonella carolina Meek, *Pal. Ohio*, I, 1873, p. 196, pl. 18, fig. 8.—Nettelroth, *Kentucky Fossil Shells*, *Mem. Kentucky Geol. Survey*, 1889, p. 75, pl. 13, figs. 1-3, 34, 35.

Camarotoechia carolina Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 4-6.

Loc. Columbus and Sandusky, Ohio; Falls of Ohio.

Camarotoechia congregata (Conrad).

Hamilton (Dev.).

Atrypa congregata Conrad, *Fifth Ann. Rep. New York Geol. Survey*, 1841, p. 55.

Rhynchonella (*Stenocisma*) *congregata* Hall, *Pal. New York*, IV, 1867, p. 341, pl. 54, figs. 44-59.

Camarotoechia congregata Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 15-27.

Loc. Fultonham, Summit, Onondaga, and Tinkers Falls, New York.

Camarotoechia contracta Hall.

Portage-Waverly (Dev.-L. Carb.).

Atrypa contracta Hall, *Geol. New York; Rep. Fourth Dist.*, 1843, tab. 66, figs. 2, 3.

Atrypa laticostata Hall (non Phillips), *Ibidem*, 1843, tab. 66, fig. 1.

Rhynchonella (*Stenocisma*) *contracta* Hall, *Pal. New York*, IV, 1867, p. 351, pl. 55, figs. 26-39.

Rhynchonella contracta Herrick, *Bull. Denison Univ.*, III, 1887, p. 39, pl. 10, fig. 9;—*Ibidem*, IV, 1888, p. 23, pl. 11, fig. 21.

Camarotoechia contracta Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 28-32, 49.

Loc. New York; Meadville and Bradford, Pennsylvania; Licking County, Ohio.

Camarotoechia contracta saxatilis (Hall).

Hamilton (Dev.).

Rhynchonella (*Stenocisma*) *saxatilis* Hall, *Pal. New York*, IV, 1867, p. 417, pl. 54A, figs. 44-51.

Loc. Rockford, Iowa.

Camarotoechia dotis Hall.

Marcellus and Hamilton (Dev.).

Rhynchonella (*Stenocisma*) *dotis* Hall, *Pal. New York*, IV, 1867, p. 344, pl. 54A, figs. 11-20.—Rathbun, *Bull. Buffalo Soc. Nat. Sci.*, I, 1874, p. 246, pl. 8, figs. 10, 12;—*Proc. Boston Soc. Nat. Hist.*, XX, 1879, p. 33.

Camarotoechia dotis Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 40, 41.

Loc. Geneseo and York, New York; Columbus, Ohio; Rio Maecuru and Rio Curua and Erere, Brazil.

Camarotoechia(?) duplicata Hall.

Chemung (Dev.).

Atrypa duplicata Hall, *Geol. New York; Rep. Fourth Dist.*, 1843, tab. 67, fig. 2.

Rhynchonella (*Stenocisma*) *duplicata* Hall, *Pal. New York*, IV, 1867, p. 350, pl. 55, figs. 17-25.

Camarotoechia (?) duplicata Hall—Continued.

Rhynchonella duplicata Walcott. Mon. U. S. Geol. Survey, VIII, 1884, p. 155, pl. 14, fig. 8.

Camarotoechia (?) duplicata Hall and Clarke. Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 36-39.

Loc. New York; Eureka district, Nevada.

Camarotoechia (Plethorhyncha) endlichi (Meek).

? Devonian.

Rhynchonella endlichi Meek. Bull. U. S. Geol. Survey Terr., 2d ser., 1, 1875, p. 46.—White, Twelfth Ann. Rep. U. S. Geol. Survey Terr., 1883, p. 133, pl. 36, fig. 2; pl. 33, fig. 4.

Loc. East of Animas River, Colorado.

Obs. This type of *Rhynchonella* occurs in eastern North America only in the Lower Devonian. It therefore seems probable that Meek's provisional reference to the Devonian is nearer correct than White's to the Lower Carboniferous.

Camarotoechia eximia Hall.

Portage-Chemung (Dev.).

Atrypa eximia Hall. Geol. New York; Rep. Fourth Dist., 1843, tab. 66, fig. 4.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 829, fig. 682.

Rhynchonella (stenocisma) eximia Hall. Pal. New York, IV, 1867, p. 348, pl. 55, figs. 1-8.—Kindle. Bull. American Pal., 6, 1896, p. 36.

Camarotoechia eximia Hall and Clarke. Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 44, 45.

Loc. Ithaca, New York; Pennsylvania.

Camarotoechia fringilla (Billings).

Anticosti (Sil.).

Rhynchonella fringilla Billings. Pal. Fossils, I, 1862, p. 141, fig. 118.

Camarotoechia fringilla Hall and Clarke. Pal. New York, VIII, Pt. II, 1893, p. 190, pl. 56, figs. 28-30.

Loc. Anticosti.

Camarotoechia glacialis (Billings).

Anticosti (Sil.).

Rhynchonella glacialis Billings. Pal. Fossils, I, 1862, p. 143, fig. 120.

Camarotoechia glacialis Hall and Clarke. Pal. New York, VIII, Pt. II, 1893, p. 190.

Loc. Anticosti.

Camarotoechia horsfordi Hall.

Marcellus and Hamilton (Dev.).

Rhynchonella horsfordi Hall. Thirtieth Rep. New York State Cab. Nat. Hist., 1860, p. 87.—Walcott. Mon. U. S. Geol. Survey, VIII, 1884, p. 152, pl. 14, fig. 3; pl. 15, fig. 6.

Rhynchonella (Stenocisma) horsfordi Hall. Pal. New York, IV, 1867, p. 339, pl. 54, figs. 24-32.

Camarotoechia horsfordi, Hall and Clarke. Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 7-9.

Loc. Moscow, York, Genesee, and Avon, New York; Eureka district, Nevada.

Camarotoechia (?) indianensis (Hall).

Niagara (Sil.).

Rhynchonella indianensis Hall. Trans. Albany Institute, IV, 1863, p. 215;—Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 163, pl. 26, figs. 12-22;—Eleventh Rep. State Geol. Indiana, 1882, p. 306, pl. 26, figs. 12-22; pl. 27, figs. 4-6.—Nettelroth. Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 76, pl. 33, figs. 18-20.—Beecher and Clarke. Mem. New York State Mus., I, 1889, p. 42, pl. 3, figs. 17-28.

Loc. Waldron, Indiana; Louisville, Kentucky.

Camarotoechia marshallensis (A. Winchell).

Marshall (L. Carb.).

Rhynchonella marshallensis A. Winchell. Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 408.—Herriek. Bull. Denison Univ., III, 1888, p. 40; IV, p. 23;—Geol. Ohio, VII, 1895, pl. 23, fig. 14.

Camarotoëchia marsnallensis (A. Winchell)—Continued.

Camarotoëchia marsnallensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192.

Loc. Marshall, Michigan; Granville, etc., Ohio.

Camarotoëchia(?) neglecta Hall.

Clinton and Niagara (Sil.).

Atrypa neglecta Hall, Pal. New York, II, 1852, p. 70, pl. 23, fig. 4; p. 274, pl. 57, fig. 1.—Billings, Canadian Nat. Geol., I, 1856, p. 138, pl. 2, figs. 11, 12.

Rhynchonella neglecta Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 78.—Billings, Geology Canada, 1863, p. 315, fig. 325.—Meek, Pal. Ohio, I, 1873, p. 179, pl. 15, fig. 3.—Hall and Whitfield, *Ibidem*, II, 1875, p. 134, pl. 7, fig. 15.—Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 162, pl. 26, figs. 1-6;—Eleventh Rep. State Geol. Indiana, 1882, p. 305, pl. 26, figs. 1-6; pl. 27, fig. 3.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 37, pl. 4, figs. 3, 6-8.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 317, pl. 6, fig. 12.

Rhynchonella neglecta var. *scobina* Meek, American Jour. Sci., 3d ser., IV, 1872, p. 277.

Rhynchonella scobina Hall and Whitfield, Pal. Ohio, II, 1875, p. 116.—Foerste, Geol. Ohio, VII, 1895, p. 592.

Camarotoëchia? neglecta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 190.

Loc. Reynales Basin, Lockport, etc., New York; Hamilton, Ontario; Dayton and Cedarville, Ohio; Hanover, Indiana; Wisconsin; Arisaig, Nova Scotia.

Camarotoëchia obtusiplicata Hall.

Niagara (Sil.).

Atrypa obtusiplicata Hall, Pal. New York, II, 1852, p. 279, pl. 58, fig. 2.

Rhynchonella obtusiplicata Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 78.

Camarotoëchia obtusiplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 190.

Loc. Lockport, New York.

Camarotoëchia orbicularis Hall.

Chemung (Dev.).

Rhynchonella orbicularis Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 88.

Rhynchonella (*Stenocisma*) *orbicularis* Hall, Pal. New York, IV, 1867, p. 353, pl. 55, figs. 40-46.

Camarotoëchia orbicularis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 46-48, 50.

Loc. Chautauqua County, New York; Meadville, Pennsylvania.

Camarotoëchia plena Hall.

Chazy (Ord.).

Atrypa plena Hall, Pal. New York, I, 1847, p. 21, pl. 4 bis, fig. 7.—Billings, Canadian Nat. Geol., I, 1856, p. 207, figs. 17-19.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 817, fig. 592.

Atrypa plicifera Hall, Pal. New York, I, 1847, p. 22, pl. 4 bis, fig. 8.

Atrypa altilis Hall, *Ibidem*, 1847, p. 23, pl. 4 bis, fig. 9.

Rhynchonella plena, *plicifera*, and *altilis* Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, pp. 65, 66.

Rhynchonella plena Billings, Canadian Nat. Geol., IV, 1859, p. 444, fig. 22;—Geol. Canada, 1863, p. 126, fig. 50.

Camarotoëchia plena and *altilis* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 190.

Loc. Chazy, New York; Montreal and Ottawa, Canada.

Camarotoëchia (Plethorhyncha) pleiopleura (Conrad).

Oriskany (Dev.).

Atrypa pleiopleura Conrad, Fifth Ann. Rep. Geol. Survey New York, 1841, p. 55.

Rhynchonella pleiopleura Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 86, figs. 1-4;—Pal. New York, III, 1859, p. 440, pl. 102, figs. 3, 4.—Billings, Pal. Fossils, II, 1874, p. 38, figs. 19, 20.

Camarotœchia (Plethorhyncha) pleiopleura (Conrad)—Continued.

Plethorhyncha pleiopleura Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 191.

Loc. Albany and Schoharie counties, New York; Indian Cove, Gaspé.

Camarotœchia prolifica Hall.

Marcellus and Hamilton (Dev.).

Rhynchonella (Stenocisma) prolifica Hall, Pal. New York, IV, 1867, p. 343, pl. 54A, figs. 1-10.

Rhynchonella prolifica Tschernyschew, Mém. du Comité Géol. St. Petersburg, III, 1887, p. 89, pl. 14, fig. 6.

Camarotœchia prolifica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 42, 43.

Loc. Fultonham and Cooperstown, New York; Russia.

Camarotœchia sageriana (A. Winchell).

Marshall (L. Carb.).

Rhynchonella sageriana A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 407;—*Ibidem*, 1865, p. 122.—Herrick, Bull. Denison Univ., III, 1888, p. 39.

Camarotœchia sageriana Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192.

Loc. Marshall, Michigan; Weymouth, Ashland, Sciotoville, and Newark, Ohio; Hickman County, Tennessee.

Camarotœchia sappho Hall.

Marcellus-Waverly (Dev.-L. Carb.).

Rhynchonella sappho Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 87.—Herrick, Bull. Denison Univ., III, 1888, p. 40, pl. 5, fig. 1; pl. 7, fig. 25;—*Geol. Ohio*, VII, 1895, pl. 21, fig. 1.

Rhynchonella (Stenocisma) sappho Hall, Pal. New York, IV, 1867, p. 340, pl. 54, figs. 33-43; var. pl. 55, figs. 47-52.

Camarotœchia sappho Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 10-14.

Loc. Leroy, Geneseo, and York, New York; Licking County, Ohio.

Camarotœchia (Plethorhyncha) speciosa (Hall).

Oriskany (Dev.).

Rhynchonella speciosa Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 81;—Pal. New York, III, 1859, p. 444, pl. 103A, figs. 1-6.—Meek and Worthen, *Geol. Survey Illinois*, III, 1868, p. 394, pl. 8, fig. 9.

Rhynchotrema speciosa Waagen, *Palæontologica Indica*, Ser. XIII, I, 1883, p. 411.

Plethorhyncha speciosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 191, pl. 58, figs. 29-37.

Loc. Cumberland, Maryland; Jackson County, Illinois.

Camarotœchia stephani Hall.

Portage and Chemung (Dev.).

Rhynchonella (Stenocisma) stephani Hall, Pal. New York, IV, 1867, p. 349, pl. 55, figs. 9-16.

Camarotœchia stephani Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192;—*Ibidem*, 1895, pl. 57, figs. 33-35.

Loc. Ithaca and Phillipsburg, New York; Bradford, Pennsylvania.

Camarotœchia tethys (Billings).

Corniferous (Dev.).

Rhynchonella? tethys Billings, *Canadian Jour.*, V, 1860, p. 270, figs. 20-22.

Rhynchonella tethys Billings, *Geol. Canada*, 1863, p. 370, fig. 387.—Walcott, *Mon. U. S. Geol. Survey*, VIII, 1884, p. 152.—Nettelroth, *Kentucky Fossil Shells*, Mem. Kentucky Geol. Survey, 1889, p. 83, pl. 13, figs. 25-33; pl. 31, figs. 22-25.

Rhynchonella (Stenocisma) tethys Hall, Pal. New York, IV, 1867, p. 335, pl. 54, figs. 1-8.

Camarotœchia tethys Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 1, 2.

Loc. County of Haldimand, Ontario; Stafford and Williamsville, New York; Columbus, Ohio; Falls of Ohio; Eureka district, Nevada.

Camarotoechia ventricosa Hall.

Lower Helderberg (Dev.).

Rhynchonella ventricosa Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 78, figs. 1-6;—Pal. New York, III, 1859, p. 238, pl. 43, fig. 1.

Camarotoechia ventricosa Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 191.

Wilsonia ventricosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 58, figs. 13, 14.

Loc. Schoharie, Carlisle, and Cherry Valley, New York.

Camarotoechia whitei Hall.

Niagara (Sil.).

Rhynchonella whitii Hall (non A. Winchell), Trans. Albany Institute, IV, 1863, p. 216.

Rhynchonella whitii Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 164, pl. 26, figs. 23-33;—Eleventh Rep. State Geol. Indiana, 1882, p. 307, pl. 26, figs. 23-33.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 39, pl. 4, figs. 1, 2, 4, 5.

Rhynchonella whitiana Miller, American Pal. Fossils, 2d ed., 1883, p. 297.

Camarotoechia? whitii Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 190.

Loc. Waldron and Osgood, Indiana.

Capulus lugubris Conrad=*Discinisca lugubris*.**CAPELLINIA** Hall and Clarke.Genotype *C. mira* H. and C.

Capellinia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248, pl. 70, figs. 6-14;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 847.

Capellinia mira Hall and Clarke.

Niagara (Sil.).

Capellinia mira Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 249, pl. 70, figs. 6-14.

Loc. Vicinity of Milwaukee, Wisconsin.

CATAZYGA Hall and Clarke.Genotype *Athyris headi* Billings.

Catazyga Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 157, fig. 151;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 803.

Catazyga erratica Hall.

Lorraine (Ord.).

Orthis? erratica Hall, Pal. New York, I, 1847, p. 288, pl. 79, fig. 5.

Athyris headi var. *anticostiensis* Billings, Pal. Fossils, I, 1862, p. 147, fig. 127.

Athyris headi var. *borealis*, Billings, *Ibidem*, 1862, p. 147, fig. 126.

Athyris borealis Billings, Geol. Canada, 1863, p. 212, fig. 216.

Athyris anticostiensis Billings, *Ibidem*, 1863, p. 212, fig. 215.

Zygospira anticostiensis Davidson, Suppl. British Sil. Brach., Palaeontographical Soc., 1882, p. 127.

Zygospira erratica Davidson, *Ibidem*, 1882, p. 126.

Orthis erratica, var. *Keesow*, Ueber Sil. u. Devon. geschiehe Westpreussens, 1884, p. 246, pl. 2, fig. 10.

Catazyga headi vars. *borealis* and *anticostiensis* Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 54, figs. 27, 31-34.

Catazyga erratica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 158, pl. 54, figs. 17-23.

Loc. Oswego County, New York; River Saguenay, Lake St. John, Canada; Anticosti; "Wesenberg Schicht," Prussia.

Catazyga headi (Billings).

Lorraine (Ord.).

Athyris headi Billings, Pal. Fossils, I, 1862, p. 147, fig. 125;—Geol. Canada, 1863, p. 212, fig. 214.

Zygospira headi Hall, Twenty-third Rep. New York State Cab. Nat. Hist., 1872, pl. 13, figs. 23-25 (extract pub. 1871).—Meek, Pal. Ohio, I, 1873, p. 127, pl. 11, fig. 1.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 59.—Davidson, Suppl. British Sil. Brach., Palaeontographical Soc., 1882, p. 125.

Glossia schuchertana Ulrich, American Geologist, I, 1888, p. 186.

Glossia headi Miller, N. American Geol. Pal., 1889, p. 346.

Catazyga headi (Billings)—Continued.

Catazyga headi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 158, fig. 151; pl. 54, figs. 24-26, 30.

Loc. St. Lawrence River, opposite Three Rivers; near St. Nicholas, St. Croix, and Becancour River, Quebec, Canada; Waynesville, etc., Ohio; Richmond and Versailles, Indiana. According to Mr. Ami, also in the Utica slate at Ottawa, Canada.

Catazyga uphami (Winchell and Schuchert). Trenton (Ord.).

Zygospira uphami Winchell and Schuchert, American Geol., IX, 1892, p. 291;—Minnesota Geol. Survey, III, p. 468, pl. 34, figs. 45-48.

Loc. Near Spring Valley and Wykoff, Minnesota.

CENTRONELLA Billings. Genotype *Rhynchonella glansfagea* Hall.

Centronella Billings, Canadian Nat. Geol., IV, 1859, p. 131, figs. 1-5;—Canadian Jour., VI, 1861, p. 271.—Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 45, figs. 13-17;—American Jour. Sci., 2d ser., XXXV, 1863, p. 396.—Billings, *Ibidem*, XXXVI, 1863, p. 237.—Hall, Trans. Albany Institute, IV, 1863, pp. 131, 148.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 122.—Hall, Pal. New York, IV, 1867, p. 399.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 265;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 853.

Centronella(?) allei A. Winchell. Waverly (L. Carb.).

Centronella allii A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 123. *Cryptonella? allei* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290.

Loc. Burlington, Iowa; Hamburg, Illinois; Summit County, Ohio.

Centronella alveata Hall. Onondaga (Dev.).

Rhynchonella? alveata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 124.

Centronella hecate Billings, Canadian Jour., VI, (May) 1861, p. 272, fig. 99;—Geol. Canada, 1863, p. 374, fig. 403.—Hall, Pal. New York, IV, 1867, p. 420, pl. 61A, figs. 27-29.—*Ibidem*, VIII, Pt. II, 1895, pl. 79, fig. 15.

Centronella alveata Hall, Pal. New York, IV, 1867, p. 401, pl. 61A, figs. 22-24.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 268, pl. 79, figs. 22-24.

Loc. New York; Cayuga, Ontario.

Obs. See *C. impressa* Hall.

Centronella anna Hartt=**Harttina anna**.**Centronella(?) arcei** A. Ulrich. Devonian.

Centronella? arcei Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 53, pl. 5, figs. 5-9.

Loc. Icla, and near Pulquina, Bolivia.

Centronella billingsiana Meek and Worthen=**Whitfieldella billingsiana**.**Centronella(??) crassicardinalis** Whitfield. Warsaw (L. Carb.).

Centronella crassicardinalis Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 55, pl. 6, figs. 50-52.—Hall, Twelfth Rep. State Geol. Indiana, XXIX, 1883, figs. 50-52.

Loc. Spergen Hill, Indiana.

Obs. This species is not well established and is based upon a single ventral valve. Compare with *Athyris densa*.

Centronella(?) flora A. Winchell. Waverly (L. Carb.).

Centronella? flora A. Winchell, Proc. American Phil. Soc., XII, 1870, p. 254.

Loc. Sciotoville, Ohio.

- Centronella glansfagea** Hall. Oriskany-Corniferous (Dev.).
Rhynchonella glansfagea Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 125, figs. 1-6.
- Centronella glansfagea* Billings, Canadian Nat. Geol., IV, 1859, p. 132, figs. 1-5;—Canadian Jour., VI, 1861, p. 271, fig. 97;—Geol. Canada, 1863, p. 374, fig. 405.—Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, pp. 45-47;—Pal. New York, IV, 1867, p. 399, pl. 61A, figs. 1-21, 25, 26.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 153, pl. 31, figs. 14-17.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 268, fig. 180; 180; pl. 79, figs. 1-14, 17, 21.
- Loc.* Albany and Schoharie counties, New York; Cayuga, Ontario; Falls of Ohio; Michigan.
- Obs.* In the American Museum of Natural History this species is labeled *Atrypa naviculoides* Conrad. The writer has not been able to find this description. It may be one of Conrad's manuscript names.
- Centronella glauca** Hall. Hamilton (Dev.).
Centronella glauca Hall, Pal. New York, IV, 1867, p. 403, pl. 61A, figs. 39, 40.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 269.
- Loc.* Schoharie, New York.
- Centronella hecate** Billings=C. *alveata*.
- Centronella impressa** Hall. Hamilton (Dev.).
Centronella impressa Hall, Fourteenth Rep. New York State Cab. Nat. Hist., (July or August) 1861, p. 102;—Fifteenth Rep., *Ibidem*, 1862, pl. 3, figs. 1-5.—Billings, Canadian Nat. Geol., VII, 1862, p. 392.—Hall, Pal. New York, IV, 1867, p. 402, pl. 61A, figs. 30-38.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 269, pl. 79, figs. 16, 18-20.
- Loc.* Bellona, York, Pavilion, and Hamburg, New York.
- Obs.* Billings says this species is the same as *C. hecate* (= *C. alveata*).
- Centronella julia** A. Winchell=*Romingerina julia*.
- Centronella margarida** Derby=*Trigleria margarida*.
- Centronella (?) navicella** Hall. Chemung (Dev.).
Terebratula navicella Hall, Pal. New York, IV, 1867, p. 391, pl. 60, figs. 38-44.
Centronella (?) navicella Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, pl. 79, figs. 40-42.
- Loc.* Rockford, Iowa.
- Centronella ovata** Hall. Upper Helderberg (Dev.).
Centronella ovata Hall, Pal. New York, IV, 1867, p. 419, pl. 61A, figs. 47-49.
- Loc.* Cayuga, Ontario.
- Centronella(?) silvetii** A. Ulrich. Devonian.
Centronella silvetii A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 51, pl. 4, figs. 15a-15d.
- Loc.* Chahuarani, Bolivia.
- Centronella tumida** Billings. Oriskany and Corniferous (Dev.).
Centronella tumida Billings, Canadian Jour., VI, 1861, p. 272, fig. 98;—Geol. Canada, 1863, p. 374, fig. 404.
- Loc.* Cayuga and Port Colbourne, Ontario.
- CHARIONELLA** Billings. Genotype *Atrypa scitula* Hall.
Charionella Billings, Canadian Jour., VI, 1861, pp. 148, 274, figs. 101, 102.—Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 40;—American Jour. Sci., n. ser., XXXV, 1863, p. 396.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78;—Thirteenth Rep. New York State Geologist, 1895, p. 775.

Charionella circe Billings = *C. scitula*.

Charionella doris Billings = *Meristella doris*.

Charionella hyale Billings = *Whitfieldella hyale*.

Charionella rostrata Billings = *Meristella rostrata*.

***Charionella scitula* Hall.**

Corniferous (Dev.).

Atrypa scitula Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 171, fig. 1.

Athyris? *scitula* Billings, Canadian Jour., V, 1860, p. 278, figs. 35-38.

Charionella circe Billings, *Ibidem*, VI, 1861, p. 273, fig. 100;—Geol. Canada, 1863, p. 371, fig. 400.

Meristella scitula Hall, Pal. New York, IV, 1867, p. 302, pl. 47, figs. 34-38.

Meristella circe Miller, N. American Geol. Pal., 1889, p. 354.

Charionella scitula Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78, pl. 42, figs. 17-19.

Loc. Williamsville and Clarence Hollow, New York; Columbus, Ohio (Whitfield); county of Haldimand, Ontario.

CHONETES Fischer de Waldheim. Genotype *Orthis striatella* Dalman.

Chonetes Fischer de Waldheim, Oryctographie du Gouvernement de Moscow,

Pt. II, 1837, p. 134.—Hall, Pal. New York, II, 1852, p. 64.—Billings, Canadian

Jour., VI, 1861, p. 349.—Meek and Hayden, Pal. Upper Missouri, Smithsonian

Cont. Knowl., 172, 1864, p. 22.—Hall, Twentieth Rep. New York State

Cab. Nat. Hist., 1867, p. 242;—Pal. New York, IV, 1867, p. 115.—Walcott,

Mon. U. S. Geol. Survey, VIII, 1884, p. 122.—Nettelroth, Kentucky Fossil

Shells, Mem. Kentucky Geol. Survey, 1886, p. 66.—Hall and Clarke, Pal. New

York, VIII, Pt. I, 1892, p. 303;—Eleventh Ann. Rep. New York State Geolo-

gist, 1894, p. 292.

***Chonetes acutiradiatus* Hall.**

Corniferous (Dev.).

Strophomena acutradiata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 171, fig. 3.

Chonetes acutiradiata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 117;—Pal. New York, IV, 1867, p. 120, pl. 20, fig. 5;—Second Ann. Rep.

New York State Geol., 1883, pl. 47, fig. 8.—Nettelroth, Kentucky Fossil

Shells, Mem. Kentucky Geol. Survey, 1889, p. 66, pl. 18, figs. 18-20.—Hall and

Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 8.

Loc. Williamsville, Stafford, etc., New York; Columbus, Ohio; Falls of Ohio.

***Chonetes amazonicus* Derby.**

Upper Carboniferous.

Chonetes amazonica Derby, Bull. Cornell Univ., I, 1874, p. 41, pl. 6, figs. 3, 12, 19; pl. 9, figs. 8, 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15B,

fig. 13.

Loc. Itaituba, Brazil.

***Chonetes antiope* Billings.**

Lower Devonian.

Chonetes antiope Billings, Pal. Fossils, II, 1874, p. 19.

Loc. Mount Jolli and Percé, Nova Scotia.

***Chonetes arcei* A. Ulrich.**

Middle Devonian.

Chonetes arcei A. Ulrich, N. Jahrb. f. Mineral., Beilageband VIII, 1892, p. 77, pl. 4, figs. 35, 36.

Loc. Chahuarani, Icla, and Tarabuco, Bolivia.

***Chonetes arcuatus* Hall.**

Corniferous (Dev.).

Chonetes arcuata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 116;—Pal. New York, IV, 1867, p. 119, pl. 20, fig. 7;—Second Ann. Rep. New

York State Geol., 1883, pl. 47, figs. 15, 35, 36.—Hall and Clarke, Pal. New

York, VIII, Pt. I, 1892, pl. 16, figs. 15, 35, 36.

Loc. Williamsville, Clarence Hollow, etc., New York; Columbus, Ohio.

Chonetes armata Norwood and Pratten (non Bouchard)=*C. pusillus*.

Chonetes canadensis Billings. Lower Devonian.

Chonetes canadensis Billings, Pal. Fossils, II, 1874, p. 17, fig. 7.

Loc. Percé, Nova Scotia.

Chonetes complanata Hall=*Chouostrophia complanata*.

Chonetes comstockei Rathbun. Middle Devonian.

Chonetes comstockii Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 250, pl. 9, figs. 5, 14, 18, 19, 31;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 18.

Loc. Province of Para, Brazil.

Chonetes cornutus (Hall). Clinton (Sil.).

Strophomena cornuta Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 73, fig. 3.

Chonetes cornuta de Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 200, pl. 20, fig. 3.—Hall, Pal. New York, II, 1852, p. 64, pl. 21, fig. 10;—Second Ann. Rep. New York State Geol., 1883, pl. 47, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 1.

Loc. Wayne County, New York.

Chonetes coronatus (Conrad). Hamilton (Dev.).

Strophomena carinata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 257, pl. 14, fig. 13.

Strophomena syrtalis Conrad, Ibidem, 1842, p. 253, pl. 14, fig. 1.

Chonetes littoni Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 25, pl. 2, fig. 4.

Chonetes maclurea Norwood and Pratten, Ibidem, 1854, p. 28, pl. 2, fig. 8.

Chonetes tuomyi Norwood and Pratten, Ibidem, 1854, p. 28, pl. 2, fig. 9.

Chonetes martini Norwood and Pratten, Ibidem, 1854, p. 29, pl. 2, fig. 10.

Chonetes coronata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 146, figs. 1, 2;—Pal. New York, IV, 1867, p. 133, pl. 21, figs. 9–12.—Whitfield, Geol. Wisconsin, IV, 1882, p. 327, pl. 25, fig. 16.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 10, 11, 24, 26, 33, 39, 41, 43.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 10, 11, 24, 26, 33, 39, 41, 43.

Loc. New York; Pennsylvania; near Arkona, Ontario; Bakeoven, Illinois; Milwaukee, Wisconsin.

Obs. In the Illinois State collection there are specimens of *C. maclurea* and *C. littoni* which are not specifically distinct from *C. coronatus* Conrad. In the American Museum of Natural History the writer has seen specimens of *C. tuomyi* and *C. martini* labeled as varieties of *C. coronatus*.

Chonetes curuaensis Rathbun. Middle Devonian.

Chonetes curuaensis Rathbun, Proc. Boston Soc. Nat. Sci., XX, 1879, p. 21.

Loc. Province of Para, Brazil.

Chonetes dawsoni Billings=*Chonostrophia dawsoni*.

Chonetes deflecta Hall=*C. vicinus*.

Chonetes emmetensis A. Winchell. Hamilton (Dev.).

Chonetes emmetensis A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 92.

Loc. Grand Traverse Region, Michigan.

Chonetes falklandicus Morris and Sharpe. Lower Devonian.

Chonetes falklandica Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 274, pl. 10, fig. 4.—De Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 204, pl. 20, fig. 4.—Von Ammon, Zeits. d. Gessels. für Erdk., Berlin, XXVIII, 1893, p. 360, fig. 5.

Loc. Falkland Islands; Taquarassu, Matto Grosso, Brazil.

- Chonetes filistriatus** Walcott. • Lower Devonian.
Chonetes filistriata Walcott, *Mon. U. S. Geol. Survey*, VIII, 1881, p. 127, pl. 13, fig. 15.
Loc. Eureka district, Nevada.
- Chonetes fischeri** Hall=*Chonoplectus fischeri*.
- Chonetes flemingi** Norwood and Pratten=*C. variolatus*.
- Chonetes freitassii** Rathbun. Middle Devonian.
Chonetes species Rathbun, *Bull. Buffalo Soc. Nat. Sci.*, I, 1874, p. 253.
Chonetes freitassii Rathbun, *Proc. Boston Soc. Nat. Hist.*, XX, 1879, p. 18.
Loc. Province of Para, Brazil.
- Chonetes geinitziana** Waagen, and Miller=*C. glaber*.
- Chonetes geniculatus** White. Kinderhook (L. Carb.).
Chonetes geniculata White, *Proc. Boston Soc. Nat. Hist.*, IX, 1862, p. 29.—A. Winchell, *Proc. Acad. Nat. Sci. Philadelphia*, 1865, p. 116;—*Proc. American Phil. Soc.*, XI, 1870, p. 250.
Chonetes geniculatus Keyes, *Geol. Survey Missouri*, V, 1895, p. 53, pl. 38, fig. 3.
Loc. Hamburg, Illinois; Clarksville, Missouri; Rockford, Indiana; Rockville, Ohio.
Obs. Compare with *C. ornatus* Shumard.
- Chonetes gibbosa** Hall=*C. vicinus*.
- Chonetes glabra** Hall (non Geinitz)=*C. lineatus*.
- Chonetes glaber** Geinitz. Upper Carboniferous.
Chonetes glabra Geinitz, *Carbon u. Dyas in Nebraska*, 1866, p. 60, pl. 4, figs. 15-18.—Toula, *Sitzb. der Kais. Akad. der Wissensch.*, Wien, LIX, 1869, p. 10.—Meek, *Final Rep. U. S. Geol. Survey Nebraska*, 1872, p. 171, pl. 4, fig. 10; pl. 8, fig. 8.—Derby, *Bull. Cornell Univ.*, I, 1874, p. 43, pl. 8, figs. 11, 14, 15, 19;—*Bull. Mus. Comp. Zool.*, III, 1876, p. 280.
Chonetes geinitziana Waagen, *Palaeontologica Indica*, Ser. XIII, I, 1884, p. 621.
Chonetes laevis Keyes, *Proc. Acad. Nat. Sci. Philadelphia*, 1888, p. 229, pl. 12, fig. 3;—*Geol. Survey Missouri*, V, 1895, p. 55, pl. 37, fig. 5.
Chonetes geinitzianus Miller, *N. American Geol. Pal.*, 1889, p. 339.
Loc. Nebraska City, Nebraska; Kansas; Iowa; Illinois; Bomjardim and Itaituba, Brazil; Yampopata and Cochabamba, Bolivia.
- Chonetes granulifer** Owen. Upper Carboniferous.
Chonetes granulifera Owen, *Geol. Rep. Iowa, Wisconsin, Minnesota*, 1852, p. 583, pl. 5, fig. 12.—Norwood and Pratten, *Jour. Acad. Nat. Sci. Philadelphia*, III, 1854, p. 24.—Meek, *Final Rep. U. S. Geol. Survey Nebraska*, 1872, p. 170, pl. 4, fig. 9; pl. 6, fig. 10; pl. 8, fig. 7.—White, *Wheeler's Geogr. Geol. Survey west 100 Merid.*, 1875, p. 122, pl. 9, fig. 8.—Keyes, *Geol. Survey Missouri*, V, 1895, p. 56.
Chonetes smithii Norwood and Pratten, *Jour. Acad. Nat. Sci. Philadelphia*, III, 1854, p. 24, pl. 2, fig. 2.—Meek and Worthen, *Geol. Survey Illinois*, V, 1873, p. 570, pl. 25, fig. 11.—Hall and Clarke, *Pal. New York*, VIII, Pt. 1, 1892, pl. 15B, fig. 12.
Chonetes mucronata Meek and Hayden, *Proc. Acad. Nat. Sci. Philadelphia*, 1858, p. 262;—*Pal. Upper Missouri*, *Smithsonian Cont. to Knowl.*, 172, 1864, p. 22, pl. 1, fig. 5.—Geinitz, *Carbon u. Dyas in Nebraska*, 1866, p. 58, pl. 4, figs. 12-14.—Toula, *Sitzungsab. der Kais. Akad. der Wissensch.*, Wien, LIX, 1869, p. 10.
Chonetes granuliferus Beecher, *American Jour. Sci.*, 3d ser., XLI, 1891, p. 357, pl. 17, fig. 15.
Loc. Mouth of Keg Creek, Iowa; Illinois; Kansas; Missouri; Alabama; Karab Canyon, Arizona; Cochabamba, Bolivia.

- Chonetes hemisphericus** Hall. Upper Helderberg (Dev.).
Chonetes hemispherica Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 116, figs. 1-3.—Billings, Canadian Jour., VI, 1861, p. 349, figs. 121-123; Geol. Canada, 1863, p. 368, fig. 380.—Hall, Pal. New York, IV, 1867, p. 118, pl. 20, fig. 6.—Nicholson, Pal. Prov. Ontario, 1873, p. 75.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 123.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 14.
Loc. Schoharie, etc., New York; Eureka district, Nevada; Ontario, Canada.
- Chonetes herbert-smithi** Rathbun. Middle Devonian.
Chonetes herbert-smithi (Hartt MS.) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 251, pl. 10, figs. 39-42, 44-47;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 20.
Loc. Province of Para, Brazil.
- Chonetes illinoisensis** Worthen. Burlington (L. Carb.).
Chonetes logani Hall (non N. and P.), Geol. Survey Iowa, I, Pt. II, 1858, p. 598, pl. 12, figs. 1, 2.
Chonetes illinoiensis Worthen, Trans. St. Louis Acad. Sci., I, 1860, p. 571.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 5;—*Ibidem*, 1865, p. 116.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 505, pl. 15, fig. 8.—Herriek, Bull. Denison Univ., III, 1888, p. 35, pl. 3, fig. 21.
Loc. Burlington, Iowa; Jersey County, Illinois; Rockford, Indiana; Licking County, Ohio.
- Chonetes iowensis** Owen = *Pholidostrophia iowensis*.
- Chonetes koninckianus** Norwood and Pratten. Middle Devonian.
Chonetes koninckiana Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 30, pl. 2, fig. 11.
Loc. Jonesboro, Union County, Illinois.
- Chonetes levis** Keyes = *C. glaber* Geinitz.
- Chonetes laticosta** Hall = *C. mucronatus*.
- Chonetes lepidus** Hall. Marcellus-Chemung (Dev.).
Chonetes lepida Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 148;—Pal. New York, IV, 1867, p. 142, pl. 22, figs. 12, 13.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, pp. 24, 32.
Loc. Cayuga Lake, etc., New York; Meadville, Pennsylvania.
- Chonetes lineatus** (Conrad). Corniferous (Dev.).
Strophomea lineata Conrad, Third Ann. Rep. Geol. Survey New York, 1839, p. 64.—Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 139, fig. 6 (should be 5a).—Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 175, fig. 8.
Chonetes glabra Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 117, figs. 1-8.
Chonetes lineata Hall, Pal. New York, IV, 1867, p. 121, pl. 20, fig. 3;—Second Ann. Rep. New York State Geol., 1883, pl. 47, fig. 34.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 34.
Loc. Cayuga Lake, etc., New York.
- Chonetes littoni** Norwood and Pratten = *C. coronatus*.
- Chonetes logani** Hall (non Nor. and Prat.) = *C. illinoisensis*.
- Chonetes logani** Norwood and Pratten. Kinderhook-Burlington (L. Carb.).
Chonetes logani Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 30, pl. 2, fig. 12.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 116.—Hall, Pal. New York, IV, 1867, pl. 22, figs. 23, 26-28;—Second Ann. Rep. New York State Geol., 1883, pl. 47, fig. 25.—Herriek, Bull. Denison Univ., III, 1888, p. 35, pl. 3, fig. 12; pl. 7, fig. 22.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 25.
Loc. Burlington, Iowa; Quincy, Illinois; Licking County, Ohio.

- Chonetes logani aurora** Hall. Tully-Burlington (Dev.-L. Carb.).
Chonetes logani var. *aurora* Hall, Pal. New York, IV, 1867, p. 137, pl. 22, figs. 16-18;—Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 9, 18.—Whiteaves, Cont. to Canadian Pal., I, 1891, p. 215, pl. 29, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 9, 18.
Chonetes aurora Williams, Bull. Geol. Soc. America, 1, 1890, p. 491, pl. 12, figs. 10, 11.
Loc. Tully and Derryter, New York; Athabasca, Mackenzie, and Red Deer rivers, Northwest Territory, Canada; Cuyahoga and Licking counties, Ohio; Burlington, Iowa.
- Chonetes loganensis** Hall and Whitfield. Kinderhook (L. Carb.).
Chonetes loganensis Hall and Whitfield, King's Geol. Expl. 40th Paral., IV, 1877, p. 253, pl. 4, fig. 9.
Loc. Logan Canyon, Wahsatch Range, Utah.
- Chonetes machurea** Norwood and Pratten = *C. coronatus*.
- Chonetes macrostriata** Walcott = *Stropheodonta macrostriata*.
- Chonetes manitobensis** Whiteaves. Upper Devonian.
Chonetes manitobensis Whiteaves, Cont. to Canadian Pal., I, 1892, p. 281, pl. 37, figs. 1, 2.
Loc. Manitoba Island, Lake Manitoba, Canada.
- Chonetes martini** Norwood and Pratten = *C. coronatus*.
- Chonetes melonicus** Billings. Oriskany (Dev.).
Chonetes melonica Billings, Pal. Fossils, II, 1874, p. 15, fig. 6.
Loc. Little Gaspé, Quebec, Canada.
- Chonetes mesolobus** Norwood and Pratten. Upper Carboniferous.
Chonetes mesoloba Nor. and Prat., Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 27, pl. 2, fig. 7.—White, Wheeler's Geogr. Geol. Expl. Survey west 100 Merid., 1875, p. 123, pl. 9; fig. 7.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 47, fig. 22.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 228.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 22.
Loc. Belleville, Illinois; Charboniere, Missouri; Flint Ridge, Ohio; New Mexico; Arizona.
- Chonetes michiganensis** Stevens. Upper Carboniferous.
Chonetes michiganensis Stevens, American Jour. Sci., 2d ser., XXV, 1858, p. 263.
Loc. Battle Creek, Michigan.
- Chonetes millipunctata** Meek and Worthen = *Aulacorhynchus millipunctatum*.
- Chonetes minima** Hall (non Sowerby) = *C. undulatus*.
- Chonetes mucronata** Meek and Hayden (non Hall) = *C. granulifer*.
- Chonetes mucronatus** Hall. Oriskany-Hamilton (Dev.).
Strophomena mucronata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 180, fig. 3.
Chonetes laticosta Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 119.—Billings, Pal. Fossils, II, 1874, p. 20.
Chonetes mucronata Hall, Pal. New York, IV, 1867, p. 124, pl. 20, fig. 1; pl. 21, fig. 1.—Nicholson, Pal. Prov. Ontario, 1873, p. 74.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 6, 7.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 6, 7.
Chonetes mucronata? Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 124.
Loc. New York; Cayuga, Ontario; Gaspé; Eureka district, Nevada.
Obs. See *C. stübéli*.

- Chonetes multicosta** A. Winchell. Kinderhook and Burlington (L. Carb.).
Chonetes multicosta A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 5;—
 Proc. American Phil. Soc., XII, 1870, p. 250.
Loc. Burlington, Iowa; Hickman and Maury counties, Tennessee.
- Chonetes muricata** Hall = *Strophalosia muricata*.
- Chonetes nana** Norwood and Pratten (non de Verneuil) = *C. yandellanus*.
- Chonetes novascoticus** Hall. Arisaig and Niagara (Sil.).
Chonetes novascotica Hall, Canadian Nat. Geol., V, 1860, p. 144, fig. 2.—Dawson,
 Acadian Geol., 3d ed., 1878, p. 595, fig. 199.—Hall, Twenty-eighth Rep. New
 York State Mus. Nat. Hist., 1879, p. 155, pl. 22, figs. 11-14;—Eleverth Rep.
 State Geol: Indiana, 1882, p. 293, pl. 22, figs. 11-14.
Loc. Arisaig, Nova Scotia; Waldron, Indiana.
- Chonetes onettianus** Rathbun. Middle Devonian.
Chonetes onettiana Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 253, pl. 10,
 figs. 43, 48.
Loc. Province of Para, Brazil.
- Chonetes ornatus** Shumard. Chouteau (L. Carb.).
Chonetes ornata Shumard, Geol. Rep. Missouri, 1855, p. 202, Pl. C, fig. 1.—Keyes,
 Geol. Survey Missouri, V, 1895, p. 53, pl. 38, fig. 2.
Loc. Louisiana and Hannibal, Missouri.
Obs. See *C. geniculatus* White.
- Chonetes parvus** Shumard. Upper Carboniferous.
Chonetes parva Shumard, Geol. Rep. Missouri, 1855, p. 201.
Loc. Boone County, Missouri.
Obs. Keyes says this species is a synonym for *C. flemingi* = *C. variolatus*.
- Chonetes permianus** Shumard. Upper Carboniferous.
Chonetes permiana Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 390.
Loc. Mouth of Delaware Creek, Texas.
- Chonetes planumbonus** Meek and Worthen. Keokuk (L. Carb.).
Chonetes planumbona Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia,
 1860, p. 450;—Geol. Survey Illinois, II, 1866, p. 253, pl. 18, fig. 1.
Loc. Monroe County, Illinois; Crawfordsville, Indiana; Kings Mountain, Ken-
 tucky.
- Chonetes platynotus** White. Upper Carboniferous.
Chonetes platynota White, Wheeler's Geogr. Geol. Expl. Survey west 100 Merid.,
 Prel. Rep., 1874, p. 19;—*Ibidem*, Final Rep., IV, 1875, p. 121, pl. 9, fig. 6.
Loc. Santa Fe, New Mexico; near Salt Lake, Utah.
- Chonetes pulchellus** A. Winchell. Waverly (L. Carb.).
Chonetes pulchella A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862,
 p. 410;—*Ibidem*, 1865, p. 115;—Proc. American Phil. Soc., XII, 1870, p. 250.—
 Herrick, Bull. Denison Univ., III, 1888, p. 37, pl. 3, fig. 14.
Loc. Moscow, Hillsdale County, Michigan; Trumbull, Summit, and Licking
 counties, Ohio; Shafers, Pennsylvania; Hickman County, Tennessee.
- Chonetes punctatus** Simpson. Lower Helderberg (Dev.).
Chonetes punctata Simpson, Trans. American Phil. Soc., n. ser., XVI, 1889,
 p. 438, fig. 3.
Loc. Hazardville, Carbon County, Pennsylvania.
- Chonetes pusillus** Hall. Hamilton (Dev.).
Chonetes armata Norwood and Pratten (non Bouchard), Jour. Acad. Nat. Sci.
 Philadelphia, III, 1854, p. 28.
 Bull. 87—12

Chonetes pusillus Hall—Continued.

Chonetes pusilla Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 149;—Pal. New York, IV, 1867, p. 128, pl. 21, fig. 6.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 93, pl. 13, fig. 2.

Loc. Bakeoven, Illinois; Fort Resolution, Great Slave Lake, British America.

Obs. In the Illinois State collection there is a specimen of *C. armatus* N. and P. with an old label attached. This specimen is identical with *C. pusillus* Hall.

Chonetes reversa Whitfield=*Chonostrophia reversa*.**Chonetes rücki** A. Ulrich.

Middle Devonian.

Chonetes rücki A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 79, pl. 5, figs. 1, 2.

Loc. Chahuarani, Icla, and Tarabuco, Bolivia.

Chonetes sarcinulatus Norwood and Pratten.

Chonetes sarcinulata Norwood and Pratten (non Schlotheim), Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 28.

Obs. It is impossible to point out the American representative intended by these authors for this species.

Chonetes scitulus Hall.

Marcellus—Chemung (Dev.).

Chonetes scitula Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 147;—Pal. New York, IV, 1867, p. 130, pl. 21, fig. 4;—Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 3, 4, 27, 32, 40, 44.—Herrick, Bull. Denison Univ., III, 1888, p. 36, pl. 1, fig. 4.—Whitfield, Annals New York Acad. Sci., V, 1891, p. 548, pl. 11, fig. 10.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 3, 4, 27, 32, 40, 44.—Whitfield, Geol. Ohio, VII, 1895, p. 443, pl. 7, fig. 10.—Kindle, Bull. American Pal., 6, 1896, p. 37.

Chonetes scitulus Beecher, American Jour. Sci., XLI, 1891, p. 357, pl. 17, fig. 14.
Loc. Moscow, Hamburg, etc., New York; Meadville, Pennsylvania; Delaware and Licking counties, Ohio.

Chonetes setigerus (Hall).

Marcellus-Waverly (Dev.-L. Carb.).

Strophomena setigera Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 180, fig. 2; p. 222, fig. 3.

Chonetes setigera de Koninck, Recher. Animaux Foss., I, 1847, p. 215, pl. 20, fig. 7.—Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 150;—Pal. New York, IV, 1867, p. 129, pl. 21, fig. 2; p. 142, pl. 22, figs. 1-5;—Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 2, 5, 19.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 125.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 24.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 2, 5, 19.

Chonetes setigera? A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 411.

Loc. New York; Meadville, Pennsylvania; Ohio; Union City, Branch County, Michigan; Eureka district, Nevada.

Chonetes shumardianus de Koninck.

Keokuk (L. Carb.).

Chonetes shumardiana de Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 192, pl. 20, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 24.

Loc. The Knobs, Jefferson County, Kentucky.

Chonetes smithii Norwood and Pratten=*C. granulifer*.**Chonetes striatellus** (Dalman).

Silurian.

Orthisstriatella Dalman, Kgl. Svens. Vetens.-Akad. Handl., 1828, p. 111, pl. 1, fig. 5.
Chonetes striatella Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 595.

Loc. Europe; Cape Louis Napoleon, lat. 79° 38'.

- Chonetes stübeli** A. Ulrich. Middle Devonian.
Chonetes stübeli A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 80, pl. 5, figs. 3, 4.
Loc. Rio Sicastica, Bolivia.
Obs. Probably the same as *C. mucronatus*.
- Chonetes subquadratus** Nettelroth. Hamilton (Dev.).
Chonetes subquadrata Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 67.
Loc. Falls of Ohio.
- Chonetes tenuistriatus** Hall. Arisaig (Sil.).
Chonetes tenuistriata Hall, Canadian Nat. Geol., V, 1860, p. 145, fig. 3.—Dawson, Acadian Geol., 3d ed., 1878, p. 596, fig. 200.
Loc. East River, Nova Scotia.
- Chonetes tumidus** Herrick. Waverly (L. Carb.).
Chonetes tumidus Herrick, Bull. Denison Univ., III, 1888, p. 36, pl. 2, fig. 21.
Loc. Moots Run, Licking County, Ohio.
- Chonetes tuomyi** Norwood and Pratten = *C. coronatus*.
- Chonetes undulatus** Hall. Niagara (Sil.).
Chonetes minima Hall (non Sowerby), Twenty-eighth Rep. New York State Mus. Nat. Hist., Doc. ed., 1876, pl. 22, fig. 15.
Chonetes undulata Hall, *Ibidem*, 1879, p. 155, pl. 22, fig. 15;—Eleventh Rep. State Geol. Indiana, 1882, p. 294, pl. 22, fig. 15.
Loc. Waldron, Indiana.
- Chonetes variolatus** (d'Orbigny). Upper Carboniferous.
Leptæna variolata d'Orbigny, Voyage dans l'Amérique Meridionale; Paléontologie, 1842, p. 49.
Productus variolata d'Orbigny, *Ibidem*, 1842, pl. 4, figs. 10, 11.
Chonetes variolata de Koninek, Recher. Animaux Foss., Pt. I, 1847, p. 206, pl. 20, fig. 2.—Hall, Stansbury's Expl. Great Salt Lake, 1852, p. 410, pl. 3, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 28.
Chonetes flemingi Norwood and Pratten, *Ibidem*, 1854, p. 26, pl. 2, fig. 5.—Geinitz, Carbo u. Dyas in Nebraska, 1866, p. 59.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15B, fig. 11.—Keyes, Geol. Survey Missouri, V, 1895, p. 54, pl. 38, fig. 6.
Loc. Yarbichambi, Bolivia; Guernsey, etc., Ohio; Illinois; Missouri; Kansas; Nebraska.
Obs. Compare with *C. parvus*.
- Chonetes verneuilianus** Norwood and Pratten. Upper Carboniferous.
Chonetes verneuiliana Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 26, pl. 2, fig. 6.—Newberry, Ives' Rep. Colorado River of the West, 1861, p. 128.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 170, pl. 1, fig. 10.—Hall, Second Rep. New York State Geol., 1883, pl. 47, figs. 20, 21.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 128, pl. 25, figs. 7, 8.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 20, 21.
Loc. Carboniere, Missouri; Indiana; Illinois; Missouri; Kansas; Nebraska; banks of Colorado River.
- Chonetes verneuilianus utahensis** Meek. Upper Carboniferous.
Chonetes verneuiliana var. *utahensis* Meek, Simpson's Rep. Expl. Great Basin, Ter. Utah, 1876, p. 348, pl. 2, fig. 2.
Loc. Near Humboldt Mountains, Utah.

Chonetes vicinus (Castelnau).

Hamilton (Dev.).

Leptaena vicina Castelnau, *Système Sil. l'Amérique Septentrionale*, 1843, p. 39, pl. 14, fig. 9.

Chonetes vicina de Koninck, *Recher. Animaux Foss.*, Pt. I, 1847, p. 203.

Chonetes deflecta Hall, *Tenth Rep. New York State Cab. Nat. Hist.*, 1857, p. 149;—*Pal. New York*, IV, 1867, p. 126, pl. 21, figs. 7, 8;—*Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 47, fig. 28.—Walcott, *Mon. U. S. Geol. Survey*, VIII, 1884, p. 24, pl. 2, fig. 8.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pl. 16, fig. 28.

Chonetes gibbosa Hall, *Tenth Rep. New York State Cab. Nat. Hist.*, 1857, p. 145. *Loc.* Ontario County, New York; Columbus, Ohio; Wisconsin; Eureka district, Nevada.

Obs. Castelnau's specimens are from "Ontario County, New York." His figures are good and can not be compared with any other species than the well-known *C. deflectus* Hall, a species occurring abundantly in Ontario County.

Chonetes yandellanus Hall.

Corniferous (Dev.).

Chonetes nana de Koninck (non de Verneuil), *Recher. Animaux Foss.*, Pt. I, 1847, p. 213.—Norwood and Pratten (non de Verneuil), *Jour. Acad. Nat. Sci. Philadelphia*, III, 1854, p. 28.

Chonetes yandellana Hall, *Tenth Rep. New York State Cab. Nat. Hist.*, 1857, p. 118;—*Pal. New York*, IV, 1867, p. 123, pl. 20, fig. 4.—Nettelroth, *Kentucky Fossil Shells*, Mem. *Kentucky Geol. Survey*, 1889, p. 68, pl. 17, figs. 16-19; pl. 31, figs. 20, 30.

Loc. Falls of Ohio; Columbus, Ohio.

CHONOPECTUS Hall and Clarke. Genotype *Chonetes fischeri* N. and P.

Chonopectus Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 312;—*Eleventh Ann. Rep. New York State Geologist*, 1894, p. 295.

Chonopectus fischeri (Norwood and Pratten).

Kinderhook and Burlington (L. Carb.).

Chonetes fischeri Norwood and Pratten, *Jour. Acad. Nat. Sci. Philadelphia*, III, 1854, p. 25, pl. 2, fig. 3.—Hall, *Geol. Survey Iowa*, I, Pt. II, 1858, p. 517, pl. 7, fig. 1;—*Second Ann. Rep. New York State Geol.*, 1883, pl. 47, figs. 17, 31.

Chonopectus fischeri Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 312, pl. 15B, figs. 20-23; pl. 16, figs. 17, 31.

Loc. Burlington, Iowa; Warren, Pennsylvania.

CHONOSTROPHIA Hall and Clarke.Genotype *Chonetes reversa* Whitfield.

Chonostrophia Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 310;—*Eleventh Ann. Rep. New York State Geologist*, 1894, p. 294.

Chonostrophia complanata Hall.

Oriskany (Dev.).

Chonetes complanata Hall, *Tenth Rep. New York State Cab. Nat. Hist.*, 1857, p. 56;—*Pal. New York*, III, 1859, p. 418, pl. 93, fig. 1;—*Second Ann. Rep. New York State Geol.*, 1883, pl. 47, figs. 13, 29.

Chonostrophia complanata Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 311, pl. 16, figs. 13, 29.

?*Strophomena* sp. A, A. Ulrich, *N. Jahrb. f. Mineral., Beilageband*, VIII, 1892, p. 70, pl. 14, fig. 24 (?23).

Loc. Albany and Schoharie counties, New York; Cayuga, Ontario; Cumberland, Maryland; ?Bolivia.

Chonostrophia dawsoni (Billings).

Lower Devonian.

Chonetes dawsoni Billings, *Pal. Fossils*, II, 1874, p. 18, fig. 8.

Chonostrophia dawsoni Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 311.

Loc. Gaspé and Percé, Quebec, Canada.

- Chonostrophia nelderbergiæ** Hall. Lower Helderberg (Dev.).
Chonostrophia helderbergia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 311, 353, pl. 15B, fig. 14.
Loc. Albany County, New York.
- Chonostrophia reversa** (Whitfield). Corniferous (Dev.).
Chonetes reversa Whitfield, Annals New York Acad. Sci., II, 1882, p. 213;—
 Ibidem, V, 1891, p. 549, pl. 11, figs. 8, 9;—Geol. Ohio, VII, 1895, p. 443, pl. 7, figs. 8, 9.
Chonostrophia reversa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 311, pl. 15B, figs. 15-19;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 176, pl. 4, fig. 5.
Loc. Columbus and Delaware, Ohio; Union Springs, New York; Cayuga, Ontario.
- CHRISTIANIA** Hall and Clarke. Genotype *Leptæna subquadrata* Hall.
Christiania Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 298;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 290.
- Christiania subquadrata** Hall. Lower Helderberg (Dev.).
Leptæna subquadrata Hall, Second Ann. Rep. New York State Geol., 1883, pl. 46, figs. 32, 33.
Christiania subquadrata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 298, 351, pl. 15, figs. 32, 33; pl. 15A, fig. 36; pl. 20, figs. 18-20.
Loc. Perry and Blount counties, Tennessee.
- CISTELLA** Gray. Genotype *Terebratula cuneata* Risso.
Cistella Gray, Brit. Mus. Cat. Brach., p. 114.
- Cistella beecheri** Clark. Upper Cretaceous.
Cistella beecheri Clark, Johns Hopkins Univ. Circ., XV, 121, 1896, p. 3.
Loc. Vincentown, New Jersey.
- Cistella plicatilis** Clark. Upper Cretaceous.
Cistella plicatilis Clark, Johns Hopkins Univ. Circ., XV, 121, 1896, p. 3.
Loc. Vincentown, New Jersey.
- CLEIOTHYRIS** King.
 Genotype *Atrypa pectinifera* J. de C. Sowerby = *Spirifer roissyi* L'Éveillé = *Athyris roissyi* of authors.
Cleiothyris King (non Phillips), Mon. Permian Fossils, Pal. Soc., 1850, p. 137.—
 Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 90;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 779.
- Cleiothyris clintonensis** (Swallow). Kaskaskia (L. Carb.).
Spirigera clintonensis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 89.
Loc. Chester, Illinois; St. Genevieve and Cooper counties, Missouri.
Obs. Compare with *C. roissyi*. Regarded by Keyes as a synonym for *Seminula subquadrata*. However, this species does not appear to be a *Seminula*.
- Cleiothyris crassicardinalis** (White). Kinderhook (L. Carb.).
Athyris crassicardinalis White, Jour. Boston Soc. Nat. Hist., VII, 1860, p. 229.
Loc. Burlington, Iowa.
- Cleiothyris hirsuta** Hall. St. Louis and Kaskaskia (L. Carb.).
Spirigera (*Athyris*) *hirsuta* Hall, Trans. Albany Institute, IV, 1858, p. 8.
Athyris hirsuta Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 49, pl. 6, figs. 18-21.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 328, pl. 29, figs. 18-21.

Cleiothyris hirsuta Hall—Continued.

Cleiothyris hirsuta Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 46, figs. 25-28.

Loc. Spergen Hill, Indiana; Alton and Chester, Illinois; Princeton, Kentucky; Montana.

Cleiothyris missouriensis (Swallow).

Upper Carboniferous.

Spirigera missouriensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 650.

Loc. Montgomery and Chariton counties, Missouri.

Cleiothyris obmaxima (McChesney).

Keokuk (L. Carb.).

Athyris obmaxima McChesney, Descriptions New Pal. Foss., 1861, p. 80.

?*Spirigera obmaxima* White, Wheeler's Expl. Survey west 100 Merid., IV, 1875, p. 92, pl. 5, fig. 12.

Loc. Nauvoo and Warsaw, Illinois; Keokuk, Iowa; Mountain Spring, Nevada; Ophir City, Utah.

Obs. The specimen figured by White may be *Athyris incrassata* Hall.

Cleiothyris obvia (McChesney).

Kaskaskia (L. Carb.).

Athyris obvia McChesney, Descriptions New Pal. Foss., 1861, p. 81.

Loc. Kaskaskia, Illinois.

Obs. Probably a synonym for *C. roissyi*.

Cleiothyris orbicularis (McChesney).

Upper Carboniferous.

Athyris orbicularis McChesney, Descriptions New Pal. Foss., 1860, p. 47.

Loc. "Extensively distributed in the Western States."

Obs. Specimens of this species in the United States National Museum donated by Professor Worthen show it to be a *Cleiothyris*.

Cleiothyris reflexa (Swallow)..

Warsaw (L. Carb.).

Spirigera reflexa Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 88.

Loc. Barretts Station, St. Louis County, Missouri.

Obs. Should be compared with *C. roissyi*. Regarded by Keyes as a synonym for *Seminula trinuclea*. Swallow's species, however, does not appear to be a *Seminula*.

Cleiothyris roissyi (L'Éveillé).

Keokuk-Kaskaskia (L. Carb.).

Spirifer de roissyi L'Éveillé, Mémoires Soc. Géol. de France, II, 1835, p. 39, pl. 2, figs. 18-20.

Terebratula roysii Marcon, Geol. North America, 1858, p. 51, pl. 6, fig. 10.

Athyris sublamellosa Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 702, pl. 27, fig. 1.—Derby, Bull. Cornell Univ., I, 1874, p. 10, pl. 2, figs. 9-12; pl. 3, figs. 15-21, 29; pl. 6, fig. 16; pl. 9, figs. 5, 6.

Athyris parvirostris Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 451.

Spirigera americana Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 89.

Spirigera pectinifera Swallow (non Sowerby), Ibidem, 1863, p. 88.

Athyris planosulcata Geinitz (non Phillips), Carbon u. Dyas in Nebraska, 1866, p. 42.—Meek and Worthen, Geol. Survey Illinois, II, 1866, p. 254, pl. 18, fig. 8.

Spirigera planosulcata? White, Wheeler's Rep. Geogr. Geol. Expl. Survey west 100 Merid., IV, 1875, p. 143, pl. 10, fig. 5.

Athyris planosulcata? Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 257, pl. 4, figs. 10, 11.

?*Athyris roissyi* Meek, Ibidem, 1877, p. 82, pl. 9, fig. 3.

Athyris hirsuta Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 222, pl. 18, fig. 5.

Cleiothyris roysii Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 91, pl. 46, figs. 23, 24; pl. 84, fig. 32.

Cleiothyris roissyi (L'Éveillé)—Continued.

Cleiothyris sublamellosa Hall and Clarke, *Ibidem*, 1893, p. 91.

Loc. Europe; Mississippi Valley; White Pine and Eureka districts, Nevada; Salt Lake City, etc., Utah; Lake Valley mining district, etc., New Mexico; Lake County, Colorado; Guatemala; Bomjardin and Itaituba, Brazil.

Obs. American specimens usually referred to this species are constantly smaller and are often without sinus or fold. If these differences are regarded as of sufficient importance to distinguish American specimens from typical *C. roissyi* then this species will be known as *C. sublamellosa* Hall. Of *Spirigera americana* Swallow, authentic specimens have been seen by the writer in Professor Hall's collection. These are identical with *Athyris sublamellosa*.

Meek's *Athyris roissyi* (1877) will probably prove to be a new species of *Seminula*.

See *C. clintonensis*, *C. reflexa* Swallow, and *C. obvia* McChesney.

Cleiothyris squamosa (Worthen).

St. Louis (L. Carb.).

Athyris squamosa Worthen, *Bull. Illinois State Mus. Nat. Hist.*, 2, 1884, p. 24;—*Geol. Survey Illinois*, VIII, 1890, p. 103, pl. 11, fig. 2.

Loc. Monroe County, Illinois.

CLINTONELLA Hall and Clarke.Genotype *C. vagabunda* Hall and Clarke.

Clintonella Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 159;—*Thirteenth Ann. Rep. New York State Geologist*, 1895, p. 814.

Clintonella vagabunda Hall and Clarke.

Clinton (Sil.).

Clintonella vagabunda Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 160, pl. 52, figs. 1–11.

Loc. ?Orleans County, New York.

CLITAMBONITES Pander.Genotype *Pronites adscendens* Pander.

Klitambonites Pander, *Beitrage zur Geognosie des Russischen Reiches*, 1830, p. 70, pl. 3, fig. 14; pl. 28, figs. 16, 17.

Clitambonites (Ehlerst, *Fischer's Manuel de Conchyliologie*, 1887, p. 1289, fig. 1059.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 233.—Winchell and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 377.—Hall and Clarke, *Eleventh Ann. Rep. New York State Geologist*, 1894, p. 274.

Clitambonites adscendens (? Pander).

Ordovician.

Orthisina adscendens (Pander) Kayser, *Paleontographica*, Suppl., III, 1876, p. 20, pl. 2, figs. 9–11.

Loc. Europe; Juan Pobre and Laja, Cordillera San Juan, Argentine Republic.

Obs. This identification is probably erroneous.

Clitambonites(?) borealis (Castelnau).“Magnesian limestone” = ? *Galena* (Ord.).

Terebratula borealis Castelnau, *Essai Syst. Sil. l'Amérique Septentrionale*, 1843, p. 40, pl. 14, fig. 14.

Terebratula turpis de Verneuil, *Ibidem*, 1843, p. 40, footnote.

Loc. “Magnesian limestone of Green Bay, Wisconsin.”

Obs. The figure is not satisfactory. The species seems to be related to *C. diversus* Shaler.

Clitambonites diversus (Shaler).

Trenton-Lorraine (Ord.).

Orthisina diversa Shaler, *Bull. Mus. Comp. Zool.*, 4, 1865, p. 67.

Orthisina venenili Billings (non Eichwald), *Catalogue Sil. Foss. Anticosti*, 1866, pp. 43, 74.

Hemipronites americanus Whitfield, *Ann. Rep. Geol. Survey Wisconsin*, 1877, p. 72;—*Geol. Wisconsin*, IV, 1882, p. 243, pl. 10, figs. 15–17.

Clitambonites diversus (Shaler)—Continued.

Streptorhynchus americanus Miller, N. American Geol. Pal., 1889, p. 378.

Clitambonites americanus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 239, pl. 15A, figs. 1-8.

Clitambonites diversa Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 378, pl. 30, figs. 11-17.—Whiteaves, Pal. Fos., III, Pt. III, 1897, p. 166.

Loc. Anticosti; Cannon Falls, Kenyon, etc., Minnesota; Oshkosh, Wisconsin; Ottawa and Lake Winnipeg, Canada.

Obs. See *C. borealis*.

Clitambonites diversus altissimus Winchell and Schuchert. Trenton (Ord.).

Clitambonites americanus var. Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15A, figs. 7, 8.

Clitambonites diversa var. *altissima* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 381, pl. 30, figs. 18, 19.

Loc. Near Cannon Falls, Minnesota.

Clitambonites (?) johannensis Matthew. Upper Cambrian.

Orthisina johannensis Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 49, pl. 12, figs. 13a-13c.

Loc. Near St. John, New Brunswick.

Clitambonites planus retroflexus (de Verneuil). Lower Ordovician.

Gonambonites plana var. *retroflexa* de Verneuil, Beitrage zur Geognosie des Russischen Reiches, 1830, p. 77, pl. 25, figs. 1, 2.

Clitambonites (*Gonambonites*) *plana* var. *retroflexa* Matthew, Trans. Roy. Soc. Canada, 2d ser., I, 1896, p. 266, pl. 2, figs. 1a-1c.

Loc. Mc. Feei, Cape Breton, Nova Scotia.

CLORINDA Barrande. Genotype *C. armata* Barrande.

Clorinda Barrande, Système Silurien Bohème, V, 1879.

Barrandella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 241, 243;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 844.

Clorinda arcuosa (McChesney). Niagara (Sil.).

Pentamerus arcuosus McChesney, Descriptions New Pal. Foss., 1861, p. 87.

Loc. Milwaukee, Wisconsin.

Clorinda areyi (Hall and Clarke). Clinton (Sil.).

Barrandella areyi Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 242, 368, pl. 71, figs. 14-16.

Loc. Rochester, New York.

Clorinda barrandei (Billings). Anticosti (Sil.).

Pentamerus barrandi Billings, Geol. Survey Canada; Rep. Progress for 1856, 1857, p. 296;—Geol. Canada, 1863, p. 316, fig. 327.

Barrandella barrandii Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 243, fig. 174; pl. 71, figs. 17-20.

Loc. Anticosti.

Clorinda fornicata (Hall). Clinton and Niagara (Sil.).

Pentamerus fornicatus Hall, Pal. New York, II, 1852, p. 81, pl. 24, fig. 7.

Pentamerus fornicatus var. Hall, Descrip. n. sp. Fossils, Waldron, Indiana, 1879, p. 16;—Eleventh Rep. State Geol. Indiana, 1882, p. 299, pl. 27, fig. 15;—Trans. Albany Institute, X, 1883, p. 72.

Barrandella fornicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 243, pl. 70, figs. 11-13.

Loc. Lockport, New York; Waldron, Indiana; Wisconsin.

Clorinda ventricosa (Hall).

Niagara (Sil.).

Pentamerus ventricosa Hall, Geol. Survey Wisconsin; Rep. Progress, 1860, p. 2.—Whitfield, Geol. Wisconsin, IV, 1882, p. 291, pl. 17, figs. 11–13.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Survey, 1889, p. 64, pl. 33, figs. 12–14.

Pentamerus chicagoensis Winchell and Marcy, Mem. Boston Soc. Nat. Hist., I, 1865, p. 94, pl. 2, fig. 11.—Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1868, p. 392.

Pentamerus (*Pentamerella*?) *ventricosa* Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1868, p. 374, pl. 13, figs. 18–21.

Pentamerus (*Pentamerella*) *ventricosus* Hall and Whitfield, Pal. Ohio, II, 1875, p. 138, pl. 7, figs. 7, 8.

Barrandella ventricosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 243, pl. 71, figs. 4–10; pl. 84, fig. 46.

Loc. Waukessa, Wisconsin; Bridgeport, Illinois; Louisville, Kentucky; Ohio.

Cœlospira Hall = *Anoplotheca*.

Cœlospira concava Hall 1867 (not 1863) = *Anoplotheca camilla*.

Cœlospira disparilis Hall = *Atrypina disparilis*.

CONCHIDIUM Linné.Genotype *C. biloculare* Linné.

Conchidium Linné, Museum Tessinianum, 1753, p. 90;—*Systema Naturæ*, ed. xi, II, 1760, p. 163.—Ehlert, Fischer's Manuel de Conchyliologie, 1887, p. 1311.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 231;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 842.

Helmintholitus Linné, *Systema Naturæ*, ed. xii, IV, 1766, p. 163.

Pentamerus Sowerby (non *Pentamera* Dumeril, 1806), Mineral Conchology, I, 1813, p. 73.

Gypidia Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, pp. 93, 100.

Pentamerus Billings, Canadian Jour., VI, 1861, p. 269.—Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 163;—Pal. New York, IV, 1867, pp. 369, 373.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 52.

Antirhynchonella Quenstedt, Petref. Deutschlands, Brach., 1871, p. 231.

Zdimir Barrande, Système Silurien Bohême, VI, 1881, p. 171.

Conchidium biloculare Linné.

Silurian.

Conchidium biloculare Linné, *Systema Naturæ*, ed. xi, II, 1760, p. 163.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 233, pl. 6, figs. 11–14.

Pentamerus conchidium Emmerson, Geol. Frobenius Bay; Nurses Narr. Hall's Arctic Exped., 1879, p. 578.

Loc. Europe; Rescue Harbor, Arctic America.

Conchidium colletti (Miller).

Waterlime (Sil.).

Pentamerus colletti Miller, Seventeenth Rep. State Geol. Indiana, 1891, p. 77, pl. 13, figs. 5, 6.

Conchidium colletti Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 66, figs. 16, 17.

Loc. Kokomo, Indiana.

Obs. Compare with *C. laqueatum* Conrad.

Conchidium crassiplica Hall and Clarke.

Niagara (Sil.).

Conchidium crassiplica Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 235, 369, pl. 66, figs. 24, 25.

Loc. ?Near Louisville, Kentucky.

Conchidium crassiradiatum (McChesney).

Niagara (Sil.).

Pentamerus crassoradius McChesney, Descriptions New Pal. Foss., 1861, p. 87.

Loc. Milwaukee, Wisconsin.

- Conchidium decussatum** (Whiteaves). Silurian.
Pentamerus decussatus Whiteaves, Canadian Record of Science, 1891, p. 295, pl. 3, figs. 3, 4.—Calvin, Bull. Lab. Nat. Hist. State Univ. Iowa, XI, 1892, p. 164, pl. 11, figs. 1-3; pl. 12, fig. 2.
Conchidium decussatum Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 65, figs. 1, 2; pl. 66, fig. 15.
Loc. Grand Rapids of the Saskatchewan, etc., Canada.
- Conchidium exponeum** Hall and Clarke. Niagara (Sil.).
Conchidium exponeus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 66, figs. 6-9.
Loc. Louisville, Kentucky.
- Conchidium georgiæ** Hall and Clarke. Clinton (Sil.).
Conchidium georgiæ Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 369, pl. 66, figs. 18, 19.
Loc. Trenton, Georgia.
- Conchidium greenei** Hall and Clarke. Niagara (Sil.).
Conchidium greenii Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 235, 368, pl. 66, figs. 20-22.
Loc. Near Milwaukee, Wisconsin.
- Conchidium knappi** (Hall and Whitfield). Niagara (Sil.).
Pentamerus knappi Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 184.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 55, pl. 28, figs. 1-4.
Pentamerus? *knappi* Hall and Whitfield, Twenty-seventh Rep. New York State Cab. Nat. Hist., 1875, pl. 10, figs. 10-12.
Conchidium knappi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 64, figs. 11-13.
Loc. Louisville, Kentucky.
- Conchidium knighti** (Nettelroth). ?Corniferous (Dev.).
Pentamerus knighti Nettelroth (non Sowerby), Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 57, pl. 29, figs. 1, 2, 17.
Conchidium nettelrothi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 234, pl. 64, figs. 14-16.
Loc. Louisville, Kentucky.
Obs. This species is very much like *C. nysius* and may be identical with it (Ami says that *C. knighti* occurs in the Upper Silurian at Arisaig, Nova Scotia).
- Conchidium laqueatum** (Conrad). Niagara (Sil.).
Pentamerus laqueatus Conrad, Proc. Acad. Nat. Sci. Philadelphia, VII, 1855, p. 441.
Pentamerus nobilis Emmons, Manual of Geol., 1860, p. 107, figure.
Conchidium laqueatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 232, fig. 168; p. 234, pl. 65, figs. 3-9.
Loc. Delphi, Indiana.
- Conchidium littoni** Hall. Niagara (Sil.).
Pentamerus littoni Hall, Pal. New York, III, 1859, p. 262.—Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 186;—Twenty-seventh Rep. Ibidem, 1875, pl. 10, figs. 8, 9.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 58, pl. 27, figs. 12, 13.
Conchidium littoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 64, figs. 9, 10.
Loc. Hardin County, Tennessee; Louisville, Kentucky.

- Conchidium multicosatum** Hall. Niagara (Sil.).
Pentamerus multicosatus Hall, Geol. Survey Wisconsin; Rep. Progress, 1860, p. 1;—Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 373, pl. 13, figs. 22-24.
Conchidium multicosatum Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 64, fig. 6; pl. 66, fig. 10.
Loc. Wauwatosa and Waukesha, Wisconsin.
- Conchidium nettelrothi** Hall and Clarke=*C. knighti*.
- Conchidium nysius** (Hall and Whitfield). Niagara (Sil.).
Pentamerus nysius var. *crassica* Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 184;—Twenty-seventh Rep. *Ibidem*, 1875, pl. 10, figs. 4-7.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 60, pl. 28, figs. 5-8.
Pentamerus nysius var. *tenuicostatus* Nettelroth, *Ibidem*, 1889, p. 60.
Conchidium nysius Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 64, figs. 1, 8, 27.
Loc. Louisville, Kentucky.
Obs. See *C. tenuicostatum*.
- Conchidium obsoletum** Hall and Clarke. Niagara (Sil.).
Conchidium obsoletum Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 67, figs. 8, 9.
Loc. Genoa, Ottawa County, Ohio.
- Conchidium occidentale** Hall. Guelph (Sil.).
Pentamerus occidentalis Hall, Pal. New York, II, 1852, p. 341, pl. 79, figs. 1, 2.—Billings, Geol. Canada, 1863, p. 337, fig. 341.—Nicholson, Pal. Prov. Ontario, 1875, p. 67, fig. 35.—Whitfield, Geol. Wisconsin, IV, 1882, p. 314, pl. 17, fig. 10; pl. 23, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 239.
Conchidium (?) *occidentalis* Hall and Clarke, *Ibidem*, 1895, pl. 67, figs. 1-5.
Loc. Gault and Guelph, Ontario; Point St. Vital, Lake Huron; Williamstown, Wisconsin.
- Conchidium** (?) *salinense* (Swallow). "Base of Chemung" (Dev.).
Pentamerus salinensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 652.—Keyes, Geol. Survey Missouri, V, 1895, p. 104.
Loc. Moniteau County, Missouri.
Obs. The geological horizon is probably Corniferous or Hamilton.
- Conchidium scoparium** Hall and Clarke. Guelph (Sil.).
Conchidium scoparium Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 67, figs. 6, 7.
Loc. Durham, Ontario.
- Conchidium tenuicostatum** (Hall and Whitfield). Niagara (Sil.).
Pentamerus nysius var. *tenuicosta* Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 184;—Twenty-seventh Rep. *Ibidem*, 1875, pl. 10, figs. 1-3.
Pentamerus complanatus Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 53, pl. 27, figs. 11-16.
Conchidium tenuicostatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 64, figs. 3-5.
Loc. Louisville, Kentucky.
Obs. *P. nysius* is described as consisting of two varieties. If these varieties are species, as pointed out by Nettelroth, then *P. nysius* will be based upon and supplant variety *crassica*, while variety *tenuicosta* must be elevated to specific rank. *P. complanatus* Nettelroth, therefore, becomes a synonym for *C. tenuicostatum*, as both are established upon the same specimens.

Conchidium unguiforme (Ulrich).

Niagara (Sil.).

Gypidia unguiformis Ulrich, Contrib. American Pal., 1886, p. 28, pl. 3, fig. 2.*Gypidula unguiformis* Miller, N. American Geol. Pal., 1889, p. 346.*Conchidium unguiformis* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 66, figs. 1-4.*Loc.* Louisville, Kentucky.**CONOTRETA** Walcott.Genotype *C. rusti* Walcott.*Conotreta* Walcott, Proc. U. S. Nat. Mus., XII, 1890, p. 365 (extract 1889).—

Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 104, 167;—Eleventh

Ann. Rep. New York State Geologist, 1894, p. 250.

Conotreta rusti Walcott

Trenton (Ord.).

Conotreta rusti Walcott, Proc. U. S. Nat. Mus., XII, 1890, p. 365, figs. 1-4 (extract 1889).—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 104, pl. 4K, figs. 16-21.*Loc.* Trenton Falls, New York; Covington, Kentucky.**Conradia** Hall and Clarke (non Adams)=*Dinobolus*.**CRANÆNA** Hall and Clarke. Genotype *Terebratula romingeri* Hall.*Cranæna* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 297;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 865.**Cranæna iowensis** (Calvin).

Middle Devonian.

Terebratula (*Cryptonella*) *iowensis* Calvin, Bull. Lab. Nat. Hist. Univ. Iowa, I, 1890, p. 174, pl. 3, fig. 4.*Cranæna iowensis* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 297, pl. 80, figs. 36-39; pl. 83, fig. 40.*Loc.* Fayette, Iowa; Fulton, Missouri.**Cranæna romingeri** Hall.

Hamilton (Dev.).

Terebratula romingeri Hall, Sixteenth Rep. New York State Geol. Nat. Hist., 1863, p. 48, figs. 22, 23;—Pal. New York, IV, 1867, p. 389, pl. 60, figs. 17-25, 66, 67.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 155, pl. 16, figs. 20-22.*Cranæna romingeri* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 297, fig. 215; pl. 80, figs. 13-19.*Loc.* Thunder Bay, Michigan; Waterloo, Iowa; York and Hamburg, New York; Clarke County, Indiana.**CRANIA** Retzius.Genotype *Anomia craniolaris* Linné.*Crania* Retzius, Schrift. Ges. Naturf. Freunde, Berlin, II, 1781, p. 72.—Dall, Bull.

Mus. Comp. Zool., III, 1871, p. 27;—Bull. U. S. Nat. Mus., 8, 1877, p. 21.—

Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p.

31.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 145, 169.—Winchell

and Schuchert, Minnesota Geol. Survey, III, 1893, p. 372.—Hall and Clarke,

Eleventh Ann. Rep. New York State Geologist, 1894, p. 260.

Crania acadiensis Hall.

Arisaig (Sil.).

Crania acadiensis Hall, Canadian Nat. Geol., V, 1860, p. 144, fig. 1.—Dawson, Acadian Geol., 3d ed., 1878, p. 595, fig. 198.*Loc.* East River, Nova Scotia.**Crania agaricina** Hall and Clarke.

Lower Helderberg (Dev.).

Crania agaricina Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 180, pl. 4H, fig. 2.*Loc.* Albany County, New York; Decatur County, Tennessee.**Crania albersi** Miller and Faber.

Utica (Ord.).

Crania albersi Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., XVII, 1894, p. 154, pl. 8, figs. 17-19.*Loc.* Cincinnati, Ohio.

Crania alternata James=C. scabiosa.

Crania anna Spencer.

Niagara (Sil.).

Crania anna Spencer, Bull. Univ. Missouri, I, 1884, p. 57;—Trans. St. Louis Acad. Sci., IV, 1886, p. 607, pl. 8, fig. 4.

Loc. Hamilton, Ontario.

Crania asperula James=C. scabiosa.

Crania aurora Hall.

Schoharie Grit (Dev.).

Crania aurora Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 30;—Pal. New York, IV, 1867, p. 27, pl. 3, fig. 12.

Loc. Knox, Albany County, New York.

Crania bella Billings.

No. 5 Gaspé Series (?Dev.).

Crania bella Billings, Pal. Fossils, II, 1874, p. 15, fig. 5.

Loc. Cape Bon Ami, Gaspé, Canada.

Crania blairi Miller=C. rowleyi.

Crania bordeni Hall and Whitfield=C. sheldoni.

Crania carbonaria Whitfield=C. modesta.

Crania centralis Hall.

Portage (Dev.).

Crania centralis Hall, Pal. New York, V, Pt. II, 1879, pl. 88, fig. 2.

Loc. Watkins, New York.

Crania chesterensis Miller and Gurley.

Kaskaskia (L. Carb.).

Crania chesterensis Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 12, 1897, p. 47, pl. 3, figs. 24-26.

Loc. Chester, Illinois.

Crania(?) columbiana Walcott.

Middle Cambrian.

Crania? columbiana Walcott, Proc. U. S. Nat. Mus., XI, 1888, p. 441.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 150.

Loc. Mount Stephan, British Columbia.

Obs. Probably a species of *Acrotreta*.

Crania costata James=C. scabiosa.

Crania crenistriata Hall.

Corniferous and Hamilton (Dev.).

Crania crenistria Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 78, fig. 6, on p. 76;—Pal. New York, IV, 1867, p. 28, pl. 3, figs. 13-16.—Hall and Clarke, *Ibidem*, VIII, Pt. I, 1892, pl. 4H, figs. 6-12.

Loc. Alexander, etc., New York; Columbus, Ohio; Louisville, Kentucky; Alpena, Michigan.

Obs. See *C. sheldoni* White.

Crania(?) deformata (Hall).

Chazy (Ord.).

Orbicula? deformata Hall, Pal. New York, I, 1847, p. 23, pl. 4 bis, fig. 10.

Crania? deformata Miller, N. American Geol. Pal., 1889, p. 341.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 150.

Loc. Chazy, New York.

Obs. This species is not well established and had better be dropped since the type specimen does not preserve the generic or specific characters.

Crania dentata Ringueberg.

Niagara (Sil.).

Crania dentata Ringueberg, Bull. Buffalo Soc. Nat. Sci., V, 1886, p. 16, pl. 2, fig. 6.

Loc. Lockport, New York.

?**Crania dubia** Foerste.

Clinton (Sil.).

?*Crania dubia* Foerste, Geol. Ohio, VII, 1895, p. 565, pl. 37, fig. 17.

Loc. Dayton, Ohio.

Obs. May not be a brachiopod.

- Crania dyeri** Miller. Utica (Ord.).
Crania dyeri Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 13, fig. 3.
Loc. Cincinnati, Ohio.
- Crania famelica** Hall and Whitfield. Hamilton (Dev.).
Crania famelica Hall and Whitfield, Descriptions n. sp. Fossils, 1872, p. 17, pl. 11, figs. 6, 7;—Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 236, pl. 11, figs. 6, 7.
Loc. Cerro Gordo, Iowa; Callaway County, Missouri.
Obs. Compare with *Craniella hamiltoniæ* Hall.
- Crania favincola** Hall and Clarke. Middle Devonian.
Crania favincola Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 180, pl. 4H, fig. 33.
Loc. Crab Orchard, Kentucky.
- Crania gracilis** Ringueberg. Niagara (Sil.).
Crania gracilis Ringueberg, Bull. Buffalo Soc. Nat. Sci. V, 1886, p. 17, pl. 2, fig. 7.
Crania pannosa Ringueberg, Ibidem, 1886, p. 17, pl. 2, fig. 8.
Loc. Lockport, New York.
Obs. Species of *Crania* are very variable in shape, and since both forms are attached to one *Orthoceras*, it is probable that but a single species is here represented.
- Crania granosa** Hall and Clarke. Hamilton (Dev.).
Crania granosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 180, pl. 4H, figs. 19, 20.
Loc. Centerfield, New York.
- Crania granulosa** N. H. Winchell. Trenton (Ord.).
Crania granulosa N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 63.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 373, pl. 29, figs. 34, 35.
Loc. Minneapolis, Minnesota.
- Crania gregaria** Hall=*Craniella hamiltoniæ*.
- Crania greenei** Miller. Upper Helderberg (Dev.).
Crania greenei Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 310, pl. 9, fig. 7.
Loc. Falls of Ohio.
Obs. Probably the same as *Craniella hamiltoniæ*.
- Crania halli** Sardeson=*Craniella ulrichi*.
- Crania hamiltoniæ** Hall=*Craniella hamiltoniæ*.
- Crania lælia** Hall. Utica and Lorraine (Ord.).
Crania lælia Hall, Descriptions n. sp. Crinoidea and other Fossils, 1866, p. 13;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 220, pl. 7, fig. 16.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 12.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 75, pl. 1, fig. 16.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, fig. 1.
Loc. Cincinnati and Oxford, Ohio; Richmond, Indiana.
- Crania lævis** Keyes. Chouteau (L. Carb.).
Crania lævis Keyes, Geol. Survey Missouri, V, 1895, p. 40.
Loc. Louisiana, Missouri.
- Crania leoni** Hall. Portage and Chemung (Dev.).
Crania leoni Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 78, figs. 7, 8 on p. 76;—Pal. New York, IV, 1867, p. 30, pl. 3, figs. 27-30, (?25, 26).—Hall and Clarke, Ibidem, VIII, Pt. I, 1892, pl. 4H, figs. 34, 35.
Loc. Leon, New York. Portage of Ontario County, New York (Clarke).

- Crania modesta** White and St. John. Upper Carboniferous.
Crania modesta White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 118.—
 White, Thirteenth Rep. State Geol. Indiana, 1884, p. 121, pl. 35, fig. 9; pl. 36,
 fig. 5.
Crania carbonaria Whitfield, Annals New York Acad. Sci., II, 1882, p. 229;—
 Ibidem, V, 1891, p. 599, pl. 15, figs. 11, 12;—Geol. Ohio, VII, 1895, p. 484, pl.
 11, figs. 11, 12.
Loc. Fremont County, Iowa; Vermilion and Sullivan counties, Indiana; Carbon
 Hill, Ohio; Manhattan, Kansas.
- Crania multipunctata** Miller=*C. scabiosa*.
Crania pannosa Ringueberg=*C. gracilis*.
Crania parallela Ulrich=*C. scabiosa*.
Crania percarinata Ulrich=*C. scabiosa*.
- Crania(?) permiana** Shumard. Upper Carboniferous.
Crania permiana Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 395.
Loc. Guadalupe Mountains, New Mexico.
Obs. Probably not a *Crania*.
- Crania pulchella** Hall and Clarke. Lower Helderberg (Dev.).
Crania pulchella Hall and Clarke, Pal. New York, VIII, Pt. 1, 1892, p. 180, pl.
 4H, fig. 3.
Loc. Albany County, New York.
- Crania radicans** A. Winchell=*Strophalosia radicans*.
- Crania reposita** White. Burlington (L. Carb.).
Crania reposita White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 30.
Loc. Burlington, Iowa.
- Crania reticularis** Miller=*Trematis reticularis*.
- Crania(?) reversa** Sardeson. St. Peter (Ord.).
Crania(?) reversa Sardeson, Bull. Minnesota Acad. Nat. Sci., IV, 1896, p. 77, pl.
 3, figs. 6, 7.
Loc. St. Paul, Minnesota.
- Crania rowleyi** Gurley. Chouteau (L. Carb.).
Crania rowleyi Gurley, New Carb. Fossils, 1, 1883, p. 3.—Hall and Clarke, Pal.
 New York, VIII, Pt. 1, 1892, pl. 4H, fig. 13.
Crania blairi Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 310,
 pl. 9, figs. 5, 6.
Loc. Pike County and Sedalia, Missouri.
- Crania scabiosa** Hall. Utica and Lorraine (Ord.).
Crania scabiosa Hall, Descriptions n. sp. Crinoidea and other Foss., 1866, p. 13;—
 Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 220, pl. 7, fig.
 15.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 74, pl. 1, fig. 17.—Miller, Cin-
 cinnati Quart. Jour. Sci., II, 1875, p. 12.—Hall and Clarke, Pal. New York,
 VIII, Pt. 1, 1892, p. 148, pl. 4H, figs. 23-28, 30, 31.
Crania multipunctata Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 13, fig. 4.
Crania percarinata Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 98, pl. 4,
 fig. 12.
Crania parallela Ulrich, Ibidem, 1878, p. 98, pl. 4, fig. 13.
Crania asperula James, The Paleontologist, 3, 1879, p. 22.
Crania costata James, Ibidem, 1879, p. 22.
Crania alternata James, Ibidem, 1879, p. 23.
Loc. Cincinnati, etc., Ohio; Indiana; Illinois; Wisconsin.
Obs. The shells of *Crania* are adapted to the objects upon which they are cemented.

Crania scabiosa Hall—Continued.

C. scabiosa has been found growing on *Rafinesquina*, *Strophomena*, *Rhynchonella*, *Pleurotomaria*, and *Monticulipora*. In nearly all cases this species partakes more or less of the ornamentation of its host. The variation pointed out by authors is accidental and has no specific value.

Crania setifera Hall.

Niagara (Sil.).

Crania setifera Hall, Trans. Albany Institute, IV, 1863, p. 209 (non Hall, 1866);—Twenty-eighth Rep. New York State Mus. Nat. Hist., Doc. ed., 1876, pl. 21, figs. 8-10;—*Ibidem*, 1879, p. 148, pl. 21, figs. 8-10;—Eleventh Rep. State Geol. Indiana, 1882, p. 283, pl. 21, figs. 8-10.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, fig. 18.

Loc. Waldron, Indiana.

Crania setigera Hall.

Trenton and Lorraine (Ord.).

Crania setigera Hall, Descriptions n. sp. Crinoidea and other Fossils, 1866, p. 12;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 220, pl. 7, fig. 15.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, figs. 14-16.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 372, pl. 29, figs. 32, 33.

Loc. Mineral Point and Beloit, Wisconsin; Decorah, Iowa; Minneapolis, Cannon Falls, etc., Minnesota; Wilmington, Illinois.

Crania sheldoni White.

Hamilton (Dev.).

Crania sheldoni White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 29.
Crania bordeni Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 187;—Twenty-seventh Rep. *Ibidem*, 1875, pl. 9, figs. 36, 37.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 32, pl. 2, fig. 14.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, figs. 4, 5.

Loc. New Buffalo and Iowa City, Iowa; Falls of Ohio.

Obs. This species may not be distinct from *C. crenistria*.

Crania siluriana Hall.

Niagara (Sil.).

Crania siluriana Hall, Trans. Albany Institute, IV, 1863, p. 208;—Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 148, pl. 21, figs. 3-7;—Eleventh Rep. State Geol. Indiana, 1882, p. 282, pl. 21, figs. 3-7.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 13, pl. 1, figs. 1, 2.

Loc. Waldron, Indiana.

Crania socialis Ulrich.

Utica (Ord.).

Crania socialis Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 98, pl. 4, fig. 14.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, fig. 29.

Loc. Cincinnati, Ohio.

Crania spinigera Hall.

Niagara (Sil.).

Crania spinigera Hall, Descriptions n. sp. Foss. Waldron, Indiana, 1879, p. 13;—Eleventh Rep. State Geol. Indiana, 1882, p. 283, pl. 27, fig. 1;—Trans. Albany Institute, X, 1883, p. 69.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, fig. 17.

Loc. Waldron, Indiana.

Crania trentonensis Hall.

Trenton (Ord.).

Crania trentonensis Hall, Descriptions n. sp. Crinoidea and other Fossils, 1866, p. 12;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 219, pl. 7, figs. 11, 12.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, figs. 21, 22.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 374, pl. 29, figs. 36, 37.

Loc. Middleville, New York; Cannon Falls, Minnesota; Janesville, Wisconsin; Dixon, Illinois.

CRANIELLA Ehlert.Genotype *C. meduanensis* Ehlert.

Craniella Ehlert, Bull. Soc. Études Scientif. d'Angers, 1888, p. 37.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 153, 170.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 374.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 262.

Craniella*(?) *clintonensis Foerste.

Clinton (Sil.).

Craniella? *clintonensis* Foerste, Geol. Ohio, VII, 1895, p. 565, pl. 37, figs. 3a, 3b.
Loc. Todds Fork, Ohio.

Craniella hamiltoniæ Hall.

Hamilton (Dev.).

Crania hamiltoniæ Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 77, figs. 4, 5, on p. 76;—Pal. New York, IV, 1867, p. 27, pl. 3, figs. 17-23.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 214.

?*Crania hamiltoniæ*? Herrick, Bull. Denison Univ., III, 1888, p. 31, pl. 12, fig. 10.

Crania gregaria Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 31;—Pal. New York, IV, 1867, p. 29, pl. 3, fig. 24.

Craniella hamiltoniæ Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 148, 153, pl. 41, figs. 3-16.

Loc. Cazenovia, Hamilton, etc., New York; Hay and Athabasca rivers, Canada. (Waverly group, Moote Run, Licking County, Ohio, according to Herrick.)

Obs. See *Crania greenei* Miller.

Craniella*(?) *ulrichi Hall and Clarke.

Trenton (Ord.).

Craniella ulrichi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 153, 181, pl. 4, figs. 1, 2.

Crania halli Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 328, pl. 4, figs. 8-10.

Craniella? *ulrichi* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 375, pl. 29, figs. 38, 39.

Loc. Minneapolis, St. Paul, and Fountain, Minnesota.

Craniops Hall=*Pholidops*.**CRYPTACANTHIA** White and St. John.Genotype *Waldheimia*? *compacta* White and St. John.

Cryptacanthia White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 119.—Dall, American Jour. Conch., VI, 1870, p. 114.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 300;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 867.

Cryptacanthia compacta White and St. John.

Upper Carboniferous.

Waldheimia? (*Cryptacanthia*) *compacta* White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 119, fig. 3.

Cryptacanthia compacta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 301, fig. 225.

Loc. Madison County, Missouri.

CRYPTONELLA Hall, 1867.Genotype *Terebratula rectirostra* Hall.

?*Cryptonella* Hall, Fourteenth Rep. New York State Cab. Nat. Hist., 1861, pp. 101, 102;—Fifteenth Rep. Ibidem, 1862, p. 160, pl. 3, figs. 8, 9.—Billings, Canadian Nat. Geol., VII, 1862, p. 392.—Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 43, figs. 1-7 on p. 42;—American Jour. Sci., 2d ser., XXXV, 1863, p. 396.—Billings, Ibidem, XXXVI, 1863, p. 238.—Hall, Trans. Albany Institute, IV, 1863, pp. 132, 148.

Centronella (partim) A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 123.

Cryptonella Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 164;—Pal. New York, IV, 1867, p. 392.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 286;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 860.

Obs. This genus can not be considered as established before 1867.

Cryptonella calvini Hall and Whitfield = *Dielasma calvini*.

***Cryptonella*(?) *circulus* Walcott.**

Devonian.

Cryptonella? *circula* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 163, pl. 15, fig. 2.

Loc. Lone Mountain, Nevada.

Obs. Additional material shows that this species attained a length of 1 inch.

Cryptonella eudora Hall and Whitfield, 1873 = *Dielasma calvini*.

***Cryptonella*(?) *eudora* Hall.**

Chemung-Waverly (Dev.-L. Carb.).

Cryptonella (*Terebratula*) *eudora* Hall, Pal. New York, IV, 1867, p. 398, pl. 61, figs. 31-41.

Cryptonella eudora Herrick, Bull. Denison Univ., III, 1888, p. 48, pl. 5, fig. 10;—Geol. Ohio, VII, 1895, pl. 21, fig. 10.

Loc. Ithaca, New York; Licking County, Ohio.

***Cryptonella*(?) *eximia* Hall.**

Lower Helderberg (Dev.).

Cryptonella eximia Hall, Fifteenth Rep. New York State Cab. Nat. Hist., 1862, p. 160, pl. 3, figs. 6, 7;—Sixteenth Rep. Ibidem, 1863, p. 43, figs. 10, 11.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 80, figs. 11, 12.

Loc. Not given.

***Cryptonella*(?) *inconstans* (Herrick).**

Waverly (L. Carb.).

Terebratula? *inconstans* Herrick, Bull. Denison Univ., IV, 1888, p. 24, pl. 3, figs. 8, 9; pl. 11, fig. 18.

Cryptonella(?) *inconstans* Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 79, figs. 31, 32.

Terebratula inconstans Herrick, Geol. Ohio, VII, 1895, pl. 23, fig. 17.

Loc. Ashland County and Lodi, Ohio.

Cryptonella iowensis Calvin = *Cranæna iowaensis*.

***Cryptonella iphis* Hall.**

Corniferous (Dev.).

Cryptonella iphis Hall, Pal. New York, IV, 1867, p. 396, pl. 61, figs. 26-28.

Loc. Cayuga, Ontario.

***Cryptonella lens* Hall.**

Corniferous (Dev.).

Terebratula lens Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 89;—Pal. New York, IV, 1867, p. 386, pl. 60, figs. 1-4.

Cryptonella lens Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 199.

Loc. Clarence Hollow, New York; Falls of Ohio.

Cryptonella lineklæni Hall = *Eunella lineklæni*.

***Cryptonella ovalis* Miller.**

Hamilton (Dev.).

Cryptonella ovalis Miller, Seventeenth Rep. State Geol. Indiana, 1891, p. 76, pl. 13, figs. 1, 2.

Loc. Bunker Hill, Indiana.

***Cryptonella pinonensis* Walcott.**

Upper Devonian.

Cryptonella pinonensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 163, pl. 4, fig. 4.

Loc. Pinon Range, Nevada.

***Cryptonella planirostris* Hall.**

Marcellus, Hamilton (Dev.).

Terebratula planirostra Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 89.

Cryptonella planirostra Hall, Fourteenth Rep. New York State Cab. Nat. Hist., 1861, p. 101;—Sixteenth Rep. Ibidem, 1863, p. 44;—Pal. New York, IV, 1867, p. 395, pl. 61, figs. 9-27.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 287, fig. 208; pl. 80, figs. 5-10.

Loc. Seneca and Canandaigua lakes, New York.

- Cryptonella rectirostris** Hall. Hamilton (Dev.).
Terebratula rectirostra Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 88.
Cryptonella rectirostra Hall, Fourteenth Rep. New York State Cab. Nat. Hist., 1861, p. 101;—Sixteenth Rep. Ibidem, 1863, p. 44;—Pal. New York, IV, 1867, p. 394, pl. 61, figs. 1-8.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 286, pl. 80, figs. 1-4.
Loc. Bellona, York, Moscow, etc., New York; Falls of Ohio.
- Cryptonella subelliptica** Hall and Clarke. Waverly (L. Carb.).
Cryptonella subelliptica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pl. 81, figs. 41-43.
Loc. Sciotoville, Ohio.
- CYCLORHINA** Hall and Clarke. Genotype *Rhynchospira nobilis* Hall.
Cyclorhina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 206;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 830.
- Cyclorhina nobilis** Hall. Hamilton (Dev.).
Rhynchospira nobilis Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 83.
Rhynchospira and *Trematospira?* *nobilis* Hall, Pal. New York, IV, 1867, pp. 277, 412, pl. 63, figs. 33-36.
Retzia (*Trematospira*) *nobilis* Whiteaves, Cont. Canadian Pal., I, 1889, p. 116.
Cyclorhina nobilis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 207, pl. 61, figs. 1-12.
Loc. Darien, New York; Thedford, Ontario.
- CYCLOSPIRA** Hall and Clarke. Genotype *Orthis bisulcata* Emmons.
Cyclospira Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 146.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 469.—Hall and Clarke, Thirteenth Ann. Rep. New York State Geologist, 1895, p. 808.
- Cyclospira bisulcata** (Emmons). Trenton (Ord.).
Orthis bisulcata Emmons, Geol. New York; Rep. Second Dist., 1842, p. 396, fig. 4.
Atrypa bisulcata Hall, Pal. New York, I, 1847, p. 139, pl. 33, fig. 3.
 Genus? *bisulcata* Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 65.
Camarella bisulcata Miller, American Pal. Foss., 1877, p. 107.
Camarella owatomensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 328, pl. 4, figs. 1-3.
Cyclospira bisulcata? Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 470, pl. 34, figs. 49-54.
Cyclospira bisulcata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 147, figs. 133-136; pl. 54, figs. 38-40;—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 180.
Loc. Adams, Jefferson County, New York; Ottawa, Canada; Cannon Falls, etc., Minnesota; Lake Winnipeg, Manitoba.
- Cyclospira(?) sparsiplica** Foerste. Clinton (Sil.).
Cyclospira? *sparsiplica* Foerste, Geol. Ohio, VII, 1895, p. 593, pl. 37A, fig. 18.
Loc. Dayton, Ohio.
Obs. May be a species of *Parastrophia* or a rhynchonelloid.
- CYRTIA** Dalman. Genotype *Anomites exporrectus* Wahlenberg.
Cyrtia Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, pp. 93, 97.—Billings, Canadian Jour., VI, 1861, p. 262.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 93.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 40;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 759.
- Cyrtia acutirostris* Shumard = *Cyrtina acutirostris*.

Cyrtia alta Hall.

Waverly (L. Carb.).

Spirifer alta Hall, Proc. American Phil. Soc., X, 1866, p. 216;—Pal. New York, IV, 1867, p. 248, pl. 43, figs. 1-7.

Syringothyris alta Schuchert, Ninth Ann. Rep. New York State Geol., 1890, p. 35.
Cyrtia alta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 42, pl. 26, figs. 1-5; pl. 39, figs. 37, 38.

Loc. Meadville, Pennsylvania; Bedford, Ohio.

Cyrtia biplicata Hall=*Cyrtina biplicata*.

Cyrtia curvilineata White=*Cyrtina curvilineata*.

Cyrtia cyrtiniformis (Hall and Whitfield).

Chemung (Dev.).

Spirifera cyrtinaformis Hall and Whitfield, Twenty-third Rep. New York State Cab. Nat. Hist., 1872, p. 238, pl. 11, figs. 21-24;—Extract, 1872, p. 19, pl. 11, figs. 21-24.—Whiteaves, Cont. to Canadian Pal., I, 1891, p. 222.

Cyrtia cyrtiniformis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 42, pl. 25, figs. 26-32.

Loc. Rockford, Iowa; Hay River, Canada.

Obs. Compare with *C. norwoodi* Meek.

Cyrtia dalmani Hall=*Cyrtina dalmani*.

Cyrtia exporrecta (Wahlenberg).

Niagara (Sil.).

Anomites exporrectus Wahlenberg, Nova Acta Regias Soc. Scient. Upsal, VIII, 1821, p. 64.

Spirifera (*Cyrtia*) *trapezoidalis* Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 183.

Cyrtia trapezoidalis Hall and Whitfield, Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 19-21.

Cyrtia exporrecta Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 93, pl. 27, figs. 6-8, 20.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 42, pl. 28, figs. 1, 48, 49, 51.

Loc. Europe; Louisville, Kentucky.

Cyrtia exporrecta arrecta Hall and Whitfield=*C. myrtea*.

Cyrtia gigas Troost=*Syringothyris gigas*.

Cyrtia hamiltonensis Hall=*Cyrtina hamiltonensis*.

Cyrtia meta (Hall).

Clinton and Niagara (Sil.).

Spirifer radiatus (pars) Hall, Pal. New York, II, 1852, p. 66, pl. 22, figs. 2a-2c, 21.

Spirifera meta Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 372, pl. 13, figs. 12, 13.

Cyrtia radians Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 42, 362, pl. 28, figs. 4, 5, 50, 52; pl. 39, fig. 33.

Loc. Lockport and Rochester, New York; Milwaukee, Wisconsin.

Cyrtia missouriensis Swallow=*Cyrtina missouriensis*.

Cyrtia myrtia Billings.

Anticosti and Niagara (Sil.).

Cyrtia myrtia Billings, Pal. Fossils, I, 1862, p. 165, fig. 149.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 42.

Cyrtia trapezoidalis var. *arrecta* Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 183.

Cyrtia exporrecta Hall and Whitfield, Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 22, 23.

Cyrtia exporrecta var. *arrecta* Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 94, pl. 27, fig. 21; pl. 34, fig. 35; pl. 37, figs. 60, 61.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pl. 28, figs. 2, 3; pl. 39, fig. 32.

Loc. Anticosti; Louisville, Kentucky.

- Cyrtia norwoodi** (Meek). Middle Devonian.
Spirifera norwoodi Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 308.
Spirifera utahensis Meek, note appended to extra copies of the above-cited paper, 1860;—Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 345, pl. 1, fig. 4;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 39, pl. 3, fig. 1.
Loc. Buell Valley, Utah.
Obs. Compare with *C. crytiniformis* Hall and Whitfield.
- Cyrtia occidentalis** Swallow = *Cyrtina occidentalis*.
- Cyrtia radians** Hall and Clarke = *C. meta*.
- Cyrtia rostrata** Hall = *Cyrtina rostrata*.
- Cyrtia trapezoidalis** Hisinger = *C. exporrecta*.
- Cyrtia trapezoidalis arrecta** Hall and Whitfield = *C. myrtia*.
- Cyrtia triquetra** Hall = *Cyrtina triquetra*.
- Cyrtia umbonata** Hall = *Cyrtina umbonata*.
- CYRTINA** Davidson. Genotype *Cyrtia heteroclitia* Defrance.
Cyrtina Davidson, Mon. British Carb. Brachiopoda, Pal. Soc., 1858, p. 66.—Hall, Pal. New York, IV, 1867, p. 263;—Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 251.—Herrick, Bull. Dennison Univ., IV, 1888, p. 14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 95.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 43;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 763.
- Cyrtina acutirostris** (Shumard). Chouteau (L. Carb.).
Cyrtia acutirostris Shumard, Geol. Rep. Missouri, 1855, p. 204, pl. C, fig. 3.
Cyrtina acutirostris Miller, N. American Geol. Pal., 1889, p. 342.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 38-42, 44, 54.—Keyes Geol. Survey Missouri, V, 1895, p. 89, pl. 39, fig. 10.
Loc. Hannibal and Louisiana, Missouri.
- Cyrtina affinis** Billings. Oriskany (Dev.)
Cyrtina dalmani Billings, Canadian Nat. Geol., VIII, 1863, p. 37.
Cyrtina affinis Billings, Pal. Fossils, II, 1874, p. 49, pl. 3A, fig. 6.
Loc. Grand Greve, Gaspé.
- Cyrtina billingsi** Meek. Hamilton (Dev.).
Cyrtina billingsi Meek, Trans. Chicago Acad. Sci., I, 1868, p. 97, pl. 14, fig. 6.—Whiteaves, Cont. to Canadian Pal., I, 1891, p. 27.
Loc. Clearwater and Athabasca rivers, British America.
- Cyrtina buplicata** Hall. Upper Helderberg (Dev.).
Cyrtia buplicata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 165.
Cyrtina buplicata Hall, Pal. New York, IV, 1867, p. 266, pl. 27, figs. 5-10.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 7-10.
Loc. Albany and Schoharie counties, etc., New York; Michigan.
- Cyrtina burlingtonensis** Rowley. Burlington (L. Carb.).
Cyrtina burlingtonensis Rowley, American Geologist, XII, 1893, p. 308, pl. 14, figs. 15-17.
Loc. Louisiana, Missouri.
Obs. Compare with *C. neogenes*.
- Cyrtina crassa** Hall. Corniferous (Dev.).
Cyrtina crassa Hall, Pal. New York, IV, 1867, p. 267, pl. 27, figs. 11, 12.—Hall and Whitfield, Twenty-seventh Rep. New York State Cab. Nat. Hist., 1875, pl. 9, figs. 14-16.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 95, pl. 13, figs. 21-24.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 13-15.
Loc. Vienna, New York; Falls of Ohio.

- Cyrtina(?) curupira** Rathbun. Middle Devonian.
Cyrtina(?) curupira Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 242, pl. 10, figs 1, 6.
Loc. Erere, Province of Para, Brazil.
- Cyrtina curvilineata** White. Hamilton (Dev.).
Cyrtia curvilineata White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 25.
Cyrtina curvilineata? Hall, Pal. New York, IV, 1867, p. 270, pl. 44, figs. 53-55.
Cyrtina curvilineata Hall and Clarke, *Ibidem*, VIII, Pt. II, 1895, pl. 28, figs. 11, 12
Loc. Iowa City, Iowa.
- Cyrtina dalmani** Billings (non Hall)=*C. affinis*.
- Cyrtina dalmani** (Hall). Lower Helderberg (Dev.).
Cyrtia dalmani Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 64;—
 Pal. New York, III, 1859, p. 206, pl. 24, fig. 1.
Cyrtina dalmani Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 383, pl. 7, fig. 3.
Loc. Albany and Schoharie counties, New York; Perry County, Missouri; Decatur County, Tennessee; Dalhousie, New Brunswick.
- Cyrtina davidsoni** Walcott. Middle and Upper Devonian.
Cyrtina davidsoni Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 146, pl. 3, fig. 2.
Loc. White Pine district, Nevada.
- Cyrtina hamiltonensis** Hall. Up. Helderberg, Ham., and Port. (Dev.).
Cyrtia hamiltonensis Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 166.—Billings, Canadian Jour., VI, 1861, p. 262, figs. 80-82;—Geol. Canada, 1863, p. 384, fig. 415.
Cyrtina hamiltonensis Hall, Pal. New York, IV, 1867, p. 268, pl. 27, figs. 1-4; pl. 44, figs. 26-33, 38-52.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 99, pl. 14, figs. 5, 7, 10.—Nicholson, Pal. Prov. Ontario, 1874, p. 83.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 147.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 96, pl. 13, figs. 4-12.—Whiteaves, Cont. to Canadian Pal., I, 1891, pp. 226, 288.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 23-33, 43, 45, 46, 53.—Kindle, Bull. American Pal., 6, 1896, p. 35.
Cyrtina panda Meek, Trans. Chicago Acad. Sci., I, 1868, p. 100, pl. 14, fig. 8.
Loc. New York; Pennsylvania; Maryland; Cayuga and Thedford, Ontario; Louisville, Kentucky; Independence, Iowa; Eureka district, Nevada; Mackenzie and Athabasca rivers, and lakes Manitoba and Winnipegosis, British America.
Obs. *C. panda* is a variation of this species with a higher ventral area.
- Cyrtina hamiltonensis recta** Hall. Hamilton and Chemung (Dev.).
Cyrtina hamiltonensis var. *recta* Hall, Pal. New York, IV, 1867, p. 270, pl. 44, figs. 34-37.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 97, pl. 13, figs. 13-16.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 21, 22.
Loc. Allegany County, New York; Falls of Ohio.
- Cyrtina lachrymosa** Hall and Clarke. Waverly (L. Carb.).
Cyrtina lachrymosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 46, 362, pl. 28, figs. 36, 37, 47.
Loc. Richfield, Ohio.
- Cyrtina missouriensis** (Swallow). Hamilton (Dev.).
Cyrtia missouriensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 647.
Cyrtina missouriensis Miller, N. American Geol. Pal., 1889, p. 343.
Loc. Callaway County, Missouri.
Obs. Regarded by Keyes as a synonym for *C. umbonata*.

- Cyrtina neogenes** Hall and Clarke. Burlington (L. Carb.).
Cyrtina neogenes Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 84, fig. 41.
Loc. Burlington, Iowa.
Obs. Compare with *C. burlingtonensis*.
- Cyrtina(?) occidentalis** (Swallow). Hamilton (Dev.).
Cyrtia occidentalis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 648.
Cyrtina? *occidentalis* Miller, N. American Geol. Pal., 1889, p. 343.
Syringothyris occidentalis Keyes, Geol. Survey Missouri, V, 1889, p. 86.
Loc. Callaway County, Missouri.
Obs. This is probably a *Spirifer* with a high area as in *S. asperus*, or it is a *Cyrtia*.
- Cyrtina panda** Meek = *C. hamiltonensis*.
- Cyrtina pyramidalis** (Hall). Niagara (Sil.).
Spirifer pyramidalis Hall, Pal. New York, II, 1852, p. 266, pl. 54, fig. 7.
Cyrtina pyramidalis Miller, N. American Geol. Pal., 1889, p. 343.
Loc. Lewiston, New York.
- Cyrtina rostrata** Hall. Oriskany and Corniferous (Dev.).
Cyrtia rostrata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 64;—
 Pal. New York, III, 1859, p. 429, pl. 96, figs. 1-6; pl. 98, fig. 8.—Billings,
 Canadian Jour., VI, 1861, p. 263.
Cyrtina rostrata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 25, figs.
 1-8; pl. 28, fig. 6.
Loc. Albany County, New York; Cumberland, Maryland; Cayuga, Ontario.
- Cyrtina triplicata** Simpson. Waverly (L. Carb.).
Cyrtina triplicata Simpson, Trans. American Phil. Soc., n. ser., XVI, 1889, p. 439,
 fig. 4.
Loc. Warren, Pennsylvania.
- Cyrtina triquetra** (Hall). Hamilton (Dev.).
Cyrtia triquetra Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 513.
Cyrtina triquetra Meek, Trans. Chicago Acad. Sci., I, 1868, p. 99.—Meek and
 Worthen, Geol. Survey Illinois, III, 1868, p. 436, pl. 13, fig. 4.—Hall and
 Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 14, 35.
Loc. Rock Island, Illinois.
- Cyrtina umbonata** (Hall). Hamilton (Dev.).
Cyrtia umbonata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 512, pl. 5, fig. 2.
Cyrtina umbonata Miller, N. American Geol. Pal., 1889, p. 313.—Keyes, Geol.
 Survey Missouri, V, 1895, p. 90.
Loc. Buffalo, Iowa; Rock Island, Illinois; Callaway County, Missouri.
Obs. See *C. missouriensis*.
- Cyrtina umbonata alpenaensis** Hall and Clarke. Hamilton (Dev.).
Cyrtina umbonata var. *alpenensis* Hall and Clarke, Pal. New York, VIII, Pt. II,
 1895, p. 362, pl. 28, figs. 16-20.
Loc. Alpena, Michigan.
- DALMANELLA** Hall and Clarke.
 Genotype *Orthis testudinaria* Dalman.
Orthis (group of *O. testudinaria*) Hall, Bull. Geol. Soc. America, I, 1889, p. 21.
Dalmanella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 205, 223.—
 Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 439.—Hall
 and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 170.

- Dalmanella amœna** N. H. Winchell. Trenton (Ord.).
Orthis amœna Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 65.
Orthis (D.) *amœna* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 453, pl. 33, figs. 48-50.
Loc. Spring Valley, Minnesota.
- Dalmanella arcuaria** Hall and Clarke. Niagara (Sil.).
Dalmanella arcuaria Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 224, 341, pl. 5C, figs. 20, 21.
Loc. Perry County, Tennessee.
- Dalmanella bellula** (Meek). Lorraine (Ord.).
Orthis bellula (James MS.) Meek, Pal. Ohio, I, 1873, p. 103, pl. 8, fig. 5; Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 31.
Dalmanella bellula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.
Loc. Cincinnati, Ohio.
- Dalmanella concinna** Hall. Lower Helderberg (Dev.).
Orthis concinna Hall, Pal. New York, III, 1859, p. 172, pl. 13, figs. 1-3.
Dalmanella concinna Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224.
Loc. Cumberland, Maryland.
- Dalmanella crispata** (Emmons). Lorraine (Ord.).
Orthis crispata Emmons, Geol. New York; Rep. Second Dist., 1842, p. 404, fig. 5.
Dalmanella crispata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.
Loc. Lorraine, New York.
- Dalmanella devonica** (Walcott). Lower Devonian.
Skenidium devonicum Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 116, pl. 13, fig. 4.
Loc. Eureka district, Nevada.
Obs. The type specimen has no spondylium and therefore is no *Skenidium*.
- Dalmanella electra** (Billings). Calciferous (Ord.).
Orthis electra Billings, Pal. Fossils, I, 1862, p. 79, fig. 72; p. 217;—Geol. Canada, 1863, p. 231, fig. 246.
Orthis electra? White, Wheeler's Rep. Geol. Geogr. Expl. west 100 Merid., IV, 1875, p. 55.
Dalmanella electra Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 223.
Loc. Point Levis and St. John, Canada; Newfoundland; House Range, Utah.
- Dalmanella electra major** (Matthew). Calciferous (Ord.).
Orthis electra var. *major* Matthew, Trans. Royal Soc. Canada, X, 1893, p. 100, pl. 7, fig. 3.
Loc. Near St. John, New Brunswick.
- Dalmanella electra lævis** (Matthew). Calciferous (Ord.).
Orthis electra var. *lævis* Matthew, Trans. Royal Soc. Canada, X, 1893, p. 100.
Loc. Near St. John, New Brunswick.
- Dalmanella elegantula** (Dalman). Clinton and Niagara (Sil.).
Orthis elegantula Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, p. 117, pl. 2, fig. 6.—Hall, Pal. New York, II, 1852, p. 252, pl. 52, fig. 3.—Billings, Canadian Nat. Geol., I, 1856, p. 136, pl. 2, fig. 5.—Roemer, Sil. Fauna west. Tennessee, 1860, p. 62, pl. 5, fig. 7.—Billings, Geol. Canada, 1863, p. 312, fig. 320.—Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 150, pl. 21, figs. 11-17;—Eleventh Rep. State Geol. Indiana, 1882, p. 285, pl. 21, figs. 11-17;—Second Ann. Rep. New York State Geol., 1883,

Dalmanella elegantula (Dalman)—Continued.

pl. 35, figs. 34-37.—Foerste, Bull. Denison Univ., I, 1885, p. 84, pl. 13, fig. 1.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 37, pl. 32, figs. 52-57.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 14, pl. 1, figs. 3-12.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 307.

Orthis canalis Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 105, fig. 6.

Orthis elegantula? var. Hall, Pal. New York, II, 1852, p. 57, pl. 20, fig. 7.

Dalmanella elegantula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224, pl. 5C, figs. 15-19.

Orthis (Dalmanella) elegantula Foerste, Geol. Ohio, VII, 1895, p. 581, pl. 25, figs. 11, 17.

Loc. Europe; New York; Ohio; Indiana; Kentucky; Tennessee; Missouri; Ontario and Nova Scotia, Canada; Collinsville, Alabama.

Dalmanella elegantula parva (Foerste). Clinton (Sil.).

Orthis elegantula var. *parva* Foerste, Bull. Denison Univ., I, 1885, p. 85, pl. 13, fig. 17.

Dalmanella elegantula var. *parva* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.

Loc. Dayton, Ohio.

Dalmanella(?) evadne (Billings). Calciferous (Ord.).

Orthis evadne Billings, Pal. Fossils, I, 1862, p. 81, fig. 74; p. 79.—Whitfield, Bull. American Mus. Nat. Hist., I, 1886, p. 300, pl. 24, fig. 8.

Dalmanella? *evadne* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 223, pl. 5B, figs. 25, 26.

Loc. Point Levis, Canada; Fort Cassin, Vermont.

Dalmanella hamburgensis (Walcott). Pogonip and Trenton (Ord.).

Orthis hamburgensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 73, pl. 2, fig. 5.

Orthis (Dalmanella) hamburgensis? Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 440, pl. 33, figs. 14-16.

Loc. Pogonip group, Eureka district, Nevada. In the Trenton at St. Paul, Cannon Falls, etc., Minnesota; Highbridge, Kentucky.

Dalmanella infera (Calvin). Chemung (Dev.).

Orthis infera Calvin, Bull. U. S. Geol. Survey Terr., IV, 1878, p. 728.

Dalmanella infera Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.

Loc. Independence, Iowa; Naples, New York.

Dalmanella lenticularis (Vanuxem). Corniferous (Dev.).

Orthis lenticularis Vanuxem (non Wahlenberg), Geol. New York; Rep. Third Dist., 1842, p. 139, fig. 4.—Hall, Pal. New York, IV, 1867, p. 35, pl. 5, figs. 1, 2.

Orthis lenticularis and *O. lentiformis* Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 175, fig. 4.

Orthis eboracensis Miller, N. American Geol. Pal., 1889, p. 357.

Dalmanella lenticularis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224, pl. 5C, figs. 36-41.

Loc. Leroy, Caledonia, etc., New York.

Dalmanella lepida Hall. Hamilton (Dev.).

Orthis lepidus Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 78;—Pal. New York, IV, 1867, p. 46, pl. 6, fig. 1.

Dalmanella lepida Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224.

Loc. Ontario County, New York.

- Dalmanella macleodi** (Whitfield). Calciferous (Ord.).
Orthis macleodi Whitfield, Bull. American Mus. Nat. Hist., II, 1889, p. 43, pl. 7, figs. 1-4.
Dalmanella macleodi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.
Loc. Beekmantown, New York.
- Dalmanella melita** (Hall and Whitfield). Upper Cambrian.
Leptæna melita Hall and Whitfield, King's U. S. Geol. Survey, 40th Parl., IV, 1877, p. 208, pl. 1, figs. 13, 14.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 22.
Loc. Eureka district, Nevada.
Obs. This species is related to *D. evadne* (Billings).
- Dalmanella(?) nettoana** (Rathbun). Middle Devonian.
Orthis nettoana Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 247, pl. 10, figs. 7, 10, 13;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 22.
Loc. Province of Para, Brazil.
- Dalmanella parva** (de Verneuil). Anticosti (Sil.).
Orthis parva (Pander) de Verneuil, Geology of Russia and the Ural Mountains, 1845, p. 188, pl. 13, fig. 3.—Billings, Cat. Sil. Foss. Anticosti, 1866, p. 41.
Loc. Europe; Anticosti.
- Dalmanella perelegans** Hall. Lower Helderberg (Dev.).
Orthis perelegans Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 44, fig. 1;—Pal. New York, III, 1859, p. 171, pl. 13, figs. 4-12;—Second Ann. Rep. New York State Geol., 1883, pl. 35, figs. 32, 33.
Dalmanella perelegans Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224, pl. 5C, figs. 34, 35.
Loc. Albany and Schoharie counties, New York; Decatur County, Tennessee.
- Dalmanella planiconvexa** Hall. Lower Helderberg and Oriskany (Dev.).
Orthis planoconvexa Hall, Pal. New York, III, 1859, p. 168, pl. 12, figs. 1-6.
Dalmanella planoconvexa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224.
Loc. Albany County, New York; Cumberland, Maryland.
- Dalmanella(?) plicifera** (Hall). Chazy (Ord.).
Leptæna plicifera Hall, Pal. New York, I, 1847, p. 19, pl. 4 bis, fig. 1.
Strophomena plicifera Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 70.
Loc. Chazy, New York.
- Dalmanella pogonipensis** (Hall and Whitfield). Pogonip (Ord.).
Orthis pogonipensis Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 232, pl. 1, figs. 9, 10.
Strophomena nemea H. and W., Ibidem, 1877, p. 233, pl. 1, fig. 15.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 71.
Loc. White Pine and Eureka districts, Nevada.
Obs. These are shells of the *D. perveta* group. *S. nemea* is based on a dorsal valve of *O. pogonipensis*.
- Dalmanella quadrans** Hall. Lower Helderberg (Dev.).
Orthis quadrans Hall, Pal. New York, III; Corrigenda in vol. with plates, 1861, pl. 12, figs. 9-12.
Dalmanella quadrans Hall and Clarke, Ibidem, VIII, Pt. I, 1892, p. 224.
Loc. Catskill and Schoharie, New York.

- Dalmanella stonensis** (Safford). Trenton (Ord.).
Orthis stonensis Safford, Geol. Tennessee, 1869, p. 286.
Dalmanella stonensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224, pl. 5C, figs. 4, 5.
Loc. Near Nashville, Tennessee.
- Dalmanella subæquata** (Conrad). Trenton (Ord.).
Orthis subæquata Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 333.—Hall, Pal. New York, I, 1847, p. 118, pl. 32, fig. 2;—Geol. Wisconsin, I, 1862, p. 42, figs. 1-3, and p. 436;—Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 19-24.
Orthis minneapolis N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 63.
Orthis perveta Hall, Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 17, 18 (?16).
Dalmanella subæquata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 207, 224, pl. 5C, figs. 6-11.
Dalmanella perveta Hall and Clarke, Ibidem, 1892, p. 224, pl. 5C, figs. 13, 14.
Orthis (D.) *subæquata* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 446, pl. 33, figs. 30-36.
Loc. Mineral Point, Wisconsin; Minneapolis, St. Paul, Cannon Falls, Fountain, etc., Minnesota; Decorah and McGregor, Iowa; Auburn, Lincoln County, Missouri; Montreal, Canada.
- Dalmanella subæquata circularis** N. H. Winchell. Trenton (Ord.).
Orthis circularis N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 66.
Orthis (D.) *subæquata* var. *circularis* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 452, pl. 33, figs. 46, 47.
Loc. Minneapolis, Cannon Falls, etc., Minnesota; Highbridge, Kentucky; Lebanon, Tennessee.
- Dalmanella subæquata conradi** N. H. Winchell. Trenton (Ord.).
Orthis conradi N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 68.
Orthis (D.) *subæquata* var. *conradi* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 449, pl. 33, figs. 37-39.
Loc. Minneapolis, Minnesota; Decorah, Iowa; Janesville and Beloit, Wisconsin; Montreal, Canada; ?Eureka district, Nevada.
- Dalmanella subæquata gibbosa** (Billings). Chazy-Trenton (Ord.).
Orthis gibbosa Billings, Geol. Survey Canada; Rep. Progress for 1856, 1857, p. 296;—Canadian Nat. Geol., IV, 1859, p. 434.
Dalmanella gibbosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.
Orthis (D.) *subæquata* var. *gibbosa* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 451, pl. 33, figs. 43-45.
Loc. Near Ottawa and Bellville, Canada; Minneapolis, Cannon Falls, etc., Minnesota; Decorah, Iowa; Mineral Point, Wisconsin; in the Chazy, Island of Montreal, and Pallideau Islands, Lake Huron.
- Dalmanella subæquata pervetus** (Conrad). Trenton (Ord.).
Orthis perveta Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 333.—Hall, Pal. New York, I, 1847, p. 120, pl. 32, fig. 5.—Billings, Canadian Nat. Geol., IV, 1859, p. 434, fig. 10.—Hall, Geol. Wisconsin, I, 1862, p. 42, fig. 7.—Billings, Geol. Canada, 1863, p. 130, fig. 57.
Orthis media N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 64.

Dalmanella subæquata pervetus (Conrad)—Continued.

Orthis kassuba N. H. Winchell, *Ibidem*, 1880, p. 65.

?*Orthis* perveta Walcott, *Mon. U. S. Geol. Survey*, VIII, 1884, p. 72, pl. 11, fig. 3.
Dalmanella perveta Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pl. 5C, fig. 12.

Orthis (D.) subæquata var. perveta Winchell and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 450, pl. 33, figs. 40-42.

Loc. Mineral Point, Beloit, etc., Wisconsin; Minneapolis, St. Paul, Cannon Falls, etc., Minnesota; Decorah, Iowa; Dixon, Illinois; Tennessee.

Dalmanella subcarinata Hall.

Lower Helderberg (Dev.).

Orthis subcarinata Hall, *Tenth Rep. New York State Geol. Nat. Hist.*, 1857, p. 43, figs. 1, 2;—*Pal. New York*, III, 1859, p. 169, pl. 12, figs. 7, 8, 13-21 (not figs. 9-12 = *D. quadrans*).—Meek and Worthen, *Geol. Survey Illinois*, III, 1868, p. 373, pl. 7, fig. 6.—Whitfield, *Geol. Wisconsin*, IV, 1882, p. 320, pl. 25, figs. 3, 4.—Hall, *Second Ann. Rep. New York State Geol.*, 1883, pl. 35, figs. 23-31.

?*Orthis* subcarinata Tschernyschew, *Fauna Unteru Devon des Urals*, *Mém. Com. Géol.*, Russia, IV, 1885, p. 57, pl. 7, fig. 97.

Dalmanella subcarinata Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 207, 224, pl. 5C, figs. 25-33.

Loc. Catskill, Schoharie, etc., New York; Perry and Pike counties, Missouri; Decatur County, Tennessee; Waubakee, Wisconsin; Arisaig, Nova Scotia (Ami); Russia.

Dalmanella superstes Hall and Clarke.

Chemung (Dev.).

Dalmanella superstes Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 207, 224, 342, pl. 5C, figs. 44-47.

Loc. Near Howard, Steuben County, New York.

Dalmanella tenuilineata (Hall).

Chemung (Dev.).

Atrypa? tenuilineata Hall, *Geol. New York*; *Rep. Fourth Dist.*, 1843, p. 271, fig. 4.

Orthis leonensis Hall, *Pal. New York*, IV, 1867, p. 62, pl. 8, figs. 3-8.

Dalmanella leonensis Hall and Clarke, *Ibidem*, VIII, Pt. I, 1892, p. 224, pl. 5C, figs. 42, 43.

Loc. Leon, Conewango, etc., New York.

Dalmanella tersa (Sardeson).

Lorraine (Ord.).

Orthis tersus Sardeson, *Bull. Minnesota Acad. Nat. Sci.*, III, 1892, p. 331, pl. 5, figs. 11-13;—*American Geol.*, XIX, 1897, p. 100, pl. 5, figs. 8-13.

Loc. Wilmington, Illinois; Nye, Wisconsin.

Dalmanella testudinaria (Dalman).

Chazy-Lorraine (Ord.).

Orthis testudinaria Dalman, *Kongl. Svenska Vet.-Akad. Handl.*, för 1827, 1828, p. 115, pl. 2, fig. 4.—Conrad, *Ann. Rep. Geol. Survey New York*, 1839, p. 63.—Hall, *Pal. New York*, I, 1847, p. 117, pl. 32, fig. 1; p. 288, pl. 79, fig. 4.—Billings, *Canadian Nat. Geol.*, I, 1856, p. 40, fig. 1.—Rogers, *Geol. Pennsylvania*, II, Pt. II, 1858, p. 818, fig. 601.—Billings, *Geol. Canada*, 1863, p. 165, fig. 144.—Miller, *Cincinnati Quart. Jour. Sci.*, II, 1875, p. 20.—Whitfield, *Geol. Wisconsin*, IV, 1882, p. 258, pl. 12, figs. 5-7.—Hall, *Second Ann. Rep. New York State Geol.*, 1883, pl. 34, figs. 1-4, 6-13.—Walcott, *Mon. U. S. Geol. Survey*, VIII, 1884, p. 72, pl. 11, fig. 10.—Sardeson, *American Geol.*, XIX, 1897, p. 92.

Orthis striatula Emmons, *Geol. New York*; *Rep. Second Dist.*, 1842, p. 394, fig. 3.

Orthis testudinaria? Emmons, *Ibidem*, 1842, p. 404, fig. 4.—White, *Wheeler's Expl. Survey west 100 Merid.*, IV, 1875, p. 72.

Orthis disparilis Owen (non Conrad), *Geol. Survey Wisconsin, Iowa, Minnesota*, 1852, pl. 2B, fig. 23 (see specimens *U. S. Nat. Mus.*, *Cat. Invert. Foss.*, 17887).

Dalmanella testudinaria (Dalman)—Continued.

Dalmanella testudinaria Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 190, 206, 218, 224, pl. 5B, figs. 27-39.

Orthis rogata Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 331, pl. 5, figs. 1-4;—American Geol., XIX, 1897, p. 95, pl. 4, figs. 1-10.

Orthis (Dalmanella) testudinaria Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 441, pl. 33, figs. 17-22.—Whiteaves, Pal. Foss., III, Pt. III, 1897, pp. 177, 241.

Loc. Europe; throughout the extent of the formations in America.

Dalmanella testudinaria emacerata Hall. Utica (Ord.).

Orthis emacerata Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 121;—Fifteenth Rep. Ibidem, 1862, pl. 2, figs. 1-3.—Billings, Canadian Nat. Geol., VII, 1862, p. 393.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 24.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 14, 15.—Keyes, Geol. Survey Missouri, V, 1895, p. 58.—Sardeson, American Geol., XIX, 1897, p. 102, pl. 5, figs. 14, 18, 28.

Orthis cyclus James, Cincinnati Quart. Jour. Sci., I, 1874, p. 19.

Dalmanella emacerata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224, pl. 5C, figs. 1, 2.

Orthis macrior Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 330, pl. 5, figs. 5-7.

Orthis (D.) testudinaria var. *emacerata* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 445, pl. 33, figs. 23, 24.

Loc. Cincinnati, Ohio; Spring Valley and Granger, Minnesota; Cape Girardeau, Missouri; St. Croix, Quebec, Canada.

Dalmanella testudinaria futilis (Sardeson). Trenton (Ord.).

Orthis futilis Sardeson, American Geol., XIX, 1897, p. 104, pl. 5, figs. 25-27.

Loc. Near Granger and Wykoff, Minnesota.

Dalmanella testudinaria ignota (Sardeson). Lorraine (Ord.).

Orthis ignota Sardeson, American Geol., XIX, 1897, p. 99, pl. 5, figs. 1-7.

Loc. Near Spring Valley, Minnesota.

Dalmanella testudinaria meeki (Miller). Lorraine (Ord.).

Orthis emacerata Meek (non Hall), Pal. Ohio, I, 1873, p. 109, pl. 8, figs. 1, 2

Orthis meeki Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 20.—Sardeson, American Geol., XIX, 1897, p. 98, pl. 4, figs. 24-29.

Orthis jugosa James, The Paleontologist, 4, 1879, p. 31.

Dalmanella meeki Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 206, 224, pl. 5C, fig. 3.

Orthis corpulenta Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 330, pl. 5, figs. 8-10;—American Geol., XIX, 1897, p. 101, pl. 4, figs. 11-19.

Orthis (D.) testudinaria var. *meeki* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 445, pl. 33, figs. 25-29.

Loc. Oxford, etc., Ohio; Spring Valley, Minnesota.

Dalmanella testudinaria multisecta (Meek). Utica (Ord.).

Orthis emacerata var. *multisecta* (James MS.) Meek, Pal. Ohio, I, 1873, p. 112, pl. 8, fig. 3.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 22.

Orthis multisecta Sardeson, American Geol., XIX, 1897, p. 97, pl. 4, figs. 20-23.

Dalmanella multisecta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224.

Loc. Cincinnati, Ohio.

Dalmanella testudinaria porrecta (Sardeson). Trenton (Ord.).

Orthis porrecta Sardeson, American Geol., XIX, 1897, p. 104, pl. 5, figs. 19-24.

Loc. Near Granger, Minnesota.

DELTHYRIS Dalman.Genotype *Delthyris elevata* Dalman.

- Delthyris* Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, pp. 93, 99.—
Dall, American Jour. Conch., VI, 1870, p. 116.—Hall and Clarke, Pal. New
York, VIII, Pt. II, 1893, pp. 9 and 16 under caption *Septati* (non p. 19).
Spirifera "*lamellosa*" Hall, Ninth Ann. Rep. New York State Geol., 1890, p. 11.
Obs. Specimens of *D. elevata* examined by the writer show a distinct median
septum in the ventral valve.

Delthyris acanthoptera Conrad=*Spirifer acanthopterus*.*Delthyris acanthota* Hall=*Spirifer disjunctus*.*Delthyris acuminata* Conrad=*Spirifer acuminatus*.*Delthyris acuminata* Hall (non Conrad)=*D. mesicostalis*.*Delthyris acutilirata* Conrad=*Platystrophia acutilirata*.*Delthyris arenaria* Vanuxem=*Spirifer arenosus*.*Delthyris arenosa* Conrad=*Spirifer arenosus*.*Delthyris audacula* Conrad=*Spirifer audaculus*.*Delthyris bialveata* Conrad=*Spirifer radiatus*.*Delthyris biloba* Conrad=*Bilobites varicus*.*Delthyris brachynota* Hall=*Platystrophia biforata*.*Delthyris chemungensis* Conrad=*Spirifer disjunctus*.*Delthyris congesta* Hall=*Spirifer granulosis*.***Delthyris consobrina*** (d'Orbigny).

Hamilton (Dev.).

Delthyris ziezac Hall (non Roemer), Geol. New York; Rep. Fourth Dist., 1843,
p. 200, fig. 5.

Spirifera consobrina d'Orbigny, Prodrôme Pal., I, 1850, p. 98.—Miller, N. American
Geol. Pal., 1889, p. 372.

Spirifer elio Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 94.

Spirifera ziezac Hall, Pal. New York, IV, 1867, p. 222, pl. 35, figs. 15-23;—Second
Ann. Rep. New York State Geol., 1883, pl. 59, fig. 9; pl. 60, fig. 18.—Whit-
field, Annals New York Acad. Sci., V, 1891, p. 554, pl. 11, fig. 13;—Geol.
Ohio, VII, 1895, p. 448, pl. 7, fig. 13.

Spiriferina? *ziezac* Whitfield, Geol. Wisconsin, IV, 1882, p. 332, pl. 25, figs. 23, 24.

Spirifer consobrinus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 34,
figs. 9, 18; pl. 37, figs. 9, 10.

Loc. Moscow, York, Darien, etc., New York; Columbus, Ohio; Milwaukee, Wis-
consin; Louisville, Kentucky.

Delthyris cuspidata Hall=*Spirifer disjunctus*.*Delthyris decemplicatus* Hall=*D. sulcata*.*Delthyris disjuncta* Hall=*Spirifer disjunctus*.*Delthyris duodenaria* Hall=*Spirifer duodenarius*.*Delthyris duplicata* Conrad=*Spirifer duplicatus*.*Delthyris euruteines* Owen=*Spirifer euruteines*.*Delthyris expansa* Owen=*Pterotheca expansa*, a Pteropod.*Delthyris fimbriata* Conrad=*Reticularia fimbriata*.*Delthyris granulifera* Hall=*Spirifer granulosis*.*Delthyris granulosa* Conrad=*Spirifer granulosis*.*Delthyris inermis* Hall=*Spirifer disjunctus*.*Delthyris lævis* Hall=*Reticularia lævis*.*Delthyris lynx* Hall=*Platystrophia lynx* and *biforata*.*Delthyris macronota* Hall=*Spirifer macronotus*.

Delthyris macropleura Conrad = *Spirifer macropleura*.

Delthyris medialis Hall = *Spirifer audaculus*.

***Delthyris mesicostalis* Hall.**

Ithaca and Chemung (Dev.).

Delthyris mesacostalis Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 269, fig. 9.

Delthyris acuminata Hall (non Conrad), Ibidem, 1843, p. 270, fig. 5.

Spirifera mesacostalis Hall, Pal. New York, IV, 1867, p. 240, pl. 40, figs. 1-3.

Spirifera mesacostalis? Hall, Second Ann. Rep. New York State Geol., 1883, pl. 59, figs. 32-34.

Spirifera mesacostalis var. *acuminata* Hall, Ibidem, 1883, figs. 27-31.

Spirifer mesacostalis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 34, figs. 32-34.—Kindle, Bull. American Pal., 6, 1896, p. 35.

Loc. Ithaca, Philipsburg, Olean, etc., New York.

Delthyris mesastrialis Hall = *Spirifer mesistrialis*.

Delthyris mucronata Conrad = *Spirifer pennatus*.

Delthyris niagarensis Conrad = *Spirifer niagaraensis*.

***Delthyris perlamellosa* (Hall).**

Lower Helderberg (Dev.).

Spirifer perlamellosa Hall, Tenth Rep. New York State Geol. Nat. Hist., 1857, p. 57, figs. 1-5 on p. 58;—Pal. New York, III, 1859, p. 201, pl. 26, figs. 1, 2.—Billings, Geol. Canada, 1863, p. 957, fig. 455.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 35, figs. 7-13.

Delthyris macropleura Rogers (non Conrad), Geol. Pennsylvania, II, Pt. II, 1858, p. 825, fig. 643.

Spirifera perlamellosa Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 384, pl. 7, fig. 9.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 60, figs. 5-13.

Spirifera perlamellosa? Keyes, Geol. Survey Missouri, V, 1895, p. 77.

Loc. Schoharie, Carlisle, etc., New York; Cumberland, Maryland; Pennsylvania; Square Lake, Maine; Perry County, Missouri; Decatur County, Tennessee.

Delthyris perlatus Conrad = *Spirifer disjunctus*.

Delthyris prolata Vanuxem = *Spirifer disjunctus*.

Delthyris prora Conrad = *Spirifer acuminatus*.

Delthyris radiatus Hall = *Spirifer radiatus*.

***Delthyris raricosta* Conrad.**

Upper Helderberg (Dev.).

Delthyris raricosta Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 262, pl. 14, fig. 18.

Delthyris undulatus Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 132, fig. 3.

Spirifer raricosta Billings, Canadian Jour., VI, 1861, p. 258, figs. 71-73 on p. 259;—Geol. Canada, 1863, p. 372, fig. 392.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 135, pl. 4, fig. 2; pl. 14, fig. 12.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 35, figs. 5, 6, 14-17.

?*Spirifer hesione* Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 117, pl. 3, fig. 17.

Spirifera raricosta Hall, Pal. New York, IV, 1867, p. 192, pl. 27, figs. 30-34; pl. 30, figs. 1-9.—Nicholson, Pal. Prov. Ontario, 1873, p. 82.—Billings, Pal. Fossils, II, 1874, p. 47, pl. 3A, fig. 5.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 60, figs. 14-17.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 128, pl. 17, figs. 38-42.

Loc. Schoharie, Caledonia, etc., New York; Columbus, Ohio; Falls of Ohio; Eureka district, Nevada; Port Colborne, Ontario; Square Lake, Maine; Grand Greve, Gaspé.

Delthyris rugatina Conrad=*D. sulcata*.

Delthyris*(?) *rugicosta (Hall).

Arisaig (Sil.).

Spirifera rugicosta Hall, Canadian Nat. Geol., V, 1860, p. 145.—Dawson, Acadian Geol., 3d ed., 1878, p. 596.

Loc. Arisaig, Nova Scotia.

Delthyris sculptilis Hall.

Hamilton (Dev.).

Delthyris sculptilis Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 202.

Spirifera sculptilis? Billings, Canadian Jour., VI, 1861, p. 262, fig. 79.

Spirifera sculptilis Billings, Geol. Canada, 1863, p. 386, fig. 423.—Hall, Pal. New York, IV, 1867, p. 221, pl. 35, figs. 10–14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 132, pl. 31, fig. 13.

Spirifer sculptilis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 37, fig. 8.

Loc. Ludlowville, York, etc., New York; Monroe County, Pennsylvania; Bosanquet, Ontario; Falls of Ohio.

Delthyris sinuatus Hall=*Bilobites bilobus*.

Delthyris staminea Hall=*Spirifer crispus*.

Delthyris sulcata Hisinger.

Niagara (Sil.).

Delthyris sulcata Hisinger, Petref. Suecica, 1837, p. 73, pl. 21, fig. 8.

Delthyris rugatina Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 261.

Delthyris decemplicatus Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 105, fig. 4.

Spirifer sulcatus Hall, American Jour. Sci., XX, 1849, p. 228;—Pal. New York, II, 1852, p. 261, pl. 54, fig. 2.—Billings, Canadian Nat. Geol., I, 1856, p. 137, pl. 2, fig. 7.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 60, figs. 1–4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 35, figs. 1–4.

Loc. Europe; Lockport, Rochester, etc., New York; Hamilton, Ontario.

Obs. Davidson regards this species as synonymous with *D. elevata* Dalman, 1828.

Delthyris undulatus Vanuxem=*D. raricosta*.

Delthyris varica Conrad=*Bilobites varicus*.

Delthyris ziczac Hall=*D. consobrina*.

DERBYA Waagen.

Genotype *Derbya regularis* Waagen.

Derbya Waagen, Palæontologica Indica, Ser. XIII, I, 1884, pp. 576, 591.

Derbya Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 261;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 286.

Derbya affinis Hall and Clarke.

Upper Carboniferous.

Derbya affinis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 349, pl. 11B, figs. 4, 5.

Loc. Near Kansas City, Missouri.

Derbya bennetti Hall and Clarke.

Upper Carboniferous.

Derbya bennetti Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 263, 348, pl. 11A, figs. 34–39.

Loc. Near Kansas City, Missouri.

Derbya biloba Hall.

Upper Carboniferous.

Streptorhynchus biloba Hall, Second Ann. Rep. New York State Geol., 1883, pl. 41, figs. 4, 5.

Derbya biloba Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 350, pl. 11, figs. 4, 5.

Loc. Winterset, Iowa.

- Derbya broadheadi** Hall and Clarke. Upper Carboniferous.
Derbya broadheadi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 263, 347, pl. 11A, figs. 23, 24.
Loc. Near Kansas City, Missouri.
- Derbya correanus** (Derby). Upper Carboniferous.
Streptorhynchus correanus Derby, Bull. Cornell Univ., I, 1874, p. 32, pl. 6, fig. 11; pl. 7, figs. 1-4, 8, 10, 11-14, 17.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 41, figs. 18-22.
Derbya correanus Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 592.
Derbya correana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 262, pl. 11, figs. 18-22; pl. 20, figs. 10, 11.
Loc. Itaituba, Brazil.
- Derbya(?) costatula** Hall and Clarke. Kaskaskia (L. Carb.).
Derbya? *costatula* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 11B, figs. 16, 17.
Loc. Crittenden County, Kentucky.
- Derbya crassa** (Meek and Hayden). Upper Carboniferous.
Orthis arachnoides Roemer (non Phillips), Kreidebildung Texas, 1852, p. 89, pl. 11, fig. 9.—Hall, Mexican Bound. Survey, 1857, pl. 20, fig. 3.
Orthisina crassa Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1858, p. 261.
Orthis lasallensis McChesney, Descriptions New Pal. Fossils, 1860, p. 32;—*Ibidem*, 1865, pl. 1, fig. 6.
Orthis richmonda McChesney, Descriptions New Pal. Foss., 1860, p. 32;—*Ibidem*, 1865, pl. 1, fig. 5.
Hemipronites crassus Meek and Hayden, Pal. Upper Missouri. Smithsonian Cont. Knowl., XIV, 172, 1864, p. 26, pl. 1, fig. 7.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 174, pl. 5, fig. 10; pl. 8, fig. 1.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 570, pl. 25, fig. 12.—Herrick, Bull. Denison Univ., II, 1887, p. 50, pl. 2, fig. 19.
Orthis crenistria Geinitz (non Phillips), Carbon u. Dyas in Nebraska, 1866, p. 46, pl. 3, figs. 20, 21.
Hemipronites lasallensis McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 28, pl. 1, fig. 6.
Hemipronites richmonda McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 28, pl. 1, fig. 5.
Hemipronites crenistria White, Wheeler's Expl. Survey west 100 Merid., IV, 1875, p. 124, pl. 10, fig. 9.
Streptorhynchus richmondi Hall, Second Ann. Rep. New York State Geol., 1883, pl. 40, figs. 10, 11.
Hemipronites crassa White, Thirteenth Rep. State Geol. Indiana, 1884, p. 129, pl. 26, figs. 4-11.
Derbyia crassa Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 592.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 262, pl. 10, figs. 10, 11; pl. 11A, figs. 28-33; pl. 11B, figs. 23, 24; pl. 20, figs. 12, 13.—Smith, Proc. American Phil. Soc., XXXV, 1897, p. 28 (extract).
Streptorhynchus crenistria Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 229;—Geol. Survey Missouri, V, 1895, p. 67, pl. 38, fig. 8.
Streptorhynchus crassum Miller, N. American Geol. Pal., 1889, p. 378.
?Streptorhynchus crassum Whitfield, Annals New York Acad. Sci., V, 1894, p. 580, pl. 13, figs. 11, 12;—Geol. Ohio, VII, 1893, p. 468, pl. 9, figs. 11, 12.
Loc. Leavenworth, Kansas; Nebraska City, Nebraska; Illinois; Missouri; Iowa; Ohio; Arkansas; Utah; Nevada; northern New Mexico; San Saba Valley, Texas.

- Derbya cymbula** Hall and Clarke. Upper Carboniferous.
Derbya cymbula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 348, pl. 11B, figs. 2, 3.
Loc. Near Kansas City, Missouri.
- Derbya kaskaskiaensis** (McChesney). Kaskaskia (L. Carb.).
Orthis kaskaskiensis McChesney, Descriptions New Pal. Foss., 1860, p. 31.
Derbya kaskaskiensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 11B, fig. 6.
Loc. Kaskaskia, Chester, and Crittenden, Illinois.
- Derbya keokuk** Hall. Knobstone-Keokuk (L. Carb.).
Orthis crenistria Yandell and Shumard, Cont. Geol. Kentucky, 1847, pp. 19, 21.
Orthis keokuk Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 640, pl. 19, fig. 5.—Keyes, Geol. Survey Missouri, V, 1895, p. 63.
Streptorhynchus keokuk Hall, Second Ann. Rep. New York State Geol., 1883, pl. 41, figs. 1-3.
Streptorhynchus crenistria Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 279, pl. 18, fig. 14.
Derbya keokuk Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 262, pl. 11, figs. 1-3.
Loc. Keokuk, Iowa; Warsaw and Nauvoo, Illinois; New Providence, Indiana; Clark County, Missouri; Nevada.
- Derbya pratteni** (McChesney). Upper Carboniferous.
Orthis pratteni McChesney, Descriptions New Pal. Foss., 1860, p. 33.
Loc. Charbonier, Missouri.
- Derbya robusta** (Hall). Upper Carboniferous.
Orthis umbraculum? Owen (non Schloth.), Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 5, fig. 11 (see specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17915).
Orthis robusta Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 743, pl. 28, fig. 5.
Streptorhynchus robusta Hall, Second Ann. Rep. New York State Geol., 1883, pl. 40, figs. 12-17.
Derbya robusta Waagen, Paleontologica Indica, Ser. XIII, I, 1884, p. 592.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 262, pl. 10, figs. 12-17; pl. 11B, figs. 7, 8.
Loc. St. Clair County, Illinois.
- Derbya ruginosa** Hall and Clarke. Keokuk (L. Carb.).
Derbya ruginosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 346, pl. 11A, figs. 25-27.
Loc. New Providence, Indiana.
- Dicellomus** Hall=Obolella.
Dicellomus crassa Hall=Obolella crassa.
Dicellomus polita Hall=Obolella polita.
Dicelosia King=Bilobites.
Dicraniseus Meek=Triplecia.
Dicraniseus ortonii Meek=Triplecia ortonii.
- DICTYONELLA** Hall. Genotype *Rhynchonella?* reticulata Hall
Dictyonella Hall, Twentieth Rep. New York State Geol. Nat. Hist., 1867, p. 274.
Eichwaldia Hall, Ibidem, 1867, pp. 274-277, with figs.—Dall, American Jour. Conch., VI, 1870, p. 98.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 307;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 903.

- Dictyonella anticostiensis** (Billings). Anticosti (Sil.).
Eichwaldia anticostiensis Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 10.
Loc. Anticosti.
- Dictyonella concinna** Hall. ?Niagara (Sil.).
Eichwaldia concinna Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867,
p. 278.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 83, fig. 5.
Loc. Perry and Decatur counties, Tennessee.
- Dictyonella corallifera** Hall. Niagara (Sil.).
Atrypa corallifera Hall, Pal. New York, II, 1852, p. 281, pl. 58, fig. 5.
Eichwaldia corallifera Hall, Twentieth Rep. New York State Cab. Nat. Hist.,
1867, p. 278.
Loc. Lockport and Rochester, New York.
- Dictyonella gibbosa** Hall. Niagara (Sil.).
Eichwaldia gibbosa Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867,
p. 278.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 83, figs. 6, 7.
Loc. Perry and Decatur counties, Tennessee.
- Dictyonella reticulata** Hall. Niagara (Sil.).
Rhychonella? reticulata Hall, Trans. Albany Institute, IV, 1863, p. 217.
Eichwaldia reticulata Hall, Twentieth Rep. New York State Cab. Nat. Hist.,
1867, pp. 275-277, figs. 1-7;—Twenty-eighth Rep. Ibidem, 1879, p. 169, pl. 26,
figs. 50-54;—Eleventh Rep. State Geol. Indiana, 1882, p. 312, pl. 26, figs.
50-54.—Foerste, Bull. Denison Univ., I, 1885, p. 91, pl. 13, fig. 4.—Beecher
and Clarke, Mem. New York State Mus., I, 1889, p. 31, pl. 3, figs. 11-13.—Hall
and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 308, figs. 229-235; pl. 83, figs.
8-13.—Foerste, Geol. Ohio, VII, 1895, p. 594, pl. 25, fig. 4.
Loc. Waldron, Indiana; Dayton, Ohio; Wisconsin.
- DIELASMA** King. Genotype *Terebratulites elongatus* Schlotheim.
Epithyris King (non Phillips), Mon. Permian Foss., Pal. Soc., 1850, p. 46.—Dall,
American Jour. Conch., VI, 1870, p. 103.
Dielasma King, Proc. Dublin Univ. Zool. Bot. Assoc., I, 1859, p. 260.—Beecher
and Schuchert, Biol. Soc. Washington, VIII, 1893, pp. 71-82.—Hall and
Clarke, Pal. New York, VIII, Pt. II, 1893, p. 293;—Thirteenth Ann. Rep. New
York State Geologist, 1895, p. 863.
- Dielasma bovidens** (Morton). Upper Carboniferous.
Terebratula bovidens Morton, American Jour. Sci., XXIX, 1836, p. 150, pl. 2, fig.
4.—Meek, Final Rep. U. S. Geol. Survey, Nebraska, 1872, p. 187, pl. 1, fig. 7;
pl. 2, fig. 4.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 572, pl. 25,
fig. 15.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 137, pl. 32, figs.
17-19.—Keyes, Geol. Survey Missouri, V, 1895, p. 105.
Terebratula bovidens? Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 711.—McChes-
ney, Trans. Chicago Acad. Sci., I, 1869, p. 37, pl. 1, fig. 2.
Terebratula millipunctata Hall, Expl. Surveys R. R. Route Miss. River, Pacific
Ocean, III, 1856, p. 101, pl. 2, figs. 1, 2;—Trans. Albany Institute, IV, 1858,
p. 35.—Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 26.—
White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 119.
Terebratula clongata Shumard (non Schlotheim), Trans. St. Louis Acad. Sci., I,
1859, p. 392.
Terebratula geniculosa McChesney, Descriptions New Pal. Foss., 1861, p. 82;—
Ibidem, 1865, pl. 1, fig. 2.
Dielasma? *bovidens* White, Wheeler's Expl. Survey west 100 Merid., Prel. Rep.,
1874, p. 21.

Dielasma bovidens (Morton)—Continued.

Terebratula (Dielasma) bovidens White, *Ibidem*, Final Rep., IV, 1875, p. 141, pl. 11, fig. 10.

Terebratula hastata Walcott (non Sowerby), *Mon. U. S. Geol. Survey*, VIII, 1884, p. 224.—Smith, *Proc. American Phil. Soc.*, XXXV, 1897, p. 30.

Dielasma bovidens Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, pp. 295, 296, fig. 213; pl. 81, figs. 29-35.

Loc. Putnam Hill, Ohio; Indiana; Illinois; Missouri; Iowa; Nebraska; Arkansas; New Mexico; Eureka district, Nevada; Guadalupe Mountains, Texas.

Dielasma burlingtonense White. Kinderhook (L. Carb.).

Terebratula burlingtonensa White, *Jour. Boston Soc. Nat. Hist.*, VII, 1860, p. 228.

Terebratula (Dielasma) burlingtonensis White, *Wheeler's Expl. Survey west 100 Merid.*, IV, 1875, p. 93.

Dielasma burlingtonensis Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 296, pl. 81, figs. 9-11.

Loc. Burlington, Iowa; Mountain Spring, Nevada.

Dielasma calvini (Hall and Whitfield). Chemung (Dev.).

Cryptonella eudora Hall and Whitfield (non Hall, 1867), *Twenty-third Rep. New York State Cab. Nat. Hist.*, 1873, p. 225.

Cryptonella calvini Hall and Whitfield, *Ibidem*, 1873, p. 239.

?*Cryptonella calvini* Whiteaves, *Cont. Canadian Pal.*, I, 1891, p. 235.

Dielasma calvini Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 296, pl. 80, figs. 20-22.

Loc. Hackberry Grove, Iowa; Mackenzie and Peace rivers, Canada.

Dielasma formosum Hall. Warsaw (L. Carb.).

Terebratula formosa Hall, *Trans. Albany Institute*, IV, 1858, p. 7.—Whitfield, *Bull. American Mus. Nat. Hist.*, I, 1882, p. 55, pl. 6, figs. 59-64.—White, *Eleventh Rep. State Geol. Indiana*, 1882, p. 361, pl. 39, figs. 6-8.—Hall, *Twelfth Rep. Ibidem*, 1883, p. 337, pl. 29, figs. 59-64.

Dielasma formosa Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 296, pl. 81, figs. 12-26.

Loc. Bloomington and Spergen Hill, Indiana; Alton and Warsaw, Illinois; Caldwell County, Kentucky.

Dielasma gorbyi (Miller). Keokuk (L. Carb.).

Terebratula gorbyi Miller, *Seventeenth Rep. State Geol. Indiana*, 1891, p. 77, pl. 13, figs. 3, 4.

Loc. Edwardsville and Crawfordsville, Indiana.

Dielasma hochstetteri (Toula). Upper Carboniferous.

Terebratula hochstetteri Toula, *Sitzb. der k. k. Akad. der Wissensch. zu Wien*, LIX, 1869, p. 1, pl. 1, fig. 1.—Derby, *Bull. Cornell Univ.*, I, 1874, p. 63.

Loc. Near Cochabamba, Bolivia.

Obs. Probably synonymous with *D. bovidens* (Morton).

Dielasma itaitubaense (Derby). Upper Carboniferous.

Terebratula itaitubensis Derby, *Bull. Cornell Univ.*, I, 1874, p. 1, pl. 2, figs. 1, 3, 8, 16; pl. 3, fig. 24; pl. 6, fig. 15.

Dielasma itaitubensis Waagen, *Palaeontologica Indica*, Ser. XIII, I, 1882, p. 348.—de Koninck, *Annales du Musée Royal d'Histoire Naturelle de Belgique*, XIV, 1887, p. 26, pl. 5, figs. 1-10, 45, 50.

Loc. Beach at Itaituba, Brazil; Belgium.

- Dielasma obovatum** Hall and Clarke. ?Upper Carboniferous.
Dielasma obovata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 81, figs. 38-40.
Loc. Kentucky.
- Dielasma occidentale** (Miller). Chouteau (L. Carb.).
Terebratula occidentalis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 313, pl. 9, figs. 10-13.
Loc. Sedalia, Missouri.
- Dielasma(?) rowleyi** (Worthen). Burlington (L. Carb.).
Terebratula rowleyi Worthen, Bull. Illinois State Mus. Nat. Hist., 2, 1884, p. 23;—
 Geol. Survey Illinois, VIII, 1890, p. 102, pl. 11, fig. 6.—Keyes, Geol. Survey
 Missouri, V, 1895, p. 105, pl. 40, fig. 15.
Dielasma rowleyi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 296,
 pl. 81, figs. 27, 28.
Loc. Pike County, Missouri.
- Dielasma sacculus** (Martin). Upper Carboniferous.
Conchylolithus anomites sacculus Martin, Petref. Derbesiana, 1809, tab. 46,
 figs. 1, 2.
Terebratula sacculus Dawson, Acadian Geol., 1855, p. 219, fig. 27.—Davidson,
 Quart. Jour. Geol. Soc. London, XIX, 1863, p. 169, pl. 9, figs. 1-3.—Dawson,
 Acadian Geol., 3d ed., 1878, p. 289, fig. 87.
Loc. Europe; Windsor, Nova Scotia.
- Dielasma shumardianum** (Miller). Kaskaskia (L. Carb.).
Terebratula arcuata Swallow (non Roemer, 1840), Trans. St. Louis Acad. Sci., II,
 1863, p. 83.—Meek, Sixth Ann. Rep. U. S. Geol. Survey Terr., 1872, p. 470.
Terebratula shumardana Miller, American Pal. Foss., 2d ed., 1883, p. 299.
Loc. St. Genevieve County, Missouri; Chester, Illinois; near Virginia City,
 Montana.
Obs. Regarded by Meek and White as probably synonyms with *D. bovidens*
 (Morton).
- Dielasma turgidum** (Hall). Warsaw and St. Louis (L. Carb.).
Terebratula turgida Hall, Trans. Albany Institute, IV, 1858, p. 6.—Whitfield,
 Bull. American Mus. Nat. Hist., 1, 1882, p. 54, pl. 6, figs. 53-58.—Hall, Twelfth
 Rep. State Geol. Indiana, 1883, p. 336, pl. 29, figs. 53-58.—Whitfield, Annals
 New York Acad. Sci., V, 1891, p. 586, pl. 13, figs. 21, 22;—Geol. Ohio, VII, 1895,
 p. 473, pl. 9, figs. 21, 22.
Dielasma turgida Beecher and Schuchert, Proc. Biol. Soc. Washington, VIII,
 1893, p. 73, pl. 10, figs. 1-6.—Hall and Clarke, Pal. New York, VIII, Pt. II,
 1893, p. 296, pl. 81, figs. 1-8.
Loc. Bloomington and Spergen Hill, Indiana; Crittenden County, Kentucky;
 Maxville and Newtonville, Ohio; Alton and Warsaw, Illinois; Pella, Iowa;
 Boonville, Missouri.
- DIGNOMIA** Hall. Genotype *Lingula alveata* Hall.
Dignomia Hall, Notes on some New or Imperfectly Known Forms among the
 Brach., 1872, p. 2, pl. 13, fig. 3;—Twenty-third Rep. New York State Cab.
 Nat. Hist., 1873, p. 245, pl. 13, fig. 3.—Hall and Clarke, Pal. New York, VIII,
 Pt. I, 1892, pp. 14, 163;—Eleventh Ann. Rep. New York State Geologist, 1894,
 p. 230.
- Dignomia alveata** Hall. Hamilton (Dev.).
Lingula alveata Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p.
 23;—Pal. New York, IV, 1867, p. 12, pl. 2, figs. 14, 15.

Dignomia alveata Hall—Continued.

Dignomia alveata Hall, Notes on some New or Imperfectly Known Forms among the Brach., 1872, p. 2, pl. 13, fig. 3;—Twenty-third Rep. New York State Cab. Nat. Hist., 1873, pl. 13, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 14, pl. 1, figs. 24, 25.—Clarke, Thirteenth Ann. Rep. New York State Geologist, 1895, p. 187, pl. 4, fig. 1.

Loc. Canandaigua Lake, etc., New York.

DINOBOLUS Hall.Genotype *Obolus couradi* Hall.

Dinobolus Hall, Notes on some New or Imperfectly Known Forms among the Brach., (March) 1871, p. 4;—*Ibidem*, 1872, p. 4;—Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 247.—Hall and Whitfield, Pal. Ohio, II, 1873, p. 130.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 36, 46, 164;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 237. *Obolellina* Billings, Canadian Nat. Geol., VI (December) 1871, p. 222;—*Ibidem*, VI, 1872, p. 326, figs. 1, 2;—American Jour. Sci., 3d ser., III, 1872, p. 270. *Conradia* Hall (non Adams), Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 250.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 159.

Dinobolus canadaensis (Billings).

Black River and Trenton (Ord.).

Obolus canadaensis Billings, Canadian Nat. Geol., III, 1858, p. 441, fig. 20-23 (non fig. 19 = *D. magnificus*);—Geol. Survey Canada; Rep. Prog. for 1857, 1858, p. 189, figs. 20-23 (non fig. 19);—Geol. Canada, 1863, p. 142, figs. 75.

Obolellina canadaensis Billings, Canadian Nat. Geol., VI, 1871, p. 222;—*Ibidem*, 1872, p. 326, fig. 15; fig. 6, p. 329.

Dinobolus canadaensis Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 162, pl. 19, fig. 7.

Loc. Pauquette Rapids, etc., Canada.

Dinobolus conradi Hall.

Niagara (Sil.).

Obolus conradi Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1868, p. 368, pl. 13, figs. 1, 2.

Obolus (*Trimerella*?) *conradi* Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 351, pl. 5, fig. 7.

Trimerella conradi Dall, American Jour. Conch., VII, 1871, p. 83.

Dinobolus conradi Hall, Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 247 (also extracts 1871, 1872).—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 160, pl. 18, figs. 1-5.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 130, pl. 7, figs. 3, 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 38, pl. 4B, figs. 13-24.

Loc. Port Byron, Illinois; Leclaire, Iowa; Racine and Grafton, Wisconsin; Crawford, Ohio; England; Gotland.

Dinobolus magnificus (Billings).

Black River-Trenton (Ord.).

Obolus canadaensis Billings (partim), Geol. Surv. Canada, Rep. Prog. for 1857, 1858, p. 189, fig. 19 (non 20-23);—Canadian Nat. Geol., III, 1858, p. 441, fig. 19 (non figs. 20-23 = *D. canadaensis*).

Obolellina magnificus Billings, *Ibidem*, n. ser., VI, 1872, p. 329, fig. 7.

Dinobolus magnificus Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 164, pl. 19, fig. 8.—Nicholson, Pal. Prov. Ontario, 1875, p. 17, fig. 6.

Loc. Pauquette Rapids, etc., Canada.

Dinobolus(?) parvus Whitfield.

Galena (Ord.).

Dinobolus? *parvus* Whitfield, Geol. Wisconsin, IV, 1882, p. 347, pl. 27, figs. 8-10.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 336, fig. 27.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 166.

Loc. Whitewater, Wisconsin; Wykoff, Minnesota; Lake Winnipeg, Canada.

DINORTHIS Hall and Clarke. Genotype *Orthis pectinella* Emmons.

Dinorthis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 195, 222.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 420.

Plesiomys Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 196.

Dinorthis and *Plesiomys* Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1891, p. 266.

Dinorthis deflecta (Conrad). Trenton (Ord.).

Strophomena deflecta Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 332.—Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 70.

Strophomena recta Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 332.—Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 70.

Leptæna deflecta Hall, Pal. New York, I, 1847, p. 113, pl. 31B, fig. 5.

Leptæna recta Hall, Ibidem, 1847, p. 113, pl. 31B, fig. 6.

Streptorhynchus rectus Miller, American Pal. Foss., 1877, p. 131.

Streptorhynchus deflectum Miller, N. American Geol. and Pal., 1889, p. 378.

Plesiomys deflecta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 197, 222, pl. 5A, figs. 28-34.

Plesiomys recta Hall and Clarke, Ibidem, 1892, pp. 197, 222.

Plesiomys lorienula Hall and Clarke, Ibidem, 1892, pp. 197, 341, pl. 5A, figs. 31-34.

Orthis (*Dinorthis*) *deflecta* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 422, pl. 32, figs. 24-30.

Loc. Mineral Point, Beloit, Janesville, Wisconsin; Dixon, Illinois; Minneapolis, St. Paul, etc., Minnesota; McGregor, Iowa; central Tennessee; Highbridge, Kentucky.

Dinorthis fontinalis (White). Calciferous (Ord.).

Strophomena fontinalis White, Wheeler's Expl. and Survey west 100th Merid., IV, 1875, p. 51, pl. 3, fig. 4;—Prelim. Rep., p. 10, 1874.

Loc. Fish Spring, House Range, Utah.

Obs. Related to *D. deflecta* (Conrad).

Dinorthis iphigenia (Billings). Trenton (Ord.).

Orthis iphigenia Billings, Pal. Fossils, I, 1862, p. 133, pl. 110.

Plesiomys iphigenia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Loc. Ottawa, Canada.

Dinorthis meedsi Winchell and Schuchert. Trenton (Ord.).

Orthis meedsi Winchell and Schuchert, American Geol., IX, April 1, 1892, p. 289.

Orthis minnesotensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, April 9, 1892, p. 332, pl. 5, figs. 14-17.

Orthis (*Dinorthis*) *meedsi* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 427, pl. 32, figs. 39-42.

Loc. Cannon Falls, Kenyon, Preston, etc., Minnesota; Decorah and McGregor, Iowa; Neenah and Oshkosh, Wisconsin.

Dinorthis meedsi germana Winchell and Schuchert. Trenton (Ord.).

Orthis meedsi var. *germana* Winchell and Schuchert, American Geol., IX, 1892, p. 290.

Orthis (*D.*) *meedsi* var. *germana* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 428, pl. 32, figs. 43-45.

Loc. Cannon Falls, Kenyon, and Fountain, Minnesota.

Dinorthis pectinella (Emmons). Trenton (Ord.).

Orthis pectinella Emmons, Geol. New York; Rep. Second Dist., 1842, p. 394, fig. 2.—Hall, Pal. New York, I, 1847, p. 123, pl. 32, fig. 10.—Billings, Canadian

Nat. Geol., I, 1856, p. 205, fig. 5.—Rogers, Geol. Pennsylvania, II, Pt. II,

Dinorthis pectinella (Emmons)—Continued.

1858, p. 818, fig. 602.—Billings, Geol. Canada, 1863, p. 165, fig. 147.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 39, 40.

Orthis pectinella var. *semiovalis* Hall, Pal. New York, I, 1847, p. 124, pl. 32, fig. 11.—Miller, N. American Geol. Pal., 1889, p. 359.

Orthis charlotte N. H. Winchell, Eighth Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 67.

Dinorthis pectinella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 195, 222, 228, pl. 5, figs. 27-33.

Orthis (*Dinorthis*) *pectinella* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 424, pl. 32, figs. 31-34.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 175.

Loc. Middleville, Trenton Falls, etc., New York; Pennsylvania; Mercer County, Kentucky; Ontario, Canada; Decorah, Iowa; St. Paul, Minneapolis, and Cannon Falls, Minnesota; Lake Winnipeg, Canada.

Dinorthis pectinella sweeneyi N. H. Winchell. Trenton (Ord.).

Orthis sweeneyi N. H. Winchell, Ninth Rep. Geol. Nat. Hist. Survey Minnesota, 1881, p. 117.

Dinorthis sweeneyi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 196, 222, 228, pl. 5, figs. 34-36.

Orthis (*Dinorthis*) *pectinella* var. *sweeneyi* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 426, pl. 32, figs. 35-38.

Loc. St. Paul, Cannon Falls, etc., Minnesota; Decorah and McGregor, Iowa.

Dinorthis platys (Billings). Chazy (Ord.).

Orthis platys Billings, Canadian Nat. Geol., IV, 1859, p. 438, fig. 15;—Geol. Canada, 1863, p. 129, fig. 54.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 218.

Loc. Island of Montreal, Canada.

Dinorthis porcata (McCoy). Trenton and Lorraine (Ord.).

Orthis porcata McCoy, Silurian Foss. of Ireland, 1846, p. 32, pl. 3, fig. 14.—Billings, Pal. Fossils, I, 1862, p. 135, fig. 111;—Geol. Canada, 1863, p. 312, fig. 319.

Orthis anticostiensis Shaler, Fossil Brachiopoda of the Ohio Valley, 1887, p. 49, pl. 6.

Plasiomys porcata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 197, 222, pl. 5A, figs. 20, 21.

Loc. Ireland; Ottawa, Canada; Anticosti.

Dinorthis proavita Winchell and Schuchert. Lorraine (Ord.).

Orthis proavita Winchell and Schuchert, American Geol., IX, April 1, 1892, p. 299.

Orthis petrae Sardeson, Bull. Minnesota Acad. Nat. Sci., III, April 9, 1892, p. 332, pl. 5, figs. 18-21.

Orthis (*Dinorthis*) *proavita* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 431, pl. 32, figs. 51-57.—? Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 176.

Loc. Spring Valley, Minnesota; Wilmington, Illinois; Lake Winnipeg, Canada.

Dinorthis retrorsa (Salter). Trenton and Lorraine (Ord.).

Orthis retrorsa Salter, Mem. Geol. Survey Great Britain, II, 1858, p. 373, pl. 27, figs. 3, 4.—Billings, Pal. Fossils, I, 1862, p. 136, figs. 112, 113.—Meek, Pal. Ohio, I, 1873, p. 92, pl. 11, fig. 7.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 37.

Orthis carleyi Hall, Thirteenth Rep. New York State Geol. Nat. Hist., 1860, p. 120, fig. in text;—Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 28, 29.

Orthis kennicotti McChesney, New Pal. Fossils, 1861, p. 78.

Dinorthis retrorsa (Salter)—Continued.

Plasionmys retrorsa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 197, 222, pl. 5A, figs. 14-16.

Loc. England; Oxford, etc., Ohio; Ottawa, Canada.

Dinorthis subquadrata (Hall).

Lorraine (Ord.).

Orthis subquadrata Hall, Pal. New York, I, 1847, p. 126, pl. 32A, fig. 1;—Geol. Wisconsin, I, 1862, p. 54, figs. 1, 2.—Meek, Pal. Ohio, I, 1873, p. 94, pl. 9, fig. 2.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 38.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 484, pl. 1, figs. 3-5;—Tenth Rep. State Geol. Indiana, 1881, p. 116, pl. 1, figs. 3-5.—Shaler, Foss. Brachiopoda of the Ohio Valley, 1887, p. 22, pl. 7.—Keyes, Geol. Survey Missouri, V, 1895, p. 60.

?*Orthis subquadrata* Billings, Geol. Canada, 1863, p. 165, fig. 146.

Plasionmys subquadrata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 191, 196, 222, pl. 5A, figs. 17-19.

Orthis (*Dinorthis*) *subquadrata* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 428, pl. 32, figs. 46-50.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 176.

Loc. Ohio Valley; Spring Valley, Minnesota; Wilmington, Illinois; Warren and Jefferson counties, Missouri; Lattners, Iowa; Iron Ridge, Wisconsin; Lake Winnipeg, Canada; Anticosti.

Discina of authors (non Lamarek)=*Orbiculoidea*.

Discina acadica Hartt=*Parmophorella acadica*, a gastropod.

Discina alleghania Hall=*Orbiculoidea alleghania*.

Discina ampla Hall=*Orbiculoidea ampla*.

Discina capax White=*Orbiculoidea capax*.

Discina capuliformis McChesney=*Orbiculoidea capuliformis*.

Discina circe Billings=*Orbiculoidea lamellosa*.

Discina clara Spencer=*Schizotreta tenuilamellata*.

Discina concordensis Sardeson=*Schizotreta pelopea*.

Discina connata Walcott=*Lingulodiscina connata*.

Discina conradi Hall=*Orbiculoidea conradi*.

Discina convexa Shumard=*Orbiculoidea convexa*.

Discina discus Hall=*Orbiculoidea discus*.

Discina doria Hall=*Orbiculoidea doria*.

Discina elmira Hall=*Orbiculoidea elmira*.

Discina forbesi Nicholson=*Schizotreta tenuilamellata*.

Discina gallaheri Winchell=*Orbiculoidea gallaheri*.

Discina grandis Vanuxem=*Romerella grandis*.

Discina grandis Hall=*Orbiculoidea ampla*.

Discina humilis Hall=*Orbiculoidea humilis*.

?Discina inutilis Hall.

Upper Cambrian.

Discina inutilis Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 130, pl. 6, fig. 11;—Trans. Albany Institute, V, 1867, p. 108.

Loc. Mazomanie, Wisconsin.

Obs. Undeterminable.

Discina illinoisensis Miller and Gurley=*Orbiculoidea illinoisensis*.

Discina jervensis Barret=*Orbiculoidea jervensis*.

- Discina keokuk* Gurley = *Orbiculoidea keokuk*.
Discina lodensis Hall = *Orbiculoidea lodiensis*.
Discina magnifica Herrick = *Orbiculoidea magnifica*.
Discina manhattensis Meek and Hayden = *Orbiculoidea manhattanensis*.
Discina marginalis Whitfield = *Orbiculoidea marginalis*.
Discina media Hall = *Orbiculoidea lodiensis media*.
Discina meekana Whitfield = *Orbiculoidea missouriensis*.
Discina microscopica Shumard = *Acrotreta microscopica*.
Discina minuta Hall = *Orbiculoidea minuta*.
Discina missouriensis Shumard = *Orbiculoidea missouriensis*.
Discina munda Miller and Gurley = *Orbiculoidea munda*.
Discina neglecta Hall = *Orbiculoidea neglecta*.
Discina newberryi Hall = *Lingulodiscina newberryi*.
Discina nitida Meek and Worthen = *Orbiculoidea missouriensis*.
Discina nitida = *Orbiculoidea nitida*.
Discina patellaris Winchell = *Orbiculoidea patellaris*.
Discina pelopea Billings = *Schizotreta pelopea*.
Discina*(?) *pileolus Whiteaves. ? Lower Cretaceous.
Discina pileolus Whiteaves, Cont. Canadian Pal., I, 1889, p. 159, pl. 21, fig. 3.
Loc. Rink Rapids on Lewis River, British America.
Obs. "Professor Hyatt thinks that the fossils from this locality are Jurassic"
 (Stanton).
Discina pleurites Meek = *Lingulodiscina pleurites*.
Discina randalli Hall = *Orbiculoidea randalli*.
Discina saffordi Winchell = *Orbiculoidea saffordi*.
Discina sampsoni Miller = *Orbiculoidea sampsoni*.
Discina*(?) *semipolita Whiteaves. Cretaceous.
Discina semipolita Whiteaves, Mesozoic Fossils, I, Geol. Survey Canada, 1884,
 p. 252, pl. 33, fig. 9.
Loc. Queen Charlotte Island.
Discina seneca Hall = *Orbiculoidea seneca*.
Discina solitaria Ringneberg = *Schizotreta tenuilamellata*.
?*Discina sublamellosa* Ulrich. Lorraine (Ord.).
Discina sublamellosa Ulrich, Jour. Cincinnati, Soc. Nat. Hist., I, 1878, p. 97, pl. 4,
 fig. 11.—Miller, N. American Geol. Pal., 1889, p. 344.
Loc. Covington, Kentucky.
Obs. Probably not a brachiopod.
Discina subtrigonalis McChesney = *Orbiculoidea subtrigonalis*.
Discina tenuilamellata var. *subplana* Hall = *Orbiculoidea subplana*.
Discina tenuilineata Meek and Hayden = *Orbiculoidea tenuilineata*.
Discina tenuistriata Ulrich = *Orbiculoidea tenuistriata*.
Discina trigonalis McChesney = *Orbiculoidea subtrigonalis*.
Discina truncata Hall = *Schizobolus concentricus*.
Discina truncata Emmons = *Orbiculoidea lamellosa*.
Discina tullia Hall = *Orbiculoidea tullia*.
Discina utahensis Meek = *Orbiculoidea utahensis*.

- Discina(?) vancouverensis** Whiteaves. Cretaceous.
Discina vancouverensis Whiteaves, Mesozoic Fossils, I, Geol. Survey Canada, 1879, p. 177, pl. 20, fig. 6.
Loc. Admiralty Island.
- Discina vanuxemi* Hall=*Orbiculoidea vanuxemi*.
Discina varsoviensis Worthen=*Orbiculoidea varsaviensis*.
Discinella Hall=*Operculum* of Pteropod.
- DISCINISCA** Dall. Genotype *Discina lamellosa* Broderip.
Discinisca Dall, Bull. Mus. Comp. Zoology, III, 1871, p. 37.
- Discinisca lugubris** (Conrad). Miocene and Pliocene.
Capulus lugubris Conrad, Jour. Acad. Nat. Sci. Philadelphia, VII, 1834, p. 143.
Orbicula lugubris Conrad, Fossils Medial Tertiary For. U. S., 1845, p. 75, pl. 43, fig. 2.—Tuomey and Holmes, Foss. South Carolina, 1855, p. 17, pl. 5, fig. 1.—Dall, Republication of Conrad's Foss. Medial Tert. For. U. S., 1893, p. 101, pl. 43, fig. 2.
Discina lugubris, Whitfield, Mon. U. S. Geol. Survey, XXIV, 1894, p. 23, pl. 1, figs. 1-3.
Loc. St. Marys County, Maryland; Petersburg, Virginia; Peedee River, South Carolina; Atlantic City, Shiloh, and Bridgeton, New Jersey.
Obs. Referred to *Discinisca* on authority of Dr. W. H. Dall.
- Discinisca multilineata** (Conrad). Miocene.
Orbicula multilineata Conrad, Fossils Medial Tertiary For. U. S., 1845, p. 75, pl. 43, fig. 3.—Tuomey and Holmes, Foss. South Carolina, 1855, p. 18, pl. 5, fig. 2.—Dall, Republication of Conrad's Foss. Medial Tert. For. U. S., 1893, p. 101, pl. 43, fig. 3.
Loc. City Point, Virginia; Peedee River, South Carolina.
Obs. Probably a less worn variety of *D. lugubris* (Dall).
- DISCINOPSIS** Matthew. Genotype *Acrotreta? gulielmi* Matthew.
Discinopsis (Matthew MS.) Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 105, 167;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 250.
- Discinopsis gulielmi** Matthew. Middle Cambrian.
Acrotreta? gulielmi Matthew, Trans. Royal Soc. Canada, 1886, p. 37, pl. 5, fig. 14.
Discinopsis gulielmi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 105, pl. 3, figs. 20-24.
Loc. Portland, New Brunswick.
- EATONIA** Hall. Genotype *Atrypa peculiaris* Conrad.
Eatonia Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 90;—Twelfth Rep. Ibidem, 1859, p. 35;—Pal. New York, III, 1859, p. 432.—Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 111.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 205;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 829.
- Eatonia coulteri** Miller and Gurley. Oriskany (Dev.).
Eatonia coulteri Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 3, 1893, p. 72, pl. 7, figs. 8-11.
Loc. Jackson County, Illinois.
- Eatonia eminens** Hall. Lower Helderberg (Dev.).
Eatonia eminens Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 92;—Pal. New York, III, 1859, p. 242, pl. 37, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 206.
Loc. Decatur County, Tennessee.

- Eatonia medialis** (Vanuxem). Lower Helderberg (Dev.).
Atrypa medialis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 120, fig. 4.
Eatonia medialis Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 90, figs. 1-7;—Pal. New York, III, 1859, p. 241, pl. 37, fig. 1.—Billings; Proc. Portland Soc. Nat. Hist., 1863, p. 111, pl. 3, fig. 7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 206, pl. 61, figs. 29-35.
Loc. Schoharie, Carlisle, Catskill, etc., New York; Square Lake, Maine.
- Eatonia peculiaris** (Conrad). Lower Helderberg and Oriskany (Dev.).
Atrypa peculiaris Conrad, Fifth Ann. Rep. Geol. Survey New York, 1841, p. 56.—Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 123, fig. 3.—Hall, *Ibidem*, Rep. Fourth Dist, 1843, p. 148, fig. 3.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 825, fig. 640.
Atrypa? *nustella* Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 39, pl. 14, fig. 3.
Eatonia peculiaris Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 37, figs. 1-7;—Pal. New York, III, 1859, p. 244, pl. 38, figs. 21-26; pl. 51, fig. 2; p. 436, pl. 101, fig. 2; pl. 101A, fig. 1;—Fifteenth Rep. New York State Cab. Nat. Hist., 1862, pl. 11.—Billings, Geol. Canada, 1863, p. 957, fig. 450.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 395, pl. 8, fig. 2.—Billings, Pal. Fossils, II, 1874, p. 40, pl. 3A, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 206, pl. 61, figs. 17-26.
Eatonia peculiaris? Keyes, Geol. Survey Missouri, V, 1895, p. 104.
Loc. Schoharie, etc., New York; Pennsylvania; Cumberland, Maryland; Jackson and Perry counties, Missouri; Gaspé.
- Eatonia pumila** Hall. Oriskany (Dev.).
Eatonia pumila Hall, Pal. New York, III, 1859, p. 437, pl. 101, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 206.
Loc. Albany County, New York.
- Eatonia singularis** (Vanuxem). Lower Helderberg (Dev.).
Atrypa singularis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 120, fig. 3.
Eatonia singularis Hall, Pal. New York, III, 1859, p. 242, pl. 38, figs. 14-20.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 206, pl. 61, figs. 13-16.
Loc. Schoharie, etc., New York.
- Eatonia sinuata** Hall. Oriskany (Dev.).
Eatonia sinuata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 91;—Pal. New York, III, 1859, p. 438, pl. 101A, figs. 3-6.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 206, pl. 61, figs. 36-38.
Loc. Cumberland, Maryland.
- Eatonia(?) variabilis** Whiteaves. Hamilton (Dev.).
Eatonia variabilis Whiteaves, Cont. to Canadian Pal., I, 1891, p. 233, pl. 29, figs. 6-9.
Loc. Hay River, Canada.
- Eatonia whitfieldi** Hall. Oriskany (Dev.).
Eatonia whitfieldi Hall, Pal. New York, III, 1859, p. 437, pl. 101A, fig. 2.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 206, pl. 61, figs. 27, 28.
Loc. Cumberland, Maryland.
- EICHWALDIA** Billings. Genotype *Eichwaldia subtrigonalis* Billings.
Eichwaldia Billings, Geol. Survey Canada; Rep. Progress for 1857, 1858, p. 190;—Canadian Nat. Geol., III, 1858, p. 442.
- Eichwaldia* of other authors = *Dictyonella*.

- Eichwaldia subtrigonalis** Billings. Trenton (Ord.).
Eichwaldia subtrigonalis Billings, Geol. Survey Canada; Rep. Progress for 1857, 1858, p. 192, fig. 24;—Canadian Nat. Geol., III, 1858, p. 443, fig. 24;—Geol. Canada, 1863, p. 142, fig. 76.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 310, figs. 241, 242; pl. 83, figs. 1-1.
Loc. Panquette Rapids, Canada.
- ELKANIA** Ford. Genotype *Obolella desiderata* Billings.
Billingsia Ford (non de Koninek, 1876), American Jour. Sci., 3d ser., XXXI, 1885, p. 466.
Elkania Ford, American Jour. Sci., 3d ser., XXXII, 1886, p. 325.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 75, 165;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 211.
- Elkania ambigua** (Walcott). Pogonip (base of Ord.).
Obolella? *ambigua* Walcott, Mon. U. S. Geol. Survey, VI, 1884, p. 67, pl. 1, fig. 2.
Elkania ambigua Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 78.
Loc. Eureka district, Nevada.
- Elkania desiderata** (Billings). Upper Cambrian.
Obolella desiderata Billings, Pal. Fossils, I, 1862, p. 69, fig. 62 on p. 68.
Obolella? *desiderata* Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 111.
Billingsia desiderata Ford, American Jour. Sci., 3d ser., XXXI, 1886, p. 466, figs. 1, 2.
Elkania desiderata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 77, pl. 3, figs. 15-19.
Loc. Point Levis, Canada.
- ENTELETES** Fischer de Waldheim. Genotype *Orthis lamarecki* Fisch.
Enteletes Fischer de Waldheim, Œyct. Gouv. Moscou, 1830, p. 193, tab. 26, figs. 6, 7.—Waagen, Paleontologica Indica, Ser. XIII, I, 1884, p. 550.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 185, 214;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 272.
Syntriclasma Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 277;—Geol. Survey Illinois, II, 1866, p. 321, fig. 36.
- Enteletes andii** (d'Orbigny). Upper Carboniferous.
Terebratula andii d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 45, pl. 3, figs. 14, 15.
Orthis andii Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 64, pl. 4, fig. 3.
Syntriclasma andii Derby, Bull. Cornell Univ., I, 1874, p. 62.
Rhynchonella andii Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 302.
Enteletes andii Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.
Loc. Yarbichambi and Lake Titicaca, Bolivia; Santa Cruz.
- Enteletes gaudryi** (d'Orbigny). Upper Carboniferous.
Terebratula gaudryi d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 45.
Terebratula antissiensis d'Orbigny, Ibidem, 1842, pl. 3, fig. 16 (non pl. 2).
Syntriclasma gaudryi Derby, Bull. Cornell Univ., I, 1874, p. 62.
Enteletes gaudryi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.
Loc. Yarbichambi, Bolivia.
- Enteletes hemiplicata** Hall. Upper Carboniferous.
Spirifer hemiplicata Hall, Stansbury's Exped. Great Salt Lake, 1852, p. 409, pl. 4, fig. 3.

Enteleles hemiplicata Hall—Continued.

- Rhynchonella angulata* Geinitz (non Linné), Carbon u. Dyas Nebraska, 1866, p. 37, pl. 3, figs. 1-4.
- Syntrielasma hemiplicata* Meek and Worthen, Geol. Survey Illinois, II, 1866, p. 323, fig. 36; p. 324, fig. 37.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 177, pl. 6, fig. 1; pl. 8, fig. 12.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 571, pl. 26, fig. 20.—Kayser, Richthofens China, IV, 1883, p. 179, pl. 21, figs. 2, 3.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 131, pl. 26, figs. 15-18.—Keyes, Geol. Survey Missouri, V, p. 76, pl. 39, fig. 8.
- Camerophoria giffordi* Worthen, Bull. Illinois State Mus., 1, 1882, p. 39;—Geol. Survey Illinois, VII, 1883, p. 318, figs. a-c.
- Enteleles hemiplicata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 215, 226, pl. 7A, figs. 44-52.
- Loc.* Weston, Platte County, Missouri; Vandalia and Alta, Illinois; Stennett, Iowa; Kansas City, Missouri; Nebraska City, Nebraska; Lo Ping, China.

EUMETRIA Hall.

Genotype *Retzia verneuiliana* Hall = *Terebratula marcyi* Shumard.

- Eumetria* Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 59.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 487.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 115, figs. 104, 105;—Thirteenth Ann. Rep. New York State Geol., 1895, p. 795.

***Eumetria* (?) *altirostris* (White).**

Kinderhook (L. Carb.).

- Retzia* (Acambona?) *altirostris* White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 28.
- Loc.* Burlington, Iowa.

***Eumetria marcyi* (Shumard).**

St. Louis and Kaskaskia (L. Carb.).

- Terebratula serpentina*? Owen (non de Koninek), Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 3A, fig. 13 (see specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17955).
- Terebratula marcyi* Shumard, Marcy's Rep. U. S. Expl. Red River of Louisiana, 1854, p. 177, pl. 1, fig. 4.
- Retzia verneuiliana* Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 657, pl. 23, fig. 1;—Trans. Albany Institute, IV, 1858, p. 9.
- Retzia vera* Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 704, pl. 27, fig. 3.
- Eumetria vera* Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 55, figs. 1-3, and p. 59.
- Eumetria verneuiliana* Hall, *Ibidem*, 1863, p. 55, fig. 2.—Whitfield, Bull. American Mus. Nat. Hist., 1882, p. 50, pl. 6, figs. 28-30.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 335, pl. 29, figs. 28-30.
- Retzia radialis* Walcott (non Phillips), Mon. U. S. Geol. Survey, VIII, 1884, p. 220, pl. 7, figs. 5, 5a (5b?).
- Retzia marcyi* Miller, N. American Geol. Pal., 1889, p. 366.
- Eumetria verneuiliana* and *vera* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 117, figs. 104, 105, pl. 50, figs. 13-26, 34, 37; pl. 83, figs. 26, 27.
- Loc.* Washington and Crawford counties, Arkansas; Floyd County and elsewhere in Indiana; Alton, Illinois; Greene County, Missouri; Iowa; Cumberland Mountain, Tennessee.
- Obs.* Hall and Clarke (1893), in treating of the American species of *Eumetria* (*E. vera* and var. *costata*, and *E. verneuiliana*), say they "are, perhaps, all representatives of the same species." The writer regards them as one species, varying in different localities in size and number of striations. Owen was the first to observe this form and identified it provisionally with *T. serpentina* de Koninek. Shumard, however, believed it to be distinct from that species, and gave the name *T. marcyi* four years prior to that of Hall.

- Eumetria marcyi costata** Hall. Kaskaskia (L. Carb.).
Retzia vera var. *costata* Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 704, pl. 27, fig. 3.
Eumetria vera var. *costata* Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 51, figs. 27-33.
Loc. Chester, Illinois; Crittenden County, Kentucky.
- Eumetria vera* Hall = *E. marcyi*.
- Eumetria verneuilliana* Hall = *E. marcyi*.
- Eumetria woosteri** (White). ? Upper Carboniferous.
Retzia woosteri White, Bull. U. S. Geol. Survey Terr., V, 1879, p. 215;—Twelfth Ann. Rep. U. S. Geol. Survey Terr., 1883, p. 134, pl. 34, fig. 8.
Loc. Near Greeley, Colorado.
Obs. Closely related with *E. marcyi* of the Lower Carboniferous.
- EUNELLA** Hall and Clarke. Genotype *Terebratula sallivanti* Hall.
Eunella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290;—Thirteenth Ann. Rep. New York State Geol., 1895, p. 861.
- Eunella harmonia** Hall. Corniferous (Dev.).
Terebratula harmonia Hall, Pal. New York, IV, 1867, p. 388, pl. 60, figs. 11-16.—Nettelroth, Kentucky Fossil Shells. Mem. Kentucky Geol. Survey, 1889, p. 154, pl. 17, figs. 1-4.
Eunella harmonia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290, pl. 80, figs. 33-35.
Loc. Falls of Ohio; Ontario, Canada.
- Eunella lincklæni** Hall. Marcellus and Hamilton (Dev.).
Terebratula lincklæni Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 88;—Pal. New York, IV, 1867, corrigenda.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 155, pl. 17, figs. 22-24.
Cryptonella lincklæni Hall, Fourteenth Rep. New York State Cab. Nat. Hist., 1861, p. 101;—Sixteenth Rep. Ibidem, 1863, p. 44.
Cryptonella? *lincklæni* Hall, Pal. New York, IV, 1867, p. 397, pl. 60, figs. 49-65.
Terebratula lincklæni var. Hall, Ibidem, 1867, p. 418, pl. 60, figs. 32-37.
Eunella lincklæni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290, pl. 80, figs. 28-32.
Loc. Clarke County, Indiana; Hamilton and Canandaigua Lake, New York; Thunder Bay, Michigan.
- Eunella simulator** Hall. Hamilton (Dev.).
Terebratula simulator Hall, Pal. New York, IV, 1867, p. 391, pl. 60, figs. 69, 70.
Eunella simulator Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290, pl. 80, fig. 27.
Loc. Thedford, Ontario.
- Eunella sullivanti** Hall. Corniferous (Dev.).
Terebratula sullivanti Hall, Pal. New York, IV, 1867, p. 387, pl. 60, figs. 5-10, 68.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 291, pl. 37, figs. 9, 10.
Eunella sullivanti Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290, fig. 210, pl. 80, figs. 23-26.
Loc. Columbus and Sandusky, Ohio; near Cayuga, Ontario, and Lakes Manitoba, and Winnipegosis, Canada.
- GLASSIA** Davidson. Genotype *Atrypa obovata* Sowerby.
Glassia Davidson, Geol. Mag., n. ser., VIII, 1881, p. 11;—Sup. British Devonian and Silurian Brach., Pal. Soc., 1882, p. 38.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 152, figs. 142-145;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 811.

- Glossia romingeri** Hall and Clarke. Trenton (Ord.).
Glossia romingeri Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 153, pl. 83, figs. 32-35.
Loc. Drift near Ann Arbor, Michigan.
- Glossia schucherti** Ulrich=*Catazyga headi*.
- GLOSSINA** Phillips. Genotype *Lingula attenuata* Sowerby.
Glossina Phillips, Mem. Geol. Survey Great Britain, II, Pt. II, 1818, p. 370.—Dall, Bull. U. S. Nat. Mus., 8, 1877, p. 29.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 15, 164;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 230.
- Glossina acuminata** Hall and Clarke=*Lingulepis acuminata*.
- Glossina crassa** (Hall). Trenton (Ord.).
Lingula crassa Hall, Pal. New York, I, 1847, p. 98, pl. 30, fig. 8.
Loc. Middleville and Lake Champlain, New York.
- Glossina cyane** (Billings). Calciferous (Ord.).
Lingula cyane Billings, Pal. Fossils, I, 1865, p. 216, fig. 200.
Loc. Near Portland Creek, Newfoundland.
- Glossina deflecta** Winchell and Schuchert. Trenton and Lorraine (Ord.).
Lingula (*Glossina*) *deflecta* Winchell and Schuchert, American Geol., IX, 1892, p. 281;—Minnesota Geol. Survey, III, 1893, p. 348, pl. 29, figs. 15-18.
Loc. Near Fountain and Spring Valley, Minnesota.
- Glossina dubia** (d'Orbigny). Ordovician.
Lingula dubia d'Orbigny, Voyage dans l'Amérique Méridionale, 1842, p. 29, pl. 2, fig. 7.
Loc. Tacopaya, Bolivia.
- Glossina flabellula** Hall and Clarke. Waverly (L. Carb.).
Lingula (*Glossina*) *flabellula* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 15, 172, pl. 1, figs. 33, 34.
Loc. Sciotoville, Ohio.
- Glossina hurlbuti** N. H. Winchell. Trenton (Ord.).
Lingula hurlbuti N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist., Survey Minnesota, 1880, p. 62.
Lingula (*Glossina*) *hurlbuti* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 347, pl. 29, figs. 13, 14.
Loc. Mantorville and near Spring Valley, Minnesota.
- Glossina leana** (Hall). Hamilton (Dev.).
Lingula leana Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 20;—Pal. New York, IV, 1867, p. 9, pl. 2, fig. 12.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 106, pl. 13, fig. 2.
Loc. Bristol, New York; Lone Mountain, Nevada.
- Glossina nebraskaensis** (Meek). Upper Carboniferous.
Lingula scotica var. *nebraskaensis* Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 158, pl. 8, fig. 3.
Lingula nebraskaensis Miller, N. American Geol. Pal., 1889, p. 350.
Loc. Nebraska City, Nebraska.
- Glossina perovata** (Hall). Clinton (Sil.).
Lingula perovata Hall, Pal. New York, II, 1852, p. 55, pl. 20, fig. 3.
Loc. Rochester, New York.

- Glossina sedaliaensis** (Miller). Chouteau (L. Carb.).
Lingula sedaliensis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894,
 p. 308, pl. 9, fig. 2.
Loc. Sedalia, Missouri.
Obs. This species is probably the same as *G. waverlyensis*.
- Glossina spatiosa** (Hall). Lower Helderberg (Dev.).
Lingula spatiosa Hall, Pal. New York, III, 1859, p. 158, pl. 9, fig. 10.
Loc. Near Hudson, New York.
- Glossina trentonensis** (Conrad). Trenton and Utica (Ord.).
Lingula trentonensis Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842,
 p. 266, pl. 15, fig. 11.—Vanuxem, Geol. New York; Rep. Third Dist., 1842,
 p. 48.
Lingula attenuata? Hall (non Sowerby), Pal. New York, I, 1847, p. 94, pl. 30,
 fig. 1.
Lingula daphne Billings, Pal. Fossils, I, 1862, p. 50.
 ?*Lingula attenuata* A. Ulrich, N. Jahrb. f. Mineral, Beilageband, VIII, 1892, p. 7,
 pl. 1, fig. 3.
Loc. Glens Falls, Trenton Falls, Middleville, New York; Wisconsin; Montreal
 and Ottawa, Canada; ?near Vacas, Bolivia.
- Glossina triangulata** (Nettelroth). Hamilton (Dev.).
Lingula triangulata Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol.
 Survey, 1889, p. 34, pl. 26, fig. 1.
Loc. Falls of Ohio.
- Glossina waverlyensis** (Herrick). Waverly (L. Carb.).
Lingula scotica?? Meek, Pal. Ohio, II, 1875, p. 276, pl. 14, fig. 9.
Lingula waverlyensis Herrick, Bull. Denison Univ., IV, 1888, pp. 12, 18, pl. 3, fig.
 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 9, pl. 4K, fig. 7.
Lingula (*scotica* var.) *waverlyensis* Herrick, Geol. Ohio, VII, 1895, pl. 22, fig. 1.
Loc. Berea and Newark, Ohio; Oil City, Pennsylvania.
Obs. See *G. sedaliaensis* (Miller).
- Goniocœlia** Hall = **Pentagonia**.
Goniocœlia uniangulata Hall = **Pentagonia unisulcata**.
Gotlandia Dall = **Trimerella**.
Gypidia Dalman = **Conchidium**.
Gypidia unguiformis Ulrich = **Conchidium unguiformis**.
- GYPIDULA** Hall. Genotype **Pentamerus occidentalis** Hall.
Gypidula Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 163;—
 Pal. New York, IV, 1867, pp. 373, 380.—Walcott, Mon. U. S. Geol. Survey, VIII,
 1884, p. 161.
Sieberella Ehlert, Fischer's Manuel de Conchyliologie, 1887, p. 1311.
Gypidula and *Sieberella* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p.
 245;—Thirteenth Ann. Rep. New York State Geol., 1895, pp. 845, 846.
- Gypidula comis** (Owen). Middle Devonian.
Atrypa comis Owen, Geol. Rep. Wisconsin, Iowa, Minnesota, 1852, p. 583, pl. 3A,
 fig. 4 (see specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17928).
Pentamerus (n. sp. ?) Owen, Ibidem, 1852, pl. 3A, fig. 11 (Ibidem, Cat., 17929).
Pentamerus occidentalis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 514, pl. 6, fig. 2
 (non *Pentamerus occidentalis* Hall, 1852).
Pentamerus galeatiformis Meek and Worthen, Geol. Survey, Illinois, II, 1866, p.
 325.
Gypidula occidentalis Hall, Pal. New York, IV, 1867, p. 380, pl. 58A, figs. 1-8.

Gypidula comis (Owen)—Continued.

Pentamerus comis Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 428, pl. 13, fig. 6.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 290.

Pentamerus (Gypidula) comis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 159, pl. 3, figs. 4, 7; pl. 14, fig. 15; pl. 15, fig. 5.

Gypidula comis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 247, fig. 177; pl. 72, figs. 15-24.

Loc. Independence and Davenport, Iowa; Rock Island, Illinois; Eureka district, Nevada; lakes Manitoba and Winnipegosis, Canada.

Gypidula coppingeri (Etheridge).

Silurian.

Pentamerus coppingeri Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 594, pl. 25, figs. 2, 3.

Loc. Offley Island, lat. 81° 16'.

Gypidula galeata (Dalman). Lower Helderberg and Middle Devonian.

Atrypa galeata Dalman, Kongl. Svenska, Vet.-Akad. Handl., för 1827, 1828, p. 46, pl. 5, fig. 4.—Troost, Sixth Geol. Rep. Tennessee, 1841, p. 15.—Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 117, fig. 1.—Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 39, pl. 14, fig. 4.

Pentamerus galeatus Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 105, figs. 1-3.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 825, fig. 646.—Hall, Pal. New York, III, 1859, p. 257, pl. 46, fig. 1; pl. 47, fig. 1.—Billings, Geol. Canada, 1863, p. 957, fig. 454.

Pentamerus galeatus var. *Whiteaves*, Cont. to Canadian Pal., I, 1891, p. 234.

Sieberella galeatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 246, fig. 175; pl. 72, figs. 7-13.

Loc. Europe; Albany and Schoharie counties, New York; Cumberland, Maryland; Pennsylvania; St. Blandine, New Brunswick; Mackenzie River, Canada.

Gypidula globulosa (Nettelroth).

Niagara (Sil.).

Pentamerus globulosus Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 54.

Loc. Louisville, Kentucky.

Gypidula knotti (Nettelroth).

Niagara (Sil.).

Pentamerus knotti Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 56, pl. 32, figs. 9-12.

Loc. Louisville, Kentucky.

Gypidula læviuscula Hall.

Middle Devonian.

Gypidula læviuscula Hall, Pal. New York, IV, 1867, p. 381, pl. 58, figs. 22, 23.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248, pl. 72, figs. 25, 26.

Loc. Waterloo, Iowa.

Gypidula lotis (Walcott).

Upper Devonian.

Pentamerus lotis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 161, pl. 3, fig. 9. *Gypidula lotis* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248.

Loc. White Pine mining district, Nevada.

Gypidula munda Calvin.

Middle Devonian.

Gypidula munda Calvin, Bull. U. S. Geol. Geogr. Survey Terr., IV, 1878, p. 730. *Gypidula mundula* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248.

Loc. Independence, Iowa.

Gypidula nucleus (Hall and Whitfield).

? Clinton (Sil.).

Pentamerus galeatus Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, pp. 197, 200a.

Pentamerus nucleus Hall and Whitfield, Twenty-seventh Rep. New York State Cab. Nat. Hist., 1875, pl. 9, figs. 30-32.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 59, pl. 27, figs. 25-27; pl. 33, figs. 27-33.

Gypidula nucleus (Hall and Whitfield)—Continued.

Sieberella nucleus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 247, pl. 72, figs. 1-3.

Loc. Louisville, Kentucky.

Gypidula occidentalis Hall=G. *comis*.**Gypidula pseudogaleata** (Hall).

Lower Helderberg (Dev.).

Pentamerus pseudogaleatus Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 106, figs. 1-6;—Pal. New York, III, 1859, p. 259, pl. 46, fig. 2.

Sieberella pseudogaleata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 242, pl. 72, fig. 14.

Loc. Schoharie and Carlisle, New York.

Gypidula roemeri (Hall and Clarke).

Silurian.

Pentamerus galcatus Roemer (not Dalman), Sil. Fauna west. Tennessee, 1860, p. 73, pl. 5, fig. 14.

Sieberella roemeri Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 247, pl. 72, fig. 6.

Loc. Decatur County, Tennessee.

Gypidula romingeri Hall and Clarke.

Hamilton (Dev.).

Gypidula romingeri Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248, pl. 72, figs. 27-33.

Loc. Alpena, Michigan.

Gypidula subglobosa (Meek and Worthen).

Hamilton (Dev.).

Pentamerus subglobosus Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 429, pl. 13, fig. 5.

Gypidula subglobosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248.

Loc. Rock Island, Illinois.

Gypidula uniplicata (Nettelroth).

Niagara (Sil.).

Pentamerus uniplicatus Nettelroth, Kentucky Fossil Shells, Kentucky Geol. Survey, 1889, p. 63, pl. 33, figs. 25, 26.

Sieberella uniplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 247.

Loc. Louisville, Kentucky.

HARTTINA Hall and Clarke.Genotype *Centronella anna* Hartt.

Harttina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 292;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 862.

Harttina coutinhoana (Derby).

Upper Carboniferous.

Waldheimia coutinhoana Derby, Bull. Cornell Univ., I, 1874, p. 3, pl. 3, fig. 22; pl. 8, fig. 6; pl. 9, figs. 1, 2.

Harttina coutinhoana Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 292.

Loc. Bomjardim, Brazil.

Harttina anna (Hartt).

Upper Carboniferous.

Centronella anna Hartt, Dawson's Acadian Geol., 3d ed., 1878, p. 360, fig. 99.

Harttina anna Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 292, figs. 211, 212; pl. 79, figs. 37-39.

Loc. Windsor, Nova Scotia.

Hallina Winchell and Schuchert=*Zygospira*.**HEBERTELLA** Hall and Clarke.Genotype *Orthis sinuata* Hall.

Group of *Orthis occidentalis* Hall, Bull. Geol. Soc. America, I, 1889, p. 20.

Hebertella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 198, 222.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 432.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 266.

Hebertella battis (Billings).

Calciferous (Ord.).

Orthis battis Billings, Pal. Fossils, I, 1865, p. 185.*Hebertella* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.*Loc.* Point Levis, Canada.**Hebertella bellirugosa** (Conrad).

Trenton (Ord.).

Orthis bellarugosa Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 333.—Hall, Pal. New York, I, 1847, p. 118, pl. 32, fig. 3.*Hebertella bellarugosa* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.*Orthis* (*Hebertella*?) *bellarugosa* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 434, pl. 33, figs. 1-1.*Loc.* Mineral Point, Janesville, Neenah, etc., Wisconsin; Minneapolis, St. Paul, Cannon Falls, etc., Minnesota; Decorah and McGregor, Iowa; Curdsville, Kentucky; Rutherford County, Tennessee.**Hebertella borealis** (Billings).

Chazy-Trenton (Ord.).

Orthis borealis Billings, Canadian Nat. Geol., IV, 1859, p. 436, fig. 14;—Geol. Canada, 1863, p. 129, fig. 56; p. 167, fig. 148.—Meek, Pal. Ohio, I, 1873, p. 101, pl. 8, fig. 4.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 28.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 36, pl. 34, figs. 14-20.*Hebertella borealis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.*Orthis* (*Hebertella*) *borealis* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 433, fig. 33.*Loc.* Caughnawaga, St. Genevieve, Isle Bizard, and Cornwall, Canada; Frankfort, Kentucky; Nashville, Tennessee; Cannon Falls, etc., Minnesota; Wisconsin (Whitfield).**Hebertella daytonensis** (Foerste).

Clinton (Sil.).

Orthis daytonensis Foerste, Bull. Denison Univ., I, 1885, p. 87, pl. 13, figs. 13, 20, 21.*Hebertella daytonensis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.*Orthis* (*Hebertella*) *daytonensis* Foerste, Geol. Ohio, VII, 1895, p. 575, pl. 25, figs. 13, 20, 21.*Loc.* Dayton, Ohio.**Hebertella fausta** (Foerste).

Clinton (Sil.).

Orthis fausta Foerste, Bull. Denison Univ., I, 1885, p. 85, pl. 13, figs. 15, 16.*Hebertella fausta* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.*Orthis* (*Hebertella*) *fausta* and var. *squamosa* Foerste, Geol. Ohio, VII, 1895, pp. 573, 571, pl. 25, figs. 15a-15d, 16a, 16b; pl. 37A, figs. 19a, 19b.*Loc.* Dayton, Ohio.**Hebertella imperator** (Billings).

Chazy (Ord.).

Orthis imperator Billings, Canadian Nat. Geol., IV, 1859, p. 435, figs. 11-13;—Geol. Canada, 1863, p. 129, fig. 55.*Hebertella imperator* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.*Loc.* Hawkesbury and Cornwall, Canada.**Hebertella insculpta** Hall.

Lorraine (Ord.).

Orthis insculpta Hall, Pal. New York, I, 1847, p. 125, pl. 32, fig. 12.—Billings, Geol. Canada, 1863, p. 167, fig. 150.—Meek, Pal. Ohio, I, 1873, p. 99, pl. 9, fig. 1.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 40.*Orthis bellarugosa* Hall (non Conrad), Second Ann. Rep. New York State Geol., 1883, pl. 35, fig. 22.*Hebertella insculpta* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222, pl. 5A, fig. 13.

Hebertella insculpta Hall—Continued.

Orthis (*Hebertella*) *insculpta* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 435.

Loc. Oxford, etc., Ohio; Richmond, Indiana; Wilmington, Illinois; Iron Ridge, Wisconsin; Lattners, Iowa.

Hebertella lonensis (Walcott).

Pogonip (Ord.).

Orthis lonensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 74, pl. 11, fig. 6.

Hebertella lonensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Loc. Eureka district, Nevada.

Hebertella maria (Billings).

Lorraine (Ord.).

Orthis maria Billings, Pal. Fossils, I, 1862, p. 137, fig. 114.

Hebertella sinuata or *maria*? Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222, pl. 5A, figs. 9, 10.

Loc. Anticosti; Colby, Kentucky.

Hebertella occidentalis Hall.

Lorraine (Ord.).

Orthis occidentalis Hall, Pal. New York, I, 1847, p. 127, pl. 32A, fig. 2; pl. 32B, fig. 1;—Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 72.—Billings, Geol. Canada, 1863, p. 210, fig. 210.—Meek, Pal. Ohio, I, 1873, p. 96, pl. 9, fig. 3.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 70, pl. 4, fig. 11.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 34.—White, Second Ann. Rep. Indiana Bureau Statistics and Geol., 1880, p. 485, pl. 2, figs. 10-12;—Tenth Rep. State Geol. Indiana, 1881, p. 117, pl. 2, figs. 10-12.—Whitfield, Geol. Wisconsin, IV, 1882, p. 260, pl. 12, figs. 17, 18.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 31-34; pl. 35, figs. 16-21.

Orthis subjugata Hall, Pal. New York, I, 1847, p. 129, pl. 32C, fig. 1.

Orthis subjugata(?) Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 2B, figs. 4, 5 (see specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17885).

Hebertella occidentalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222, pl. 5A, figs. 11, 12.

Loc. Cincinnati, Oxford, etc., Ohio; Richmond, Indiana; Savanna, Illinois; Cape Girardeau, Missouri; Delafield, Wisconsin; Silver City, New Mexico.

Hebertella occidentalis sinuata Hall.

Lorraine (Ord.).

Orthis sinuata Hall, Pal. New York, I, 1847, p. 128, pl. 32B, fig. 2.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 36.—Shaler, Fossil Brachiopoda Ohio Valley, 1887, pl. 8.

Orthis occidentalis var. *sinuata* Meek, Pal. Ohio, I, 1873, p. 98.

Hebertella sinuata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222, pl. 5A, figs. 1-8.

Loc. Cincinnati, Ohio.

Hebertella scovilli (Miller).

Lorraine (Ord.).

Orthis scovilli Miller, Jour. Cincinnati Soc. Nat. Hist., V, 1882, p. 40, pl. 1, fig. 5.

Hebertella scovilli Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Loc. Lebanon, Ohio.

Hemipronites americanus Whitfield = *Clitambonites diversus*.

Hemipronites apicalis Whitfield = *Polytaechia apicalis*.

Hemipronites crassus McChesney = *Derbya crassa*.

Hemipronites crenistria White (non Meek or Phillips) = *Derbya crassa*.

Hemipronites crenistria Meek, and Herrick = *Orthotheses crenistria*.

Hemipronites propinquus Meek and Worthen = *Orthotheses subplanus*.

HEMITHYRIS d'Orbigny. Genotype *Rhynchonella psittacea* Gmel.

Hemithyris d'Orbigny, Ann. Sci. Nat., VIII, 1850, p. 246; XIII, 1850, p. 322.

- Hemithyris psittacea** (Chemnitz). Pliocene and Recent.
Anomia rostrum psittacea Chemnitz, Neues syst. Conch.-Cab., VIII, 1785, pl. 78, fig. 713.
Rhynchonella psittacea Davidson, Trans. Linnæan Soc. London, IV, 1887, p. 163, pl. 24, figs. 1-11.
Loc. Fossil, Gulf of St. Lawrence, Canada.
- HETERORTHIS** Hall and Clarke. Genotype *Orthis clytie* Hall.
Heterorthis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 223;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 268.
- Heterorthis clytie** Hall. Trenton (Ord.).
Orthis clytie Hall, Fourteenth Rep. New York State Cab. Nat. Hist., 1861, p. 96;—Fifteenth Rep., *Ibidem*, 1862, pl. 2, figs. 4, 5.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 34.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 75, pl. 1, figs. 18, 19.
Heterorthis clytie Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 202, 223, pl. 5B, figs. 20-24.
Loc. Frankfort and Paris, Kentucky.
- HINDELLA** Davidson. Genotype *Athyris umbonata* Billings.
Hindella Davidson, Suppl. British Sil. Brach., Pal. Soc., 1882, p. 130.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 63, figs. 46-51;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 769.
- Hindella prinstana** (Billings). Anticosti (Sil.).
Athyris prinstana Billings, Pal. Fossils, I, 1862, p. 145, fig. 122.
Meristella prinstana Miller, N. American Geol. Pal., 1889, p. 354.
Hindella prinstana Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 64, pl. 41, fig. 28; pl. 49, fig. 1.
Loc. Anticosti.
- Hindella umbonata** (Billings). Anticosti (Sil.).
Athyris umbonata Billings, Pal. Fossils, I, 1862, p. 144, fig. 121;—Geol. Canada, 1863, p. 317, fig. 331.
Hindella umbonata Davidson, Suppl. British Sil. Brach., Pal. Soc., 1882, p. 130, fig. in text.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 64, figs. 46-51; pl. 41, figs. 26, 27, 29, 30.
Meristella umbonata Foerste, Bull. Denison Univ., I, 1885, p. 88, pl. 13, fig. 2;—Geol. Ohio, VII, 1895, p. 590, pl. 25, fig. 2.
Loc. Anticosti; Dayton, Ohio (Foerste).
- HIPPARIONYX** Vanuxem. Genotype *Hipparionyx proximus* Vanuxem.
Hipparionyx Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 124, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 257;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 281.
- Hipparionyx consimularis* Vanuxem = *Atrypa reticularis*.
- Hipparionyx proximus** Vanuxem. Oriskany (Dev.).
Hipparionyx proximus Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 124, fig. 29, No. 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 257, pl. 9, figs. 33-36; pl. 15A, figs. 9-11.
Atrypa unguiformis (Conrad) Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 149, fig. 4.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 826, fig. 651
Orthis conradi Castelnaud, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 37, pl. 15, fig. 4.
Orthis unguiformis Castelman, *Ibidem*, 1843, p. 37, pl. 15, fig. 3.—Emmons, Manual Geol., 1860, p. 129, fig. 115.

Hipparionyx proximus Vanuxem—Continued.

Orthis hipparionyx Hall, Pal. New York, III, 1859, p. 407, pl. 89, figs. 1-4; pl. 90, figs. 1-7; pl. 91, figs. 4, 5; pl. 94, fig. 4.

Strophodonta intermedia Hall, Pal. New York, III, 1859, p. 482, pl. 95A, figs. 13, 14.

Streptorhynchus hipparionyx Hall, Second Ann. Rep. New York State Geol., 1883, pl. 39, figs. 33-36.

Loc. Schoharie and Albany counties, New York; Frankstown, Pennsylvania; Cumberland, Maryland; Cayuga, Ontario.

Obs. This species does not occur in Germany according to Kayser.

HOMŒOSPIRA Hall and Clarke. Genotype Rhynchospira evax Hall.

Homeospira Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 112;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 792.

Homœospira apriniformis Hall.

Niagara (Sil.).

Atrypa aprinis Hall (non de Verneuil), Pal. New York, II, 1852, p. 280, pl. 57, fig. 7.

Rhynchospira? *aprinis* Hall, Twelfth Rep. New York State Geol. Nat. Hist., 1859, p. 77.

Rhynchospira apriniformis Hall, Pal. New York, III, 1859, p. 485.

Rhynchonella aprinis Miller, N. American Geol. Pal., 1889, p. 367.

Homœospira apriniformis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 111, pl. 83, figs. 24, 25.

Loc. Lockport, New York.

Homœospira evax Hall.

Niagara (Sil.).

Rhynchospira evax Hall, Trans. Albany Institute, IV, 1863, p. 213.

Retzia evax Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 160, pl. 25, figs. 13-21;—Eleventh Rep. State Geol. Indiana, 1882, p. 302, pl. 25, figs. 13-21.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 55, pl. 5, figs. 1-9.

Homeospira evax Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 112, pl. 50, figs. 15-20 (32-35).

Loc. Waldron, Indiana; ?Perry County, Tennessee.

Homœospira sobrina (Beecher and Clarke).

Niagara (Sil.).

Retzia sobrina Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 61, pl. 5, figs. 10-16.

Homeospira sobrina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 112, pl. 50, figs. 26-28.

Loc. Waldron, Indiana.

HUSTEDIA Hall and Clarke. Genotype Terebratula mormoni Marcou.

Hustedia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 120;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 797.

Hustedia(?) meekana (Shumard).

Upper Carboniferous.

Retzia(?) meekana Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 295, pl. 11, fig. 7.

Loc. Guadalupe Mountains, New Mexico.

Hustedia mormoni (Marcou).

Upper Carboniferous.

Terebratula mormoni Marcou, Geol. N. America, February, 1858, p. 51, pl. 6, fig. 11;—Trans. St. Louis Acad. Sci., III, 1875, p. 252.

Retzia punctulifera Shumard, Trans. St. Louis Acad. Sci., I, June, 1858, p. 220.—McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 32, pl. 1, fig. 1.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 181, pl. 1, fig. 13; pl. 5, fig. 7.

Hustedia mormoni (Mareou)—Continued.

Retzia mormoni Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 27.—Geinitz, Carb. u. Dyas Nebraska, 1866, p. 39, pl. 3, fig. 6.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 141, pl. 10, fig. 7;—Thirteenth Rep. State Geol. Indiana, 1884, p. 136, pl. 35, figs. 10–12.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 231;—Geol. Survey Missouri, V, 1895, p. 95, pl. 41, fig. 2.

Retzia subglobosa McChesney, Descriptions New Pal. Foss., 1860, p. 45;—*Ibidem*, 1865, pl. 1, fig. 1.

Retzia compressa Meek, Geol. Survey California, I, 1864, p. 14, pl. 2, fig. 7.—Kayser, Riechthofens China, IV, 1883, p. 176, pl. 22, figs. 1–4.

Eumetria punctulifera Derby, Bull. Cornell Univ., I, 1874, p. 4, pl. 8, figs. 4, 5, 7, 8, 10; pl. 9, fig. 3.

Retzia radialis Walcott (non Phillips), Mon. U. S. Geol. Survey, VIII, 1884, p. 220, pl. 7, figs. 5d–5h.—Smith, Proc. American Phil. Soc., XXXV, 1897, p. 31.

Hustedia mormoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 120, fig. 106; pl. 51, figs. 1–9.

Loc. Salt Lake City, Utah; Santa Fe, New Mexico; Nevada; Shasta County, California; Nebraska; Kansas; Arkansas; Missouri; Iowa; Illinois; Indiana; Bonjardim and Itaituba, Brazil; Lo Ping, China.

Hustedia(?) papillata (Shumard).

Upper Carboniferous.

Retzia papillata Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 294, pl. 11, fig. 9.

Loc. Guadalupe Mountains, New Mexico.

Obs. Compare with *H. mormoni*.

Hustedia(?) triangularis (Miller).

Chonteau (L. Carb.).

Retzia triangularis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 315, pl. 9, figs. 25, 26.

Loc. Sedalia, Missouri.

HYATTELLA Hall and Clarke.Genotype *Atrypa congesta* Conrad.

Hyattella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 61, fig. 45;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 767.

Hyattella congesta (Conrad).

Clinton (Sil.).

Atrypa congesta Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 265, pl. 16, fig. 18.—Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 71, fig. 2;—Pal. New York, II, 1852, p. 67, pl. 23, fig. 1.—Billings, Canadian Nat. Geol., I, 1856, p. 136, pl. 2, fig. 4.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 823, fig. 632.

Atrypa quadricostata Hall, Pal. New York, II, 1852, p. 68, pl. 23, fig. 2.

Triplesia? congesta Hall, Twelfth Rep. New York State Geol. Nat. Hist., 1859, p. 77.

Triplesia? quadricostata Hall, *Ibidem*, 1859, p. 78.

Rhynchonella quadricostata Miller, N. American Geol. Pal., 1889, p. 369.

Camerella congesta Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 48.

Hyattella congesta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 61, fig. 45; pl. 40, figs. 23–28; pl. 81, figs. 26–28.

Loc. Rochester, Reynales Basin, etc., New York; Flamborough Head, Ontario; Pennsylvania; Louisville, Kentucky.

Hyattella junia (Billings).

Anticosti (Sil.).

Athyris junia Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 46.

Hyattella junia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 62, pl. 40, figs. 29–31.

Loc. Anticosti.

HYPOTHYRIS King. Genotype *Atrypa cuboides* Sowerby.

Hypothyris King (non Phillips), Ann. Mag. Nat. Hist., XVIII, 1846, p. 28;—Mon. Permian Foss., Pal. Soc., 1850, pp. 81, 100, 111.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 200;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 828.

Hypothyris castanea (Meek). Middle Devonian.

Rhynchonella castanea Meek, Trans. Chicago Acad. Sci., I, 1868, p. 93, pl. 13, fig. 9.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 153, pl. 15, figs. 1, 4.—Whiteaves, Cont. to Canadian Pal., I, 1891, p. 232.

Liorhynchus castaneus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 59, figs. 28, 29.

Loc. Lockhart and Mackenzie River, Canada; Eureka district, Nevada.

Hypothyris cuboides (Sowerby). Tully (Dev.).

Atrypa cuboides Sowerby, Trans. Geological Soc., 2d ser., V, 1840, pl. 6, fig. 24.—Vauxen, Geol. New York; Rep. Third Dist., 1842, p. 163, fig. 1.—Hall, *Ibidem*, Rep. Fourth Dist., 1843, pp. 215, 216, fig. 1.

Rhynchonella venustula Hall, Pal. New York, IV, 1867, p. 346, pl. 54A, figs. 24-43.—Williams, Bull. Geol. Soc. America, I, 1890, p. 493, pl. 13, figs. 4, 8, 14, 23, 24, 27, 29, 31-34.

Hypothyris cuboides and *venustula* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 200, pl. 60, figs. 49-55.

Loc. Europe; Tully, Ovid, Penn Yan, etc., New York.

Hypothyris emmonsi (Hall and Whitfield). Middle Devonian.

Rhynchonella emmonsi Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 247, pl. 3, figs. 4-8.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 157.

Rhynchonella intermedia Barris, Proc. Davenport Acad. Nat. Sci., II, 1878, p. 285, pl. 11, figs. 5, 6.

Rhynchonella cuboides Whiteaves, Cont. to Canadian Pal., I, 1891, p. 231.

Hypothyris emmonsi and *intermedia* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 200.

Loc. White Pine district, Nevada; Davenport, Iowa; Hay and Peace rivers, Canada.

IPHIDEA Billings. Genotype *Iphidea bella* Billings.

Iphidea Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 477;—Pal. Fossils, II, 1874, p. 76.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 100.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 97, 166;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 249.—Walcott, Proc. U. S. National Mus., XIX, 1897, p. 707.

Micromitra Meek, Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 479.

Kutorgina (pars) Dall, Bull. U. S. National Mus., 8, 1877, p. 40.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 101.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 90.

Paterina Beecher, American Jour. Science, 3d ser., XLI, 1891, p. 345.—Hall and Clarke, Eleventh Rep. N. Y. State Geologist, 1894, p. 247.

Iphidea alabamaensis Walcott. Middle Cambrian.

Iphidea alabamaensis Walcott, Proc. U. S. National Mus., XIX, 1897, p. 713, pl. 59, figs. 5, 5a.

Loc. Coosa Valley, Cherokee County, Alabama; near Rogersville, Tennessee.

Iphidea bella Billings. Lower Cambrian.

Iphidea bella Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 447, fig. 13;—Pal. Fossils, II, 1874, p. 76, fig. 44.—Walcott, Bull. U. S. Geol. Survey, 30, 1886,

Iphidea bella Billings—Continued.

p. 100, pl. 7, fig. 4;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 608, pl. 67, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. 1, 1892, p. 98, fig. 54, pl. 4, figs. 8, 9.

Loc. Trois Pistoles, below Quebec, Canada; Anse au Loup, Labrador.

Iphidea crenistria Walcott.

Middle Cambrian.

Iphidea crenistria Walcott, Proc. U. S. National Mus., XIX, 1897, p. 713, pl. 59, figs. 4-4b.

Loc. Grand Canyon of the Colorado.

Iphidea labradorica (Billings).

Lower Cambrian.

Obolus labradoricus Billings, Geol. Vermont, II, 1861, p. 946, fig. 345;—Pal. Fossils, I, 1861, p. 6, fig. 6;—Geol. of Canada, 1863, p. 284, fig. 291.

Kutorgina labradorica Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 104, pl. 9, fig. 2;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 609, pl. 69, fig. 3.

Paterina labradorica Beecher, American Jour. Sci., 3d ser., XLI, 1891, pp. 345, 356, pl. 17, figs. 1, 2.

Loc. Anse au Loup, Straits of Belle Isle, Labrador; Conception Bay, Newfoundland.

Iphidea labradorica swantonensis Walcott.

Lower Cambrian.

Kutorgina labradorica var. *swantonensis* Walcott, Proc. U. S. Nat. Mus., XII, 1889, p. 36;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 609, pl. 69, fig. 2.

Loc. East of Swanton and Highgate Springs, Vermont.

Iphidea logani Walcott.

Middle Cambrian.

Iphidea logani Walcott, Proc. U. S. National Mus., XIX, 1897, p. 711, pl. 59, figs. 2-2b.

Loc. Trois Pistoles, Quebec, Canada.

Iphidea ornatella Hall and Clarke=*I. superba*.**Iphidea pannulus** (White).

Lower and Middle Cambrian.

Trematis pannulus White, Wheeler's Expl. Survey west 100th Merid., Prel. Rep., 1874, p. 6.

Trematis? *pannulus* White, *Ibidem*, Final Rep., IV, 1875, p. 36, pl. 1, fig. 4.

Kutorgina pannula Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 105, pl. 7, fig. 3; pl. 8, fig. 2;—American Jour. Sci., 3d ser., XXXIV, 1887, p. 190, pl. 1, fig. 14;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 609, pl. 69, fig. 5.

Loc. Pioche, Nevada; Wasatch Mountains, Utah; Mount Stephan and Castle Mountain, British Columbia; Washington County, New York; Island of Orleans in the Sillery conglomerate.

Iphidea pealei Walcott.

Middle Cambrian.

Iphidea pealei Walcott, Proc. U. S. National Mus., XIX, 1897, p. 712, pl. 59, figs. 3-3c.

Loc. Near Hillsdale, Montana.

Iphidea prospectensis Walcott.

Lower Cambrian.

Kutorgina prospectensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 19, pl. 9, fig. 1;—Bull. U. S. Geol. Survey, 30, 1886, p. 106, pl. 9, fig. 3;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 610, pl. 69, fig. 4.

Loc. Eureka district, Nevada.

Iphidea sculptilis Meek.

Upper Cambrian.

Iphidea (??) *sculptilis* Meek, Sixth Ann. Rep. U. S. Geol. Survey Territories, 1873, p. 479.

Micromitra sculptilis Meek, *Ibidem*, 1873, p. 479.

Kutorgina minutissima Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 207, pl. 1, figs. 11, 12.

Iphidea sculptilis Meek—Continued.

Kutorgina sculptilis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 20, pl. 1, fig. 7; pl. 9, fig. 7.

Loc. Gallatin City, Montana; Eureka district, Nevada.

Obs. The ventral pedicle foramen in this species, the genotype of *Micromitra*, is partially closed posteriorly, but otherwise does not seem to differ generically from *Iphidea*.

Iphidea stissingensis (Dwight).

Middle Cambrian.

Kutorgina stissingensis Dwight, American Jour. Sci., 3d ser., XXXVIII, 1889, p. 145, pl. 6, figs. 5-8;—Trans. Vassar Brothers' Inst., V, 1891, p. 105, pl. 1, figs. 5-8.

Loc. Stissing Mountain, Dutchess County, New York.

Iphidea superba Walcott.

Middle Cambrian.

Iphidea enf. ? *ornatella* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4, figs. 6, 7.

Iphidea superba Walcott, Proc. U. S. National Mus., XIX, 1897, p. 711, pl. 59, figs. 1-1c.

Loc. Grand Canyon of the Colorado.

Isogramma Meek and Worthen = *Anlacorhynchus*.**Isogramma millipunctata** Meek and Worthen = *Aulacorhynchus millipunctatum*.**KINGENA** Davidson.Genotype *Terebratula lima* Defrance.

Kingena Davidson, Mon. British Cret. Brach., Pal. Soc., I, 1853, p. 42.

Kingena leonensis (Conrad).

Washita (Lower Cret.).

Terebratula leonensis Conrad, Emory's Rep. U. S. and Mexican Bound. Survey, I, 1857, p. 164, pl. 21, fig. 2.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 18.

Loc. Leon Springs, Texas; also Denison, Texas (Hill).

Kingena wacoensis (Roemer).

Washita (Lower Cret.).

Terebratula sp. undet. Roemer, Texas, 1849, p. 408.

Terebratula wacoensis Roemer, Kreidebildung von Texas, 1852, p. 81, pl. 6, fig. 2.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 18.

Terebratula choctawensis Shumard, Marey's Rep. Red River Louisiana, 1854, p. 195, pl. 2, fig. 3.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 19.

?*Terebratula wacoensis* Whiteaves, Mesozoic Foss., Geol. Surv. Canada, I, 1879, p. 177.

Loc. Near New Braunfels, Texas; Trent River, Vancouver Island. "I have traced its continuity from the Red River to the Rio Grande" (Hill).

Obs. Gabb is correct in regarding *T. choctawensis* as a synonym for *T. wacoensis*. "The Vancouver specimens are doubtful" (Stanton).

Klitambonites Pander = *Clitambonites*.**Koninekiana americana** Swallow = *Productus swallowi*.**KUTORGINA** Billings.Genotype *Obolella cingulata* Billings.

Kutorgina Billings (partim), Geol. Vermont, II, 1861, p. 948, figs. 347-349.—Billings (partim), Pal. Fossils, I, 1861, p. 9, figs. 8-10.—Dall, Bull. U. S. Nat. Mus., 8, 1877, p. 40.—Walcott (partim), Bull. U. S. Geol. Survey, 30, 1886, p. 101.—Beecher, American Jour. Sci., 3d ser., XL1, 1891, p. 345.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 90, 166, 183;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 247.

- Kutorgina cingulata** Billings. Lower Cambrian.
Obolella (*Kutorgina*) *cingulata* Billings, Geol. Vermont, II, 1861, p. 948, figs. 347-349;—Pal. Fossils, I, 1861, p. 8, figs. 8-10.
Obolella cingulata Billings, Geol. Canada, 1863, p. 284, fig. 287.
Kutorgina cingulata Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 102, pl. 9, fig. 1.—Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 345.—Walcott, Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 609, pl. 69, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 92, figs. 47-49; pl. 4, figs. 10-17.
Loc. Anse au Loup, Labrador; Swanton and Georgia, Vermont; Malvern Hills, England; Island of Bornholm, Sweden.
- Kutorgina labradorica** Walcott=*Iphidea labradorica*.
Kutorgina labradorica var. *swantonensis* Walcott=*Iphidea labradorica swantonensis*.
Kutorgina latourensis Matthew=*Billingsella latourensis*.
Kutorgina minutissima Hall and Whitfield=*Iphidea sculptilis*.
Kutorgina pannula White=*Iphidea pannulus*.
Kutorgina prospectensis Walcott=*Iphidea prospectensis*.
- ?**Kutorgina pterineoides** Matthew. Middle Cambrian.
Kutorgina ? *pterineoides* Matthew, Trans. Royal Soc. Canada, III, 1886, p. 43, pl. 5, fig. 19.
Loc. Hanford Brook and St. Martins, New Brunswick.
Obs. It is not certain that this species is a brachiopod. May be the operculum of a pteropod.
- Kutorgina sculptilis** Walcott=*Iphidea sculptilis*.
Kutorgina stissingensis Dwight=*Iphidea stissingensis*.
Kutorgina whitfieldi Walcott=*Billingsella whitfieldi*.
- LEIORHYNCHUS** Hall. Genotype *Orthis quadricostata* Vanuxem.
Leiorhynchus Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 75;—Twentieth Rep. Ibidem, 1867, p. 272;—Pal. New York, IV, 1867, p. 355.—Waagen, Palaeontologica Indica, Ser. XIII, I, 1883, p. 411.
Liorhynchus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 193;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 827.
Obs. A subgenus of *Camartoechia*, differing only in exterior ornamentation.
- Leiorhynchus boonense** (Shumard). Burlington (L. Carb.).
Rhynchonella boonensis Shumard, Geol. Rep. Missouri, 1855, p. 205, pl. C, fig. 6.—Keyes, Geol. Survey Missouri, V, 1895, p. 101.
Liorhynchus boonensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 60, fig. 35.
Loc. Columbia, Boone County, and Cooper County, Missouri.
- Leiorhynchus dubium** Hall. Marcellus (Dev.).
Leiorhynchus dubius Hall, Pal. New York, IV, 1867, p. 364, pl. 56, figs. 22-25.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 59, figs. 6, 7.
Rhynchonella dubia Tschernyschew, Mém. Comité Géologique de St. Petersburg, III, 3, 1887, p. 90, pl. 14, fig. 7.
Loc. New York; Urals of Russia.
- Leiorhynchus globuliforme** (Vanuxem). Chemung (Dev.).
Atrypa globuliformis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 182, fig. 2.
Leiorhynchus globuliformis Hall, Pal. New York, IV, 1867, p. 364, pl. 57, figs. 26-29.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 59, figs. 23-27.
Loc. Otsego County, New York.

- Leiorhynchus greeneanum** (Ulrich). Waverly (L. Carb.).
Rhynchonella greenana Ulrich, Cont. American Pal., I, 1886, p. 26, pl. 3, fig. 1.
Liorhynchus greenianus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194.
Pugnax greenianus Hall and Clarke, *Ibidem*, 1895, pl. 60, figs. 36-38.
Loc. Near New Albany, Indiana.
- Leiorhynchus (?) hecate** Clarke. Genesee (Dev.).
Leiorhynchus (?) hecate Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 31, pl. 3, fig. 4.
Loc. Ontario County, New York.
Obs. Probably the same as *Spirifer pluto* Clarke.
- Leiorhynchus iris** Hall. Chemung (Dev.).
Leiorhynchus iris Hall, Pal. New York, IV, 1867, p. 360, pl. 56, figs. 41-43.
Loc. Rockford, Iowa.
- Leiorhynchus kelloggi** Hall. Hamilton (Dev.).
Leiorhynchus kelloggi Hall, Pal. New York, IV, 1867, p. 361, pl. 57, figs. 1-12.—
Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 59, figs. 18-20, 32, 33.
Leiorhynchus kelloggi? Whitfield, Geol. Wisconsin, IV, 1882, p. 334, pl. 26, fig. 9.
Rhynchonella kelloggi Tschernyschew, Mém. Comité Géologique de St. Petersburg, III, 3, 1887, p. 91, pl. 14, fig. 14.
Loc. Ohio; New York; Milwaukee, Wisconsin; Urals of Russia.
- Leiorhynchus laura** (Billings). Marcellus-Hamilton (Dev.).
Rhynchonella? laura Billings, Canadian Jour., V, May, 1860, p. 273, figs. 26-28;—
Geol. Canada, 1863, p. 384, fig. 418.
Leiorhynchus multicosta Hall, Thirteenth Rep. New York State Cab. Nat. Hist.,
December, 1860, p. 85, figs. 14, 15, on p. 94;—Pal. New York, IV, 1867, p. 358,
pl. 56, figs. 26-40.
Leiorhynchus laura Billings, Canadian Nat. Geol., n. ser., VII, 1874, p. 240.
Rhynchonella (*Leiorhynchus*) *laura* Walcott, Mon. U. S. Geol. Survey, VIII,
1884, p. 159.
?*Rhynchonella multicosta* Tschernyschew, Devon. im Donetz Becken, 1886, pl.
15, figs. 1-3;—Mém. Comité Géologique de St. Petersburg, III, 3, 1887, p. 92.
Liorhynchus multicosta and *laura* Hall and Clarke, Pal. New York, VIII, Pt.
II, 1893, p. 194, pl. 59, figs. 8-10, 13-17.
Loc. Thedford and Bosanquet, Ontario; New York; Eureka district, Nevada;
?Russia.
- Leiorhynchus lesleyi** Hall and Clarke. Upper Devonian.
Liorhynchus lesleyi Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 368,
pl. 59, figs. 34-36.
Loc. "Pennsylvania."
- Leiorhynchus limitare** (Vanuxem). Marcellus (Dev.).
Orthis limitaris Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 146, fig. 3.
Atrypa limitaris Hall, *Ibidem*, Rep. Fourth Dist., 1843, p. 182, fig. 11.
Leiorhynchus limitaris Hall, Thirteenth Rep. New York State Cab. Nat. Hist.,
1860, p. 85;—Pal. New York, IV, 1867, p. 356, pl. 56, figs. 6-21.—Whitfield,
Annals New York Acad. Sci., V, 1891, p. 550, pl. 11, fig. 11;—Geol. Ohio,
VII, 1895, p. 444, pl. 7, fig. 11.
Rhynchonella limitaris Tschernyschew, Mémoires du Comité Géologique de St.
Petersburg, 1887, III, 3, pl. 14, fig. 5.
Liorhynchus limitaris Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194,
pl. 59, figs. 12, 35.
Loc. Schoharie, Marcellus, Avon, etc., New York; Delaware County, Ohio (Whit-
field); Urals of Russia.

- Leiorhynchus mesicostale** Hall. Portage-Chemung (Dev.).
Atrypa mesacostalis Hall, Geol. New York; Rep. Fourth Dist., 1843, Tables Organic Remains, 64, fig. 1.
Leiorhynchus mesacostalis Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 86, fig. 1;—Pal. New York, IV, 1867, p. 362, pl. 67, figs. 18-25.—Kindle, Bull. American Pal., 6, 1896, p. 37.
Rhynchonella mesacostalis Tschernyschew, Mémoires du Comité Géologique de St. Petersburg, 1887, p. 91, pl. 14, figs. 3, 4.
Liorhynchus mesacostalis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 59, figs. 11, 12.
Loc. Ithaca, Elmira, Bath, etc., New York; Urals of Russia.
- Leiorhynchus multicosta** Hall=L. laura.
- Leiorhynchus mysia** Hall. Marcellus (Dev.).
Leiorhynchus mysia Hall, Pal. New York, IV, 1867, p. 357, pl. 56, figs. 1-5.
Loc. Schoharie, New York.
- Leiorhynchus nevadaense** Walcott. Middle Devonian.
Rhynchonella (*Leiorhynchus*) *nevadensis* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 157, pl. 14, fig. 9.
Loc. Eureka district, Nevada.
- Leiorhynchus newberryi** Hall. Waverly (L. Carb.).
Leiorhynchus newberryi Hall, Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 240, pl. 11, figs. 25-27.
Liorhynchus newberryi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 59, figs. 37, 38.
Loc. Kelloggsville, Ashtabula County, Ohio.
- Leiorhynchus quadricostatum** (Vanuxem). Genesee (Dev.).
Orthis quadricostata Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 168, fig. 2.
Atrypa (*Orthis*) *quadricostata* Hall, Ibidem, Rep. Fourth Dist., 1843, p. 223, fig. 2.
Leiorhynchus quadricostata Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 86;—Pal. New York, IV, 1867, p. 357, pl. 56, figs. 44-49.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 24.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 71.
Leiorhynchus quadricostata? Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 79, pl. 3, fig. 9.
Liorhynchus quadricostatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 193, pl. 59, figs. 21, 22.
Loc. Ithaca, Seneca Lake, Cayuga Lake, New York; Falls of Ohio; White Pine district, Nevada.
- Leiorhynchus robustum** Hall and Clarke. Chemung (Dev.).
Liorhynchus robustus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pl. 59, figs. 30, 31.
Loc. Steuben County, New York.
- Leiorhynchus sesquiplicatum** A. Winchell. Hamilton (Dev.).
Leiorhynchus sesquiplicatus A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 95.
Loc. Grand Traverse district, Michigan.
- Leiorhynchus sinuatum** Hall. Chemung (Dev.).
Leiorhynchus sinuatus Hall, Pal. New York, IV, 1867, p. 362, pl. 57, figs. 13-17.
Rhynchonella (*Leiorhynchus*) *sinuatus* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 158, pl. 14, fig. 5.
Liorhynchus sinuatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194.
Loc. Ithaca and Chemung Narrows, New York; Eureka district, Nevada.

LEPTÆNA Dalman.

Genotype *Productus rugosa* Hisinger = *Conchita rhomboidalis* Wilckens.

Leptæna Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, pp. 93, 94.—King, Mon. Permian Foss., Pal. Soc., 1850, p. 104.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 276.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 409.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 277.

Leptagonia McCoy, Carb. Foss. Ireland, 1844, p. 116.

Plectambonites Ehlert, Fischer's Manuel Conchyliologie, 1887, p. 1283.

Leptæna alternata Conrad = *Rafinesquina alternata*.

Leptæna alternistriata Hall = *Rafinesquina alternata alternistriata*.

Leptæna barabuensis Whitfield = *Syntrophia barabuensis*.

Leptæna bipartita Hall = *Strophomena bipartita*.

Leptæna camerata Hall = *Rafinesquina camerata*.

Leptæna charlottæ Winchell and Schuchert. Trenton (Ord.).

Leptæna charlottæ Winchell and Schuchert, American Geol., IX, April 1, 1892, p. 288;—Minnesota Geol. Survey, III, 1893, p. 410, pl. 32, figs. 1-5.

Strophomena halli Sardeson, Bull. Minnesota Acad. Nat. Sci., III, April 9, 1892, p. 334, pl. 4, figs. 36-38.

Loc. Minneapolis and St. Paul, Minnesota.

Leptæna concava Hall = *Leptænisca concava*.

Leptæna corrugata Hall = *Strophomena corrugata*.

Leptæna decipiens Billings = *Leptella decipiens*.

Leptæna deflecta Hall = *Dinorthis deflecta*.

Leptæna deltoidea = *Rafinesquina deltoidea* and *R. minnesotaensis*.

Leptæna depressa Hall = *L. rhomboidalis*.

Leptæna fasciata Hall = *Rafinesquina fasciata*.

Leptæna incrassata Hall = *Rafinesquina incrassata*.

Leptæna indenta Conrad = *Stropheodonta indenta*.

Leptæna julia Shaler = *Strophomena julia*.

Leptæna laticosta de Verneuil = *Tropidoleptus carinatus*.

Leptæna melita Hall and Whitfield = *Dalmanella melita*.

Leptæna mesacosta Shumard = *Rafinesquina mesicosta*.

Leptæna minnesotensis Sardeson = *Plectambonites sericeus*.

Leptæna nucleata Hall = *Anoplia nucleata*.

Leptæna obscura Hall = *Rafinesquina obscura*.

Leptæna orthididea Hall = *Strophonella orthididea*.

Leptæna patenta Hall = *Strophonella patenta*.

Leptæna planoconvexa Hall = *Strophomena planiconvexa*.

Leptæna planumbona Hall = *Strophomena rugosa*.

Leptæna plicatella Ulrich = *Plectambonites plicatellus*.

Leptæna plicifera Hall = *Dalmanella?* *plicifera*.

Leptæna præcosis Sardeson = *Plectambonites sericeus*.

Leptæna profunda Hall = *Stropheodonta profunda*.

Leptæna prolongata Foerste = *Plectambonites transversalis* prolongatus.

Leptæna punctulifera Conrad = *Strophonella punctulifera*.

Leptæna quadrilatera Shaler = *L. rhomboidalis*.

Leptæna reedens Sardeson = *Plectambonites sericeus*.

Leptæna recta Hall = *Dinorthis deflecta*.

***Leptæna rhomboidalis* (Wilckens). Trenton-Waverly (Ord.-L. Carb.).**

Conchita rhomboidalis Wilckens, *Nachricht von selten Versteinerungen*, 1769, p. 77, pl. 8, figs. 43, 44.

Strophomena undulosa Conrad, *Fifth Ann. Rep. Geol. Survey New York*, 1841, p. 54.

Strophomena depressa Vanuxem, *Geol. New York; Rep. Third Dist.*, 1842, p. 79, fig. 5.—Hall, *Ibidem*, *Rep. Fourth Dist.*, 1843, p. 77, fig. 5; p. 104, fig. 2.—Billings, *Canadian Nat. Geol.*, I, 1856, p. 59, pl. 1, fig. 5.—Roemer, *Sil. Fauna west. Tennessee*, 1860, p. 65, pl. 5, fig. 2.

Strophomena undulatus Vanuxem, *Geol. New York; Rep. Third Dist.*, 1842, p. 139, fig. 3.

Strophomena undulata Hall, *Ibidem*, *Rep. Fourth Dist.*, 1843, p. 175, fig. 3.—Yandell and Shumard, *Cont. Geol. Kentucky*, 1847, p. 11.

Productus? sulcatus Castelman, *Essai Syst. Sil. l'Amérique Septentrionale*, 1843, p. 39, pl. 13, fig. 7.

Productus sulcifer de Verneuil, *Ibidem*, 1843, p. 39.

Leptæna tenuistriata Hall, *Pal. New York*, I, 1847, p. 108, pl. 31A, fig. 4.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pl. 8, figs. 12-16.

Leptæna depressa Hall, *Pal. New York*, II, 1852, p. 62, pl. 21, fig. 8; p. 257, pl. 53, fig. 6.—Rogers, *Geol. Pennsylvania*, II, Pt. II, 1858, p. 823, fig. 630.

Strophomena rugosa Hall, *Pal. New York*, III, 1859, p. 195, pl. 19, fig. 1.

Strophomena rhomboidalis Billings, *Canadian Jour.*, VI, 1861, p. 336, figs. 111, 112;—*Geol. Canada*, 1863, p. 311, fig. 314; p. 367, fig. 373;—*Proc. Portland Soc. Nat. Hist.*, 1863, p. 107, pl. 3, fig. 1.—Hall, *Pal. New York*, IV, 1867, p. 76, pl. 12, figs. 16-18; p. 414, pl. 15, figs. 15, 16.—Meek and Worthen, *Geol. Survey Illinois*, III, 1868, p. 426, pl. 10, fig. 7.—Meek, *Pal. Ohio*, I, 1873, p. 75, pl. 5, fig. 6.—Billings, *Pal. Foss.*, II, 1874, p. 27.—White, *Wheeler's Expl. Survey west 100th Merid.*, IV, 1875, p. 85, pl. 5, fig. 5.—Hall and Whitfield, *King's U. S. Geol. Expl. 40th Parl.*, IV, 1877, p. 253, pl. 4, fig. 4.—Hall, *Twenty-eighth Rep. New York State Mus. Nat. Hist.*, 1879, p. 151, pl. 22, figs. 4-10.—Miller, *Jour. Cincinnati Soc. Nat. Hist.*, IV, 1881, p. 1.—Hall, *Eleventh Rep. State Geol. Indiana*, 1882, p. 288, pl. 22, figs. 4-10;—*Second Ann. Rep. New York State Geol.*, 1883, pl. 38, figs. 17-31.—Walcott, *Mon. U. S. Geol. Survey*, VIII, 1884, p. 118.—Beecher and Clarke, *Mem. New York State Mus.*, I, 1889, p. 18, pl. 2, figs. 1-13.—Nettelroth, *Kentucky Fossil Shells*, *Mem. Kentucky Geol. Survey*, 1889, p. 150, pl. 18, figs. 1-3.—Foster, *Proc. Boston Soc. Nat. Hist.*, XXIV, 1890, p. 298.—Beecher, *American Jour. Sci.*, 3d ser., XLI, 1891, p. 357, pl. 17, figs. 18-21.—Herrick, *Geol. Ohio*, VII, 1895, pl. 20, fig. 6.

Strophomena analoga Davidson, *Quart. Jour. Geol. Soc. London*, XIX, 1863, p. 173, pl. 9, fig. 18.—Dawson, *Acadian Geol.*, 3d ed., 1878, p. 295, fig. 95.

Leptæna quadrilatera Shaler, *Bull. Mus. Comp. Zool.*, 4, 1865, p. 65.

Strophomena gibbosa James, *Cincinnati Quart. Jour. Sci.*, I, 1874, p. 333.

Strophomena tenuistriata Miller, *Ibidem*, II, 1875, p. 55.—Hall, *Second Ann. Rep. New York State Geol.*, 1883, pl. 38, figs. 12-16.

Leptæna rhomboidalis Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 279, pl. 8, figs. 17-31; pl. 15A, figs. 40-42; pl. 20, figs. 21-24.—Foster, *Geol. Ohio*, VII, 1895, p. 566.

Leptæna (Strophomena) rhomboidalis, Beecher, *American Jour. Sci.*, 3d ser., XLIV, 1892, p. 150, pl. 1, figs. 7-9.

Plectambonites rhomboidalis Keyes, *Geol. Survey Missouri*, V, 1895, p. 70, fig. 6. *Loc.* Generally distributed in the above-given formations throughout America and Europe.

Leptaena rhomboidalis ventricosa Hall. Oriskany (Dev.).

Strophomena depressa var. *ventricosa* Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 55.

Strophomena rugosa var. *ventricosa* Hall, Pal. New York, III, 1859, p. 417, pl. 94, figs. 2, 3.

Leptaena rhomboidalis var. *ventricosa* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15A, fig. 43.

Loc. Albany and Schoharie counties, New York; Cumberland, Maryland; Cayuga, Ontario.

Leptaena rugosa = *L. rhomboidalis*.

Leptaena saxea Sardeson = *Plectambonites sericeus*.

Leptaena sericea Sowerby = *Plectambonites sericeus*.

Leptaena sordida Billings = *Leptella sordida*.

Leptaena(?) stelzneri Kayser. Ordovician.

Leptaena stelzneri Kayser, Palaeontographica, Suppl., III, 1876, p. 21, pl. 3, fig. 21.
Loc. Guaco, Argentine Republic.

Obs. Since this species has a high ventral area and a perforated deltidium it is probably a *Clitambonites*.

Leptaena striata Hall = *Strophonella striata*.

Leptaena subplana Hall = *Orthotheses subplanus*.

Leptaena subquadrata Hall = *Christiania subquadrata*.

Leptaena subtenta Hall = *Strophomena trentonensis* or *S. rugosa* subtenta.

Leptaena sulcata de Verneuil = *Strophomena sulcata*.

Leptaena tenuilineata Hall = *Rafinesquina tenuilineata*.

Leptaena tenuistriata Hall = *L. rhomboidalis*.

Leptaena transversalis = *Plectambonites transversalis*.

Leptaena transversalis var. *alabamaensis* Foerste = *Plectambonites transversalis alabamaensis*.

Leptaena trilobata Owen = *Strophomena trilobata*.

Leptaena unicastata Meek and Worthen. Lorraine (Ord.).

Leptaena (n. sp.?) Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 2B, fig. 3. [See specimen in U. S. Nat. Mus., Cat. Invert. Foss., 17908.]

Strophomena unicastata Meek and Worthen, Geol. Survey Illinois, III, 1863, p. 335, pl. 4, fig. 11.—Whitfield, Geol. Wisconsin, IV, 1882, p. 262, pl. 12, fig. 14.

Rafinesquina unicastata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15A, fig. 39; pl. 20, fig. 25.

Leptaena unicastata Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 411, pl. 32, figs. 6-9.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 174.

Loc. Savanna and Wilmington, Illinois; Delatfield and Iron Ridge, Wisconsin; Spring Valley and Granger, Minnesota; Lattners, Iowa; Rapids of the Nelson River, Lake Winnipeg, Manitoba.

Leptaena variolata d'Orbigny = *Chonetes variolatus*.

Leptaena vicina Castelnau = *Chonetes vicinus*.

LEPTÆNISCA Beecher. Genotype *Leptaena concava* Hall.

Leptænisca Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 239, pl. 9, figs. 1-5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 322;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 291.

- Leptænisca adnascens** Hall and Clarke. Lower Helderberg (Dev.).
Leptænisca adnascens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 301, 352, pl. 15A, figs. 22, 23.
Loc. Near Clarksville, New York.
- Leptænisca concava** Hall. Lower Helderberg (Dev.).
Leptænisca concava Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 47;—Pal. New York, III, 1859, p. 197, pl. 18, fig. 2.
Leptæna? (subgenus?) *concava* Hall, Second Ann. Rep. New York State Geol., 1883, pl. 46, figs. 30, 31.
Leptænisca concava Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 238, pl. 9, figs. 1-5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 300, pl. 15, figs. 30, 31; pl. 15A, figs. 19-21.
Loc. Albany County, New York; Decatur County, Tennessee.
- Leptænisca tangens** Hall and Clarke. Lower Helderberg (Dev.).
Leptænisca tangens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 301, 352, pl. 15A, figs. 24-30.
Loc. Near Clarksville, New York.
- LEPTELLA** Hall and Clarke. Genotype *Leptæna sordida* Billings.
Leptella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 293;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 277.
- Leptella decipiens** (Billings). Calciferous (Ord.).
Leptæna decipiens Billings, Pal. Fossils, I, 1862, p. 74, fig. 67; p. 219;—Geol. Canada, 1863, p. 231, fig. 243.
Leptella decipiens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 294.
Loc. Point Levis, Canada; Portland Creek, Newfoundland.
- Leptella sordida** (Billings). Calciferous (Ord.).
Leptæna sordida Billings, Pal. Fossils, I, 1862, p. 73, fig. 66;—Geol. Canada, 1863, p. 231, fig. 242.
Leptella sordida Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 293, pl. 15A, figs. 12-16.
Loc. Point Levis, Canada.
- LEPTOBOLUS** Hall. Genotype *L. lepis* Hall.
Leptobolus Hall, Description n. sp. Foss. from Hudson River Group, 1871, p. 3;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 226.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 73, 165;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 241.
- Leptobolus grandis** Matthew. Lowest Ordovician.
Leptobolus grandis Matthew, Trans. Royal Soc. Canada, X, 1874, p. 91, pl. 16, fig. 7.
Loc. Hardingtonville, New Brunswick.
- Leptobolus insignis** Hall. Utica (Ord.).
Leptobolus insignis Hall, Descrip. n. sp. Foss. from Hudson River Group, 1871, p. 3, pl. 3, fig. 17;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 227, pl. 7, fig. 17.—Nicholson, Pal. Province Ontario, 1875, p. 85.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 74, pl. 3, figs. 1-6.
Loc. Middleville, Utica, etc., New York; Ottawa, Canada; Cincinnati, Ohio.
- Leptobolus lepis** Hall. Utica (Ord.).
Leptobolus lepis Hall, Description n. sp. Foss. from Hudson River Group, 1871, p. 3, pl. 3, figs. 19, 20;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 226, pl. 7, figs. 19, 20.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 69, pl. 1, figs. 10, 11.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 11.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 74, pl. 3, figs. 8-10.
Loc. Cincinnati, Ohio.

Leptobolus occidentalis Hall.

Maquoketa (Ord.).

Leptobolus occidentalis Hall, Description n. sp. Foss. from Hudson River Group, 1871, p. 3, pl. 3, fig. 18;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 227, pl. 7, fig. 18.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 3, fig. 7.

Loc. Hawleys Mills, Iowa; Platteville, Wisconsin; Ottawa, Canada (Ami).

Leptocœlia Hall = *Anoplotheca*.**Leptocœlia propria** Hall = *Anoplotheca flabellites*.**Leptocœlia disparilis** Hall = *Atrypina disparilis*.**Leptocœlia imbricata** Hall = *Atrypina imbricata*.**LEPTOSTROPHIA** Hall and Clarke.Genotype *Stropheodonta magnifica* Hall.

Leptostrophia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 281.

Obs. This is a subdivision of *Stropheodonta*. The following species have been referred to it: *S. magnifica*, *S. perplana*, *S. textilis*, *S. beckeii*, *S. magniventra*, *S. junia*, *S. irene*, *S. blainvillei*, and *S. tullia*.

LINDSTRØMELLA Hall and Clarke. Genotype *L. aspidium* H. and C.

Lindstrømella Hall and Clarke, Extract Pal. New York, VIII, 1890, p. 134;—Pal. New York, VIII, Pt. I, 1892, p. 134;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 257.

Lindstrømella aspidium Hall and Clarke.

Hamilton (Dev.).

Lindstrømella aspidium Hall and Clarke, Extract Pal. New York, VIII, 1890, p. 134, pl. 4E, figs. 25–28;—Pal. New York, VIII, Pt. I, 1892, pp. 134, 178, pl. 4E, figs. 25–28.

Loc. Leonardsville, Hamilton, Darien, etc., New York.

LINGULA Bruguière.Genotype *Lingula anatina* Lamarek.

Lingula Bruguière, Encyclopédie Méthodique, I, 1792, pl. 250.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 68.—Hall, Pal. New York, IV, 1867, p. 5.—Dall, American Jour. Conch., VI, 1870, pp. 153, 154.—Meek, Hayden's U. S. Geol. Survey Terr., IX, 1876, p. 7.—Dall, Bull. U. S. Nat. Museum, 8, 1877, p. 43.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 2, 161.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 338.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 226.

Lingula acuminata Hall = *Lingulepis acuminata*.**Lingula acutangula** Roemer = *Lingulepis acutangulus*.**Lingula acutirostris** Hall.

Clinton (Sil.).

Lingula acutirostra Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 77, fig. 9 on p. 76;—Pal. New York, II, 1852, p. 56, pl. 20, fig. 5.

Loc. Wolcott, New York.

Obs. Based upon a single specimen now lost.

Lingula æqualis Hall.

Trenton (Ord.).

Lingula æqualis Hall, Pal. New York, I, 1847, p. 95, pl. 30, fig. 3.—Walcott, Proc. U. S. Nat. Mus., XI, 1888, p. 480, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 9, fig. 4.

Loc. Middleville, Trenton Falls, and Rome, New York.

Lingula alba-pinensis Walcott.

Upper Devonian.

Lingula alba-pinensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 108, pl. 2, fig. 1.

Loc. White Pine district, Nevada.

Lingula alveata Hall=*Dignomia alveata*.

Lingula ampla Owen=*Lingulella ampla*.

Lingula antiqua Emmons=*Lingulepis acuminata*.

Lingula antiqua Hall, 1851, 1862, Hayden, 1863 (non Hall, 1847)=*Lingulepis pinniformis*.

Lingula antiquata Emmons=*Lingulepis acuminata*.

Lingula artemis Billings.

Gaspé No. 5 (L. Dev.).

Lingula artemis Billings, Pal. Fossils, II, 1874, p. 14, fig. 4.

Loc. Gaspé, Cape Bon Ami.

Lingula atra Herrick.

Waverly (L. Carb.).

Lingula atra Herrick, Bull. Denison Univ., IV, 1888, pp. 13, 16, pl. 10, fig. 30;—

Geol. Ohio, VII, 1895, pl. 22, figs. 5, 6.

Loc. Cuyahoga River, Ohio.

Lingula attenuata Hall=*Glossina trentonensis*.

Lingula aurora Hall=*Lingulella aurora*.

Lingula aurora var. Hall=*Lingulella stoneana*.

Lingula belli Billings.

Chazy (Ord.).

Lingula belli Billings, Canadian Nat. Geol., IV, 1859, p. 431, figs. 7, 8;—Geol.

Canada, 1863, p. 124, fig. 47.

Loc. Island of Montreal, Allumette Island, Canada.

Lingula beltrami Winchell and Schuchert.

Lorraine (Ord.).

Lingula beltrami Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 351, figs. 25a, 25b.

Loc. Spring Valley, Minnesota.

Lingula bicarinata Ringueberg.

Niagara (Sil.).

Lingula bicarinata Ringueberg, Proc. Acad. Nat. Sci. Philadelphia, 1884, p. 149,

pl. 3, fig. 8.—Miller, N. American Geol. Pal., 1889, p. 349.

Loc. Lockport, New York.

Lingula billingsana Whitcaves=*Lingulella billingsana*.

Lingula bisulcata Ulrich.

Utica (Ord.).

Lingula bisulcata Ulrich, American Geologist, III, 1889, p. 380, fig. 2, on p. 378.

Loc. Ludlow, Kentucky.

Lingula brevirostris Meek and Hayden.

Jurassic.

Lingula brevirostris Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1858,

p. 50;—*Ibidem*, 1860, p. 419;—Pal. Upper Missouri, Smithsonian Cont. to

Knowl., XIV, 172, 1865, p. 69, pl. 3, fig. 3.—Whitfield, Powell's Geol. Geogr.

Survey Rocky Mt. Region, 1880, p. 346, pl. 3, figs. 4, 5.

Loc. Black Hills, Dakota.

Lingula briseis Billings.

Trenton (Ord.).

Lingula briseis Billings, Pal. Fossils, I, 1862, p. 48, fig. 52;—Geol. Canada, 1863,

p. 161, fig. 136.

Loc. Bayonne River, Canada.

Lingula (?) *calumet* N. H. Winchell.

? Cambrian.

Lingula calumet N. H. Winchell, Thirteenth Ann. Rep. Geol. Nat. Hist. Survey

Minnesota, 1885, p. 65.—Miller, N. American Geol. Pal., 1889, p. 349.

Loc. Pipestone, Minnesota.

Obs. It is not certain that these specimens are organic.

- Lingula(?) canadaensis** Billings. Trenton and Lorraine (Ord.).
Lingula canadensis Billings, Pal. Fossils, I, 1862, p. 114, fig. 95;—Geol. Canada, 1863, p. 210, fig. 209.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 27.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 352, fig. 26.
Loc. Anticosti; in the Galena at Mantorville and Hader, Minnesota.
- Lingula carbonaria** Shumard. Upper Carboniferous.
Lingula carbonaria Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 215.
Loc. Clarke County, Missouri.
- Lingula centrilineata** Hall. Lower Helderberg (Dev.).
Lingula centrilineata Hall, Pal. New York, III, 1859, p. 155, pl. 9, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 15.
Loc. Albany County, New York.
- Lingula ceryx** Hall. Schoharie (Dev.).
Lingula ceryx Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 19;—Pal. New York, IV, 1867, p. 5, pl. 2, fig. 1.
Loc. Clarkesville, New York.
- Lingula cincinnatiensis** Hall and Whitfield. Lorraine (Ord.).
Lingulella (*Dignomia*) *cincinnatiensis* Hall and Whitfield, Pal. Ohio, II, 1875, p. 67, pl. 1, figs. 2, 3.
Lingulella cincinnatiensis Miller, American Pal. Foss., 1877, p. 115.
Loc. Cincinnati, Ohio.
- Lingula clathrata** Winchell and Schuchert. Trenton (Ord.).
Lingula clathrata Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 345, pl. 29, fig. 42.
Loc. St. Paul, Minnesota.
- Lingula clintoni** Vanuxem. Clinton (Sil.).
Lingula oblonga Conrad (non Eichwald), Third Ann. Rep. Geol. Survey New York, 1839, p. 65.—Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 77, fig. 4;—Pal. New York, II, 1852, p. 54, pl. 20, fig. 1.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 823, fig. 629.
Lingula clintoni Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 79, fig. 4.
Lingula suboblonga d'Orbigny, Prodrôme Pal. Stratig., 1850, p. 34.
Loc. Cayuga County, New York; Pennsylvania; Hamilton, Ontario; Arisaig, Nova Scotia (Honeyman and Ami).
- Lingula cobourgensis** Billings. Trenton (Ord.).
Lingula cobourgensis Billings, Pal. Fossils, I, 1862, p. 50, fig. 54;—Geol. Canada, 1863, p. 161, fig. 132.
Lingula cobourgensis? Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 346, pl. 29, fig. 12.
Loc. Cobourg and Colingwood, Canada; ?Minneapolis, Minnesota; in the Utica at Ottawa, Canada (Ami).
- Lingula coheni** A. Ulrich. Middle Devonian.
Lingula coheni A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 82, pl. 5, fig. 11.
Loc. Near Pulquina, Bolivia.
- Lingula complanata** Williams. Hamilton-Ithaca (Dev.).
Lingula nuda Hall, Pal. New York, IV, 1867, pl. 2, fig. 4 (not figs. 5, 6).
Lingula complanata Williams, Proc. American Ass. Adv. Sci., XXX, 1882, p. 188;—Bull. U. S. Geol. Survey, 3, 1884, pp. 14, 15, 20, 22.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 1, fig. 17.
Loc. Ithaca and Canandaigua Lake, New York.

- Lingula compta** Hall and Clarke. Hamilton (Dev.).
Lingula compta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 171, pl. I, fig. 16.
Loc. Canandaigua Lake, New York.
- Lingula concentrica** Vanuxem = *Schizobolus concentricus*.
- Lingula concentrica** Conrad. ? Corniferous (Dev.).
Lingula concentrica Conrad, Third Ann. Rep. Geol. Survey New York, 1839, p. 64.
Loc. "Helderberg Mountains," New York.
Obs. Insufficiently defined to be recognized.
- Lingula covingtonensis** Hall and Whitfield. Utica (Ord.).
Lingula covingtonensis Hall and Whitfield, Pal. Ohio, II, 1875, p. 67, pl. 1, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 8.
Loc. Covington, Kentucky.
- Lingula crassa** Hall = *Glossina crassa*.
- Lingula crawfordsvillensis** Gurley. Keokuk (L. Carb.).
Lingula crawfordsvillensis Gurley, New Carboniferous Foss., 1, 1883, p. 2.—Miller, N. American Geol. Pal., 1889, p. 350.
Loc. Crawfordsville, Indiana.
Obs. Should be compared with *L. varsaviensis*.
- Lingula cuneata** Conrad. Medina (Sil.).
Lingula cuneata Conrad, Third Ann. Rep. Geol. Survey New York, 1839, pp. 63, 64.—Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 48, fig. 5.—Pal. New York, II, 1852, p. 8, pl. 4, fig. 2.—Hall and Clarke, Pal. New York, VIII Pt. I, 1892, p. 12, pl. 1, figs. 11, 12; pl. 4K, fig. 9.
Lingulella cuneata Miller, N. American Geol. Pal., 1889, p. 352.
Loc. Medina and Lockport, New York.
- Lingula curta** Conrad. Trenton-Utica (Ord.).
Lingula curta Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 266, pl. 15, fig. 12.—Hall, Pal. New York, I, 1847, p. 97, pl. 30, fig. 6.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 818, fig. 604.—Billings, Geol. Canada, 1863, p. 161, fig. 138; p. 201, fig. 197.—Emerson, "Geol. Frobisher Bay; Nourse's Narr. Hall's Arctic Exped., App., III, 1879, p. 578.
Loc. East Canada Creek and Middleville, New York; Carlisle, etc., Pennsylvania; Montmorency Falls, Canada; Frobisher Bay.
- Lingula cuyahoga** Hall. Chemung-Waverly (Dev.-L. Carb.).
Lingula cuyahoga Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 24;—Pal. New York, IV, 1867, p. 15, pl. 1, fig. 5.—Herrick, Bull. Denison Univ., IV, 1888, p. 13;—Geol. Ohio, VII, 1895, pl. 22, fig. 9.
Lingula cuyahoga? Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 1, fig. 18.
Loc. Akron and Cuyahoga Falls, Ohio; Chemung group, Panama, New York.
- Lingula cyane** Billings = *Glossina cyane*.
- Lingula daphne** Billings = *Glossina trentonensis*.
- Lingula dawsoni** Matthew = *Lingulella dawsoni*.
- Lingula delia** Hall. Hamilton (Dev.).
Lingula delia Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 22;—Pal. New York, IV, 1867, p. 12, pl. 2, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 15, pl. 1, fig. 29.
Loc. Canandaigua Lake, New York.
- Lingula densa** Hall. Hamilton (Dev.).
Lingula densa Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 22;—Pal. New York, IV, 1867, p. 11, pl. 2, figs. 10, 11.

Lingula densa Hall—Continued.

Lingula densa? Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 15, pl. 1, fig. 23.

Loc. Summit and Centerfield, New York.

Lingula desiderata Hall.

Corniferous (Dev.).

Lingula desiderata Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 19;—Pal. New York, IV, 1867, p. 6, pl. 2, fig. 2.

Loc. Ontario County, New York.

Lingula(?) dolata Sardeson.

Calciferous (Ord.).

Lingula dolata Sardeson, Bull. Minnesota Acad. Nat. Sci., IV, 1896, pl. 6, fig. 12.

Loc. Stillwater, Minnesota.

Lingula dubia d'Orbigny=*Glossina dubia*.**Lingula elderi** Whitfield.

Trenton and Lorraine (Ord.).

Lingula elderi Whitfield, American Jour. Sci., 3d ser., XIX, June, 1880, p. 472, figs. 1, 2;—Geol. Wisconsin, IV, 1882, p. 345, pl. 27, figs. 1-5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 11, pl. 1, figs. 21, 22.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 339, pl. 29, figs. 1-4.

Lingula minnesotensis N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, July, 1880, p. 61.

Loc. Rochester, Minneapolis, etc., Minnesota; Beloit, Wisconsin; Cincinnati, Ohio.

Lingula elegantula Shaler=*L. rectilateralis*.**Lingula elliptica** Hall (non Phillips)=*L. subelliptica*.**Lingula(?) elliptica** Emmons.

Cambrian.

Lingula elliptica Emmons (non Phillips, 1836), American Geology, Pt. II, 1855, p. 112.

Loc. Augusta County, Virginia.

Obs. This species belongs to another genus. The specific name will therefore not conflict with that of Phillips.

Lingula elongata Hall.

Trenton (Ord.).

Lingula elongata Hall, Pal. New York, I, 1847, p. 97, pl. 30, fig. 5.—Billings, Geol. Canada, 1863, p. 161, fig. 135.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 165.

Loc. Lewis County, New York; Lake Winnipeg, Manitoba; Ottawa, Canada, in the Utica terrane (Ami).

Lingula ererensis Rathbun.

Middle Devonian.

Lingula ererensis Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 16.

Loc. Erere, Province of Para, Brazil.

Lingula exilis Hall=*Lingulodiscina exilis*.**Lingula eva** Billings.

Black River (Ord.).

Lingula eva Billings, Canadian Nat. Geol., VI, 1861, p. 150;—Geol. Canada, 1863, p. 141, fig. 73.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 341, pl. 29, figs. 5, 6.

Loc. Murray Bay, Canada; Fremont, Winona County, Minnesota.

Lingula forbesi Billings.

Lorraine (Ord.).

Lingula forbesi Billings, Pal. Fossils, I, 1862, p. 115, fig. 96.

Loc. Auticosti.

Lingula gannensis Herrick.

Waverly (L. Carb.).

Lingula gannensis Herrick, Bull. Denison Univ., IV, 1888, pp. 12, 17, pl. 3, figs. 2, 3;—Geol. Ohio, VII, 1895, pl. 22, figs. 2, 3.

Loc. Gann, Knox County, Ohio.

- Lingula gibbosa** Hall. Niagara (Sil.).
Lingula gibbosa Hall, Description n. sp. Foss. Waldron, Indiana, 1879, p. 13;—
 Eleventh Rep. State Geol. Indiana, 1882, p. 284, pl. 27, fig. 2;—Trans. Albany
 Institute, X, 1883, p. 69.
Loc. Waldron, Indiana.
- Lingula gorbyi** Miller. Chouteau (L. Carb.).
Lingula gorbyi Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p.
 309, pl. 9, figs. 3, 4.
Loc. Sedalia, Missouri.
- Lingula gracana** Rathbun. Middle Devonian.
Lingula gracana Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 259, fig. 2.
Loc. Erere, Province of Para, Brazil.
- Lingula halli** White. Burlington (L. Carb.).
Lingula halli White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 30.
Loc. Burlington, Iowa.
- Lingula howleyi** Matthew. Lower Ordovician.
Lingula howleyi Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 259, pl.
 1, fig. 3.
Loc. Kelleys Island, Conception Bay, Newfoundland.
Obs. Appears to be a synonym for *L. murrayi* Billings.
- Lingula hurlbuti** N. H. Winchell = *Glossina hurlbuti*.
- Lingula huronensis** Billings. Chazy (Ord.).
Lingula huronensis Billings, Canadian Nat. Geol., IV, 1859, p. 433, fig. 9;—Geol.
 Canada, 1863, p. 124, fig. 48.
Loc. St. Joseph Island, Lake Huron.
- Lingula indianaensis** Miller and Gurley. Keokuk (L. Carb.).
Lingula indianensis Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 3,
 1893, p. 69, pl. 7, fig. 1.
Loc. Crawfordsville, Indiana.
- Lingula ingens** Spencer. Niagara (Sil.).
Lingula ingens Spencer, Bull. Univ. State Missouri, 1884, p. 56;—Trans. St.
 Louis Acad. Sci., IV, 1886, p. 606, pl. 8, fig. 6.
Loc. Hamilton, Ontario.
- Lingula insularis** Billings. Anticosti (Sil.).
Lingula insularis Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 40.
Loc. Anticosti.
- Lingula iole** Billings. Calciferous (Ord.).
Lingula iole Billings, Pal. Fossils, I, 1865, p. 215, fig. 199.
Loc. Near Portland Creek, Newfoundland.
- Lingula iowaensis** Owen. Galena (Ord.).
Lingula iowensis Owen, Geol. Rep. Iowa, Wisconsin, and Illinois, 1844, p. 70,
 pl. 15, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 8, pl. 1,
 fig. 14.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 349,
 pl. 29, figs. 19-22.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 164.
Lingula quadrata? Owen (not Eich.), Geol. Rep. Wisconsin, Iowa, and Minne-
 sota, 1851, pl. 2B, fig. 8. [See specimens in U. S. Nat. Mus., Cat. Invert.
 Foss., 17873.]
Lingula quadrata Hall, Geol. Wisconsin, I, 1862, p. 46, fig. 1, and p. 435.—Meek
 and Worthen, Geol. Survey Illinois, III, 1868, p. 305, pl. 2, fig. 4.
Lingulella iowensis Whitfield, Geol. Wisconsin, IV, 1882, p. 242, pl. 9, fig. 1.
Loc. Wisconsin; Iowa; Minnesota; Illinois; Lake Winnipeg, Manitoba.

Lingula irene Billings=*Lingulølla irene*.

***Lingula iris* Billings.**

CalCIFerous (Ord.).

Lingula iris Billings, Pal. Fossils, I, 1865, p. 301, fig. 290.

Loc. Point Levis, Canada.

***Lingula kingstonensis* Billings.**

Black River (Ord.).

Lingula kingstonensis Billings, Pal. Fossils, I, 1862, p. 48, fig. 51;—Geol. Canada, 1863, p. 141, fig. 74.

Loc. Long Island, near Kingston, Canada.

Lingula lamellata Hall, 1852 (partim, non Hall, 1843)=*L. tæniola*.

***Lingula lamellata* Hall.**

Niagara (Sil.).

Lingula lamellata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 108, fig. 2;—Pal. New York, II, 1852, p. 249, pl. 53, figs. 1, 2 (non p. 55, pl. 20, fig. 4=*L. tæniola*).—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 16, pl. 1, figs. 9, 10; pl. 4K, figs. 10–13.

Loc. Lockport and Rochester, New York; Hamilton, Ontario.

Lingula leana Hall=*Glossina leana*.

***Lingula ligea* Hall.**

Hamilton–Portage (Dev.).

Lingula ligea Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 76;—Pal. New York, IV, 1867, p. 7, pl. 1, fig. 2.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 107, pl. 2, fig. 2.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 62.

Lingula ligea var. Hall, Pal. New York, IV, 1867, p. 8, pl. 2, fig. 8.

Lingula ligea? Whitfield, Annals New York Acad. Sci., V, 1891, pp. 547, 573, pl. 11, figs. 3, 4;—Geol. Ohio, VII, 1895, p. 441, pl. 7, figs. 3, 4; p. 462.

Loc. Seneca Lake, Ithaca, etc., New York; Thedford, Ontario (Whiteaves); Delaware County, Ohio (Whitfield); Eureka district, Nevada.

***Lingula ligea nevadaensis* Walcott.**

Lower Devonian.

Lingula ligea var. *nevadensis* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 107, pl. 2, fig. 3.

Loc. Eureka district, Nevada.

***Lingula lingulata* Hall and Clarke.**

Clinton (Sil.).

Lingula lingulata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 173, pl. 4K, fig. 5.

Loc. Hamilton, Ontario.

***Lingula lonensis* Walcott.**

Lower Devonian.

Lingula lonensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 108, pl. 13, fig. 1.

Loc. Lone Mountain, Nevada.

***Lingula lucretia* Billings.**

Gaspé No. 5 (Dev.).

Lingula lucretia Billings, Pal. Fossils, II, 1874, p. 14, fig. 3.

Loc. Cape Bon Ami, Gaspé.

***Lingula lyelli* Billings.**

Chazy (Ord.).

Lingula lyelli Billings, Canadian Nat. Geol., IV, 1859, p. 348, fig. 1; p. 431;—Geol. Canada, 1863, p. 124, fig. 49.

Loc. Alumette Island.

***Lingula maida* Hall.**

Hamilton (Dev.).

Lingula maida Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 20;—Pal. New York, IV, 1867, p. 9, pl. 2, fig. 13.

Loc. Moscow, New York.

- Lingula manni** Hall. Corniferous (Dev.).
Lingula manni Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 20;—Pal. New York, IV, 1867, p. 6, pl. 2, fig. 3.—Whitfield, Annals New York Acad. Sci., V, 1891, p. 546, pl. 11, figs. 1, 2;—Geol. Ohio, VII, 1895, p. 441, pl. 7, figs. 1, 2.
Loc. Delaware County, Ohio.
- Lingula mantelli** Billings. Calciferous (Ord.).
Lingula mantelli Billings, Canadian Nat. Geol., IV, 1859, p. 349, figs. 1e-1f;—Geol. Canada, 1863, p. 113, fig. 20.
Loc. St. Eustache, Canada.
- Lingula (?) manticula** White. Upper Cambrian.
Lingula? *manticula* White, Wheeler's Expl. Survey west 100 Merid., Prel. Rep., 1874, p. 9;—*Ibidem*, Final Rep., IV, 1875, p. 52, pl. 3, fig. 2.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 13, pl. 9, fig. 3; pl. 11, fig. 2.
Loc. Schell Creek Range, Nevada.
- Lingula marginata** d'Orbigny (non Phillips)=*L. submarginata*.
Lingula matthewi Hartt=*Acrothele matthewi*.
- Lingula meeki** Herrick. Waverly (L. Carb.).
Lingula meeki Herrick, Bull. Denison Univ., IV, 1888, pp. 13, 18, pl. 10, fig. 31;—Geol. Ohio, VII, 1895, pl. 22, figs. 7, 8.
Loc. Cuyahoga Valley, Ohio.
- Lingula melie** Hall. Waverly (L. Carb.).
Lingula melie Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 24;—Pal. New York, IV, 1867, p. 14, pl. 1, figs. 3, 4.—Meek, Pal. Ohio, II, 1875, p. 276, pl. 14, fig. 3.—Herrick, Bull. Denison Univ., IV, 1888, p. 13.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 12, fig. 9; pl. 1, fig. 32.—Herrick, Geol. Ohio, VII, 1895, pl. 20, fig. 1; pl. 22, fig. 10.
Loc. Chagrin Falls and Berea, Ohio.
- Lingula membranacea** Winchell. Waverly (L. Carb.).
Lingula membranacea A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 3.—Herrick, Bull. Denison Univ., IV, 1888, pp. 12, 17, pl. 3, fig. 4;—Geol. Ohio, VII, 1895, pl. 22, fig. 4.
Lingula (*Lingulella?*) *membranacea* Meek, Pal. Ohio, II, 1875, p. 275, pl. 14, fig. 4.
Loc. Burlington, Iowa; Harts Grove and Loudonville, Ohio; Shafers, Pennsylvania.
- Lingula metensis** Terquem? Lower Lias (Jurassic).
Lingula cf. metensis (Terquem) Mörücke, Neues Jahrbuch f. Mineral., Beilageband, IX, 1894, p. 58, pl. 5, fig. 10.
Loc. Sierra de la Ternera; Mine Amolunes, Chile.
- Lingula minnesotensis** N. H. Winchell=*L. elderi*.
- Lingula minuta** Meek. Hamilton (Dev.).
Lingula minuta Meek, Trans. Chicago Acad. Sci., I, 1868, p. 87, pl. 13, fig. 1.
Loc. Near Fort Resolution, Great Slave Lake, British America.
- Lingula modesta** E. O. Ulrich. Trenton-Lorraine (Ord.).
Lingula modesta Ulrich, American Geologist, III, 1889, p. 382, fig. 4 on p. 378.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 344, pl. 29, fig. 41.
Lingula vanhorni Hall and Clarke (non Miller), Pal. New York, VIII, Pt. I, 1892, pl. 1, fig. 4.
Loc. Covington and Frankfort, Kentucky; Lattners, Iowa; Granger and Wykoff, Minnesota.

- Lingula morsei** (N. H. Winchell). St. Peters (Ord.).
Lingulepis morsensis N. H. Winchell, Fourth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1876, p. 41, fig. 6.
Lingulepis morsii Miller, N. American Geol. Pal., 1889, p. 352.
Lingula morsii Hall and Clarke, Pal. New York, VIII, Pt. 1, 1892, p. 62.—Sardeson, Bull. Minnesota Acad. Nat. Sci., IV, 1896, p. 77, pl. 4, figs. 2, 3.
Loc. Near Fountain, Minnesota.
- Lingula mosia** Hall. Upper Cambrian.
Lingula mosia Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 126, pl. 6, figs. 1-3;—Trans. Albany Institute, V, 1867, p. 102.—Sardeson, Bull. Minnesota Acad. Nat. Sci., IV, 1896, p. 95.
Loc. Lagrange Mountain, Minnesota; Mazomanie, Wisconsin.
- Lingula münsteri** d'Orbigny. Ordovician.
Lingula münsterii d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 29, pl. 2, fig. 6.
Lingula münsteri A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 7.
Loc. Tacopaya, etc., Bolivia.
- Lingula(?) murrayi** Billings. Upper Cambrian.
Lingula murrayi Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 467, fig. 3;—Pal. Fossils, II, 1874, p. 66, fig. 34.
Loc. Bell Island, Conception Bay, Newfoundland.
Obs. See *Lingula howleyi*.
- Lingula mytiloides** Sowerby. Upper Carboniferous.
Lingula mytiloides Sowerby, Mineral Conchology, I, 1813, p. 55, tab. 19, figs. 1, 2.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 572, pl. 25, fig. 2.
Loc. Illinois.
- Lingula nitida** Meek and Hayden. Upper Cretaceous.
Lingula nitida Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 443.—Meek, Rep. U. S. Geol. Survey Terr., IX, 1876, p. 9, pl. 28, fig. 18.—White, Eleventh Rep. U. S. Geol. Survey Terr., 1879, p. 205.—Whiteaves, Cont. Canadian Pal., I, 1885, p. 29.
Loc. Mouth of Big Horn River, Nebraska; Sage Creek, Colorado; Near Irvine Station, Canadian Pacific Railroad, Canada.
- Lingula norwoodi** James = *Lingulops norwoodi*.
- Lingula nuda** Hall (partim) = *L. complanata*.
- Lingula nuda** Hall. Hamilton (Dev.).
Lingula nuda Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 22;—Pal. New York, IV, 1867, p. 10, pl. 2, figs. 5, 6 (non fig. 4 = *L. complanata*).
Loc. Canandaigua Lake, New York.
- Lingula nympha** Billings. Calciferous (Ord.).
Lingula nympha Billings, Pal. Fossils, I, 1865, p. 214, fig. 198.
Loc. Table Head, Newfoundland.
- Lingula oblata** Hall. Clinton (Sil.).
Lingula oblata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 77, fig. 8 on p. 76;—Pal. New York, II, 1852, p. 54, pl. 20, fig. 2.
Loc. Sodus and Wolcott, New York.
- Lingula oblonga** Conrad (non Eichwald) = *L. clintoni*.
- Lingula obtusa** Hall. Trenton-Utica (Ord.).
Lingula obtusa Hall, Pal. New York, I, 1847, p. 98, pl. 30, fig. 7.—Billings, Geol. Canada, 1863, p. 161, fig. 137.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 165.
Loc. Middleville, New York; Lake Winnipeg and Ottawa, Canada.

Lingula paliformis Hall = *Lingulella paliformis*.

Lingula papillosa Emmons.

Trenton (Ord.).

Lingula papillosa Emmons, American Geology, Pt. II, 1855, p. 202, fig. 64;—
Manual Geol., 1860, p. 99, fig. in text.

Loc. Unknown.

Lingula paracletus Hall and Clarke.

Waverly (L. Carb.).

Lingula paracletus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 10, 12,
fig. 8; p. 172.

Loc. Chardon, Ohio.

Lingula parrishi Miller.

Upper Carboniferous.

Lingula parrishi Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p.
307, pl. 8, fig. 2; pl. 9, fig. 1.

Loc. Kansas City, Missouri.

Lingula perlata Hall.

Lower Helderberg (Dev.).

Lingula perlata Hall, Pal. New York, III, 1859, p. 156, pl. 9, figs. 3-5.

Loc. Albany and Schoharie counties, New York.

Lingula perovata Hall = *Glossina perovata*.

Lingula perplexa Hall = *L. subelliptica*.

Lingula perryi Billings.

? Chazy (Ord.).

Lingula perryi Billings, Pal. Fossils, I, 1861, p. 20, fig. 23;—Geol. Vermont, II,
1861, p. 957, fig. 363;—Geol. Canada, 1863, p. 274, fig. 278.

Loc. Highgate Spring, Vermont.

Lingula philomela Billings.

Trenton and Lorraine (Ord.).

Lingula philomela Billings, Pal. Fossils, I, 1862, p. 49, fig. 53;—Geol. Canada,
1863, p. 161, fig. 133.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 1,
fig. 8.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 342,
pl. 29, figs. 7, 8.

Loc. Montmorency Falls, Ottawa, etc., Canada; Florenceville, Iowa.

Lingula plagemanni Möricke.

Jurassic.

Lingula plagemanni Möricke, Neues Jahrbuch f. Mineral., Beilageband, IX, 1894,
p. 59, pl. 5, fig. 9.

Loc. Canales and Caracoles, Bolivia.

Lingula pinnaformis Hall = *Lingulepis pinniformis*.

Lingula polita Hall = *Obolella polita*.

Lingula prima Hall = *Lingulepis prima*.

Lingula procteri Ulrich = *L. vanhorni*.

Lingula progne Billings.

Trenton-Utica (Ord.).

Lingula progne Billings, Pal. Fossils, I, 1862, p. 47, fig. 50;—Geol. Canada, 1863,
p. 161, fig. 134; p. 201, fig. 196.

Loc. Montreal, Collingwood, Ottawa, etc., Canada.

Lingula punctata Hall.

Hamilton and Ithaca (Dev.).

Lingula punctata Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p.
21;—Pal. New York, IV, 1867, p. 10, pl. 1, fig. 6.—Hall and Clarke, Pal. New
York, VIII, Pt. I, 1892, pp. 11, 17, pl. 1, figs. 26-28.

Loc. Canandaigua Lake and Summit, New York; Portage group at Ithaca
(Williams).

Lingula quadrata, American authors = *L. rectilateralis* and *L. iowaensis*.

- Lingula quebecensis** Billings. Upper Cambrian and Calciferous.
Lingula quebecensis Billings, Pal. Fossils, I, 1862, p. 72, fig. 65; pp. 72, 216;—
 Geol. Canada, 1863, p. 230, fig. 241.
Loc. Point Levis, Sillery, etc., Canada; Cow Head, Newfoundland.
- Lingula rectilatera** Hall. Lower Helderberg (Dev.).
Lingula rectilatera Hall, Pal. New York, III, 1859, p. 156, pl. 9, figs 6–8.
Loc. Albany and Schoharie counties, New York; Arisaig, Nova Scotia (Ami).
- Lingula rectilateralis** Emmons. Trenton-Lorraine (Ord.).
Lingula rectilateralis Emmons, Geol. New York; Rep. Second Dist., 1842, p.
 399, fig. 6.
Lingula quadrata Hall (non Eichwald), Pal. New York, I, 1847, p. 96, pl. 30, fig.
 4; p. 285, pl. 79, fig. 1.—Billings, Canadian Nat. Geol., I, 1856, p. 319, fig.
 8.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 820, fig. 615.—Billings,
 Geol. Canada, 1863, p. 161, fig. 131;—Catalogue Sil. Foss. Anticosti, 1866, p.
 10.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 1, fig. 13.
Lingula elegantula Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 61.
 ?*Lingula quadrata* Miller, Cincinnati Quart. Jour Sci., II, 1875, p. 9.
Loc. Rodman, Lorraine, Middleville, Trenton Falls, etc., New York; Ottawa
 etc., Canada; Anticosti.
Obs. This species is more closely related to *L. iowaensis* than to *L. quadrata*
 Eichwald.
- Lingula riciniformis** Hall. Trenton (Ord.).
Lingula riciniformis Hall, Pal. New York, I, 1847, p. 95, pl. 30, fig. 2.—Winchell
 and Schuchert, Minnesota Geol. Survey, III, 1893, p. 343, fig. 24; pl. 29, fig 9.
Lingula (*Glossina*) *riciniformis* Hall and Clarke, Pal. New York, VIII, Pt. I,
 1892, pl. 1, fig. 3.
Loc. Middleville, New York; Charlesbourg, Canada; St. Paul, Minnesota.
- Lingula riciniformis galenaensis** Winchell and Schuchert. Trenton (Ord.).
Lingula riciniformis var. *galenensis* Winchell and Schuchert, American Geol.,
 IX, 1892, p. 284;—Minnesota Geol. Survey, III, 1893, p. 344, pl. 29, figs. 10, 11.
Loc. Near Kenyon and Fountain, Minnesota; Neenah and Oshkosh, Wisconsin.
- Lingula rodriguezii** Rathbun. Middle Devonian.
Lingula rodriguezii Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 260.
Loc. Erere, Province of Para, Brazil.
- Lingula scotica* Meek (non Davidson) = *Glossina waverlyensis*.
Lingula scotica var. *nebraskensis* Meek = *Glossina nebraskensis*.
- Lingula scutella** Hall and Clarke. Chemung (Dev.).
Lingula scutella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 171, pl. 1,
 fig. 30.
Loc. Alleghany County, New York.
- Lingula shumardi** Cragin. Lower Cretaceous.
Lingula shumardi Cragin, Geol. Survey Texas; Fourth Ann. Rep., 1893, p. 166.
Loc. Bonham-Sherman road, Fannin County, Texas.
- Lingula spathata** Hall. Lower Helderberg (Dev.).
Lingula spathata Hall, Pal. New York, III, 1859, p. 157, pl. 9, figs. 7, 9, 11.
Loc. Albany and Schoharie counties, New York; Arisaig, Nova Scotia (Ami).
- Lingula spatiosa** Hall = *Glossina spatiosa*.
- Lingula spatulata** Vanuxem. Genesee and Portage (Dev.).
Lingula spatulata Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 168,
 fig. 3.—Hall, *Ibidem*, Rep. Fourth Dist., 1843, p. 223, fig. 3;—Pal. New York,
 IV, 1867, p. 13, pl. 1, fig. 1.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 25.—

Lingula spatulata Vanuxem—Continued.

Tschernyschew, Mémoires du Comité Géologique de St. Pétersbourg, 1887, p. 116, pl. 14, fig. 29.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 1, fig. 15.

Lingula spatulata? Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 258, fig. 1;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 16.

Loc. Lodi, Seneca Lake, etc., New York; Portage group at Ithaca, New York (Williams); Erere, Province of Para, Brazil; Urals of Russia.

Lingula stautoniana Rathbun.

Middle Devonian.

Lingula stautoniana Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 259, fig. 3.

Loc. Erere, Province of Para, Brazil.

Lingula(?) striata Emmons.

Cambrian.

Lingula striata Emmons, American Geology, Pt. II, 1855, p. 112, pl. 1, fig. 17;—Manual Geol., 1860, p. 88, fig. 74.

Loc. Augusta County, Virginia.

Lingula subelliptica d'Orbigny.

Clinton (Sil.).

Lingula elliptica Hall (non Phillips), Geol. New York; Rep. Fourth Dist., 1843, p. 76, fig. 7.

Lingula subelliptica d'Orbigny, Prodrôme de Pal., I, 1850, p. 34.

Lingula perplexa Hall, Miller's American Pal. Fossils, 1877, p. 244.

Loc. Wolcott, New York.

Lingula submarginata d'Orbigny.

Ordovician.

Lingula marginata d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 28, pl. 2, fig. 5.

Lingula submarginata d'Orbigny, Prodrôme de Pal., I, 1850, p. 14.

Loc. Tacopaya, Bolivia.

Lingula suboblonga d'Orbigny=L. clintoni.**Lingula subspatulata** Meek and Worthen (non Hall and Meek)=*Barroisella subspatulata*.**Lingula subspatulata** Hall and Meek.

Upper Cretaceous.

Lingula subspatulata Hall and Meek, Mem. American Acad. Arts Science, n. ser., V, 1854–1856, p. 380, pl. 1, fig. 2.—White, Rep. Geogr. Geol. Survey west 100th Merid., IV, 1875, p. 169, pl. 15, fig. 4.

Lingula subspatulata? Whiteaves, Cont. Canadian Pal., I, 1889, p. 185.

Loc. Near Red Cedar Island, Nebraska; near old Fort Wingate, New Mexico; Rolling River, Manitoba.

Lingula tæniola Hall and Clarke.

Clinton (Sil.).

Lingula lamellata Hall (partim), Pal. New York, II, 1852, p. 55, pl. 20, fig. 4.

Lingula tæniola Hall and Clarke, Ibidem, VIII, Pt. I, 1892, pp. 18, 173, pl. 4K, fig. 8.

Loc. Clinton, New York; Hamilton, Ontario.

Lingula thedfordensis Whiteaves.

Hamilton (Dev.).

Lingula thedfordensis Whiteaves, Extract Cont. Canadian Pal., I, 1887, p. 3, pl. 15, fig. 1;—Cont. Canadian Pal., I, 1889, p. 111, pl. 15, fig. 1.

Loc. Thedford, Ontario.

Lingula tighti Herrick.

Upper Carboniferous.

Lingula tighti Herrick, Bull. Denison Univ., II, 1887, p. 43, pl. 4, fig. 5.

Loc. Newark, Ohio.

Lingula trentonensis Conrad=Glossina trentonensis.**Lingula triangulata** Nettelroth=Glossina triangulata.

- Lingula triquetra** Clarke. Portage (Dev.).
Lingula triquetra Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 62, pl. 3, fig. 11.
Loc. Ontario County, New York.
- Lingula truncata** Sowerby. Neocomian (Cret.).
Lingula truncata Sowerby, Trans. Geol. Soc. London, IV, 1836, pl. 14, fig. 15.—
 Davidson, British Cret. Brach., Pal. Soc., 1852, p. 6, pl. 1, figs. 27, 28, 31.—
 Behrensden, Zeit. der Deutschen Geol. Gessel., XLIV, 1892, p. 27.
Loc. Europe; Arrogo, Triuguico, Argentine Republic.
- Lingula umbonata** Cox. Upper Carboniferous.
Lingula umbonata Cox, Owen's Geol. Survey Kentucky, III, 1857, p. 576, pl. 10,
 fig. 4.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 120, pl. 25,
 fig. 14.—Herrick, Bull. Denison Univ., II, 1887, p. 144, pl. 14, fig. 2.—Keyes,
 Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 226;—Geol. Survey Missouri, V,
 1895, p. 38, pl. 35, fig. 4.
Loc. Crittenden, Union, and Hancock counties, Kentucky; Newark, Ohio; Des
 Moines, Iowa; Clinton and Kansas City, Missouri.
- Lingula vanhorni** Hall and Clarke (partim)=*L. modesta*.
- Lingula vanhorni** Miller. Trenton and Lorraine (Ord.).
Lingula vanhorni Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 9, fig. 1;—
 Eighteenth Rep. Geol. Survey Indiana, 1894, p. 309.
Lingula procteri Ulrich, American Geologist, III, 1889, p. 377, fig. 1.—Hall and
 Clarke, Pal. New York, VIII, Pt. I, 1892, p. 12, pl. 1, figs. 5-7.
Loc. Versailles, Indiana; Covington and Burgin, Kentucky.
Obs. An examination of the type specimen led to the above synonymy.
- Lingula varsaviensis** Worthen. Warsaw (L. Carb.).
Lingula varsoviense Worthen, Bull. Illinois State Mus. Nat. Hist., 2, 1884, p.
 24;—Geol. Survey Illinois, VIII, 1890, p. 104, pl. 11, fig. 8.
Loc. Warsaw and Hamilton, Illinois.
- Lingula waverlyensis** Herrick=*Glossina waverlyensis*.
- Lingula whitfieldi** Ulrich. Lorraine (Ord.).
Lingula whitfieldi Ulrich, American Geologist, III, 1889, p. 381, fig. 3 on p. 378.
Loc. Covington, Kentucky.
- Lingula whitei** Walcott. Lower Devonian.
Lingula whitii Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 109, pl. 13, fig. 3.—
 Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 11, pl. 1, fig. 31.
Loc. Eureka district, Nevada.
- Lingula winona** Hall=*Lingulella winona*.
- LINGULASMA** E. O. Ulrich. Genotype *L. schucherti* Ulrich.
Lingulasma Ulrich, American Geologist, III, 1889, p. 383.—Hall and Clarke, Pal.
 New York, VIII, Pt. I, 1892, pp. 21, 46, 163.—Winchell and Schuchert, Min-
 nesota Geol. Survey, III, 1893, p. 353.—Hall and Clarke, Eleventh Ann. Rep.
 New York State Geologist, 1894, p. 335.
Lingulelasma Miller, N. American Geol. Pal., 1889, p. 351.
- Lingulasma galenaense** Winchell and Schuchert. Galena (Ord.).
Lingulasma galenensis Winchell and Schuchert, American Geol., IX, 1892, p.
 285;—Minnesota Geol. Survey, III, 1893, p. 354, pl. 30, figs. 1-4.
Loc. Fillmore and Goodhue counties, Minnesota; Decorah, Iowa; Neenah and
 Oshkosh, Wisconsin.

Lingulasma schucherti Ulrich.

Lorraine (Ord.).

Lingulasma schucherti Ulrich, *American Geologist*, III, 1889, p. 389, fig. 5 on p. 378.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 24, pl. 2, figs. 17-23.

Lingulelasma schucherti Miller, *N. American Geol. Pal.*, 1889, p. 351.

Loc. Wilmington and Savanna, Illinois.

LINGULELLA Salter.Genotype *Lingula davisi* McCoy.

Lingulella Salter, *Mem. Geol. Survey Great Britain*, III, 1866, p. 333.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 55, 163;—*Eleventh Ann. Rep. New York State Geologist*, 1894, p. 232.

Lingulella affinis Billings=*Lingulobolus affinis*.

Lingulella ampla (Owen).

Middle Cambrian.

Lingula ampla Owen, *Geol. Rep. Wisconsin, Iowa, and Minnesota*, 1852, p. 583, pl. 11, fig. 5.—Hall, *Sixteenth Rep. New York State Cab. Nat. Hist.*, 1863, p. 125, pl. 6, fig. 10;—*Trans. Albany Institute*, V, 1867, p. 101.

Loc. Trempealeau, Wisconsin; Winona, Minnesota.

Lingulella aurora Hall.

Upper Cambrian.

Lingula aurora Hall, *Ann. Geol. Rep. Wisconsin*, 1861, p. 24;—*Geol. Surv. Wisconsin*, I, 1862, p. 21, fig. 4; p. 435;—*Sixteenth Rep. New York State Cab. Nat. Hist.*, 1863, p. 126, pl. 6, figs. 4, 5;—*Trans. Albany Institute*, V, 1867, p. 103.

Lingulella aurora Hall, *Twenty-third Rep. New York State Cab. Nat. Hist.*, 1873, p. 244.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pl. 2, figs. 12, 13.

Loc. Mazomanie, Wisconsin; Osceola, Wisconsin, and Otisville, Minnesota (Sardeson).

Lingulella(?) billingsana (Whiteaves).

Upper Cambrian.

Lingula billingsana Whiteaves, *American Jour. Sci.*, 3d ser., XVI, 1878, p. 226.
Lingula cfr. *billingsiana* Matthew, *Trans. Royal Soc. Canada*, X, 1894, p. 93, pl. 16, fig. 6.

Loc. Conception Bay, Newfoundland.

Lingulella cælata (Hall).

Lower Cambrian.

Orbicula cælata Hall, *Pal. New York*, I, 1847, p. 290, pl. 79, fig. 9.
Obolella cælata Billings, *Canadian Nat. Geol.*, 2d ser., VI, 1871, p. 218.
Obolella (Obolus) cælata Ford, *American Jour. Sci.*, 3d ser., II, 1871, p. 33.
Lingulella cælata Ford, *ibidem*, XV, 1878, p. 127.—Walcott, *Bull. U. S. Geol. Survey*, 30, 1886, p. 95, pl. 7, fig. 1;—*Tenth Ann. Rep. U. S. Geol. Survey*, 1891, p. 607, pl. 67, fig. 1.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 57, pl. 2, figs. 1-4.

Lingula ? cælata Matthew, *Trans. New York Acad. Sci.*, XIV, 1895, p. 126.

Loc. Troy and Schodack Landing, New York; New Brunswick.

Lingulella cincinnatiensis Hall and Whitfield=*Lingula cincinnatiensis*.

Lingulella(?) cuneata Matthew.

Lowest Ordovician.

Lingulella(?) cuneata Matthew, *Trans. Royal Soc. Canada*, X, 1894, p. 92, pl. 16, fig. 5.

Loc. Hardingville, New Brunswick.

Lingulella dawsoni Matthew.

Middle Cambrian.

Lingula? dawsoni (Matthew MS.) Walcott, *Bull. U. S. Geol. Survey*, 10, 1884, p. 15, pl. 5, fig. 8.

Lingulella dawsoni Matthew, *Trans. Royal Soc. Canada*, III, 1886, p. 33, pl. 5, fig. 9.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 58, pl. 2, fig. 5.

Loc. Portland, etc., New Brunswick.

- Lingulella ella** (Hall and Whitfield). Lower and Middle Cambrian.
Lingulepis ella Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 232, pl. 1, fig. 8.
Lingulella ella Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 97, pl. 7, fig. 2; pl. 8, fig. 4;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 607, pl. 67, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 58, figs. 19-21.
Loc. Wasatch Range, Utah; near Pioche, Nevada.
- Lingulella granvillensis** Walcott. Lower Cambrian.
Lingulella granvillensis Walcott, American Jour. Sci., 3d ser., XXXIV, 1887, p. 188, pl. 1, fig. 15;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 607, pl. 67, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 58.
Lingulella cfr. *granvillensis* Matthew, Trans. New York Acad. Sci., XIV, 1895, p. 114.
Loc. North Granville, New York; ? New Brunswick.
- Lingulella(?) inflata** Matthew. Middle Cambrian.
Lingulella? *inflata* Matthew, Trans. Royal Soc. Canada, III, 1886, p. 33, pl. 5, fig. 7;—Trans. New York Acad. Sci., XIV, 1895, p. 127, pl. 5, fig. 3.
Loc. Hanford Brook, St. Martins, New Brunswick.
- Lingulella inflata ovalis** Matthew. ? Middle Cambrian.
Lingulella inflata var. *ovalis* Matthew, Trans. New York Acad. Sci., XIV, 1895, p. 127, pl. 5, fig. 4.
Loc. Hanford Brook, New Brunswick.
- Lingulella irene** (Billings). Upper Cambrian and Calciferous.
Lingula irene Billings, Pal. Fossils, I, 1862, p. 71, fig. 64;—Geol. Canada, 1863, p. 230, fig. 240.
Loc. Point Levis, Canada.
- Lingulella lævis** Matthew. Upper Cambrian.
Lingulella lævis Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 39, pl. 12, figs. 4a, 4b.
Loc. Near St. John, New Brunswick.
- Lingulella lamborni** Meek. ? Upper Cambrian.
Lingulella lamborni Meek, Proc. Acad. Nat. Sci. Philadelphia, 1871, p. 185, fig. 1.—Keyes, Geol. Survey Missouri, V, 1895, p. 38, pl. 35, fig. 5.
Loc. Madison County, Missouri.
- Lingulella linguloides** Matthew. Middle Cambrian.
Lingulella linguloides Matthew, Trans. Royal Soc. Canada, III, 1886, p. 34, pl. 5, fig. 8.
Loc. Porters Brook, St. Martins, New Brunswick.
- Lingulella macconelli** Walcott. Middle Cambrian.
Lingulella macconelli Walcott, Proc. U. S. Nat. Museum, XI, 1888, p. 441.
Loc. Mt. Stephens, British Columbia.
- Lingulella martinensis** Matthew. Middle Cambrian.
Lingulella martinensis Matthew, Trans. Royal Soc. Canada, IV, 1890, p. 155, pl. 8, fig. 4;—Trans. New York Acad. Sci., XIV, 1895, p. 113, pl. 2, fig. 6.
Loc. Hanford Brook, New Brunswick.
- Lingulella minuta** Hall and Whitfield. Up. Camb. and Pogonip (Ord.).
Lingulella? *minuta* Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 206, pl. 1, figs. 3, 4.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 13.
Loc. Eureka district, Nevada.
 Bull. 87—17

- Lingulella(?) paliformis** Hall. Hamilton (Dev.).
Lingula paliformis Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 76, fig. 1.
Lingula paleiformis Hall, Pal. New York, IV, 1867, p. 8, pl. 1, fig. 7.—Whitfield, Geol. Wisconsin, IV, 1882, p. 324, pl. 25, fig. 10.
Lingulella? *paleiformis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 59, 64, pl. 2, figs. 6-8.
Loc. Cayuga Lake, New York; Milwaukee, Wisconsin.
- Lingulella radula** Matthew. Middle Cambrian.
Lingulella radula Matthew, Trans. Royal Soc. Canada, VIII, 1891, p. 147, pl. 15, figs. 7, 8.
Loc. St. John, New Brunswick.
- Lingulella roberti** Matthew. Lower Ordovician.
Lingulella roberti Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 256, pl. 1, fig. 2.
Loc. Cape Breton, Nova Scotia.
- Lingulella selwyni** Matthew. Lower Ordovician.
Lingulella selwyni Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 255, pl. 1, fig. 1.
Loc. Cape Breton, Nova Scotia.
- Lingulella?** *spissa* = *Sphaerobolus spissus*.
- Lingulella starri** Matthew. Middle Cambrian.
Lingulella starri Matthew, Trans. Royal Soc. Canada, VIII, 1891, p. 146, pl. 15, figs. 5, 6.
Loc. St. Johns, New Brunswick.
- Lingulella starri minor** Matthew. Upper Cambrian.
Lingulella starri var. *minor* Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 58.
Loc. Near St. John, New Brunswick.
- Lingulella stoneana** Whitfield. Upper Cambrian.
Lingula aurora var. Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 127, pl. 6, figs. 6-8;—Trans. Albany Institute, V, 1867, p. 104;—Twenty-third Rep. New York State Cab. Nat. Hist., 1873, pl. 13, fig. 5.
Lingulella stoneana Whitfield, Geol. Wisconsin, IV, 1882, p. 334, pl. 27, figs. 6, 7.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 2, figs. 9-11.
Loc. Prairie du Sac and Mazomanie, Wisconsin.
- Lingulella winona** (Hall). Middle Cambrian.
Lingula winona Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 126, pl. 6, fig. 9;—Trans. Albany Institute, V, 1867, p. 102.—Sardeson, Bull. Minnesota Acad. Nat. Sci., IV, 1896, p. 96.
Loc. Lansing, Iowa; Wisconsin.
- LINGULEPIS** Hall. Genotype *Lingula pinniformis* Owen.
Lingulepis Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 129.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 1.—Hall, Trans. Albany Institute, V, 1867, p. 106.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 59, 163;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 231.
Obs. The essential difference between *Lingulepis* and *Lingulella* is that the ventral beak of the former is often much attenuated. The amount of attenuation, however, is often a very changeable feature in specimens of a species from a locality. It is this variation and the want of large collections that has led to the making of too many species of *Lingulepis*.

Lingulepis acuminata (Conrad).

Upper Cambrian.

Lingula acuminata Conrad, Third. Ann. Rep. New York Geol. Survey, 1839, p. 64.—Hall, Pal. New York, I, 1847, p. 9, with fig.—Billings, Geol. Canada, 1863, p. 102, fig. 8.—Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 257, pl. 2, fig. 5.

Lingula antiqua Emmons, Geol. New York; Rep. Second Dist., 1842, p. 268, fig. 68.—Hall, Pal. New York, I, 1847, p. 3, pl. 1, fig. 3.—Emmons, American Geology, Pt. II, 1855, p. 202, pl. 4, fig. 7.

Glossina acuminata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 1, figs. 1, 2.

Loc. Saratoga and Franklin counties, etc., New York; Lansdowne, Bastard, and Beverly, Canada.

Obs. The material of this species in the collection of the U. S. Geological Survey has specimens which are difficult to separate from *L. pinniformis* and *L. dakotensis*, and there is every gradation between these and *L. acuminata*. See *L. pinniformis*.

Lingulepis acutangulus (Roemer).

Upper Cambrian.

Lingula acutangula Roemer, Texas, 1849, p. 420;—Kreidebildung Texas, 1852, p. 90, pl. 11, fig. 10.

Loc. Burnett and Llano counties, Texas.

Lingulepis affinis = *Lingulobolus affinis*.**Lingulepis cuneolus** Whitfield.

Upper Cambrian.

Lingulepis cuneolus Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain Region, Prel. Rep., 1877, p. 8;—*Ibidem*, Final Rep., 1880, p. 336, pl. 2, figs. 5, 6.

Lingulepis perattenuatus Whitfield, *Ibidem*, Prel. Rep., 1877, p. 9;—Final Rep., 1880, p. 337, pl. 2, figs. 7-9.

Loc. Red Canyon Creek, Black Hills, South Dakota.

Lingulepis dakotensis Meek and Hayden = *L. pinniformis*.**Lingulepis ella** Hall and Whitfield = *Lingulella ella*.**Lingulepis(?) mæra** Hall and Whitfield. Up. Camb. and Pogonip (Ord.).

Lingulepis mæra Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 206, pl. 1, figs. 5-7.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 12.

Lingulepis? mæra Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 61.

Loc. Secret Canyon, Ruby Hill, and Eureka district, Nevada.

Lingulepis matinalis Hall.

Upper Cambrian.

Lingulepis pinnaformis Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 130;—*Ibidem*, 1863, p. 130, pl. 6, figs. 12, 13.

Obs. A distinct species occurring in numbers in a blue shale just above the trap at St. Croix Falls, Wisconsin.

Lingulepis minima Whitfield = *L. prima*.**Lingulepis minuta** Hall and Whitfield = *Obolella whitfieldi*.**Lingulepis morsensis** N. H. Winchell = *Lingula morsei*.**Lingulepis perattenuata** Whitfield = *L. cuneolus*.**Lingulepis pinniformis** (Owen).

Upper Cambrian.

Lingula antiqua and *prima* (non Emmons, Hall, 1847) Foster and Whitney, Geol. Rep. Lake Superior Dist., II, 1851, p. 204, pl. 23, figs. 1, 2.—Hall, Geol. Wisconsin, I, 1862, p. 21, fig. 3.—Hayden, American Jour. Sci., 2d ser., XXXIII, 1863, p. 73.

Lingula pinnaformis Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, p. 583, pl. 1B, figs. 4, 6, 8.—Hall, Geol. Wisconsin, I, 1862, pp. 21, 435, fig. 3.

Lingulepis pinniformis (Owen)—Continued.

- Orbicula prima* Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, figs. 17, 19.
Lingulepis pinniformis Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 129, pl. 6, figs. 14–16;—Trans. Albany Institute, V, 1867, p. 107.—Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain Region, 1880, p. 335, pl. 2, figs. 1–4;—Geol. Wisconsin, IV, 1882, p. 169, pl. 1, figs. 2, 3.
Lingulepis pinniformis and *dakotensis* Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, pp. 2, 3, pl. 1, fig. 1.
Lingulepis dakotensis Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain Region, 1880, p. 337, pl. 2, figs. 10, 11.
Lingulepis pinniformis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 60, figs. 22, 23; pl. 1, figs. 35, 36.
Loc. Falls of St. Croix, Hudson, etc., Wisconsin; Black Hills, South Dakota.
Obs. This species also occurs at Ausable Chasm and Whitehall, New York, and are there regarded as *L. acuminata*. It may be advisable to refer Owen's species to *L. acuminata* (Conrad).

Lingulepis prima Meek and Hayden=Obolella polita.**Lingulepis prima** (Hall).

Upper Cambrian.

- Lingula ovata* Emmons, Geol. New York; Rep. Second Dist., 1842, p. 105 (undefined).
Lingula prima (Conrad MS.) Hall, Pal. New York, I, 1847, p. 3, pl. 1, fig. 2.—Emmons, American Geology, Pt. II, 1855, p. 202.
Obolella prima Whitfield, Bull. American Mus. Nat. Hist., I, 1884, p. 142, pl. 14, figs. 3–5.
Lingulepis minima Whitfield, Ibidem, 1884, p. 141, pl. 14, figs. 1, 2.
Lingulella? *prima* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 69.
Loc. Keeseville, Essex, etc., New York; ?Black Hills, South Dakota.

Lingulepis primiformis Whitfield.

Upper Cambrian.

- Lingulepis primiformis* Whitfield, Ludlow's Rep. Recon. Black Hills South Dakota, 1875, p. 103, pl. 1, fig. 4.
Loc. Black Hills, South Dakota.

LINGULOBOLUS Matthew.Genotype *Lingulella*(?) *affinis* Billings.

- Lingulobolus* Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1893, p. 260.

Lingulobolus affinis (Billings).

Lower Ordovician.

- Lingulella?* *affinis* Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 468, fig. 4;—Pal. Fossils, II, 1874, p. 67, fig. 35.
Lingulepis affinis Walcott, American Jour. Sci., 3d ser., XXXVII, 1889, p. 381.
Lingulobolus affinis Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 261, pl. 1, fig. 4.
Loc. Bell Island, Newfoundland.

Lingulobolus affinis cuneata Matthew.

Lower Ordovician.

- Lingulobolus affinis* var. *cuneata* Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 262, pl. 1, figs. 4e, 4d.
Loc. Great Bell Island, Conception Bay, Newfoundland.

LINGULODISCINA Whitfield.Genotype *Lingula exilis* Hall.

- Lingulodiscina* Whitfield, Bull. American Mus. Nat. Hist., III, 1890, p. 122, figs. 1–8.
Ehlertella Hall and Clarke, Pal. New York, VIII, Pt. I, 1890, pp. 133, 168;—Elev-euth Ann. Rep. N. Y. State Geologist, 1894, p. 257.

Lingulodiscina(?) *connata* (Walcott).

Lower Carboniferous.

- Discina connata* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 214, pl. 7, fig. 3.
Loc. Eureka district, Nevada.

- Lingulodiscina exilis** (Hall). Marcellus (Dev.).
Lingula exilis Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 77, fig. 2;—Pal. New York, IV, 1867, p. 7, pl. 1, figs. 8, 9.
Lingulodiscina exilis Whitfield, Bull. American Mus. Nat. Hist., III, 1890, p. 122, figs. 1-8.
Loc. Schoharie County, New York.
- Lingulodiscina newberryi** (Hall). Waverly (L. Carb.).
Discina newberryi Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 30;—Pal. New York, IV, 1867, p. 25, pl. 1, figs. 10, 11.
Discina (Orbiculoidea) *newberryi* Meek, Pal. Ohio, II, 1875, p. 277, pl. 14, fig. 1.
Discina newberryi Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 213, pl. 18, fig. 3.—Keyes, Geol. Survey Missouri, V, 1895, p. 40.
Orbiculoidea newberryi Herrick, Bull. Denison Univ., IV, 1888, p. 12;—Geol. Ohio, VII, 1895, pl. 22, figs. 11, 13.
Ehlertella newberryi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 132, pl. 4F, fig. 18.
Loc. Cuyahoga Falls, Akron, and Farmington, Ohio; Eureka district, Nevada.
Obs. This species should be compared with *Orbiculoidea* (?) *capax* (White.)
- Lingulodiscina pleurites** (Meek). Waverly (L. Carb.).
Discina (Orbiculoidea?) *pleurites* Meek, Pal. Ohio, II, 1875, p. 278, pl. 14, fig. 2.
Orbiculoidea pleurites Herrick, Bull. Denison Univ., IV, 1888, pp. 12, 19, pl. 3, fig. 5;—Geol. Ohio, VII, 1895, pl. 22, fig. 12.
Ehlertella pleurites Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 132, pl. 4E, figs. 21-24; pl. 4F, figs. 19, 20.
Loc. Newark and Gann, Knox County, Ohio.
- LINGULOPS** Hall. Genotype *L. whitfieldi* Hall.
Lingulops Hall, Notes on some New or Imperfectly Known Forms among the Brachiopoda, 1871, p. 2;—*Ibidem*, 1872, p. 2, pl. 13, figs. 1, 2;—Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 244, pl. 13, figs. 1, 2.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 164.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 18, 46, 163;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 233.
- Lingulops granti** Hall and Clarke. Niagara (Sil.).
Lingulops granti Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 19, 173, pl. 4K, figs. 14, 15.
Loc. Hamilton, Ontario.
- Lingulops norwoodi** (James). Utica (Ord.).
Lingula norwoodi James, Cincinnati Quart. Jour. Sci., II, 1875, p. 10, fig. 2;—Jour. Cincinnati Soc. Nat. Hist., VI, 1883, p. 235, pl. 10, fig. 1.
Lingulops norwoodi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 19, pl. 2, figs. 24-26.
Loc. Covington, Kentucky.
- Lingulops whitfieldi** Hall. Maquoketa (Ord.).
Lingulops whitfieldi Hall, Notes on some New or Imperfectly Known Forms among the Brachiopoda, 1872, p. 2, pl. 13, fig. 12;—Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, pl. 13, figs. 1, 2.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 164, pl. 19, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 19, pl. 2, figs. 27-30.
Loc. Near Lattners, Dubuque County, Iowa.
- LINNARSSONIA** Walcott. Genotype *Obolella transversa* Hartt.
Linnarssonina Walcott, American Jour. Sci., 3d ser., XXIX, 1885, p. 115; XXX, p. 21.—Matthew, Trans. Royal Soc. Canada, III, 1886, p. 35.—Hall and

LINNARSSONIA Walcott—Continued.

Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 107, 167;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 251.—Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 42.

Linnarssonina belti Davidson.

Upper Cambrian.

Linnarssonina belti ? Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 42, pl. 12, figs. 7a-7c.

Loc. Near St. John, New Brunswick.

Linnarssonina misera (Billings).

Middle Cambrian.

Obolella ? *misera* Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 470.

Linnarssonina misera Matthew, Trans. Royal Soc. Canada, III, 1886, p. 35, fig. 12.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 108, pl. 8, figs. 35-37.

Loc. Trinity Bay, Newfoundland; St. Martins, New Brunswick.

Linnarssonina pretiosa (Billings).

Upper Cambrian.

Obolella pretiosa Billings, Pal. Fossils, I, 1862, p. 68, fig. 61;—Geol. Canada, 1863, p. 230, fig. 239.

Obolella ? *pretiosa* Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 111.

Linnarssonina pretiosa Dawson, Trans. Royal Soc. Canada, VII, 1889, p. 53, fig. 26.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 70, pl. 3, figs. 43, 44.

Loc. Bridge of the Grand Trunk Railroad across the Chaudiere River; Cape Rouge; Little Metis; Sillery and Point Levis, Canada.

Linnarssonina sagittalis taconica Walcott. Lower and Middle Cambrian.

Linnarssonina taconica Walcott, American Jour. Sci., 3d ser., XXXIV, 1887, p. 189, pl. 1, fig. 18.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 106.

Linnarssonina sagittalis Walcott, Proc. U. S. Nat. Mus., XI, 1888, p. 442.

Linnarssonina sagittalis var. *taconica* Walcott, American Jour. Sci., 3d ser., XXXVIII, 1889, p. 36;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 610, pl. 68, fig. 1.

Loc. Washington County, New York; Mount Stephan, British Columbia.

Linnarssonina taconica Walcott = *L. sagittalis taconica*.**Linnarssonina transversa** (Hartt).

Middle Cambrian.

Obolella transversa Hartt, Dawson, Acadian Geol., 2d ed., 1868, p. 644.—Walcott, Bull. U. S. Geol. Survey, 10, 1884, p. 16, pl. 1, fig. 5.

Linnarssonina transversa Walcott, American Jour. Sci., 3d ser., XXIX, 1885, p. 116, figs. 3, 4, 6.—Matthew, Trans. Royal Soc. Canada, III, 1886, p. 35, pl. 5, fig. 11.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 108, pl. 3, figs. 38-42.—Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 125, pl. 5, figs. 1, 2.

Loc. St. John, New Brunswick.

LISSOPLEURA Whitfield.Genotype *Rhynchonella æquivalvis* Hall.

Lissopleura Whitfield, Bull. Am. Mus. Nat. Hist., VIII, 1896, p. 232.

Lissopleura æquivalvis (Hall).

Lower Helderberg (Dev.).

Rhynchonella æquivalvis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 66;—Pal. New York, III, 1859, p. 224, pl. 29, pp. 2, 3.

Lissopleura æquivalvis Whitfield, Bull. Am. Mus. Nat. Hist., VIII, 1896, p. 232, figs. 1-5.

Loc. Helderberg Mountains, New York.

MARTINIA McCoy.Genotype *Anomites glabra* Martin.

Martinia McCoy, Carboniferous Fossils Ireland, 1844, p. 128, fig. 18; p. 139, fig. 132.—King, Mon. Permian Fossils, Pal. Soc., 1850, pp. 81, 134.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 19.—Waagen, Paleontologica Indica, Ser. XIII, I, 1883, p. 528.—Herrick, Bull. Denison Univ., IV, 1888, p. 14.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 9, 32, 40.

- Martinia athyroides** A. Winchell. Hamilton (Dev.).
Martinia athyroides A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 94.
Loc. Grand Traverse region, Michigan.
- Martinia glabra** (Martin). Upper Carboniferous.
Anomites glabra Martin, Petrefacta Derbiensia, 1809, pl. 48, figs. 9, 10.
Spirifera glabra Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 170, pl. 9, figs. 9, 10.—Dawson, Acadian Geology, 3d ed., 1878, p. 291, fig. 89.
Loc. Europe; Pictou, Windsor, etc., Nova Scotia.
- Martinia glabra contracta** (Meek and Worthen). Kaskaskia (L. Carb.).
Spirifera glabra var. *contracta* Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 143;—Geol. Survey Illinois, II, 1866, p. 298, pl. 23, fig. 5.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 136, pl. 10, fig. 2.
Spirifera (*Martinia*) *contracta* Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 583, pl. 13, figs. 17-19.
Spirifera (*Martinia*) *contracta* Whitfield, Geol. Ohio, VII, 1895, p. 471, pl. 9, figs. 17-19.
Loc. Chester, Illinois; Newtonville, Ohio; Lincoln County, Nevada.
- Martinia glanscerasi** (White). Hamilton (Dev.).
Spirifera glanscerasi White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 24.
Loc. Iowa City, Iowa.
- Martinia(?) insolita** A. Winchell. Huron (Dev.).
Spirifera? *insolita* A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 406.
Loc. Port aux Barques, Michigan.
- Martinia lævigata** (Swallow). Keokuk (L. Carb.).
Spirifera lævigata Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 86.
Loc. Iowa and Missouri.
Obs. Regarded by Keyes as a synonym for *Spirifer logani*.
- Martinia maia** (Billings). Corniferous (Dev.).
Athyris maia Billings, Canadian Jour. Sci., V, 1860, p. 276, figs. 33, 34;—Geol. Canada, 1863, p. 373, fig. 398.
Athyris? *maia* Nicholson, Pal. Prov. Ontario, 1874, p. 88.
Spirifera maia Hall, Pal. New York, IV, 1867, p. 116, pl. 63, figs. 6-13.—Davidson, Suppl. British Sil. Brach., Paleontographical Soc., 1882, p. 122.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 549, pl. 11, fig. 14.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 38, figs. 5, 6.—Whitfield, Geol. Ohio, VII, 1895, p. 444, pl. 7, fig. 14.
Spirifera (*Martinia*) *maia* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 141, pl. 14, fig. 13 (?pl. 3, fig. 1).
Loc. St. Marys, Township of Blanchard, Ontario; Columbus and Delaware, Ohio; Eureka district, Nevada.
- Martinia meristoides** Meek. Middle Devonian.
Spirifera (*Martinia*) *meristoides* Meek, Trans. Chicago Acad. Sci., I, 1868, p. 106, pl. 14, fig. 3.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 142.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 226.
Loc. Mackenzie River Basin, British America.
- Martinia planconvexa** Meek and Hayden = *Ambocœlia planconvexa*.
- Martinia sublineata** Meek. Middle Devonian.
Spirifera (*Martinia*) *sublineata* Meek, Trans. Chicago Acad. Sci., I, 1868, p. 103, pl. 14, fig. 1.
Loc. Great Slave Lake, British America.

Martinia subumbona (Hall).

Hamilton-Portage (Dev.).

Orthis subumbona Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 168.*Ambocœlia subumbona* Hall, Thirteenth Rep. *Ibidem*, 1860, p. 71.*Spirifera subumbona* Hall, Pal. New York, IV, 1867, p. 234, pl. 33, figs. 22-30.*Martinia subumbona* Miller, N. American Geol. Pal., 1889, p. 352.*Spirifer subumbona* Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 29, fig. 14.*Loc.* Shore of Lake Erie, Tully, and McKinneys Station, New York.*Obs.* Professor Williams says this species is a synonym for *Ambocœlia gregaria*.**MEEKELLA** White and St. J. Genotype *Plicatula striatocostata* Cox.*Meekella* White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 120, figs. 4-6.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 175.—Waagen, *Palæontologica Indica*, Ser. XIII, I, 1884, p. 576.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 264;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 287.**Meekella occidentalis** (Newberry).

Upper Carboniferous.

Streptorhynchus occidentalis Newberry, Ives's Rep. Colorado River of the West, 1861, p. 126, pl. 1, fig. 5.*Meekella occidentalis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 266, pl. 11B, figs. 18, 19.*Loc.* Canyon of Cascade River.*Obs.* See *Meekella pyramidalis*.**Meekella(?) occidentalis** (Swallow).

Upper Carboniferous.

Orthisina occidentalis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 82.*Loc.* Caldwell County, Missouri.*Obs.* If a *Meekella* it should be compared with *M. striatocostata*. Regarded by Keyes as a synonym for *M. striatocostata*.**Meekella pyramidalis** (Newberry).

Upper Carboniferous.

Streptorhynchus pyramidalis Newberry, Ives's Rep. Colorado River of the West, 1861, p. 126, pl. 2, figs. 11-13.*Meekella pyramidalis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 266.*Loc.* Colorado River.*Obs.* This species is quite distinct from *M. striatocostata* Cox, with which it has been confounded. *M. occidentalis* Newberry, however, may prove to be but a large individual of *M. pyramidalis*.**Meekella striatocostata** (Cox).

Upper Carboniferous.

Plicatula striatocostata Cox, Owen's Geol. Survey Kentucky, III, 1857, p. 568, pl. 8, fig. 7.*Orthisina shumardianus* Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 183.*Orthisina missouriensis* Swallow, *Ibidem*, 1858, p. 219.—Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, III, 1859, p. 26.*Orthisina shumardiana* Meek and Hayden, *Ibidem*, 1859, p. 26.*Orthis striatocosta* Geinitz, Carbon und Dyas in Nebraska, 1866, p. 48, pl. 3, figs. 22-24.*Meekella striatocostata* White and St. John, Trans. Chicago Acad. Sci., I, 1868, pp. 120, 122, figs. 4-6.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 175, pl. 5, fig. 12.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 571, pl. 26, fig. 21.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 26, pl. 9, fig. 4.—Kayser, Richthofen's China, IV, 1883, p. 178, pl. 23, fig. 8.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 130, pl. 26, figs. 12-14.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 265, pl. 10, figs. 18-23; pl. 11B, figs. 20-22.—Keyes, Geol. Survey Missouri, V, 1895, p. 68, pl. 39, fig. 1.

Meekella striaticostata (Cox)—Continued.

Streptorhynchus (Meekella) striaticostata Hall, Second Ann. Rep. New York State Geol., 1883, pl. 40, figs. 18-23.

Loc. Hopkins County, Kentucky; Indiana; Illinois; Missouri; Iowa; Nebraska; New Mexico; Nevada; Utah; ?China.

Obs. See *M. occidentalis* (Swallow).

MEGALANTERIS Ehlert. Genotype *Terebratula archiaci* de Verneuil.

Meganteris Suess, Sitz. der k. k. Akad. der Wissensch. zu Wien, XVIII, 1855, p. 51.

Megalanteris Ehlert, Fischer's Manuel de Conchyliologie, 1887, p. 1319.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 277;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 859.

Megalanteris condoni (McChesney).

Oriskany (Dev.).

Rensseleria condoni McChesney, New Pal. Fossils, 1861, p. 85;—Trans. Chicago Acad. Sci., I, 1868, p. 36, pl. 7, fig. 2.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 401, pl. 8, fig. 4.

Newberria? *condoni* Hall, Tenth Ann. Rep. N. Y. State Geol., 1891, p. 7 of extract.

Megalanteris condoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 280.

Loc. West of Jonesboro, Union County, Illinois.

Megalanteris ovalis Hall.

Oriskany (Dev.).

Meganteris ovalis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 101.

Rensseleria ovalis Hall, Pal. N. Y., III, 1859, p. 458, pl. 106, fig. 2.—Billings, Geol. Canada, 1863, p. 962, fig. 471.

Megalanteris ovalis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 280, pl. 77, figs. 12-22.

Loc. Albany and Schoharie counties, New York.

Meganteris æquiradiata Hall = *Rensseleria æquiradiata*.

Meganteris cumberlandiæ Hall = *Rensseleria cumberlandiæ*.

Meganteris elliptica Hall = *Rensseleria elliptica*.

Meganteris elongata Hall = *Amphigenia elongata*.

Meganteris lævis Hall = *Meristella lævis*.

Meganteris mutabilis Hall = *Rensseleria mutabilis*.

Meganteris ovalis Hall = *Megalanteris ovalis*.

Meganteris ovoides Hall = *Rensseleria ovoides*.

Meganteris subtrigonalis Hall = *Amphigenia elongata subtrigonalis*.

Meganteris suessana Hall = *Beachia suessana*.

Megerlia dubitanda Cooper = *Terebratella*(?) *dubitanda*.

MERISTA Suess.Genotype *Atrypa herculea* Barrande.

Merista Suess, Jahrbuch Königl. Kais. Geol. Reichs., II, 1851, pp. 150, 160.—Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 73;—Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 258.—Dall, Bull. U. S. Nat. Mus., 8, 1877, p. 47.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 70, fig. 54;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 771.

Camarium Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 42;—Pal. New York, III, 1859, p. 486;—Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, p. 176.

Merista arcuata Hall = *Meristella arcuata*.

Merista bella Hall = *Meristella bella*.

Merista bisulcata Hall = *Whitfieldella bisulcata*.

Merista crassirostra Hall = *Whitfieldella cylindrica*.

Merista cylindrica Hall = *Whitfieldella cylindrica*.

- Merista elongata** (Hall). Lower Helderberg (Dev.).
Camarium elongatum Hall, Pal. New York, III, 1859, p. 488, pl. 95A, fig. 4.
Loc. Cumberland, Maryland.
Obs. Probably only a variety of *M. typa*.
- Merista houghtoni* Winchell = *Meristella houghtoni*.
Merista laevis Hall = *Meristella laevis*.
Merista lata Hall = *Meristella lata*.
Merista lens Hall = *Meristella lens*.
Merista meeki Hall = *Meristella meeki*.
Merista princeps Hall = *Meristella princeps*.
Merista subquadrata Hall = *Meristella subquadrata*.
- Merista tennesseensis** Hall and Clarke. Lower Helderberg (Dev.).
Merista tennesseensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 71, 365, pl. 42, figs. 1-6.
Loc. Perry County, Tennessee.
- Merista typus** Hall. Lower Helderberg (Dev.).
Camarium typum Hall, Pal. New York, III, 1859, p. 487, pl. 95A, figs. 2a, 3, 5, 6.
Merista typum Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 93, figs. 10-13.
Merista typa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 42, figs. 7-12.
Loc. Cumberland, Maryland.
- MERISTELLA** Hall, 1860. Genotype *Merista arcuata* Hall.
 ?*Meristella* Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.
Meristella Hall, Thirteenth Rep. Ibidem, 1860, pp. 74, 93;—Sixteenth Rep. Ibidem, 1863, p. 50, figs. 27-34;—Trans. Albany Institute, IV, 1863, p. 139;—American Jour. Sci., 2d ser., XXXV, 1863, p. 396; XXXVI, p. 11;—Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, pp. 155, 258;—Pal. New York, IV, 1867, p. 295.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 97.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 73, figs. 55, 56;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 773.
Athyris Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 115.
- Meristella arcuata** Hall. Lower Helderberg (Dev.).
Merista arcuata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 95, figs. 1-4;—Pal. New York, III, 1859, p. 249, pl. 41, fig. 1 (?).
Meristella arcuata Hall, Ibidem, IV, 1867, p. 298, figs. 1, 2.—Hall and Clarke, Ibidem, VIII, Pt. II, 1895, pl. 43, figs. 1, 2; pl. 44, fig. 5.
Loc. Albany and Schoharie counties, New York; St. Blandine, New Brunswick.
- Meristella barrisi** Hall. Marcellus-Hamilton (Dev.).
Meristella barrisi Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 84;—Pal. New York, IV, 1867, p. 304, pl. 49, figs. 5-22.—?Tschernyschew, Mémoires du Comité Géologique de St. Pétersbourg, III, 3, 1887, p. 55, pl. 9, figs. 12, 15; pl. 13, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 25, 26; pl. 44, figs. 27-30.
Loc. York and Leroy, New York; Urals of Russia.
- Meristella bella** (Hall). Lower Helderberg (Dev.).
Merista bella Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 92, figs. 1-7;—Pal. New York, III, 1859, p. 248, pl. 40, fig. 1.
Meristella bella Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 510, pl. 5, figs. 8-10.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 7-9; pl. 44, figs. 1-3.—Whitfield, Geol. Ohio, VII, 1895, p. 412, pl. 1, figs. 8-10.
Loc. Albany and Schoharie counties, New York; Greenfield, Ohio; Lake Temiscouata, New Brunswick.

- Meristella(?) blancha** (Billings). Lower Helderberg (Dev.).
Athyris blancha Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 115, pl. 3, fig. 13.
Meristina (?) blancha Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 68, pl. 41, figs. 22, 23.
Loc. Square Lake, Maine.
Obs. Compare with *Meristella arcuata*.
- Meristella clusia** (Billings). Corniferous (Dev.).
Athyris? clusia Billings, Canadian Jour. Sci., V, 1860, p. 279.
Loc. Cayuga, Ontario.
- Meristella doris** Hall. Upper Helderberg (Dev.).
Meristella doris Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 81:--
 Pal. New York, IV, 1867, p. 303, pl. 50, figs. 1-12.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 21, 22.
Charionella doris Billings, Geol. Canada, 1863, p. 374, figs. 400E, 401a, b.
Loc. Schoharie and Williamsville, New York; Cayuga, Ontario.
- Meristella elissa* Hall=*Meristella nasuta*.
- Meristella haskinsi** Hall. Hamilton (Dev.).
Meristella haskinsi Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 84;—Pal. New York, IV, 1867, p. 306, pl. 49, figs. 23-35.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1895, pl. 43, figs. 23, 24; pl. 44, fig. 31.
Loc. Seneca Lake, York, Moscow, etc., New York; Thedford, Ontario.
- Meristella (?) houghtoni** (A. Winchell). Huron (Dev.).
Merista houghtoni Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 407.
Meristella (?) houghtoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78.
Loc. Port aux Barques, Michigan.
- Meristella (?) incerta** Simpson. Waverly (L. Carb.).
Meristella incerta Simpson, Trans. American Philosophical Soc., n. ser., XVI, 1889, p. 442, fig. 7.
Loc. Warren, Pennsylvania.
Obs. Based upon a crushed and broken specimen.
- Meristella lævis** (Vanuxem). Lower Helderberg (Dev.).
Atrypa lævis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 120, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 825, fig. 642.
Merista lævis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 94, figs. 1-6;—Pal. New York, III, 1859, p. 247, pl. 39, figs. 3, 4.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 376, pl. 7, fig. 8.
Meristella lævis Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 510, pl. 5, figs. 6, 7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 3-6; pl. 44, fig. 4.—Whitfield, Geol. Ohio, VII, 1895, p. 411, pl. 1, figs. 6, 7.
Loc. Albany and Schoharie counties, New York; Greenfield, Ohio; Perry County, Missouri; Pennsylvania; Square Lake, Maine; St. Blandine, New Brunswick.
- Meristella (?) lævis** (Hall). Lower Helderberg (Dev.).
Meganteris lævis Hall (non Vanuxem), Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 99.
Rensseleria lævis Hall, Pal. New York, III, 1859, p. 256, pl. 40, fig. 2.
Loc. Albany County, New York.
- Meristella lata** Hall. Oriskany (Dev.).
Merista lata Hall, Pal. New York, III, 1859, p. 431, pl. 101, fig. 3.
Meristella lata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78, pl. 44, fig. 12.
Loc. Albany and Schoharie counties, New York; Cayuga, Ontario.

- Meristella lens** (A. Winchell). Hamilton (Dev.).
Merista lens A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 94.
Meristella lens Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78.
Loc. Grand Traverse region, Michigan.
- Meristella lenta** Hall. Oriskany (Dev.).
Meristella lenta Hall, Pal. New York, IV, 1867, p. 420, pl. 63, figs. 19-22.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1895, pl. 44, figs. 15-18.
Loc. Cayuga, Ontario.
- Meristella maria** Hall = *Meristina maria*.
- Meristella meeki** Hall. Lower Helderberg (Dev.).
Merista meeki Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 97;—Pal. New York, III, 1859, p. 252, pl. 44, fig. 6.
Camarium meeki Hall, *Ibidem*, III, 1859, p. 486.
Meristella meeki Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78.
Loc. Perry County, Tennessee.
- Meristella meta** Hall. Hamilton (Dev.).
Meristella meta Hall, Pal. New York, IV, 1867, p. 308, pl. 49, figs. 1-4.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1895, pl. 43, figs. 29, 30.
Loc. Delphi, New York.
- Meristella nasuta** (Conrad). Upper Helderberg (Dev.).
Atrypa nasuta Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 265.
Terebratulna valenciennii Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 39, pl. 13, fig. 6.
Meristella nasuta Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 93, figs. 8, 9;—Fifteenth Rep. *Ibidem*, 1862, p. 160, figs. 17-22 on p. 161;—Pal. New York, IV, 1867, p. 299, pl. 48, figs. 1-25.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 98, pl. 15, figs. 2-8.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 18-20; pl. 44, figs. 13, 14, 19-26.
Athyris clara Billings, Canadian Jour. Sci., V, 1860, p. 274, figs. 29-32;—Geol. Canada, 1863, p. 373, fig. 397;—Canadian Nat. Geol., n. ser., VII, 1874, p. 240.
Meristella elissa Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 100;—Fifteenth Rep. *Ibidem*, 1862, pl. 3, figs. 21, 22.
Athyris nasuta Nicholson, Pal. Prov. Ontario, 1874, p. 86.
Meristella (*Whitfieldia*) *nasuta* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 148, pl. 3, fig. 8.
Loc. Schoharie, Clarence, Williamsville, etc., New York; Cayuga, Ontario; Columbus and Dublin, Ohio; Falls of Ohio; Lone Mountain, Nevada.
- Meristella nucleolata** Whitfield = *Whitfieldella nucleolata*.
- Meristella princeps** Hall. Lower Helderberg (Dev.).
Merista princeps Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 95, figs. 1-5;—Pal. New York, III, 1859, p. 251, pl. 44, figs. 1-5.
Camarium princeps Hall, *Ibidem*, III, 1859, p. 486.
Meristella princeps Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 93, figs. 5-7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 10-13.
Loc. Carlisle and Schoharie, New York; St. Blandine, New Brunswick.
- Meristella rectirostra** Hall = *Meristina rectirostris*.
- Meristella riskowskyi** A. Ulrich. Middle Devonian.
Meristella riskowskyi A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 64, pl. 4, figs. 16-18.
Loc. Chahuarani and near Oconi, Bolivia.

- Meristella rostrata** Hall. Hamilton (Dev.).
Atrypa rostrata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 202, fig. 2.
Athyris? *rostrata* Billings, Canadian Jour. Sci., V, 1860, p. 281, figs. 43, 44.
Charionella rostrata Billings, Geol. Canada, 1863, p. 385, fig. 420.
Meristella rostrata Hall, Pal. New York, IV, 1867, p. 307, pl. 50, figs. 13-17.—
 Hall and Clarke, *Ibidem*, Vol. VIII, Pt. II, 1895, pl. 43, figs. 27, 28.
Loc. Eighteen Mile Creek, etc., New York; Bosanquet, Ontario.
- Meristella subquadrata** Hall. Lower Helderberg (Dev.).
Merista subquadrata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 93;—
 Pal. New York, III, 1859, p. 249, pl. 40, fig. 3.
Meristella subquadrata Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 78, pl. 43,
 figs. 14, 15.
Loc. Schoharie and Carlisle, New York.
- Meristella unisulcata** Hall = *Pentagonia unisulcata*.
Meristella unisulcata buplicata Hall = *Pentagonia unisulcata buplicata*.
Meristella unisulcata uniplicata Hall = *Pentagonia unisulcata uniplicata*.
- Meristella walcotti** Hall and Clarke. Oriskany (Dev.).
Meristella walcotti Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 77,
 365, figs. 55, 56, pl. 43, figs. 16, 17; pl. 44, figs. 6-11, 23, 32.
Loc. Cayuga, Ontario.
- MERISTINA** Hall. Genotype *Meristella maria* Hall.
Meristina Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 157;—Pal.
 New York, IV, 1867, p. 299.—*Nettelroth* (partim), Kentucky Fossil Shells, Mem.
 Kentucky Geol. Survey, 1889, p. 101.—Hall and Clarke, Pal. New York, VIII,
 Pt. II, 1893, p. 65;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 770.
Whitfieldia Davidson, Supplement British Sil. Brach., Paleontographical Soc.,
 1882, p. 107.—*Beecher* and Clarke, Mem. New York State Mus., I, 1889, p. 73.
- Meristina maria** Hall. Niagara (Sil.).
Athyris tumida Roemer, Sil. Fauna west. Tennessee, 1860, p. 70, pl. 5, fig. 12.
Meristella maria Hall, Trans. Albany Institute, IV, 1863, p. 212.—Hall and Whit-
 field, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 196.
Meristina maria Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 157;—
 Pal. New York, IV, 1867, p. 299.—Hall and Whitfield, Pal. Ohio, II, 1875, p.
 132, pl. 7, figs. 5, 6.—*Nettelroth*, Kentucky Fossil Shells, Mem. Kentucky
 Geol. Survey, 1889, p. 101, pl. 29, figs. 7-10.—Hall and Clarke, Pal. New
 York, VIII, Pt. II, 1893, p. 67, pl. 41, figs. 1-17.
Meristella tumida Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878,
 p. 597.
Meristella (*Meristina*) *maria* Hall, Twenty-eighth Rep. N. Y. State Mus. Nat.
 Hist., 1879, p. 159, pl. 25, figs. 8-12;—Eleventh Rep. State Geol. Indiana,
 1882, p. 299, pl. 25, figs. 8-12.
Whitfieldia maria *Beecher* and Clarke, Mem. N. Y. State Mus., I, 1889, p. 73, pl. 7,
 figs. 1-3.
Loc. Waldron, Indiana; Springfield, Ohio; Louisville, Kentucky; Perry County,
 Tennessee; Bridgeport, Illinois; Racine, Wisconsin; Bessels Bay, 81° 6'.
Obs. This species is not identical with *M. tumida* Dalman.
- Meristina nitida** Hall = *Whitfieldella nitida*.
- Meristina rectirostris** Hall. Niagara (Sil.).
Meristella rectirostra Hall, Descriptions n. sp. Fossils from Waldron, Indiana,
 1879, p. 15;—Eleventh Rep. State Geol. Indiana, 1882, p. 301, pl. 27, figs. 10-
 14;—Trans. Albany Institute, X, 1883, p. 71.—*Beecher* and Clarke, Mem.
 N. Y. State Mus., I, 1889, p. 67, pl. 7, figs. 4, 5, 11-13.

Meristina rectirostris Hall—Continued.

Meristina rectirostra Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 68, figs. 52, 53, pl. 41, figs. 18-21.

Loc. Waldron, Indiana.

Meristina trisinuata (McChesney).

Niagara (Sil.).

Pentamerus trisinuatus McChesney, Descriptions New Pal. Fossils, 1861, p. 86.

Athyris? trisinuatus McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 33, pl. 8, fig. 2.

Loc. Milwaukee, Wisconsin.

Obs. Probably synonymous with *Meristina maria*.

METAPLASIA Hall and Clarke.Genotype *Spirifer pyxidata* Hall.

Metaplasia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 56;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 762.

Metaplasia disparilis (Hall).

Corniferous (Dev.).

Spirifer disparilis Hall, Tenth Rep. N. Y. State Geol. Nat. Hist., 1857, p. 134.

Spirifera disparilis Hall, Pal. New York, IV, 1867, p. 204, pl. 30, figs. 10-15.

Metaplasia pyxidata Hall and Clarke, *Ibidem*, VIII, Pt. II, 1895, pl. 39, figs. 19-22.

Loc. Williamsville and Clarence Hollow, New York.

Metaplasia pyxidata Hall.

Oriskany (Dev.).

Spirifer pyxidata Hall, Pal. New York, III, 1859, p. 428, pl. 100, figs. 9-12.

Metaplasia pyxidata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 56.

Loc. Albany and Schoharie counties, New York; Cumberland, Maryland; Cayuga, Ontario.

Micromitra Meek = *Iphidea*.**MIMULUS** Barrande.Genotype *M. perversus* Barrande.

Mimulus Barrande, *Système Silurien du Centre de la Bohême*, V, 1879, p. 109.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 272;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 289.

Mimulus waldronensis (Miller and Dyer).

Niagara (Sil.).

Spirifera (?) *waldronensis* Miller and Dyer, Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 37, pl. 2, fig. 3.

Triplesia putillus Hall, Descriptions n. sp. Fossils Waldron, Indiana, 1879, p. 16;—Eleventh Rep. State Geol. Indiana, 1882, p. 298, pl. 27, figs. 19-22;—Trans. Albany Institute, X, 1883, p. 72.

Streptis waldronensis Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 30, pl. 3, figs. 9, 10.

Mimulus waldronensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 273, pl. 11C, figs. 23-28.

Loc. Waldron, Indiana.

MONOMORELLA Billings.Genotype *M. prisca* Billings.

Monomorella Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 220;—American Jour. Sci., 3d ser., III, 1872, p. 358.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 155.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 40, 46;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 238.

Monomorella egani Hall and Clarke.

Niagara (Sil.).

Monomorella egani Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 42, 175, pl. 4C, fig. 16.

Loc. Near Grafton, Wisconsin.

- Monomorella greenii** Hall and Clarke. Niagara (Sil.).
Monomorella greenii Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 42, 174, pl. 4D, figs. 5-10.
Loc. Near Grafton, Wisconsin; Risingsun, Ohio.
- Monomorella kingi** Hall and Clarke. Niagara (Sil.).
Monomorella kingi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 42, 174, pl. 4D, figs. 1, 2.
Loc. Near Cedarburg, Wisconsin; Hawthorne, Illinois.
- Monomorella newberryi** Hall and Whitfield. Niagara (Sil.).
Monomorella newberryi Hall and Whitfield, Pal. Ohio, II, 1875, p. 131, pl. 7, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4C, figs. 1, 2.
Loc. Genoa, Ohio.
- Monomorella orbicularis** Billings. Guelph (Sil.).
Monomorella orbicularis Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 221;—American Jour. Sci., 3d ser., III, 1872, p. 359.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 158, pl. 17, fig. 10.
Monomorella enf. *orbicularis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4C, figs. 3-5.
Loc. Hespelar, Ontario; near Grafton, Wisconsin.
- Monomorella ortonii** Hall and Clarke. Niagara (Sil.).
Monomorella ortonii Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 42, 175, pl. 4C, figs. 14, 15.
Loc. Risingsun, Wood County, Ohio.
- Monomorella ovata** Whiteaves. Guelph (Sil.).
Monomorella ovata Whiteaves, Pal. Fossils, III, 1884, p. 5, pl. 2, fig. 1; pl. 8, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 42, pl. 4D, figs. 13-15.
Loc. Durham, Ontario.
- Monomorella ovata lata** Whiteaves. Guelph (Sil.).
Monomorella ovata var. *lata* Whiteaves, Pal. Fossils, III, 1884, p. 6, pl. 2, fig. 2; pl. 8, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4, figs. 11, 12; pl. 4C, figs. 17, 18.
Loc. Durham, Ontario; Hawthorne, Illinois.
- Monomorella prisca** Billings. Guelph (Sil.).
Monomorella prisca Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 221;—American Jour. Sci., 3d ser., III, 1872, p. 359.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 156, pl. 17, figs. 5-8.—Nicholson, Pal. Prov. Ontario, 1875, p. 68, fig. 38.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4C, figs. 6-13.
Loc. Hespelar and Elora, Ontario; Risingsun, Wood County, Ohio; Hawthorne, Port Byron, and Cicero, Illinois.
- NEWBERRYA** Hall. Genotype *Rensselæria? johanni* Hall.
Rensselandia Hall, Pal. New York, IV, 1867, p. 385.
Newberria Hall, Cont. Canadian Pal., I, 1891, p. 236;—Tenth Ann. Rep. N. Y. State Geol., 1891, p. 91 (extract, p. 4).—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 261;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 851.
Obs. It is unfortunate that *Rensselæria johanni* is the type for two generic names. Adhering strictly to the rules of nomenclature *Rensselandia* will take precedence over *Newberria*. The first term is, however, improperly constructed and is without meaning.

- Newberrya claypolei** Hall. Hamilton (Dev.).
Rensseleria marylandica? Claypole, Proc. American Phil. Soc., 1883, p. 235.
Newberria claypolii Hall, Tenth Ann. Rep. N. Y. State Geol., 1891, p. 9, extract,
 pl. 5, figs. 1-9.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 263,
 pl. 78, figs. 1-9.
Loc. Perry County, Pennsylvania.
- Newberria?* *condoni* McChesney = *Megalanteris condoni*.
- Newberrya johannis** Hall. Middle Devonian.
Rensseleria? *johanni* Hall, Pal. New York, IV, 1867, p. 385, pl. 58A, figs. 9-20.
Rensseleria johanni Hall, *Ibidem*, 1867, at end of description.
Newberria johanni Hall, Cont. Canadian Pal., I, 1891, p. 237.
Newberria johannis Hall, Tenth Ann. Rep. N. Y. State Geol., 1891, p. 8, extract,
 pl. 6, figs. 1-11.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 262,
 pl. 78, figs. 10-16.
Loc. Waterloo, Iowa.
- Newberrya lævis** (Meek). Middle Devonian.
Rensseleria lævis Meek, Trans. Chicago Acad. Sci., I, 1868, p. 108, pl. 13, fig. 8;
 pl. 14, fig. 4.
Newberria lævis Hall, Cont. Canadian Pal., I, 1891, p. 237, pl. 30, figs. 3, 4.
Newberria lævis Hall, Tenth Ann. Rep. N. Y. State Geol., 1891, p. 7, extract, pl.
 6, figs. 12-15.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 264,
 pl. 78, figs. 17-20.
Loc. Mackenzie, Onion, and Lockhart rivers, Canada.
- Newberrya missouriensis** Swallow. Hamilton (Dev.).
Newberria missouriensis (Swallow MS.) Hall, Tenth Ann. Rep. N. Y. State Geol.,
 1891, p. 9, extract, pl. 5, figs. 10-12.—Hall and Clarke, Pal. New York, VIII,
 Pt. II, 1893, p. 263, pl. 78, figs. 21-23.
Loc. Moniteau County, Missouri.
- NOTOTHYRIS** Waagen. Genotype *Terebratula subvesicularis* David.
Notothyris Waagen, Palæontologica Indica, Ser. XIII, I, 1882, p. 375.—Hall and
 Clarke, Pal. New York, VIII, Pt. II, 1893, p. 274;—Thirteenth Ann. Rep.
 N. Y. State Geologist, 1895, p. 857.
- Notothyris** (?) *smithii* Derby. Middle Devonian.
Notothyris (?) *smithii* Derby, Archivos do Museu Nacional do Rio De Janeiro,
 IX, 1890, p. 81.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 267,
 275.
Loc. Head of the Paraguay in Matto-Grosso, Brazil.
- NUCLEOSPIRA** Hall. Genotype *Spirifer ventricosa* Hall.
Nucleospira Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 24;—Pal.
 New York, III, 1859, p. 219;—*Ibidem*, IV, 1867, p. 278.—Nettelroth, Kentucky
 Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 103.—Hall and Clarke,
 Pal. New York, VIII, Pt. II, 1893, p. 142;—Thirteenth Ann. Rep. N. Y. State
 Geologist, 1895, p. 806.
- Nucleospira barrisi** White. Kinderhook (L. Carb.).
Nucleospira barrisi White, Jour. Boston Soc. Nat. Hist., VIII, 1860, p. 227.
Loc. Burlington, Iowa.
- Nucleospira concentrica** Hall. Lower Helderberg (Dev.).
Nucleospira concentrica Hall, Pal. New York, III, 1859, p. 223, pl. 28B, figs. 15-
 19.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1895, pl. 48, fig. 7.
Loc. Decatur County, Tennessee.

Nucleospira concinna Hall. Corniferous-Hamilton (Dev.).

Atrypa concinna Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 200, fig. 3.

Nucleospira concinna Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, pp. 25, 26;—Pal. New York, IV, 1867, p. 279, pl. 45, figs. 33-57.—Davidson, Suppl. British Silurian Brach., Palaeontographical Society, 1882, p. 121.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 147.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 103, pl. 32, figs. 1-4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 145, fig. 131; pl. 48, figs. 12-17, 19-34; pl. 84, fig. 38.

Loc. Moscow, Darien, etc., New York; Monroe County, Pennsylvania; Thedford, Ontario; Hardy County, Virginia; Columbus, Ohio; Falls of Ohio; Lone Mountain, Nevada.

Nucleospira elegans Hall. ?Niagara and L. Helderberg (Sil. and Dev.).

Nucleospira elegans Hall, Pal. New York, III, 1859, p. 222, pl. 28B, figs. 10-15.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 104.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 48, figs. 8-11.

Loc. Cherry Valley, New York; Cumberland, Maryland. In the Niagara near Louisville, Kentucky (Nettelroth).

Nucleospira indianensis Miller=*Parazyga hirsuta*.**Nucleospira pisiformis** Hall. Niagara (Sil.).

Orthis pisum Hall (non Sowerby), Pal. New York, II, 1852, p. 250, pl. 2, fig. 1.

Nucleospira pisiformis Hall, Pal. New York, III, 1859, pl. 28B;—Trans. Albany Institute, IV, 1863, p. 226;—Twenty-eighth Rep. N. Y. State Mns. Nat. Hist., 1879, p. 160, pl. 25, figs. 22-28;—Eleventh Rep. State Geol. Indiana, 1882, p. 301, pl. 25, figs. 22-28.—Kayser, Richtihofens China, IV, 1883, p. 47, pl. 4, figs. 9-11.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 104, pl. 33, figs. 7-9.—Keyes, Geol. Survey Missouri, V, 1895, p. 94, pl. 41, fig. 5.

Loc. Wolcott, New York; Waldron, Indiana; Louisville, Kentucky; Pike County, Missouri; Tshan-Tien, China.

Nucleospira rotundata Whitfield. Waterlime (Sil.).

Nucleospira rotundata Whitfield, Ann. New York Acad. Sci., II, 1882, p. 194;—*Ibidem*, V, 1891, p. 511, pl. 5, figs. 11-14;—Geol. Ohio, VII, 1895, p. 413, pl. 1, figs. 11-14.

Loc. Greenfield, Ohio.

Nucleospira ventricosa Hall. Lower Helderberg (Dev.).

Spirifer ventricosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 57.

Nucleospira ventricosa Hall, Pal. New York, III, 1859, p. 220, pl. 14, fig. 1; pl. 28B, figs. 2-9.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 145, figs. 128-130; pl. 48, figs. 2-6, 18; pl. 84, figs. 39, 40.

Loc. Schoharie, Cherry Valley, etc., New York; Cumberland, Maryland.

OBOLELLA Billings. Genotype *O. chromatica* Billings.

Obolella Billings, Geol. Vermont, II, 1861, p. 946;—Pal. Fossils, I, 1861, p. 7.—Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 131.—Meek and Hayden, Smithsonian Cont. to Knowledge, XIV, 172, 1864, p. 3.—Hall, Trans. Albany Institute, V, 1867, p. 108.—Dall, American Jour. Conchology, VI, 1870, pp. 162, 164.—Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 217, figs. 5, 6;—American Jour. Sci., 3d ser., III, 1872, p. 355, figs. 5-7;—*Ibidem*, 3d ser., XI, 1876, p. 176.—Ford, *Ibidem*, 3d ser., XXI, 1881, p. 131.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 109.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 66, 164;—Eleventh Ann. Rep. N. Y. State Geologist, 1894,

OBOLELLA Billings—Continued.

p. 240.—Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 39.—Mickwitz, Mém. l'Acad. Imp. Sci. St. Pétersbourg, VIII, 1896, p. 116.

Dicellomus Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 246.

Obolella ambigua Walcott = *Elkania ambigua*.

Obolella atlantica Walcott.

Lower Cambrian.

Obolella atlantica Walcott, Proc. U. S. Nat. Mus., XII, 1889, p. 36;—Tenth Ann.

Rep. U. S. Geol. Survey, 1891, p. 611, pl. 71, fig. 1.

Loc. Conception Bay, Newfoundland; Attleboro, Massachusetts.

Obolella caelata Billings = *Lingulella caelata*.

Obolella chromatica Billings.

Lower Cambrian.

Obolella chromatica Billings, Geol. Vermont, II, 1861, p. 947, fig. 346;—Pal.

Fossils, I, 1861, p. 7, fig. 7;—Geol. Canada, 1863, p. 284, fig. 288.—Hall,

Trans. Albany Institute, V, 1867, p. 110.—Billings, American Jour. Sci., 3d

ser., XI, 1876, p. 176, figs. 1-4.—Ford, *Ibidem*, 3d ser., XXI, 1881, p. 133, figs.

3, 4, 5.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 112, pl. 11, fig. 1;—Tenth

Ann. Rep. U. S. Geol. Survey, p. 611, pl. 71, fig. 2.—Hall and Clarke, Pal. New

York, VIII, Pt. I, 1892, p. 70.

Loc. Anse au Loup, Canada.

Obolella cingulata Billings = *Kutorgina cingulata*.

Obolella circe Billings.

Lower Cambrian.

Obolella circe Billings, Canadian Nat. Geol., n. ser., IV, 1871, p. 218;—American

Jour. Sci., III, 1872, p. 357.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p.

118, pl. 10, fig. 3;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 611, pl. 71,

fig. 3.

Loc. Trois Pistoles, Canada.

Obolella crassa (Hall).

Lower Cambrian.

Orbicula? *crassa* Hall, Pal. New York, I, 1847, p. 290, pl. 79, fig. 8.

Avicula? *desquamata* Hall, *Ibidem*, 1847, p. 292, pl. 80, fig. 2.

Obolella crassa Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 218.—Ford,

Amer. Jour. Sci., 3d ser., XV, 1878, p. 128;—*Ibidem*, 3d ser., XXI, 1881, p. 131,

figs. 1, 2.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 114, pl. 10, fig. 1.—

Shaler and Foerste, Bull. Mus. Comp. Zool., XVI, 1888, p. 27, pl. 1, fig. 1.—

Walcott, Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 612, pl. 71, fig. 4.—

Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 70, pl. 2, figs. 31-36.

Obolella desquamata Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 217, fig.

6;—American Jour. Sci., 3d ser., III, 1872, p. 355, fig. 6.

Obolella (*Orbicula?*) *crassa* Ford, American Jour. Sci., 3d ser., II, 1871, p. 33.

Dicellomus *crassa* Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p.

246, pl. 13, figs. 6-9.

Obolella chromatica (*lap. crassa*) Walcott, American Jour. Sci., 3d ser., XXIX,

1885, p. 116, figs. 1, 2;—*Ibidem*, XXX, 1890, p. 21.

Loc. Troy and Schodaek Landing, New York; North Attleboro, Massachusetts;

St. Simon and Bic Harbor, below Quebec, Canada.

Obolella desiderata Billings = *Elkania desiderata*.

Obolella desquamata Billings = *Obolella crassa*.

Obolella (?) discoidea Hall and Whitfield. Up. Camb. and Pogonip (Ord.).

Obolella discoidea Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877,

p. 203, pl. 1, figs. 1, 2.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 14.

Obolella? *discoidea* Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 111.—Hall

and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 69.

Loc. Eureka district, Nevada.

- Obolella gemma** Billings. Lower Cambrian.
Obolella gemma Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 217, fig. 5;—
 American Jour. Sci., 3d ser., III, 1872, p. 357, fig. 5.—Walcott, Bull. U. S. Geol.
 Survey, 30, 1886, p. 116, pl. 10, fig. 2;—Tenth Ann. Rep. U. S. Geol. Survey, 1891,
 p. 612, pl. 71, fig. 5; pl. 72, fig. 2.—Hall and Clarke, Pal. New York, VIII,
 Pt. 1, 1892, p. 71, fig. 30; pl. 2, figs. 42–44.
Loc. Bic and St. Simon harbors, below Quebec, Canada; Troy, New York.
- Obolella (?) gemmula** Matthew. Upper Cambrian.
Obolella (?) gemmula Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 41, pl. 12,
 figs. 8a–8c.
Loc. Near St. John, New Brunswick.
- Obolella (?) ida** Billings. Upper Cambrian and Calciferous (Ord.).
Obolella ida Billings, Pal. Fossils, I, 1862, p. 71, fig. 63, on p. 68.
Obolella ? ida Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 111.
Loc. Point Levis, Canada.
- Obolella misera** Billings=*Linnarssonina misera*.
- Obolella minuta** (Hall and Whitfield). Upper Cambrian.
Lingulepis ? minuta Hall and Whitfield, Rep. Geol. Expl. 40th Part., IV, 1877,
 p. 206, pl. 1, figs. 3, 4.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 13.
Loc. Eureka district, Nevada.
- Obolella nana** Meek and Hayden. Middle Cambrian.
Obolella nana Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1861, p.
 435.—Billings, Pal. Fossils, I, 1862, p. 67.—Hayden, American Jour. Sci.,
 2d ser., XXXIII, 1863, p. 73.—Meek and Hayden, Smithsonian Cont. to Knowl-
 edge, XIV, 172, 1864, p. 4, pl. 1, fig. 3.—Whitfield, Powell's Geol. Geogr. Sur-
 vey Rocky Mountain Region, 1880, p. 340, pl. 2, figs. 14–17.—Hall and Clarke,
 Pal. New York, VIII, Pt. 1, 1892, p. 69.
Loc. Black Hills, South Dakota.
- Obolella nitida** Ford. Lower Cambrian.
Obolella nitida Ford, American Jour. Sci., 3d ser., V, 1873, p. 213.—Walcott, Bull.
 U. S. Geol. Survey, 30, 1886, p. 118, pl. 11, fig. 2;—Tenth Ann. Rep. U. S. Geol.
 Survey, 1891, p. 612, pl. 72, fig. 1.—Hall and Clarke, Pal. New York, VIII,
 Pt. 1, 1892, pp. 69, 70.—?Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 125,
 pl. 2, fig. 8.
Loc. Troy, and Washington County, New York; Hanford Brook, New Brunswick.
- Obolella pectenoides** (Whitfield). Upper Cambrian.
Obolus pectenoides Whitfield, Ludlow's Rep. Recon. Black Hills, Dakota, 1875,
 p. 103, figs. 1–3.
Obolus ? pectenoides Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain
 Region, 1880, p. 338, pl. 2, figs. 18, 19.
Loc. Black Hills, South Dakota.
- Obolella polita** Hall. Middle Cambrian.
Obolus appolinus Owen (non Eichwald), Geol. Survey Wisconsin, Iowa, Minne-
 sota, 1852, pl. 1B, figs. 9, 11, 15, 20.
Lingula ? polita Hall, Ann. Rep. Geol. Survey Wisconsin, 1861, p. 24;—Geol. Rep.
 Wisconsin, I, 1862, pp. 21, 435.
Obolella ? polita Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 133
 pl. 6, figs. 17–21;—Trans. Albany Institute, V, 1867, p. 112.
Lingulepis prima Meek and Hayden, Smithsonian Cont. to Knowl., XIV, 172, 1864,
 p. 3, pl. 1, fig. 2.
Dicellomus polita Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 246.

Obolella polita Hall—Continued.

Obolella polita Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain Region, 1880, p. 339, pl. 2, figs. 12, 13.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 111.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 2, figs. 37-41.

Loc. Trempealeau, Wisconsin; Black Hills, South Dakota.

Obolella pretiosa Billings=Linnarssonina pretiosa.

Obolella prima Whitfield=Lingulepis prima.

Obolella transversa Hartt=Linnarssonina transversa.

Obolellina Billings=Dinobolus.

Obolellina canadensis Billings=Dinobolus canadensis.

Obolellina galtensis Billings=Rhinobolus galtensis.

Obolellina magnifica Billings=Dinobolus magnificus.

OBOLUS Eichwald.Genotype *Obolus appolinus* Eichwald.

Obolus Eichwald, Zoologia Specialis, I, 1829, p. 274.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 80, figs. 33, 34; pp. 164, 337.—Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 43.—Mickwitz, Mém. l'Acad. Imp. Sci. St. Pétersbourg, VIII, 1896, pp. 25, 126.

Euobolus Mickwitz, Mém. l'Acad. Imp. Sci. St. Pétersbourg, VIII, 1896, pp. 25, 129, 133.

Obs. Both *Euobolus* and *Obolus* are based upon the same species.

Obolus appolinus Owen (non Eichwald)=*Obolella polita*.

Obolus canadensis Billings, 1858=Dinobolus magnificus.

Obolus canadensis Billings=Dinobolus canadensis.

Obolus conradi Hall=Dinobolus conradi.

Obolus galtensis Billings=Rhinobolus galtensis.

Obolus labradoricus Billings=Iphidea labradorica.

Obolus (?) major Matthew.

Lower Cambrian.

Obolus? major Matthew, Trans. Royal Soc. Canada, IV, 1890, p. 155, pl. 8, fig. 3.

Mickwitzia (?) major Mickwitz, Mém. l'Acad. Imp. Sci. St. Pétersbourg, VIII, 1896, p. 23.

Loc. Near St. John, New Brunswick.

Obolus (?) murrayi Billings.

Cambrian.

Obolus? murrayi Billings, Pal. Fossils, I, 1865, p. 362.

Loc. Hare Bay, Newfoundland.

Obolus ? pectenoides Whitfield=*Obolella pectinoides*.

Obolus pulcher Matthew=Botsfordia pulchra.

Obolus pristinus Matthew.

? Middle Cambrian.

Obolus pristinus Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 121, pl. 4, fig. 1.

Loc. Hanford Brook, New Brunswick.

Obolus (?) refulgens Matthew.

Middle Cambrian.

Obolus refulgens Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 44, pl. 12, figs. 6a-6d.

Obolus (?) refulgens Mickwitz, Mém. l'Acad. Imp. Sci. St. Pétersbourg, VIII, 1896, p. 23.

Loc. Near St. John, New Brunswick.

Ehlertella Hall and Clarke=Lingulodiscina.

Orbicula Cuvier=Crania.

Orbicula Sowerby, 1830=Discina.

Orbicula cælata Hall=Lingulella cælata.

Orbicula corrugata Hall=Lichenalia, a bryozoan.

Orbicula crassa Hall=Obolella crassa.

Orbicula deformata Hall=Crania deformata.

?*Orbicula excentrica* Emmons.

Cambrian.

Orbicula excentrica Emmons, American Geology, Pt. II, 1855, p. 112, pl. 1, fig. 4.

Crania excentrica Miller, N. American Geol. Pal., 1889, p. 341.

Loc. Augusta County, Virginia.

Obs. Probably a gastropod.

Orbicula filosa Hall=Schizocrania filosa.

Orbicula grandis Vanuxem=Röemerella grandis.

Orbicula lamellosa Hall (non Broderip)=Orbiculoidea lamellosa.

Orbicula lodensis Vanuxem=Orbiculoidea lodiensis.

Orbicula lugubris Conrad=Discinisca lugubris.

Orbicula minuta Hall=Orbiculoidea minuta.

Orbicula multilineata Conrad=Discinisca multilineata.

Orbicula parmulata Hall=Orbiculoidea parmulata.

Orbicula prima Owen=Lingulepis pinniformis.

Orbicula squamiformis Hall=Pholidops squamiformis.

Orbicula subtruncata Hall=Pholidops subtruncata.

Orbicula tenuilamellata Hall=Schizotreta tenuilamellata.

Orbicula terminalis Emmons=Trematis terminalis.

Orbicula truncata Emmons=Orbiculoidea lamellosa.

ORBICULOIDEA d'Orbigny. Genotype *Orbicula morrisi* Davidson.

Orbiculoidea d'Orbigny, Prodrôme de Paléontologie stratigraphique, I, 1850, p.

44.—Dall, Bull. Mus. Comp. Zool., III, 1871, p. 37;—American Jour. Conch.,

VII, 1871, p. 74.—Herrick, Bull. Denison Univ., IV, 1888, p. 12.—Hall and

Clarke, Pal. New York, VIII, Pt. I, 1892, p. 125, fig. 64; p. 128, fig. 160 and

pp. 160, 168.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893,

p. 363.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894,

p. 256.

Discina Hall (non Lamarek), Pal. New York, III, 1859, p. 159;—Sixteenth Rep.

N. Y. State Cab. Nat. Hist., 1863, p. 130;—Pal. New York, IV, 1867, p. 15.

Orbiculoidea alleghania (Hall).

Chemung (Dev.).

Discina alleghania Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p.

77, figs. 1, 2;—Pal. New York, IV, 1867, p. 25, fig. 1, pl. 1, fig. 17.

Loc. Hobbieville, Alleghany County, New York.

Orbiculoidea ampla Hall.

Oriskany (Dev.).

Discina grandis Hall (non Vanuxem, 1842), Pal. New York, III, 1859, p. 406, pl.

92, fig. 1.

Discina ampla Hall, Ibidem, corrigenda in volume with plates, 1859.

Orbiculoidea ampla Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 127.

Loc. Albany County, New York; Cayuga, Ontario.

Orbiculoidea baini (Morris and Sharpe.)

Middle Devonian.

Orbicula baini Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p.

277, pl. 10, fig. 5.—Sharpe and Salter, Trans. Geol. Soc. London, 2d ser., VII,

1856, p. 210, pl. 26, figs. 20-23.

Discina baini von Ammon, Zeits. Gessels. für Erdk., Berlin, XXVIII, 1893, p.

359, fig. 4.

Loc. Falkland Islands; Taqnarassu, Matto-Grosso, Brazil; South Africa.

- Orbiculoidea (?) capax** (White). Kinderhook (L. Carb.).
Discina capax White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 30.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 112;—Proc. American Phil. Soc., XII, 1870, p. 249.
Loc. Burlington, Iowa; Girard and Rockville, Ohio (A. Winchell).
Obs. This species should be compared with *Lingulodiscina newberryi* Hall.
- Orbiculoidea capuliformis** (McChesney). Upper Carboniferous.
Discina capuliformis McChesney, New Pal. Fossils, 1860, p. 72;—Trans. Chicago Acad. Sci., I, 1868, p. 73, pl. 2, fig. 20.
Loc. Springfield, Illinois.
Obs. Compare with *O. convexa* Shumard.
- Orbiculoidea conica** Dwight=Schizotreta conica.
- Orbiculoidea conradi** (Hall). Lower Helderberg (Dev.).
Discina conradi Hall, Pal. New York, III, 1859, p. 161, pl. 9, figs. 16, 17; pl. 10A, fig. 2.
Loc. Near Hudson, New York.
- Orbiculoidea convexa** (Shumard). Upper Carboniferous.
Discina convexa Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 221.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 121, pl. 25, fig. 9.—Herrick, Bull. Orbiculoidea Univ., II, 1887, pl. 3, fig. 19.—Keyes, Geol. Survey Missouri, V, 1895, p. 40, pl. 35, fig. 7.
Loc. Valley of Verdigris River, Kansas; Kansas City, Missouri; Vermilion County, Indiana; Newark, Ohio.
Obs. See *Orbiculoidea capuliformis* McChesney.
- Orbiculoidea discus** Hall. Lower Helderberg (Dev.).
Discina discus Hall, Pal. New York, III, 1859, p. 159, pl. 9, figs. 13–15.
Schizocrania (?) discus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 132.
Orbiculoidea discus Hall and Clarke, *Ibidem*, 1892, pl. 4E, fig. 13.
Loc. Near Hudson and Albany counties, New York.
- Orbiculoidea doria** (Hall). Hamilton (Dev.).
Discina doria Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 26;—Pal. New York, IV, 1867, p. 19, pl. 2, figs. 19–22, 31 (?30).—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 32.
Loc. Madison County, New York; Thedford, Ontario; Clark County, Indiana.
- Orbiculoidea elmira** (Hall). Chemung (Dev.).
Discina elmira Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 29;—Pal. New York, IV, 1867, p. 24, pl. 2, figs. 38, 39.
Loc. Elmira, New York; Wellsboro, Pennsylvania.
- Orbiculoidea gallaheri** (A. Winchell). Marshall (L. Carb.).
Discina gallaheri A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 112;—Proc. American Philosophical Soc., XII, 1870, p. 249.
Loc. Hillsdale, Michigan; Granville, Ohio; Shafers, Pennsylvania.
- Orbiculoidea herzeri** Hall and Clarke. Waverly (L. Carb.).
Orbiculoidea herzeri Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 126, 127, 178.
Orbiculoidea pulchra Hall and Clarke, *Ibidem*, 1892, pl. 4E, fig. 19; pl. 4F, figs. 9–13, 30, (?14–16).
Loc. Berea and Baconsburg, Ohio; Meadville, Pennsylvania.
- Orbiculoidea humilis** (Hall). Marcellus and Hamilton (Dev.).
Discina humilis Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 25;—Pal. New York, IV, 1867, p. 16, pl. 2, fig. 18.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 560;—Geol. Ohio, VII, 1895, p. 452, pl. 8, figs. 1, 2.
Loc. Bridgewater, Canandaigua Lake, etc., New York; Leroy, Ohio.

- Orbiculoidea illinoisensis** (Miller and Gurley). Upper Carboniferous.
Discina illinoisensis Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 3, 1893,
 p. 70, pl. 7, figs. 2-5.
Loc. Knox and Peoria counties, Illinois.
Obs. Closely related to *O. convexa*.
- Orbiculoidea jervisensis** (Barrett). Oriskany (Dev.).
Discina jervisensis Barrett, Annals N. Y. Acad. Sci., I, 1878, p. 121.
Loc. Port Jervis, New York.
- Orbiculoidea keokuk** (Gurley). Keokuk (L. Carb.).
Discina keokuk Gurley, New Carb. Fossils, 1884, p. 6.
Loc. Crawfordsville, Indiana.
- Orbiculoidea lamellosa** Hall. Trenton and Lorraine (Ord.).
Orbicula lamellosa Hall (non Broderip, 1833), Pal. New York, I, 1847, p. 99, pl.
 30, fig. 10.
Orbicula truncata Emmons, American Geology, Pt. II, 1855, p. 200, fig. 62.
Discina truncata Emmons, Manual of Geol., 1860, p. 99.
Orbiculoidea lamellosa? Winchell and Schuchert, Minnesota Geol. Survey, III,
 1893, p. 364, pl. 29, fig. 25.
Orbiculoidea lamellosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl.
 4E, fig. 12.
Discina circe Billings, Pal. Fossils, I, 1862, p. 51, fig. 55;—Geol. Canada, 1863,
 p. 159, fig. 125.
Loc. Middleville and Lowville, New York; Bellville and Ottawa, Canada;
 Spring Valley, Minnesota.
Obs. *Orbicula lamellosa* Broderip, is the type species of *Discinisca*, and Hall's
 name will therefore stand.
- Orbiculoidea lodiensis** (Vanuxem). Genesee (Dev.).
Orbicula lodensis Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 168, fig. 1.—
 Hall, *Ibidem*, Rep. Fourth Dist., 1843, p. 223, fig. 1.
Discina lodensis Hall, Pal. New York, IV, 1867, p. 22, pl. 1, fig. 14; pl. 2, fig. 35.—
 Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 257;—Proc. Boston Soc. Nat.
 Hist., XX, 1879, p. 17.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 112,
 pl. 2, fig. 5.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 21.—Whitfield,
 Annals N. Y. Acad. Sci., V, 1891, p. 547, pl. 11, fig. 7;—Geol. Ohio, VII, 1895,
 p. 442, pl. 7, fig. 7.
Discina sp. a A. Ulrich, N. Jahrb. für Mineral., Beilageband, VIII, 1892, p. 81, pl.
 5, fig. 10.
Orbiculoidea lodensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4F,
 fig. 21.
Loc. Lodi, etc., New York; White Pine district, Nevada; Erere, Province of Para,
 Brazil; Chahuarani, Bolivia. In the Marcellus shale of Delaware County,
 Ohio (Whitfield).
- Orbiculoidea lodiensis media** Hall. Marcellus-Chemung (Dev.).
Discina media Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 27;—
 Pal. New York, IV, 1867, p. 20, pl. 2, figs. 25-29.—Walcott, Mon. U. S. Geol.
 Survey, VIII, 1884, p. 113.
Orbiculoidea media Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4E,
 figs. 15-17.
Loc. Seneca and Canandaigua lakes, New York; Chemung group, Troupsburg,
 New York.
- Orbiculoidea magnifica** (Herrick). Waverly (L. Carb.).
Discina magnifica Herrick, Bull. Geol. Soc. America, II, 1891, p. 46, pl. 1, fig. 17.
Loc. Wooster, and Ashland County, Ohio.

Orbiculoidea manhattanensis (Meek and Hayden). Upper Carboniferous.

Discina manhattensis Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 25.

Loc. Near Manhattan, Kansas.

Orbiculoidea marginalis (Whitfield). Hamilton (Dev.).

Discina marginalis Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1880, p. 70;—
Geol. Survey Wisconsin, IV, 1882, p. 325, pl. 25, fig. 11.

Orbiculoidea marginalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 127, pl. 4F, fig. 17.

Loc. Milwaukee, Wisconsin.

Orbiculoidea minuta (Hall). Marcellus-Hamilton (Dev.).

Orbicula minuta Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 180, fig. 9.

Discina minuta Hall, Pal. New York, IV, 1867, p. 16, pl. I, fig. 16.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 112, pl. 13, fig. 5.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 517, pl. 11, figs. 5, 6;—Geol. Ohio, VII, 1895, p. 442, pl. 7, figs. 5, 6.

Orbiculoidea minuta Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 356, pl. 17, figs. 5-7;—American Jour. Sci., 3d ser., XLIV, 1892, p. 150, pl. 1, figs. 4-6.

Loc. Avon, New York; Delaware County, Ohio; near Eureka, Nevada.

Orbiculoidea missouriensis (Shumard). Upper Carboniferous.

Discina missouriensis Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 221.

Discina nitida? Meek and Worthen (non Phillips), Geol. Survey Illinois, V, 1873, p. 572, pl. 25, fig. 1.

Discina nitida White, Thirteenth Rep. State Geologist Indiana, 1884, p. 121, pl. 25, fig. 10.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 226.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 131, pl. 4F, figs. 23-28.—Keyes, Geol. Survey Missouri, V, 1895, p. 39, pl. 35, fig. 6.

Discina meekana Whitfield, Annals N. Y. Acad. Sci., II, 1882, p. 228.—Herrick, Bull. Denison Univ., II, 1887, p. 145, pl. 2, fig. 8.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 598, pl. 15, figs. 1-3;—Geol. Ohio, VII, 1895, p. 483, pl. 11, figs. 1-3.

Loc. Lexington, Missouri; Illinois; Carbon Hill and Flint Ridge, Ohio; Des Moines, Iowa; Vermilion County, Indiana.

Obs. This species is not *D. nitida* Phillips. It differs from it in form and in the muscular scars.

Orbiculoidea (?) munda (Miller and Gurley). Upper Carboniferous.

Discina munda Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 3, 1893, p. 71, pl. 7, figs. 6, 7.

Loc. Kansas City, Missouri.

Obs. This species may be a *Lingulodiscina*, but since the ventral valve is unknown satisfactory generic reference can not be made.

Orbiculoidea neglecta (Hall). Chemung (Dev.).

Discina neglecta Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 29;—
Pal. New York, IV, 1867, p. 24, pl. 1, figs. 12, 13.

Loc. Ithaca, New York.

Orbiculoidea newberryi Meek = *Lingulodiscina newberryi*.**Orbiculoidea nitida** (Phillips). Upper Carboniferous.

Orbicula nitida Phillips, Geol. Yorkshire, II, 1836, p. 221, pl. 9, figs. 10-13.

?*Discina nitida* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 213, pl. 7, fig. 4.

Loc. England; White Pine district, Nevada.

- Orbiculoidea numulus** Hall and Clarke. Waterline (Sil.).
Orbiculoidea numulus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 178,
 pl. 4E, fig. 14.
Loc. Marshall, New York.
- Orbiculoidea parmulate** (Hall). Medina (Sil.).
Orbicula parmulate Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 48, fig. 4;—
 Pal. New York, II, 1852, pl. 4, fig. 3.
Loc. Medina and Lockport, New York.
- Orbiculoidea patellaris** (A. Winchell). Kinderhook (L. Carb.).
Discina patellaris A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 4.
Loc. Burlington, Iowa.
- Orbiculoidea pleurites** Meek = *Lingulodiscina pleurites*.
- Orbiculoidea pulchra** Hall = *Orbiculoidea hertzeri*.
- Orbiculoidea randalli** Hall. Hamilton (Dev.).
Discina randalli Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 25;—
 Pal. New York, IV, 1867, p. 18, pl. 2, fig. 34.
Orbiculoidea randalli Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4E,
 fig. 18.
Loc. Schoharie, New York.
- Orbiculoidea saffordi** (A. Winchell). Lower Carboniferous.
Discina saffordi A. Winchell, Geol. Tennessee, 1869, p. 443;—Proc. American
 Philosophical Soc., XII, 1870, p. 248.
Loc. "Just above Black Slate," Hickman County, Tennessee.
- Orbiculoidea sampsoni** (Miller). Chouteau (L. Carb.).
Discina sampsoni Miller, Seventeenth Rep. State Geol. Indiana, 1891, p. 80, pl.
 13, figs. 10-12.
Loc. Sedalia, Missouri.
- Orbiculoidea seneca** (Hall). Hamilton (Dev.).
Discina seneca Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 26;—
 Pal. New York, IV, 1867, p. 20, pl. 2, figs. 23, 24.
Loc. East shore of Seneca Lake, New York.
- Orbiculoidea subplana** (Hall). Arisaig (Sil.).
Discina tenuilamellata var. *subplana* Hall, Canadian Nat. Geol., V, 1860, p. 144.—
 Dawson, Acadian Geol., 3d ed., 1878, p. 595.
Loc. Arisaig, Nova Scotia.
- Orbiculoidea subtrigonalis** (McChesney). Upper Carboniferous.
Discina subtrigonalis McChesney, New Pal. Fossils, 1865, p. 97.
Discina trigonalis McChesney, *Ibidem*, 1865, pl. 2, fig. 19;—Trans. Chicago Acad.
 Sci., I, 1868, p. 24, pl. 2, fig. 19.
Loc. LaSalle, Illinois.
- Orbiculoidea tenuilineata** (Meek and Hayden). Upper Carboniferous.
Discina tenuilineata Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859,
 p. 25.
Loc. Cottonwood Creek, Kansas.
- Orbiculoidea tenuistriata** (Ulrich). Utica (Ord.).
Discina tenuistriata Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 96, pl. 4,
 fig. 10.
Loc. Covington, Kentucky.

- Orbiculoidea tullia** (Hall). Tully (Dev.).
Discina tullia Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 28;—Pal.
 New York, IV, 1867, p. 22, pl. 2, figs. 16, 17.
Loc. Seneca Lake, New York.
- Orbiculoidea utahensis** (Meek). Upper Carboniferous.
Discina sp. undet., Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 99, pl.
 10, fig. 3.
Discina utahensis Meek, *Ibidem*, 1877, p. 99 (also see footnote, p. 9).
Loc. Weber Canyon, Wasatch Range, Utah.
- Orbiculoidea vanuxemi** (Hall). Arisaig and Waterlime (Sil.).
Discina vanuxemi Hall, Pal. New York, III, 1859, p. 162, pl. 8, fig. 1.
Loc. Manlius-square, New York; Arisaig, Nova Scotia (Ami).
- Orbiculoidea varsaviensis** (Worthen). Keokuk (L. Carb.).
Discina varsaviensis Worthen, Bull. Illinois State Mus. Nat. Hist., 2, 1884, p.
 23;—Geol. Survey Illinois, VIII, 1890, p. 102, pl. 11, fig. 7.
Loc. Warsaw, Illinois.
- ORISKANIA** Hall and Clarke. Genotype *O. navicella* H. and C.
Oriskania Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 270;—Thirteenth
 Ann. Rep. N. Y. State Geologist, 1895, p. 854.
- Oriskania navicella** Hall and Clarke. Oriskany (Dev.).
Oriskania navicella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 269,
 figs. 181-183, pl. 79, figs. 25-27.
Loc. Near Hudson, New York.
- ORTHIDIUM** Hall and Clarke. Genotype *Orthis gemmicula* Billings.
Orthidium Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 244;—Eleventh
 Ann. Rep. N. Y. State Geologist, 1894, p. 276.
- Orthidium gemmicula** (Billings). Calciferous (Ord.).
Orthis gemmicula Billings, Pal. Fossils, I, 1862, p. 75, fig. 68.
Orthidium gemmicula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp.
 217, 244, pl. 7A, figs. 22-25.
Loc. Point Levis, Canada.
- Orthis of authors.**
Orthis Hall, Pal. New York, IV, 1867, p. 33.—Shaler, Fossil Brachiopoda of the
 Ohio Valley, 1887, p. 18.—Herrick, Bull. Denison University, IV, 1888, p.
 14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889,
 p. 34.—Hall, Bull. Geol. Soc. America, I, 1889, p. 19.—Hall and Clarke, Pal.
 New York, VIII, Pt. I, 1892, pp. 185, 186;—Eleventh Ann. Rep. N. Y. State
 Geologist, 1894, p. 264.
- ORTHIS** Dalman (emend Hall and Clarke). Genotype *Orthis calligramma* Dalman.
Orthis Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, pp. 93, 96.—Hall
 and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 192.—Winchell and Schuchert,
 Minnesota Geol. Survey, III, 1893, p. 417.—Hall and Clarke, Eleventh
 Ann. Rep. State Geologist, 1894, p. 265.
- Orthis aequalvis* Hall, 1847 = *Plectorthis aequalvis*.
Orthis aequalvis Hall, 1857 (non 1847) = *Orthis eryna*.
Orthis aequalvis Shaler (non Hall) = *Rhipidomella nberis*.
- Orthis (?) acuminata** Billings. Chazy (Ord.).
Orthis ? acuminata Billings, Canadian Nat. Geol., IV, 1859, p. 440, fig. 19.
Orthis acuminata Billings, Geol. Canada, 1863, p. 130, fig. 59.
Loc. Caghanawaga, Canada.

Orthis acutilirata Meek=*Platystrophia acutilirata*.

Orthis acutiloba Ringueberg=*Bilobites acutilobus*.

Orthis alata Shaler=*Orthis davidsoni*.

Orthis alsus Hall=*Rhipidomella alsus*.

Orthis (?) *alternans* Castelnau.

Formation.?

Orthis alternans Castelnau, *Essai Syst. Sil. l'Amérique Septentrionale*, 1843, p. 38; pl. 14, fig. 2.

Loc. "From an erratic block, Lake of the Woods." Undeterminable.

Orthis amœna N. H. Winchell=*Dalmanella amœna*.

Orthis anticostiensis Shaler=*Dinorthis porcata*.

Orthis (?) *apicalis* Billings.

? Upper Cambrian.

Orthis ? *apicalis* Billings, *Pal. Fossils*, I, 1865, p. 301, fig. 291.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 217.

Loc. Point Levis and west end of Island of Orleans, Canada.

Orthis arachnoides Roemer and Hall (non Phillips)=*Derbya crassa*.

Orthis armanda Billings=*Syntrophia armanda*.

Orthis assimilis Hall=*Rhipidomella assimilis*.

Orthis aurelia Billings=*Plectrothis aurelia*.

Orthis aymara Salter=*Anoplotheca flabellites*.

Orthis barabuensis Winchell=*Syntrophia barabuensis*.

Orthis battis Billings=*Hebertella battis*.

Orthis bellarugosa Conrad=*Hebertella bellirugosa*.

Orthis bellarugosa Hall, 1883=*Hebertella insculpta*.

Orthis bellula Meek=*Dalmanella bellula*.

Orthis benedicti Miller.

Niagara (Sil.).

Orthis benedicti Miller, *Seventeenth Rep. State Geol. Indiana*, 1891, p. 78, pl. 13, figs. 7-9.

Loc. Hartsville, Indiana.

Orthis bicostatus Vanuxem=*Reticularia bicostata*.

Orthis biforata of authors=*Platystrophia biforata*.

Orthis biforata acutilirata White=*Platystrophia acutilirata*.

Orthis billingsi Hartt=*Billingsella billingsi*.

Orthis biloba Hall=*Bilobites bilobus*.

Orthis bisulcata Emmons=*Cyclospira bisulcata*.

Orthis borealis Billings=*Hebertella borealis*.

Orthis (?) *buchi* d'Orbigny.

Upper Carboniferous.

Orthis buchi d'Orbigny, *Voyage dans l'Amérique Méridionale*, Pal., 1842, p. 49. *Productus andii* d'Orbigny, *Ibidem*, p. 54, pl. 5, figs. 1-3.—de Koninck, *Recher. Animaux Foss.*, Pt. I, 1847, p. 238.

Loc. Yarbichambi, Bolivia.

Orthis calligramma Foerste (non Dalman)=*Orthis flabellites*.

Orthis calligramma davidsoni Nicholson and Hinde=*Orthis davidsoni*.

Orthis calligramma Kayser.

Lower Ordovician.

Orthis calligramma Kayser (non Davidson), *Palaontographica*, Suppl., III, 1876, pp. 18, 26, pl. 3, figs. 9-18.

Loc. Cordillera San Juan, Argentine Republic.

Obs. These shells appear to be more closely related to *O. plicatella* than to *O. calligramma*.

Orthis canalis Hall = *Dalmanella elegantula*.

Orthis carbonaria Swallow = *Rhipidomella pecosi*.

Orthis carinata Hall = *Schizophoria carinata*.

Orthis carleyi Hall = *Dinorthis retrorsa*.

***Orthis carausii* Salter.**

Calciferous (Ord.).

Orthis carausii (Salter, MS.) Davidson, Geol. Mag. London, V, 1868, p. 315, pl. 16, fig. 23.

Orthis carausii? Matthew, Trans. Royal Soc. Canada, X, 1893, p. 102, pl. 7, fig. 7.

Loc. England; near St. John, New Brunswick.

***Orthis* (?) *centrilineata* Hall.**

Lorraine (Ord.).

Orthis centrilineata Hall, Pal. New York, I, 1847, p. 289, pl. 79, fig. 5*.

Loc. Lorraine and Turin, New York.

Orthis centrosa Miller = *Platystrophia crassa*.

Orthis charlotta Winchell = *Dinorthis pectinella*.

Orthis cincinnatiensis Miller = *Orthis*? *pumila*.

Orthis (?) *circularis* N. H. Winchell = *Dalmanella subaequata circularis*.

Orthis circulus Hall = *Rhipidomella circulus*.

Orthis clarkensis Swallow = *Rhipidomella clarkensis*.

Orthis cleobis Hall = *Rhipidomella cleobis*.

Orthis clytie Hall = *Heterorthis clytie*.

Orthis coloradoensis Meek, 1870 = *Orthis*? *desmopleura*.

Orthis coloradoensis Shumard = *Billingsella coloradoensis*.

Orthis concinna Hall = *Dalmanella concinna*.

***Orthis* (?) *concinna* Morris and Sharpe.**

Lower Devonian.

Orthis concinna Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 275, pl. 10, fig. 2.

Loc. Falkland Islands.

Obs. Probably a species of *Orthothetes*.

Orthis conradi Castelnau = *Hipparionyx proximus*.

Orthis conradi N. H. Winchell = *Dalmanella subaequata conradi*.

Orthis cooperensis Swallow = *Rhipidomella dubia*.

Orthis cora d'Orbigny = *Schizophoria cora*.

***Orthis corinna* Billings.**

Calciferous (Ord.).

Orthis corinna Billings, Pal. Fossils, I, 1865, p. 302, fig. 292.

Orthis? *corinna* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.

Loc. Stanbridge, Quebec, Canada.

Orthis corpulenta Sardeson = *Dalmanella testudinaria meeki*.

***Orthis costalis* Hall.**

Chazy (Ord.).

Orthis costalis Hall, Pal. New York, I, 1847, p. 20, pl. 4 bis, fig. 4;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 34, figs. 35–38.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 221, 228, pl. 5, figs. 15–17.

Loc. Chazy, New York.

Orthis costata Hall (non Sowerby) = *Orthis pumila*.

Orthis crassa James = *Platystrophia crassa*.

Orthis crenistria Geinitz = *Derbya crassa*.

Orthis crispata Emmons = *Dalmanella crispata*.

Orthis cumberlandia Hall = *Rhipidomella cumberlandia*.

Orthis cuneata Owen = *Rhipidomella cuneata*.

- Orthis cyclas* Hall=*Rhipidomella cyclas*.
Orthis cyclus James=*Dalmanella testudinaria emacerata*.
Orthis cypha James=*Platystrophia laticosta*.
Orthis dalyana Miller=*Rhipidomella dalyana*.
Orthis davidsoni de Verneuil. Anticosti and Niagara (Sil.).
Orthis davidsoni de Verneuil, Bull. Soc. Géol. de France, 2d ser., V, 1848, p. 341,
 pl. 4, fig. 9.—Billings, Geol. Canada, 1863, p. 312, fig. 318.—Hall and Clarke,
 Pal. New York, VIII, Pt. I, 1892, pp. 192, 193, 221, 228, pl. 5, figs. 5-8.
Orthis alata Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 66.
Orthis calligramma var. *davidsoni* Nicholson and Hinde, Canadian Jour., n. ser.,
 XIV, 1874, p. 144.—Nicholson, Pal. Prov. Ontario, 1875, p. 47, fig. 21g.
Loc. Europe; Anticosti; Dundas, Ontario.
- Orthis daytonensis* Foerste=*Hebertella daytonensis*.
Orthis deformis Hall=*Orthothetes deformis*.
Orthis* (?) *delicatula Billings. ? Calciferous (Ord.).
Orthis delicatula Billings, Pal. Fossils, I, 1865, p. 217.
Loc. Pistolet Bay and near Portland Creek, Newfoundland.
- Orthis dentata* Meek (non Pander)=*Platystrophia crassa*.
Orthis* (?) *desmopleura Meek. Calciferous (Ord.).
Orthis coloradoensis Meek (non Shumard), Proc. American Phil. Soc., II, 1870,
 p. 425.
Orthis desmopleura Meek, Hayden's U. S. Geol. Survey Wyoming, 1872, p. 295.
Loc. Colorado City and Manitou, Colorado.
- Orthis dichotoma* Hall=*Plectorthis dichotoma*.
Orthis discus Hall=*Rhipidomella discus*.
Orthis disparilis Conrad=*Orthis tricenaria*.
Orthis disparilis Owen=*Dalmanella testudinaria*.
Orthis disparilis Kayser. Ordovician.
Orthis disparilis Kayser (non Conrad), Paleontographica, Suppl., III, 1876, p.
 26, pl. 3, figs. 4-8.
Loc. Potrero de los Angulos, etc., Argentine Republic.
Obs. Probably a new species.
- Orthis dubia* Hall=*Rhipidomella dubia*.
Orthis eboracensis Miller=*Dalmanella lenticularis*.
Orthis electra Billings=*Dalmanella electra*.
Orthis elegantula Dalman=*Dalmanella elegantula*.
Orthis elegantula parva Foerste=*Dalmanella elegantula parva*.
Orthis ella Hall=*Plectorthis ella*.
Orthis emacerata Hall=*Dalmanella testudinaria emacerata*.
Orthis emacerata Meek (non Hall)=*Dalmanella testudinaria meeki*.
Orthis emarginata Hall=*Rhipidomella oblata emarginata*.
Orthis eminens Hall=*Rhipidomella eminens*.
Orthis erratica Hall=*Catazyga erratica*.
Orthis* (?) *eryna Hall. Corniferous (Dev.).
Orthis æquivalvis Hall (non Hall, 1847), Tenth Rep. New York State Cab. Nat.
 Hist., 1857, p. 109.
Orthis eryna Hall, Sixteenth Rep. Ibidem, 1863, p. 35;—Pal. New York, IV, 1867,
 corrigenda.
Orthis idas Hall, Pal. New York, IV, 1867, p. 42, pl. 5, fig. 11.
Loc. Williamsville, New York.
Obs. Possibly a species of *Hipparionyx*.

- Orthis (?) eudocia** Billings. — Calciferous (Ord.).
Orthis eudocia Billings, Pal. Fossils, I, 1862, p. 83, fig. 76.
Loc. Point Levis, Canada.
- Orthis (?) eurekaensis** Walcott. — Upper Cambrian.
Orthis eurekaensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 22, pl. 9, fig. 8.
Protorthis? eurekaensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 232.
Loc. Eureka district, Nevada.
- Orthis euryone** Billings. — Calciferous (Ord.).
Orthis euryone Billings, Pal. Fossils, I, 1862, p. 78, fig. 71.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 221, 228, pl. 5, fig. 4.
Orthis euryone? Matthew, Trans. Royal Soc. Canada, 1893, p. 101, pl. 7, fig. 5.
Loc. Point Levis, Canada; near St. John, New Brunswick.
- Orthis evadne** Billings = *Dalmanella evadne*.
- Orthis fasciata** Hall = *Orthostrophia fasciata*.
- Orthis fausta** Foerste = *Hebertella fausta*.
- Orthis fissicosta** Meek, and Miller = *Plectorthis dichotoma*.
- Orthis fissicosta** Hall = *Plectorthis fissicosta*.
- Orthis (?) fissiplica** Roemer. — Niagara (Sil.).
Orthis fissiplica Roemer, Die silurische Fauna des west. Tennessee, 1860, p. 64, pl. 5, fig. 5.
Loc. Perry County, Tennessee.
- Orthis flabella** Hall = *Orthis flabellites*.
- Orthis flabellites** Foerste. — Clinton and Niagara (Sil.).
Orthis flabellulum? Hall (non Sowerby), Geol. N. Y.; Rep. Fourth Dist., 1843, p. 105, fig. 5.
Orthis flabellulum var. Hall, Pal. New York, II, 1852, pp. 254, 255, pl. 52, figs. 6, 7.
Orthis flabellulum Billings, Canadian Nat. Geol., I, 1856, p. 136, pl. 2, fig. 6.—
 Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 38, pl. 34, fig. 30.
Orthis flabella Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 34, figs. 41, 42; pl. 35, figs. 6–8.—Foerste, Bull. Denison Univ., I, 1885, p. 82, pl. 13, fig. 12.
Orthis calligramma Foerste (non Dalman), Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 308, pl. 6, figs. 4, 5.
Orthis flabellites Foerste, *Ibidem*, 1890, p. 311.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 221, 227, pl. 5, figs. 37–41; pl. 20, fig. 1.
Orthis (*Dinorthis*) *calligramma* Foerste, Geol. Ohio, VII, 1895, p. 570, pl. 25, figs. 12a, 12b; pl. 31, figs. 4, 5; pl. 37A, fig. 20.
Loc. Lockport, Rochester, etc., New York; Dayton, Ohio; Osgood, Indiana; Louisville, Kentucky; Milwaukee, Wisconsin; Dundas, Ontario.
- Orthis flabellites spania** Hall and Clarke. — Niagara (Sil.).
Orthis flabellites var. *spania* Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 84, figs. 10.
Loc. Near Milwaukee, Wisconsin.
- Orthis flabellulum** Hall (non Sowerby) = *Orthis flabellites*.
- Orthis (?) flava** A. Winchell. — Kinderhook (L. Carb.).
Orthis flava A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 117.
Loc. Burlington, Iowa.
- Orthis futilis** Sardeson = *Dalmanella testudinaria futilis*.
- Orthis gemmicula** Billings = *Orthidium gemmicula*.
- Orthis gibbosa** Billings = *Dalmanella subaequata gibbosa*.
- Orthis goodwini** Nettelroth = *Rhipidomella goodwini*.

- Orthis (?) glypta** Hall and Clarke. Niagara (Sil.).
Orthis ? glypta Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 359, pl. 84, figs. 8, 9.
Loc. Near Milwaukee, Wisconsin.
- Orthis halli** Safford=*Orthostrophia strophomenoides*.
- Orthis hamburgensis** Walcott=*Dalmanella hamburgensis*.
- Orthis hartii** Rathbun=*Rhipidomella hartii*.
- Orthis (?) highlandensis** Walcott. Lower Cambrian.
Orthis (?) highlandensis Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 119, pl. 8, fig. 3.
Orthis highlandensis Walcott, Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 612, pl. 72, fig. 5.
Loc. Pioche and Highland Range, Nevada.
- Orthis hipparionyx** Hall=*Hipparionyx proximus*.
- Orthis hippolyte** Billings. Calciferous (Ord.).
Orthis hippolyte Billings, Pal. Fossils, I, 1862, p. 81, fig. 73; p. 218.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 217, 221, 228.
Orthis hippolyte? Meek, Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 464.
Loc. Point Lewis and Phillipsburg, Canada; Cow Head, Newfoundland; near Malade City, Utah.
- Orthis (?) holstoni** Safford. Trenton (Ord.).
Orthis ? holstoni (Safford MS.) Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 218, 340, pl. 5A, figs. 35-37.
Loc. Near Nashville, Tennessee.
- Orthis humboldti** d'Orbigny. Silurian.
Orthis humboldtii d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 27.
Spirifer humboldtii d'Orbigny, Ibidem, pl. 2, figs. 16-20.
Loc. Bolivia.
- Orthis huroniensis** Castlenau=*Rafinesquina alternata*.
- Orthis hybrida** Sowerby=*Rhipidomella hybrida*.
- Orthis idas** Hall=*Orthis eryna*.
- Orthis idonea** Hall=*Rhipidomella idonea*.
- Orthis ignota** Sardeson=*Dalmanella testudinaria ignota*.
- Orthis imperator** Billings=*Hebertella imperator*.
- Orthis impressa** Hall=*Schizophoria striatula*.
- Orthis inequalis** Hall=*Orthotheses inequalis*.
- Orthis inca** d'Orbigny=*Rhipidomella inca*.
- Orthis infera** Calviu=*Dalmanella infera*.
- Orthis insculpta** Hall=*Hebertella insculpta*.
- Orthis insignis** Hall=*Scenidium insignis*.
- Orthis interlineata** Hall (non Sowerby)=*Schizophoria tioga*.
- Orthis interstriata** Hall=*Orthotheses interstriatus*.
- Orthis iowensis** Hall=*Schizophoria striatula*.
- Orthis iowensis furnarius** Hall=*Schizophoria striatula*.
- Orthis iphigenia** Billings=*Dinorthis iphigenia*.
- Orthis jamesi** Hall=*Plectorthis jamesi*.
- Orthis jugosa** James=*Dalmanella testudinaria meeki*.
- Orthis kankakensis** McChesney=*Plectorthis kankakiensis*.

- Orthis kaskaskiensis* McChesney = *Derbya kaskaskiaensis*.
Orthis kassubæ Winchell = *Dalmanella subæquata pervetus*.
Orthis kennicotti McChesney = *Dinorthis retrorsa*.
Orthis keokuk Hall = *Derbya keokuk*.
Orthis lasallensis McChesney = *Derbya crassa*.
Orthis laticosta Meek = *Platystrophia laticosta*.

***Orthis* (?) *laticostata* d'Orbigny.**

Devonian.

Orthis laticostata d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 39.

Loc. ? Bolivia.

Orthis laurentina* Billings = *Billingsella* ? *laurentina*.**Orthis lenticularis* Wahlenberg ?.**

Upper Cambrian.

Orthis lenticularis (Wahl.) Kayser, Palæontographica, Suppl., III, 1876, p. 9, pl. 1, figs. 11, 12.—Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 46, pl. 12, figs. 9a-9d.

Loc. Province Salta and Jujuy, Argentine Republic; near St. John, New Brunswick.

***Orthis lenticularis atrypoides* Matthew.**

Upper Cambrian.

Orthis lenticularis var. *atrypoides* Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 48, pl. 12, figs. 11a, 11b.

Loc. Near St. John, New Brunswick.

***Orthis lenticularis lyncioides* Matthew.**

Upper Cambrian.

Orthis lenticularis var. *lyncioides* Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 49, pl. 12, figs. 10a-10c.

Loc. Near St. John, New Brunswick.

***Orthis lenticularis strophomenoides* Matthew.**

Upper Cambrian.

Orthis lenticularis var. *strophomenoides* Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 49, pl. 12, figs. 12a, 12b.

Loc. Near St. John, New Brunswick.

Orthis lenticularis Vanuxem* = *Dalmanella lenticularis*.**Orthis lentiformis* Hall = *Dalmanella lenticularis*.*****Orthis lentiformis* Owen = *Schizophoria striatula*.*****Orthis leonensis* Hall = *Dalmanella tenuilineata*.*****Orthis lepida* Hall = *Dalmanella lepida*.*****Orthis* (?) *leptænoides* Emmons.**

Trenton (Ord.).

Orthis leptænoides Emmons, Geol. N. Y.; Rep. Fourth Dist., 1842, p. 396, fig. 1.

Loc. New York.

Obs. Undefined and figure too poor for identification.

Orthis leucosia* Hall = *Rhipidomella leucosia*.**Orthis limitaris* Vanuxem = *Leiorhynchus limitare*.*****Orthis linneyi* James = *Orthorhynchula linneyi*.*****Orthis livia* Billings = *Rhipidomella livia*.*****Orthis lonensis* Walcott = *Hebertella lonensis*.*****Orthis loricula* Hall = *Dinorthis deflecta*.*****Orthis lucia* Billings = *Rhipidomella lucia*.*****Orthis lynx* Eichwald = *Platystrophia lynx* and *P. biforata*.*****Orthis maria* Billings = *Hebertella maria*.*****Orthis macfarlanii* Meek = *Schizophoria macfarlanii*.**

Orthis macleodi Whitfield = *Dalmanella macleodi*.

Orthis macrior Sardeson = *Dalmanella testudinaria emacerata*.

Orthis media Shaler = *Rhipidomella media*.

Orthis media N. H. Winchell = *Dalmanella subæquata pervetus*.

Orthis meeki Miller = *Dalmanella testudinaria meeki*.

Orthis menapiæ Hicks. Calciferous (Ord.).

Orthis menapiæ (Hicks MS.) Davidson, Geol. Mag. London, V, 1868, p. 314, pl. 16, figs. 24-28.—Mathew, Trans. Royal Soc. Canada, X, 1893, p. 101, pl. 7, figs. 2-6.

Loc. England; near St. Johns, New Brunswick.

Orthis merope Billings = *Scenidium merope*.

Orthis michelini L'Éveillé = *Rhipidomella michelini*.

Orthis michelini Meek, 1877 = *Rhipidomella nevadaensis*.

Orthis michelini burlingtonensis Hall = *Rhipidomella burlingtonensis*.

Orthis (?) *minna* Billings. Calciferous (Ord.).

Orthis minna Billings, Pal. Fossils, I, 1865, p. 303, fig. 294.

Loc. Stanbridge, Quebec, Canada.

Orthis minneapolis N. H. Winchell = *Dalmanella subæquata*.

Orthis minnesotensis Sardeson = *Dinorthis meedsi*.

Orthis missouriensis Shumard. Cape Girardeau Limestone (Sil.).

Orthis missouriensis Shumard, Geol. Rep. Missouri, 1855, p. 205, pl. C, fig. 9.—Keyes, Geol. Survey Missouri, V, 1895, p. 60.

Loc. Two miles above Cape Girardeau, Missouri.

Orthis missouriensis Swallow (non Shumard) = *Rhipidomella missouriensis*.

Orthis mitis Hall = *Rhipidomella mitis*.

Orthis morganiana Derby = *Orthotichia morganiana*.

Orthis (?) *morrowensis* James. Lorraine (Ord.).

Orthis (?) *morrowensis* James, Cincinnati Quart. Jour. Sci., I, 1874, p. 21.

Loc. Warren County, Ohio.

Orthis multisecta (James) Meek = *Dalmanella multisecta*.

Orthis multistriata Hall = *Schizophoria multistriata*.

Orthis musculosa Hall = *Rhipidomella musculosa*.

Orthis (?) *mycale* Billings. Calciferous (Ord.).

Orthis mycale Billings, Pal. Fossils, I, 1862, p. 82, fig. 75.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217, pl. 7A, figs. 10, 11.

Loc. Point Levis, Canada.

Orthis neglecta James = *Plectorthis dichotoma*.

Orthis nettoana Rathbun = *Dalmanella nettoana*.

Orthis nevadensis Meek = *Rhipidomella nevadaensis*.

Orthis (?) *nisis* Hall and Whitfield. Niagara (Sil.).

Orthis nisis Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 181;—Twenty-seventh Rep. *Ibidem*, 1875, pl. 9, figs. 4-8.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 42, pl. 27, figs. 4, 5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.

Loc. Louisville, Kentucky.

Orthis nucleus Hall = *Ambocœlia umbonata*.

Orthis oblata Hall = *Rhipidomella oblata*.

Orthis oblata emarginata Hall=*Rhipidomella oblata emarginata*.

Orthis obtusa Pander.

Ordovician.

Orthis obtusa (Pander) Kayser, *Palaeontographica*, Suppl., III, 1876, p. 19, pl. 3, figs. 1, 2.

Loc. Europe; Cordillere San Juan, Argentine Republic.

Orthis occasus Hall=*Rhipidomella occasus*.

Orthis occidentalis Hall=*Hebertella occidentalis*.

Orthis orthambonites Billings=*O. panderiana*.

Orthis palmata Sharpe and Salter=*Anoplotheca flabellites*.

Orthis panderiana Hall and Clarke.

Calciferosus (Ord.).

Orthis orthambonites Billings (non Murchison and de Verneuil), *Pal. Fossils*, I, 1862, p. 77, fig. 70;—*Geol. Canada*, 1863, p. 231, fig. 245.—Schuchert, *Ninth Ann. Rep. N. Y. State Geol.*, 1890, p. 43.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 221, 228, pl. 5, figs. 1-3.—Matthew, *Trans. Royal Soc. Canada*, X, 1893, p. 101, pl. 7, fig. 4.

Orthis panderiana Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pl. 5, footnote.

Loc. Point Levis and St. John, Canada.

Orthis parva de Verneuil=*Dalmanella elegantula*.

Orthis pecosi Marcou=*Rhipidomella pecosi*.

Orthis (?) *pectinata* d'Orbigny.

Devonian.

Orthis pectinatus d'Orbigny, *Voyage dans l'Amérique Méridionale*, Pal., 1842, p. 39.

Spirifer pectinatus d'Orbigny, *Ibidem*, 1842, pl. 2, figs. 13-15.

Loc. Lake Titicaca, Bolivia.

Obs. Probably a species of *Orthothetes*.

Orthis pectinella Emmons=*Dinorthis pectinella*.

Orthis pectinella Whitfield, 1882=*Plectorthis whitfieldi*.

Orthis pectinella semiovalis Hall=*Dinorthis pectinella*.

Orthis peduncularis Hall=*Schizophoria peduncularis*.

Orthis peloris Hall=*Rhipidomella peloris*.

Orthis penelope Hall=*Rhipidomella penelope*.

Orthis penniana Derby=*Rhipidomella penniana*.

Orthis pennsylvanica Simpson=*Rhipidomella pennsylvanica*.

Orthis pepina Hall=*Billingsella coloradoensis*.

Orthis perelegans Hall=*Dalmanella perelegans*.

Orthis perversa Hall=*Orthothetes chemungensis perversus*.

Orthis perveta Conrad=*Dalmanella subaequata pervetus*.

Orthis perveta Hall, 1883=*Dalmanella subaequata*.

Orthis petrae Sardeson=*Dinorthis proavita*.

Orthis (?) *pigra* Billings.

Chazy (Ord.).

Orthis piger Billings, *Canadian Nat. Geol.*, IV, 1859, p. 442.

Loc. Mingan Island.

Obs. This species is probably congeneric with *Billingsella grandaeva*.

Orthis pisum Hall (non Murchison)=*Nucleospira pisiformis*.

Orthis plana Castelnau (non Pander)=*Rafinesquina alternata*.

Orthis planoconvexa Hall=*Dalmanella planiconvexa*.

Orthis platys Billings=*Dinorthis platys*.

Orthis plicata Vanuxem=*Spirifer vanuxemi*.

- Orthis plicatella* White (non Hall) = *Orthis tricenaria*.
Orthis plicatella Hall = *Plectorthis plicatella*.
Orthis pogonipensis Hall and Whitfield = *Dalmanella pogonipensis*.
Orthis porcata McCoy = *Dinorthis porcata*.
Orthis (?) porcia Billings. Chazy (Ord.).
Orthis porcia Billings, Canadian Nat. Geol., IV, 1859, p. 439, figs. 16-18;—Geol. Canada, 1863, p. 130, fig. 58.
Loc. Near Montreal, Canada.
Orthis porrecta Sardeson = *Dalmanella testudinaria porrecta*.
Orthis præumbona Hall = *Ambocelia præumbona*.
Orthis pratteni McChesney = *Derbya pratteni*.
Orthis pravus Hall = *Orthothetes pravus*.
Orthis propinqua Hall = *Schizophoria propinqua*.
Orthis propinqua Nettelroth = *Schizophoria striatula*.
Orthis (?) pumila Ulrich. Lorraine (Ord.).
Orthis costata (non Sowerby) Hall, American Jour. Sci., XLVIII, 1845, p. 295.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 33.
Orthis pumila Ulrich, Catalogue Cincinnati Fossils, 1880, p. 14.
Orthis cincinnatiensis Miller, American Pal. Fossils, 2d ed., 1883, p. 296.
Loc. Cincinnati, Ohio.
Orthis (?) punctostriata Hall. Niagara (Sil.).
Orthis punctostriata Hall, Pal. New York, II, 1852, p. 254, pl. 52, fig. 5.
Orthis? *punctostriata* Hall and Clarke, *Ibidem*, VIII, Pt. I, 1892, p. 217, pl. 20, figs. 2-4.
Loc. Lockport, New York.
Orthis pyramidalis Hall = *Scenidium pyramidalis*.
Orthis quacoensis Matthew = *Billingsella quacoensis*.
Orthis quadrans Hall = *Dalmanella quadrans*.
Orthis quadricostata Vanuxem = *Leiorhynchus quadricostatium*.
Orthis(?) remnicha N. H. Winchell. Upper Cambrian.
Orthis remnicha N. H. Winchell, Fourteenth Ann. Rep. Geol. Nat. Hist. Survey of Minnesota, 1886, p. 317, pl. 2, fig. 7.
Loc. Red Wing, Minnesota; Cold Creek Canyon, Burnett County, Texas.
Orthis resupinata Hall, 1843 (non Martin) = *Schizophoria tulliensis*.
Orthis resupinata Martin = *Schizophoria resupinata*.
Orthis resupinata latirostrata Toulou = *Schizophoria cora*.
Orthis resupinoides Cox = *Schizophoria resupinoides*.
Orthis retrorsa Salter = *Dinorthis retrorsa*.
Orthis rhynchonelliformis Shaler = *Rhipidomella rhynchonelliformis*.
Orthis richmonda McChesney = *Derbya crassa*.
Orthis robusta Hall = *Derbya robusta*.
Orthis rogata Sardeson = *Dalmanella testudinaria*.
Orthis (?) rugiplicata Hall and Whitfield. Niagara (Sil.).
Orthis rugiplicata Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 182;—Twenty-seventh Rep. *Ibidem*, 1875, pl. 9, figs. 1-3.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 34, figs. 25-27.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 44, pl. 27, figs. 1-3.
Orthis rugiplicata, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.
Loc. Louisville, Kentucky.

- Orthis (?) ruida** Billings. Anticosti (Sil.).
Orthis ruida Billings, Catalogue Silurian Fossils of Anticosti, 1866, p. 42.
Loc. Anticosti.
- Orthis (?) saffordi** Hall and Clarke. Trenton (Ord.).
Orthis ? saffordi, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 218, 310,
pl. 5A, figs. 38-40.
Loc. "East Tennessee."
- Orthis (?) salemensis** Walcott. Lower Cambrian.
Orthis salemensis Walcott, American Jour. Sci., 3d ser., XXXIV, 1887, p. 190, pl.
1, fig. 17;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 612, pl. 72, fig. 6.
Loc. Washington County, New York; near Quebec, Canada.
- Orthis saltensis** Kayser. Upper Cambrian.
Orthis saltensis Kayser, Palaeontographica, Suppl., III, 1876, p. 8, pl. 1, fig. 16.
Loc. Province Salta and Jujuy, Argentine Republic.
- Orthis (??) sandbergeri** N. H. Winchell. Upper Cambrian.
Orthis sandbergeri N. H. Winchell, Fourteenth Ann. Rep. Geol. Nat. Hist., Sur-
vey of Minnesota, 1886, p. 318, pl. 2, figs. 8, 9.
Loc. Red Wing, Minnesota.
- Orthis schohariensis** Castelnau = *Strophonella schohariensis*.
Orthis scovilli Miller = *Hebertella scovilli*.
Orthis sectostriata Ulrich = *Plectorthis sectistriata*.
Orthis semele Hall = *Rhipidomella semele*.
Orthis sinuata Hall = *Hebertella sinuata*.
- Orthis (?) sola** Billings. Lorraine (Ord.).
Orthis sola Billings, Catalogue Silurian Fossils of Anticosti, 1866, p. 12.
Loc. Anticosti.
- Orthis solitaria** Hall = *Rhipidomella solitaria*.
Orthis stonensis Safford = *Dalmanella stonensis*.
Orthis striatocostata Geinitz = *Meckella striaticostata*.
Orthis striatula Emmons (non Schlotheim) = *Dalmanella testudinaria*.
Orthis striatula of authors = *Schizophoria striatula*.
Orthis strophomenoides Hall = *Orthostrophia strophomenoides*.
Orthis subaequata Conrad = *Dalmanella subaequata*.
Orthis subcarinata Hall = *Dalmanella subcarinata*.
Orthis subcircula Simpson = *Rhipidomella subcirculus*.
Orthis subelliptica White and Whitfield = *Rhipidomella subelliptica*.
Orthis subjugata Hall = *Hebertella occidentalis*.
- Orthis (?) subnodosa** Hall. Niagara (Sil.).
Orthis subnodosa Hall, Descriptions of n. sp. Fossils from Waldron, Indiana, 1879,
p. 14;—Eleventh Rep. State Geol. Indiana, 1882, p. 286, pl. 27, fig. 17;—
Trans. Albany Institute, X, 1883, p. 70.—Nettelroth, Kentucky Fossil Shells,
Mem., Kentucky Geol. Survey, 1889, p. 44.
Loc. Waldron, Indiana; Louisville, Kentucky.
- Orthis suborbicularis** Hall = *Rhipidomella suborbicularis*.
Orthis subquadrata Hall = *Dinorthis subquadrata*.
Orthis subumbona Hall = *Martinia subumbona*.

- Orthis (?) sulivanti** Morris and Sharpe. Lower Devonian.
Orthis sulivanti Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 275, pl. 10, fig. 1.
Loc. Falkland Islands; South Africa.
- Orthis swallovi** Hall=*Schizophoria swallovi*.
- Orthis sweeneyi** Winchell=*Dinorthis pectinella sweeneyi*.
- Orthis (?) tenuidens** Hall. Clinton (Sil.).
Orthis tenuidens Hall, Pal. New York, II, 1852, p. 58, pl. 20, fig. 9.
Loc. Oneida County, New York.
Obs. May be a species of *Orthothetes*.
- Orthis (?) tenuis** Morris and Sharpe. Lower Devonian.
Orthis tenuis Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 275, pl. 10, fig. 4; pl. 11, fig. 4.
Loc. Falkland Islands.
Obs. Similar to *Chonostrophia complanata* Hall.
- Orthis (??) tenuistriata** Hall. Portage (Dev.).
Orthis tenuistriata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 245, fig. 3.
Loc. Shores of Crooked Lake, New York.
Obs. This is not an *Orthis*; probably a pelecypod.
- Orthis tersus** Sardeson=*Dalmanella tersa*.
- Orthis testudinaria** Dalman=*Dalmanella testudinaria*.
- Orthis testudinaria** Owen, 1844=*O. tricenaria*.
- Orthis thiemii** White=*Rhipidomella thiemei*.
- Orthis tioga** Hall=*Schizophoria tioga*.
- Orthis tricenaria** Conrad. Trenton (Ord.).
Orthis tricenaria Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 333.—Hall, Pal. New York, I, 1847, p. 121, pl. 32, fig. 8.—Salter, Canadian Organic Remains, Decade I, 1859, p. 39, pl. 9, figs. 1-4.—Hall, Geol. Wisconsin, I, 1862, p. 42, figs. 8-11.—Billings, Geol. Canada, 1863, p. 167, fig. 151.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 35, figs. 1-5.—?Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 74, pl. 11, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 191, 193, 221, 228, pl. 5, figs. 9-14.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 418, pl. 32, figs. 18-23.—Keyes, Geol. Survey Missouri, V, 1895, p. 60, pl. 39, fig. 4.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 175.
- Orthis disparilis** Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 333.—Hall, Pal. New York, I, 1847, p. 119, pl. 32, fig. 4.—Billings, Canadian Nat. Geol., IV, 1859, p. 440, fig. 20.—Hall, Geol. Wisconsin, I, 1862, p. 435.—Billings, Geol. Canada, 1863, p. 130, fig. 60.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 191, 221, 228.
- Orthis testudinaria?** Owen, Geol. Expl. Iowa, Wisconsin, and Illinois, 1844, pl. 15, fig. 11.
- ?**Orthis plicatella** White (non Hall), Wheeler's Expl. and Survey west 100th Merid., IV, 1875, p. 72, pl. 4, fig. 10.
- Loc.* Mineral Point, Wisconsin; Middleville, etc., New York; Kentucky; Tennessee; near Ottawa and Montreal, Canada; Mingan Islands; Lake Winnipeg, Manitoba; White Pine and Eureka districts, Nevada; Minneapolis, etc., Minnesota; Pike County, Missouri.
- Obs.* *O. plicatella* White and *O. tricenaria* Walcott may prove to be distinct from *O. tricenaria* Conrad.

- Orthis (?) trinucleus** Hall. Clinton (Sil.).
Orthis trinucleus Hall, Pal. New York, II, 1852, p. 58, pl. 20, fig. 8.
Loc. Wayne County, New York.
- Orthis triplicatella** Meek = *Plectorthis triplicatella*.
- Orthis (?) tritonia** Billings. Calciferous (Ord.).
Orthis tritonia Billings, Pal. Fossils, 1, 1862, p. 76, fig. 69;—*Geol. Canada*, 1863, p. 231, fig. 244.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217, pl. 7A, figs. 12, 13.
Loc. Point Levis, Canada.
- Orthis tubulostriata** Hall = *Rhipidomella tubulostriata*.
- Orthis tulliensis** Vanuxem = *Schizophoria tulliensis*.
- Orthis uberis** Billings = *Rhipidomella uberis*.
- Orthis umbonata** Conrad = *Ambocœlia umbonata*.
- Orthis umbraculum** Owen (non von Buch) = *Derbya robusta*.
- Orthis umbraculum** Hall, 1852, Newberry, 1861 = *Orthotheses umbraculum*.
- Orthis unguiculus** Hall, 1843 (non Phillips) = *Ambocœlia gregaria*.
- Orthis unguiformis** Castelnau, and Emmons = *Hipparionyx proximus*.
- Orthis vanuxemi** Hall = *Rhipidomella vanuxemi*.
- Orthis vanuxemi pulchella** Herriek = *Rhipidomella vanuxemi pulchella*.
- Orthis varica** Conrad = *Bilobites varicus*.
- Orthis vespertilio** Sowerby. Ordovician.
Orthis vespertilio (Sowerby) Kayser, Palæontographica, Suppl., III, 1876, p. 27, pl. 3, figs. 22, 23.
Loc. Europe; Potrero de los Angulos, etc., Argentine Republic.
- Orthis whitfieldi** N. H. Winchell = *Plectorthis whitfieldi*.
- Orthisina d'Orbigny** = *Clitambonites*.
- Orthisina alberta** Walcott = *Billingsella alberta*.
- Orthisina alternata** Hall = *Orthotheses chemungensis perversus*.
- Orthisina americana** Whitfield = *Clitambonites diversus*.
- Orthisina arctostriata** Hall = *Orthotheses chemungensis arctostriatus*.
- Orthisina crassa** Meek and Hayden = *Derbya crassa*.
- Orthisina diversa** Shaler = *Clitambonites diversus*.
- Orthisina festinata** Billings = *Billingsella festinata*.
- Orthisina grandæva** Billings = *Billingsella grandæva*.
- Orthisina missouriensis** Swallow = *Meekella striaticostata*.
- Orthisina transversa** Walcott = *Billingsella transversa*.
- Orthisina verneuili** Billings = *Clitambonites diversus*.
- ORTHORHYNCHULA** Hall and C. Genotype *Orthis (?) linneyi* James.
Orthorhynchula Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 181;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 824.
- Orthorhynchula linneyi** (James). Lorraine (Ord.).
Orthis (?) linneyi James, The Paleontologist, 5, 1881, p. 41.
Orthis linneyi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 41, pl. 34, figs. 7-18; errata, p. 1.
Orthorhynchula linneyi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 181, pl. 56, figs. 10-13, 19.
Loc. Near Danville, etc., Kentucky; Cincinnati, Ohio; Nashville, Tennessee.

- ORTHOSTROPHIA** Hall. Genotype *Orthis strophomenoides* Hall.
Orthostrophia Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 32-34.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 199, 223, 253;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 267.
- Orthostrophia** (?) *fasciata* Hall. Niagara (Sil.).
Orthis fasciata Hall, Pal. New York, II, 1852, p. 255, pl. 52, fig. 8.
Orthostrophia ? *fasciata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 200, 223.
Loc. Rochester and Lockport, New York.
- Orthostrophia strophomenoides** Hall. Lower Helderberg (Dev.).
Orthis strophomenoides Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 46;—Pal. New York, III, 1859, p. 177, pl. 14, fig. 2.
Orthis halli Safford, Geol. Tennessee, 1869, pp. 328, 533.
Orthostrophia strophomenoides Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 32-34.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 200, 223, pl. 5A, figs. 24-27; pl. 6, figs. 32-34.
Orthis halli Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 5A, figs. 22, 23.
Loc. Albany and Schoharie counties, New York; Square Lake, Maine; Perry County, Tennessee.
- ORTHOTHETES** Fischer de Wald. Genotype *Spirifera crenistria* Phil.
Orthothes Fischer de Waldheim, Oryctographie du Gouvernement de Moscou, 1837, p. 133.—Waagen, Palæontologica Indica, Ser. XIII, I, p. 607, 1884.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 253;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 284.
Streptorhynchus Hall (non King), Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 61, figs. 1-6;—Pal. New York, IV, 1867, p. 64.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 139.
- Orthothes** *agassizi* (Rathbun). Middle Devonian.
Streptorhynchus agassizi (Hartt) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 248, pl. 9, figs. 3, 4, 10, 16, 17, 23, 25, 26, 28-30;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 24.
Loc. Erere, Province of Para, Brazil.
- Orthothes** *anomala* (A. Winchell). Hamilton (Dev.).
Crania (Pseudoerania) *anomala* A. Winchell, Geol. Rep. Lower Peninsula Michigan, 1866, p. 92.
Streptorhynchus anomala Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 152.
Loc. Grand Traverse region, Michigan.
- Orthothes** *bellulus* Clarke. Marcellus (Dev.).
Orthothes bellulus Clarke, Thirteenth Ann. Rep. N. Y. State Geologist, 1895, pp. 176, 187, pl. 4, figs. 2-4.
Loc. Livonia salt shaft, Livonia, New York.
- Orthothes** *chemungensis* (Conrad). Chemung (Dev.).
Strophomena chemungensis Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 257, pl. 14, fig. 12.
Strophomena bifurcata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 266, fig. 2.
Strophomena pectinacea Hall, *ibidem*, 1843, p. 266, fig. 4.
Streptorhynchus chemungensis Hall, Pal. New York, IV, 1867, p. 67;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 40, fig. 9.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 117, pl. 13, fig. 16.
Streptorhynchus chemungensis var. *pectinacea* Hall, Pal. New York, IV, 1867, p. 73, pl. 10, fig. 6.

Orthothetes chemungensis (Conrad)—Continued.

Orthothetes chemungensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 10, fig. 9; pl. 11A, fig. 14.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 285.

Loc. New York and Pennsylvania; Eureka district, Nevada; Lake Winnepogosis, Canada; Waverly group of Ohio.

Orthothetes chemungensis arectostriatus Hall.

Hamilton (Dev.).

Strophomena arectostriata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 266, fig. 3. *Orthisina arectostriata* Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, pp. 80, 81, figs. 1, 2; p. 112.

Streptorhynchus chemungensis var. *arectostriata* Hall, Pal. New York, IV, 1867, p. 71, pl. 9, figs. 1-12;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 40, fig. 8.

Hemipronites chemungensis var. *arectostriata* Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 35, pl. 3, fig. 2.

Streptorhynchus arectostriata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 117, pl. 13, fig. 7.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 140, pl. 31, figs. 31-33.

Orthothetes chemungensis var. *arectostriata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 10, fig. 8.

Loc. New York; Falls of Ohio; Eureka district, Nevada.

Orthothetes chemungensis perversus (Hall).

Cornif. and Ham. (Dev.).

Orthis perversa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 137.

Orthisina alternata Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 81, figs. 1, 2; p. 112.

Streptorhynchus chemungensis var. *perversus* Hall, Pal. New York, IV, 1867, p. 72, pl. 9, figs. 13-17, 26.

Streptorhynchus chemungensis var. *alternata* Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 40, fig. 7.

Orthothetes chemungensis var. *alternata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 10, fig. 7.

Loc. New York; Bosanquet, Ontario; Eureka district, Nevada.

Orthothetes crenistria (Phillips?).

Lower Carboniferous.

Streptorhynchus crenistria? A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 410.

Streptorhynchus crenistria Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 173, pl. 9, fig. 19.—Dawson, Acadian Geology, 3d ed., 1878, p. 296, fig. 96.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 362.

Hemipronites crenistria? Meek, Pal. Ohio, II, 1875, p. 279, pl. 10, fig. 5.

Hemipronites crenistria Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. pl. 7, fig. 2.—Herrick, Bull. Denison Univ., III, 1888, p. 37, pl. 5, fig. 14; pl. 3, fig. 24; pl. 6, fig. 8; pl. 9, fig. 21; IV, p. 24, pl. 2, figs. 1, 5;—Geol. Ohio, VII, 1895, pl. 15, fig. 1; pl. 21, fig. 14.

Orthothetes crenistria Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 11A, fig. 15.

Loc. Medina and Granville, Ohio; Port aux Barques, Michigan; East River and Shubenacadie, Nova Scotia; Feilden Isthmus, lat. 82° 43'; White Pine district, Nevada.

Obs. These references are unsatisfactory identifications of Phillips's species. It may prove that more than a single species is here included.

Orthothetes deformis Hall.

Lower Helderberg (Dev.).

Orthis deformis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 44;—Pal. New York, III, 1859, p. 174, pl. 10A, fig. 13; pl. 15, fig. 3.

Orthothetes deformis Hall—Continued.

Streptorhynchus deformis Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, fig. 32.

Orthothetes deformis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 9, fig. 32.

Loc. Albany County, New York; Cumberland, Maryland.

Orthothetes deformis sinuatus Hall and Clarke. Lower Helderberg (Dev.).

Orthothetes deformis var. *sinuata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 20, figs. 8, 9.

Loc. Cumberland, Maryland.

Orthothetes desideratus Hall and Clarke.

Waverly (L. Carb.).

Orthothetes desideratus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 345, pl. 9A, figs. 26, 27.

Loc. Medina County, Ohio.

Orthothetes flabellum (Whitfield).

Corniferous (Dev.)

Streptorhynchus flabellum Whitfield, Annals N. Y. Acad. Sci., II, 1882, p. 200;—*Ibidem*, V, 1891, p. 521, pl. 6, figs. 7, 9;—Geol. Ohio, VII, 1895, p. 421, pl. 2, figs. 7, 9.

Loc. Columbus, Ohio.

Orthothetes hydraulicus (Whitfield).

Waterlime (Sil.).

Streptorhynchus hydraulicum Whitfield, Annals N. Y. Acad. Sci., II, 1882, p. 193;—*Ibidem*, V, 1891, p. 508, pl. 5, figs. 1-3;—Geol. Ohio, VII, 1895, p. 410, pl. 1, figs. 1-3.

Loc. Bellville and Greenfield, Ohio.

Orthothetes inæqualis Hall.

Kinderhook (L. Carb.).

Orthis inæqualis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 490, pl. 2, fig. 6.

Streptorhynchus inæqualis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 117.

Streptorhynchus equivalvis Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 252, pl. 4, figs. 1, 2.

Streptorhynchus aequalvis Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 42, figs. 20-23.

Orthothetes inæqualis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 9A, figs. 20-23.

Loc. Burlington, Iowa; Newark and Granville, Ohio; Shafers, Pennsylvania; Wasatch Range, Utah.

Orthothetes inflatus (White and Whitfield).

Kinderhook (L. Carb.).

Streptorhynchus inflatus White and Whitfield, Proc. Boston Soc. Nat. Hist., VIII, 1862, p. 293.—Hall and Whitfield, King's U. S. Geol. Expl. 40 Parl., IV, 1877, p. 252, pl. 4, fig. 3.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 42, figs. 24, 25.

Orthothetes inflatus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 9A, figs. 24, 25.

Loc. Burlington, Iowa; Dry Canyon, Oquirrh Mountains, Utah; Montana.

Orthothetes interstriatus (Hall).

Coralline (Sil.).

Orthis interstriata Hall, Pal. New York, II, 1852, p. 326, pl. 74, figs. 1, 2.

Loc. Schoharie, New York.

Orthothetes lens (White).

Kinderhook (L. Carb.).

Streptorhynchus lens White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 28.—Keyes, Geol. Survey Missouri, V, 1895, p. 67, pl. 39, fig. 2.

Streptorhynchus lens? A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 117.

Orthothetes lens (White)—Continued.

Orthothetes lens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 256, pl. 11A, figs. 16-22.

Loc. Clarksville, etc., Missouri; Hamburg, Illinois; Medina County, Ohio (Winchell).

Orthothetes pandora (Billings).

Upper Helderberg (Dev.).

Streptorhynchus pandora Billings, Canadian Jour., V, 1860, p. 226, figs. 12, 13;—*Geol. Canada*, 1863, p. 369, fig. 381.—Nicholson, Pal. Prov. Ontario, 1874, p. 70.

Streptorhynchus chemungensis var. *pandora* Hall, Pal. New York, IV, 1867, p. 68, pl. 4, figs. 11-19; pl. 9, figs. 18-25, 27;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 40, figs. 1-6.

Orthothetes chemungensis var. *pandora* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 9, fig. 30; pl. 10, figs. 1-6.

Loc. Scholarie, Knoxville, Clarksville, etc., New York; Cayuga, Ontario; Columbus, Ohio (Whitfield); Eureka district, Nevada.

Orthothetes pravus Hall.

(?Upper) Devonian.

Orthis prava Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 490.

Orthothetes prava Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 11A, fig. 13A.

Loc. Lime Creek, Worth County, Iowa.

Orthothetes subplanus (Conrad).

Niagara and L. Held. (Sil. and Dev.).

Strophomena subplana Conrad, Jour. Acad. Nat. Sci., Philadelphia, VIII, 1842, p. 258.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 104, fig. 1;—Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.

Leptena subplana Hall, Pal. New York, II, 1852, p. 259, pl. 53, figs. 8-10.—Billings, Canadian Nat. Geol., I, 1856, p. 138, pl. 2, figs. 16, 17.

Strophomena pecten Roemer, Die Sil. Fauna west. Tennessee, 1860, p. 67, pl. 5, fig. 4.—Billings, Geol. Canada, 1863, p. 311, fig. 315;—Catalogue Silurian Fossils of Anticosti, 1866, p. 40.

Streptorhynchus (*Strophodonta*) *subplanus* Hall, Geol. Survey Wisconsin, I, 1862, p. 436.

Streptorhynchus subplanus Hall, Trans. Albany Institute, IV, 1863, p. 226;—Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 63, figs. 1, 2;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 151, pl. 21, figs. 26-33;—Eleventh Rep. State Geol. Indiana, 1882, p. 288, pl. 21, figs. 26-33;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, figs. 21-24; pl. 42, fig. 19.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 141, pl. 29, figs. 11, 12.—Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 23, pl. 2, figs. 14-20.

Streptorhynchus hemiaster Winchell and Marey, Mem. Boston Soc. Nat. Hist., I, 1865, p. 93, pl. 2, fig. 10.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 392.

Hemipronites subplanus Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 349.

Hemipronites propinquus Meek and Worthen, *Ibidem*, III, 1868, p. 351, pl. 6, fig. 6.

Orthothetes subplana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 9, figs. 21-24; pl. 9A, fig. 19; pl. 11A, figs. 9-12.

Loc. Lockport, Rochester, etc., New York; Thorold, Ontario; Waldron, Indiana; Louisville, Kentucky; Thebes, Alexander County, and Bridgeport, Illinois; Pike County, Missouri; Decatur County, Tennessee; Arisaig, Nova Scotia (Ami); Anticosti.

Orthothetes tapajotensis (Derby).

Upper Carboniferous.

Streptorhynchus tapajotensis Derby, Bull. Cornell Univ., I, 1874, p. 37, pl. 5, figs. 3, 6, 7, 9, 10; pl. 8, fig. 9.

Orthothetes tapajotensis (Derby)—Continued.

Orthothetes tapajotensis Waagen, *Palæontologica Indica*, Ser. XIII, I, 1884, pp. 607, 608.

Loc. Bomjardim and Itaituba, Brazil.

Orthothetes tenuis Hall.

Niagara (Sil.).

Streptorhynchus tenuis Hall, *Trans. Albany Institute*, IV, 1863, p. 210;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 150, pl. 23, figs. 11–13;—Eleventh Rep. State Geol. Indiana, 1882, p. 287, pl. 23, figs. 11–13.—Foerste, *Bull. Denison Univ.*, II, 1887, p. 105, pl. 8, figs. 31, 32, 38.—Nettelroth, *Kentucky Fossil Shells*, Mem. Kentucky Geol. Survey, 1889, p. 142.

Orthothetes tenuis Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 255.

Strophomena (*Orthothetes*) *tennis* Foerste, *Geol. Ohio*, VII, 1895, p. 568, pl. 27, figs. 31, 32, 38.

Loc. Waldron, Indiana; near Louisville, Kentucky; Dayton, Ohio.

Orthothetes umbraculum of authors (non von Buch). L. and Up. Carb.

Orthis umbraculum Hall, *Stansbury's Expl. Survey Valley Great Salt Lake*, Utah, 1852, p. 412, pl. 3, fig. 6.—Newberry, *Ives's Rep. Colorado River of the West*, 1861, p. 125.

Streptorhynchus umbraculum? A. Winchell, *Proc. Acad. Nat. Sci. Philadelphia*, 1865, p. 117.

Hemipronites umbraculum? A. Winchell, *Proc. American Philosophical Soc.*, XII, 1870, p. 251.

Orthothetes umbraculum Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 256.

Loc. Waverly group, Newark, Sciotoville, Warren, etc., Ohio; Up. Carb., Leavenworth, Kansas.

Orthothetes woolworthanus Hall.

Lower Helderberg (Dev.).

Strophomena woolworthana Hall, *Tenth. Rep. N. Y. State Geol. Nat. Hist.*, 1857, p. 48, figs. 1, 2;—Hall, *Pal. New York*, III, 1859, p. 192, pl. 17, figs. 1, 2.

Streptorhynchus woolworthana Billings, *Geol. Canada*, 1863, p. 957, fig. 449.—Hall, *Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 39, figs. 25–31.

Orthothetes woolworthana Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 255, pl. 9, figs. 25–31.

Loc. Schoharie, Carlisle, Clarksville, and Hudson, New York.

ORTHOTICHIA Hall and C.Genotype *Orthis*? *morganiana* Derby.

Orthotichia Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 213;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 272.

Orthotichia morganiana (Derby).

Upper Carboniferous.

Orthis? *morganiana* Derby, *Bull. Cornell University*, I, 1874, p. 29, pl. 3, figs. 1–9, 11, 31; pl. 4, figs. 6, 14, 15.

Orthis morganiana Waagen, *Palæontologica Indica*, Ser. XIII, I, 1884, p. 564.

Orthotichia? *morganiana* Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 213, 226, pl. 7, figs. 11–15.

Loc. Bomjardim and Itaituba, Brazil.

ORTHOTROPIA Hall and Clarke.Genotype *O. dolomitica* H. and C.

Orthotropia Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, explanation sheet to pl. 84, figs. 3–7.—Thirteenth Ann. Rep. N. Y. State Geol., 1895, p. 943.

Orthotropia dolomitica Hall and Clarke.

Niagara (Sil.).

Orthotropia dolomitica Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, pl. 84, figs. 3–7.

Loc. Near Milwaukee, Wisconsin.

- PARASTROPHIA** Hall and C. Genotype *Atrypa hemiplicata* Hall.
Parastrophia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 221;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 839.
- Parastrophia divergens** Hall and Clarke. Lorraine (Ord.).
Parastrophia divergens Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 222, 366, pl. 63, figs. 4-7.
Loc. Wilmington, Illinois.
- Parastrophia greenei** Hall and Clarke. Niagara (Sil.).
Parastrophia greenii Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 222, 367, pl. 63, figs. 17-20, 22.
Loc. Milwaukee, Wisconsin.
- Parastrophia hemiplicata** Hall. Trenton (Ord.).
Atrypa hemiplicata Hall, Pal. New York, I, 1847, p. 144, pl. 33, fig. 10.—Billings, Canadian Nat. Geol., I, 1856, p. 208, figs. 20-23.
Atrypa circulus Hall, Pal. New York, I, 1847, p. 142, pl. 33, fig. 7;—Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 65.
Pentamerus hemiplicatus Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.—Billings, Canadian Jour., IV, 1859, p. 316.
Camarella hemiplicata Billings, Geol. Canada, 1863, p. 168, fig. 154.
Camarella circulus Miller, American Pal. Fossils, 1877, p. 107.
Camarella bernensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 328, pl. 4, figs. 4-6.
Anastrophia ? *hemiplicata* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 382, pl. 30, figs. 29-31.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 167.
Parastrophia hemiplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 221, pl. 63, figs. 1-3.
Loc. Middleville, Watertown, etc., New York; Center County, Pennsylvania; Wisconsin; Minnesota; Ottawa and Lake Winnipeg, Canada.
- Parastrophia hemiplicata rotunda** (Winchell and Schu.). Trenton (Ord.).
Anastrophia ? *hemiplicata* var. *rotunda* W. and S., Minnesota Geol. Survey, III, 1893, p. 383, pl. 30, figs. 32-35.
Loc. Cannon Falls, Minnesota; Decorah, Iowa.
- Parastrophia latiplicata** Hall and Clarke. Niagara (Sil.).
Parastrophia latiplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 222, 368, pl. 63, figs. 23-27.
Loc. Milwaukee, Wisconsin.
- Parastrophia multiplicata** Hall and Clarke. Niagara (Sil.).
Parastrophia multiplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 222, 367, pl. 63, figs. 15, 16, 21.
Loc. Milwaukee, Wisconsin.
- Parastrophia** (?) *obscura* (Hall and Whitfield). Pogonip (Ord.).
Porambonites obscurus Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 234, pl. 1, fig. 16.
Porambonites ? *obscurus* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 228.
Loc. White Pine district, Nevada.
Obs. Based upon a single ventral valve which is insufficient to determine whether it belongs to *Parastrophia* or some rhynchonelloid. It is not a *Porambonites*.

- Parastrophia ops** (Billings). Anticosti (Sil.).
Camarella ops Billings, Pal. Fossils, I, 1862, p. 148, fig. 128.
Loc. Anticosti.
Obs. May be only a variety of *P. reversa*.
- Parastrophia reversa** (Billings). Anticosti (Sil.).
Pentamerus reversus Billings, Geol. Survey Canada; Rep. Progress for 1856, 1857, p. 295;—Canadian Jour., IV, 1859, p. 316.
Brachymerus reversus Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 69.
Anastrophia reversa Miller, American Pal. Foss., 1877, p. 104.
Parastrophia reversa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 63, figs. 8-14.
Loc. Anticosti.
Obs. Billings says this species is a large *P. hemiplicata* Hall. It appears, however, to be distinct. See *P. ops* Billings.
- Parastrophia scofieldi** (Winchell and Schuchert). Trenton (Ord.).
Anastrophia ? *scofieldi* W. and S., Minnesota Geol. Survey, III, 1893, p. 383, pl. 30, figs. 24-28.
Loc. Near Cannon Falls, Minnesota.
- PARAZYGA** Hall and Clarke. Genotype *Atrypa hirsuta* Hall.
Parazyga Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 127;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 800.
- Parazyga deweyi** Hall. Lower Helderberg (Dev.).
Waldheimia deweyi Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 89.
Trematospira (*Rhynchospira*) *deweyi* Hall, Pal. New York, III, 1889, p. 216, pl. 36, fig. 3.
Parazyga deweyi Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 128, fig. 112, pl. 49, figs. 40-46.
Loc. Albany and Schoharie counties, New York.
- Parazyga hirsuta** Hall. Corniferous and Hamilton (Dev.).
Atrypa hirsuta Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 168.
Trematospira hirsuta Hall, Thirteenth Rep. *Ibidem*, 1860, p. 101;—Fourteenth Rep. *Ibidem*, 1861, p. 101;—Fifteenth Rep. *Ibidem*, 1862, pl. 2, figs. 11-16;—Pal. New York, IV, 1867, p. 274, pl. 45, figs. 16-32.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 136, pl. 16, figs. 15-19.
Athyris ? *chloe* Billings, Canadian Jour., n. ser., V, 1860, p. 282, figs. 45-47.
Retzia chloe Billings, Geol. Canada, 1863, p. 385, fig. 419.
Nucleospira indianensis Miller, Seventeenth Rep. State Geol. Indiana, 1892, p. 79, pl. 13, figs. 13-15.
Parazyga hirsuta Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 128, fig. 111; pl. 49, figs. 28-39.
Loc. New York; Thedford, Canada; Falls of Ohio; Bunker Hill, Indiana.
- Paterina** Beecher=*Iphidea*.
- PATERULA** Barrande. Genotype *Paterula bohemia* Barrande.
Paterula Barrande, Système Sil. du Centre de la Bohême, V, 1879, p. 110.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 78, 165;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 242.
- Paterula amii** n. sp. Calciferous (Ord.).
Paterula species Hall and Clarke, VIII, Pt. I, p. 78, pl. 4K, fig. 1.
Loc. Quebec, Canada.

PENTAGONIA Cozzens. Genotype *Pentagonia peersii* Cozzens=
Atrypa unisulcata Conrad.

Pentagonia Cozzens, *Annals Lyceum Nat. Hist. N. Y.*, IV, 1846, p. 158.—Meek and Hayden, *Smithsonian Cont. Knowledge*, XIV, 172, 1864, p. 16.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, p. 80;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 775.

Goniocœlia Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 101.

Pentagonia peersii Cozzens=*Pentagonia unisulcata*.

Pentagonia unisulcata (Conrad). Oriskany to Hamilton (Dev.).

Atrypa unisulcata Conrad, Fifth Ann. Rep. Geol. Survey of N. Y., 1841, p. 56.—Hall, Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, pl. 11, fig. 10.

Pentagonia peersii Cozzens, *Annals Lyceum Nat. Hist. N. Y.*, IV, 1846, p. 158, pl. 10, fig. 3.

Rhynchonella unisulcata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 125.

Athyris? *unisulcata* Billings, *Canadian Journal*, V, 1860, p. 279, figs. 39-42.

Goniocœlia uniangulata Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 101.

Meristella? *unisulcata* Hall, Fifteenth Rep. *Ibidem*, 1862, pl. 2, figs. 17-25.

Athyris unisulcata Billings, *Geol. Canada*, 1863, p. 373, fig. 396.

Meristella (*Pentagonia*) *unisulcata* varieties *biplicata* and *uniplicata* Hall, *Pal. New York*, IV, 1867, p. 309, pl. 50, figs. 18-35.

Meristella unisulcata Nettelroth, *Kentucky Fossil Shells*, *Mem. Kentucky Geol. Survey*, 1889, p. 99, pl. 15, figs. 9-16.

Pentagonia unisulcata Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, p. 80, pl. 42, figs. 22-32.

Loc. New York; county of Haldimand and Bosanquet, Ontario; Falls of Ohio.

PENTAMERELLA Hall. Genotype *Atrypa arata* Conrad.

Pentamerella Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 163;—*Pal. New York*, IV, 1867, pp. 373, 375.—Nettelroth, *Kentucky Fossil Shells*, *Mem. Kentucky Geol. Survey*, 1889, p. 49.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 245;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 845.

Pentamerella arata (Conrad). Upper Helderberg (Dev.).

Atrypa arata Conrad, Fifth Ann. Rep. Geol. Survey N. Y., 1841, p. 55.

Atrypa octocostata Conrad, *Ibidem*, 1841, p. 55.

Pentamerus aratus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 120, figs. 1-10.—Billings, *Canadian Journal*, VI, 1861, p. 269, figs. 93-96;—*Geol. Canada*, 1863, p. 370, fig. 389.

Pentamerella arata Hall, *Pal. New York*, IV, 1867, p. 375, pl. 58, figs. 1-21.—Nettelroth, *Kentucky Fossil Shells*, *Mem. Kentucky Geol. Survey*, 1889, p. 49, pl. 13, figs. 17-20.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 245, pl. 71, figs. 21-29.

?*Pentamerus aratus* Tschernysehew, *Mém. Comité Géologique de St. Pétersbourg*, III, 1887, p. 101, pl. 4, figs. 18, 19.

Loc. New York; Cayuga, etc., Ontario; Columbus, Ohio; Falls of Ohio; ?Urals of Russia.

Pentamerella borealis (Meek). Hamilton (Dev.).

Pentamerus borealis Meek, *Trans. Chicago Acad. Sci.*, I, 1868, p. 95, pl. 13, fig. 11.

Loc. Anderson River, British America.

Pentamerella (?) compressa Ringueberg. Niagara (Sil.).

Pentamerella compressa Ringueberg, *Bull. Buffalo Soc. Nat. Sci.*, V, 1886, p. 15, pl. 2, fig. 4.

Pentamerella (?) compressa Ringueberg—Continued.*Loc.* Lockport, New York.*Obs.* May be a pathologic or compressed specimen of *Spirifer crispus* or *S. sulcatus*.**Pentamerella dubia** Hall.

? Hamilton (Dev.).

Atrypa (n. sp.?) Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 3A, fig. 1. [See specimen in U. S. Nat. Mus., Cat., Invert. Foss., 17927.]*Spirifer dubius* Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 90.*Pentamerella dubia* Hall, Pal. New York, IV, 1867, p. 379, pl. 58, figs. 38-43.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 245, pl. 71, figs. 32-38.*Loc.* Iowa City, Iowa.*Obs.* See *Pentamerella micula* Hall.**Pentamerella intralineata** (A. Winchell).

Hamilton (Dev.).

Pentamerus intralineatus A. Winchell, Geol. Rep. Lower Peninsula of Michigan, 1866, p. 94.*Loc.* Grand Traverse region, Michigan.**Pentamerella micula** Hall.

? Hamilton (Dev.).

Pentamerella micula Hall, Pal. New York, IV, 1867, p. 378, pl. 58, figs. 26, 27.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 245.*Loc.* Iowa City, Iowa.*Obs.* Compare with *Pentamerella dubia* Hall.**Pentamerella obsolescens** Hall.

? Hamilton (Dev.).

Pentamerella obsolescens Hall, Pal. New York, IV, 1867, p. 379, pl. 58, figs. 24, 25.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 245.*Loc.* Waterloo, Iowa.**Pentamerella pavilionensis** Hall.

Hamilton (Dev.).

Pentamerus papilionensis Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 86.*Pentamerella papilionensis* Hall, Pal. New York, IV, 1867, p. 377, pl. 58, figs. 28-37.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 50.*Pentamerella pavilionensis* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 245, pl. 71, figs. 30, 31.*Loc.* Seneca and Canandaigua lakes, etc., New York; Falls of Ohio.**Pentamerella thusnelda** Nettelroth.

Corniferous (Dev.).

Pentamerella thusnelda Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 51, pl. 31, figs. 26-28.*Loc.* Near Louisville, Kentucky.**Pentamerella ventricosa** Hall=*Clorinda ventricosa*.**PENTAMERUS** Sowerby.Genotype *P. laevis* Sowerby.*Pentamerus* Sowerby, Mineral Conchology, I, 1813, p. 76.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 236;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 844.*Pentamerus arcuosus* McChesney=*Clorinda arcuosa*.*Pentamerus aratus*=*Pentamerella arata*.*Pentamerus barrandi* Billings=*Clorinda barrandei*.*Pentamerus beaumonti* Castelnau=*P. oblongus*.*Pentamerus bisinuatus* McChesney=*P. oblongus*.*Pentamerus borealis* Meek=*Pentamerella borealis*.*Pentamerus brevirostris* Hall=*Anastrophia brevirostris*.

- Pentamerus chicagoensis* Winchell and Marcy=*Clorinda ventricosa*.
Pentamerus colletti Miller=*Conchidium colletti*.
Pentamerus comis Meek and Worthen=*Gypidula comis*.
Pentamerus complanatus Nettelroth=*Conchidium tenuicostatum*.
Pentamerus conchidium=*Conchidium biloculare*.
Pentamerus coppingeri Etheridge=*Gypidula coppingeri*.
Pentamerus crassoradius McChesney=*Conchidium crassiradiatum*.
Pentamerus decussatus Whiteaves=*Conchidium decussatum*.
Pentamerus deshayessii Castelnau=*Rensseleria ovoidea*.
Pentamerus elongatus Vanuxem=*Amphigenia elongata*.
Pentamerus fornicatus Hall=*Clorinda fornicata*.
Pentamerus galeatiformis Meek and Worthen=*Gypidula comis*.
Pentamerus galeatus Hall=*Gypidula galeata*.
Pentamerus galeatus Hall and Whitfield=*Gypidula nucleus*.
Pentamerus galeatus Roemer=*Gypidula roemeri*.
Pentamerus globulosus Nettelroth=*Gypidula globulosa*.
Pentamerus hemiplicatus Billings=*Parastrophia hemiplicata*.
Pentamerus interplicatus Hall=*Anastrophia interplicata*.
Pentamerus intralineatus Winchell=*Pentamerella intralineata*.
Pentamerus knappi Hall and Whitfield=*Conchidium knappi*.
Pentamerus knighti Sowerby=*Conchidium knighti*.
Pentamerus knotti Nettelroth=*Gypidula knotti*.
Pentamerus laqueatus Conrad=*Conchidium laqueatum*.
Pentamerus lenticularis White and Whitfield=*Camarophorella lenticularis*.
Pentamerus littoni Hall=*Conchidium littoni*.
Pentamerus lotis Walcott=*Gypidula lotis*.
Pentamerus multicostatus=*Conchidium multicostatum*.
Pentamerus nobilis Emmons=*Conchidium laqueatum*.
Pentamerus nucleus Hall and Whitfield=*Gypidula nucleus*.
Pentamerus nysius var. *crassicosta* Hall=*Conchidium nysius*.
Pentamerus nysius var. *tenuicostatus* Nettelroth=*Conchidium nysius*.
Pentamerus nysius var. *tenuicosta* Hall=*Conchidium tenuicosta*.

***Pentamerus oblongus* Sowerby.**

Clinton and Niagara (Sil.).

- Pentamerus oblongus* Sowerby, Murchison's Silurian System, 1839, p. 641, pl. 19, fig. 10.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 70, figs. 1-5.—Owen, Geol. Expl. Iowa, Wisconsin and Illinois, 1844, pl. 14, fig. 10.—Hall, American Jour. Sci., 2d ser., XX, 1849, p. 227;—Pal. New York, II, 1852, p. 79, pl. 25, fig. 1; pl. 26, fig. 1.—Billings, Canadian Nat. Geol., I, 1856, p. 58, pl. 1, figs. 2, 3;—Geol. Canada, 1863, p. 316, fig. 326.—Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 183;—Geol. Survey Ohio, Pal., II, 1875, p. 137, pl. 7, fig. 9.—Whitfield, Geol. Wisconsin, IV, 1882, p. 288, pl. 17, figs. 4-9.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 60, pl. 33, figs. 15-17.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 237, figs. 169-171; pl. 67, fig. 20; pl. 68, figs. 1-5; pl. 69, figs. 1, 4-7, 13, 14; pl. 70, figs. 1-4.

- Pentamerus beamonti* Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 38, pl. 13, fig. 9.

Pentamerus oblongus Sowerby—Continued.

Pentamerus bisinuatus McChesney, Descriptions New Pal. Foss., 1861, p. 85;—*Trans. Chicago Acad. Sci.*, I, 1868, pl. 9, fig. 1.—Whitfield, *Geol. Wisconsin*, IV, 1882, p. 290, pl. 17, fig. 3.

Loc. England; New York; Ohio; Indiana; Kentucky; Illinois; Iowa; Wisconsin; Thorold, Ontario; Anticosti.

Pentamerus oblongus cylindricus Hall and Whitfield. Niagara (Sil.).

Pentamerus oblongus var. *cylindrica* Hall and Whitfield, *Twenty-fourth Rep. N. Y. State Cab. Nat. Hist.*, 1872, p. 183;—*Twenty-seventh Rep. Ibidem*, 1875, pl. 10, figs. 13, 14.—Nettelroth, *Kentucky Fossil Shells*, Mem. *Kentucky Geol. Survey*, 1889, p. 61, pl. 30, figs. 2-4.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 237, fig. 172; pl. 68, figs. 7, 8; pl. 69, figs. 11, 12.

Loc. Louisville, Kentucky.

Pentamerus oblongus maquoketa Hall and Clarke. Niagara (Sil.).

Pentamerus oblongus (partim) Whitfield, *Geol. Wisconsin*, IV, 1882, pp. 288, 291, pl. 17, figs. 8, 9.

Pentamerus oblongus var. *maquoketa* Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 239, pl. 67, figs. 11-13.

Loc. Ashford, Wisconsin; near Dubuque and Hopkinton, Iowa.

Pentamerus oblongus subrectus Hall and Clarke. Niagara (Sil.).

Pentamerus oblongus var. *subrectus* Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, pp. 238, 239, pl. 68, fig. 6; pl. 69, figs. 2, 3, 8-10; pl. 70, fig. 5.

Loc. Earlville, Iowa; Wisconsin.

Pentamerus occidentalis Hall, 1858 (non 1852)=Gypidula comis.**Pentamerus occidentalis Hall, 1852=Conchidium occidentale.****Pentamerus ovalis Hall. Clinton (Sil.).**

Pentamerus ovalis Hall, *Pal. New York*, II, 1852, p. 103, pl. 31, fig. 1.—Foerste, *Proc. Boston Soc. Nat. Hist.*, XXIV, 1890, p. 324, pl. 5, figs. 17, 18.

Loc. New Hartford, Oneida County, New York; Cumberland Gap, Tennessee; Collinsville, Alabama.

Obs. Compare with *P. oblongus*.

Pentamerus papilionensis Hall=Pentamerella pavilionensis.**Pentamerus pergibbosus Hall and Whitfield. Niagara (Sil.).**

Pentamerus pergibbosus Hall and Whitfield, *Pal. Ohio*, II, 1875, p. 139, pl. 7, figs. 10, 11.—Nettelroth, *Kentucky Fossil Shells*, Mem. *Kentucky Geol. Survey*, 1889, p. 162.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 239, pl. 67, figs. 10, 14-19.

Loc. Greenfield, Ohio; Louisville, Kentucky; Wisconsin (Whitfield).

Pentamerus pesovis Whitfield. Waterlime (Sil.).

Pentamerus pesovis Whitfield, *Annals N. Y. Acad. Sci.*, II, 1882, p. 195;—*Ibidem*, V, 1891, p. 513, pl. 5, figs. 11-22;—*Geol. Ohio*, VII, 1895, p. 414, pl. 1, figs. 18-22.

Loc. Greenfield, Ohio; Louisville, Kentucky; Wisconsin (Whitfield).

Pentamerus pseudogaleatus Hall=Gypidula pseudogaleata.**Pentamerus reversus Billings=Parastrophia reversa.****Pentamerus salinensis Swallow=Conchidium salinense.****Pentamerus subglobosus Meek and Worthen=Gypidula subglobosa.****Pentamerus trisinuatus McChesney=Meristina trisinuata.****Pentamerus uniplicatus Nettelroth=Gypidula uniplicata.****Pentamerus ventricosus Hall=Clorinda ventricosa.**

Pentamerus verneuili Hall=*Anastrophia verneuili*.

PHOLIDOPS Hall.

Genotype *Orbicula squamiformis* Hall.

Pholidops Hall, Pal. New York, III, 1859, p. 489;—Thirteenth Rep., N. Y. State Cab. Nat. Hist., 1860, p. 92;—Fifteenth Rep. *Ibidem*, 1862, p. 195;—Pal. New York, IV, 1867, pp. 31, 413.—Dall, Bull. Mus. Comp., Zool., III, 1871, p. 27.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 155.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 376.—Hall and Clarke, Eleventh Rep. N. Y. State Geologist, 1894, p. 262.

Craniops Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 84.—Ehler, Fischer's *Manuel de Conchyliologie*, 1887, p. 1272.

***Pholidops arenaria* Hall.**

Oriskany (Dev.).

Pholidops arenaria Hall, Pal. New York, IV, 1867, p. 413, pl. 3, fig. 10.—Hall and Clarke, *Ibidem*, VIII, Pt. I, 1892, pl. 41, fig. 24.

Loc. Albany County and Hudson, New York.

***Pholidops areolata* Hall.**

Scholarie (Dev.).

Pholidops areolata Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 31;—Pal. New York, IV, 1867, p. 31, pl. 3, figs. 4, 5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 41, figs. 25, 26.

Loc. Clarksville and Knox, New York.

***Pholidops bellula* Walcott.**

Lower Devonian.

Pholidops bellula Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 113, pl. 2, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157.

Loc. Eureka district, Nevada.

***Pholidops calceola* Hall and Clarke.**

Corniferous (Dev.).

Pholidops calceola Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 157, 182, pl. 41, fig. 30.

Loc. Falls of Ohio.

***Pholidops cincinnatiensis* Hall.**

Lorraine (Ord.).

Pholidops cincinnatiensis Hall, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, pl. 7, fig. 10;—Pal. Ohio, I, 1873, p. 130, pl. 5, fig. 2.—Miller, Cincinnati Quart. Jour. Science, II, 1875, p. 14;—Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 107.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 41, fig. 18.

Loc. Cincinnati, etc., Ohio.

***Pholidops greenei* Miller and Gurley.**

Hamilton (Dev.).

Pholidops greenei Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 12, 1897, p. 48, pl. 3, figs. 16–21.

Loc. Falls of Ohio.

***Pholidops hamiltoniæ* Hall.**

Hamilton (Dev.).

Pholidops hamiltoniæ Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 92;—Pal. New York, IV, 1867, p. 32, pl. 3, figs. 6–9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 41, figs. 31–34 (37?).

Loc. Darien, Moscow, Canandaigua Lake, etc., New York.

Pholidops lamellosa Hall=*Pholidops oblata*.

***Pholidops lepis* Hall and Clarke.**

Corniferous (Dev.).

Pholidops lepis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157.

Loc. Not given.

Obs. A nomina nudum.

Pholidops linguloides Hall=*Pholidops oblata*.

- Pholidops oblata** Hall. Hamilton (Dev.).
 Pholidops oblata Hall, Pal. New York, IV, 1867, p. 414, pl. 3, fig. 10.
 Pholidops (?) linguloides Hall, Ibidem, 1867, p. 414.
 Pholidops lamellosa Hall, Ibidem, 1867, pl. 3, fig. 11.
 Pholidops linguloides and oblata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 41, figs. 35, 36.
Loc. Aurora and Canandaigua Lake, New York.
- Pholidops ovalis** Hall. Niagara (Sil.).
 Pholidops ovalis Hall, Trans. Albany Institute, IV, 1863, p. 209;—Pal. New York, IV, 1867, pl. 3, figs. 1, 2;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 149, pl. 21, figs. 1, 2;—Eleventh Rep. State Geol. Indiana, 1882, p. 284, pl. 21, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 41, fig. 26.
Loc. Waldron, Indiana; Arisaig, Nova Scotia (Ami).
Obs. This species and *P. squamiformis* are probably identical with *P. implicata* Sowerby.
- Pholidops ovata** Hall. Lower Helderberg (Dev.).
 Pholidops ovatus Hall, Pal. New York, III, 1859, p. 490, pl. 103B, fig. 7.
 Pholidops ovata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 41, figs. 22, 23.
Loc. Albany County, New York; ? Square Lake, Maine.
- Pholidops patina** Hall and Clarke. Corniferous (Dev.).
 Pholidops patina Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 182, pl. 41, figs. 27-29.
Loc. De Ceuville, Ontario.
- ? Pholidops quadrangularis** Walcott. Lower Devonian.
 Pholidops quadrangularis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 114, pl. 2, fig. 7.
Loc. Lone Mountain, Nevada.
Obs. Apparently a plate of a crinoid.
- Pholidops squamiformis** Hall. Niagara (Sil.).
 Orbicula ? squamiformis Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 108, fig. 1;—Pal. New York, II, 1852, p. 250, pl. 53, fig. 4.
 Craniops squamiformis Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 84.
 Pholidops squamiformis Hall, Pal. New York, III, 1859, p. 490, pl. 103B, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 156, pl. 41, fig. 21.
Loc. Lockport, Rochester, etc., New York.
Obs. See *Pholidops ovalis* Hall.
- Pholidops subtruncata** Hall. Lorraine (Ord.).
 Orbicula ? subtruncata Hall, Pal. New York, I, 1847, p. 290, pl. 79, fig. 7.
 Pholidops subtruncata Hall, Descrip. n. sp. of Crinoidea and other Fossils, 1866, p. 14;—Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 221, pl. 7, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 41, fig. 19.
Loc. Lorraine and Turin, New York. In the Trenton at Ottawa, Canada (Ami).
- Pholidops terminalis** Hall. Oriskany (Dev.).
 Pholidops terminalis Hall, Pal. New York, III, 1859, p. 490, pl. 103B, fig. 8.—Hall and Clarke, Ibidem, VIII, Pt. I, 1892, p. 157.
Loc. Cumberland, Maryland.
- Pholidops trentonensis** Hall. Trenton (Ord.).
 Pholidops trentonensis Hall, Descrip. n. sp. of Crinoidea and other Fossils, 1866, p. 14;—Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 221, pl. 7, fig. 8.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 41, fig. 17.
Loc. Middleville, New York.

Pholidops trentonensis minor Winchell and Schuchert. Trenton (Ord.).

Pholidops trentonensis var. *minor* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 376, pl. 29, fig. 40.

Loc. St. Paul and Cannon Falls, Minnesota.

PHOLIDOSTROPHIA Hall and Clarke. Genotype *Strophodonta naerea* Hall=*Chonetes* (?) *iowensis* Owen.

Pholidostrophia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 287;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 281.

Pholidostrophia iowaensis (Owen). Corniferous and Hamilton (Dev.).

Chonetes (?) *iowensis* Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, p. 584, pl. 3A, fig. 7. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17912.]

Chonetes sp. undet. Owen, *Ibidem*, 1852, pl. 3A, fig. 17. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17916.]

Strophomena (*Strophodonta*) *naerea* Hall, Tenth Rep. N. Y. State Geol. Nat. Hist., 1857, p. 144.

Strophomena lepida Hall, Geol. Iowa, I, 1858, p. 493, pl. 3, fig. 3.—Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 344.

Strophodonta naerea Hall, Pal. New York, IV, 1867, p. 104, pl. 18, fig. 1;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, figs. 20–24.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 146.

Strophodonta (*Pholidostrophia*) *naerea* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 287, pl. 15, figs. 20–24; Pt. II, 1895, pl. 84, fig. 11.

Loc. Iowa City, Iowa; western New York; Columbus, Ohio; Falls of Ohio; Rock Island, Illinois; Alpena, Michigan; Ontario, Canada.

Obs. Owen's type specimens preserved in the United States National Museum prove to be identical with *Strophomena lepida*, which Hall in 1867 said is a synonym for *Strophodonta naerea*.

Plasiomys Hall and Clarke=*Dinorthis*.**PLATYSTROPHIA** King. Genotype *Terebratulites biforata* Schlotheim.

Platystrophia King, Mon. Permian Fossils of England, Pal. Soc., 1850, p. 116.—Hall, Geol. Soc. America, I, 1889, pp. 19, 20.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 200.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 454.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 268.

Obs. It is doubtful whether all the various forms of *Platystrophia* can be regarded as species. This genus is nearly always abundantly represented by one or more forms throughout the American Ordovician and Silurian systems. When individuals of the same region or of widely separated localities are compared with each other it is apparent that the specific characters are very inconstant. Individuals of a stratum, however, are fairly constant in form, size, and plications, and it is this limited constancy that has served in many of the following species.

Platystrophia acuminata James. Lorraine (Ord.).

Orthis (*Platystrophia*) *acuminata* James, The Paleontologist, 1, 1878, p. 7.

Loc. Cincinnati, Ohio.

Platystrophia acutilirata (Conrad). Lorraine (Ord.).

Delthyris acutilirata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 260, pl. 14, fig. 15.

Orthis (*Platystrophia*) *acutilirata* Meek, Pal. Ohio, I, 1873, p. 119, pl. 10, fig. 5.

Orthis acutilirata Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 28.

Platystrophia acutilirata (Conrad)—Continued.

Orthis biforata var. *acutilirata* White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 487, pl. 2, figs. 5-9;—Tenth Rep. State Geol. Indiana, 1881, p. 119, pl. 2, figs. 5-9.

Platystrophia acutilirata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 223. *Loc.* Richmond, Indiana; Oxford, Ohio; Louisiana, Missouri (Keyes).

Platystrophia biforata (Schlotheim). Chazy-Niagara (Ord. and Sil.).

Terebratulites biforatus Schlotheim, Petrefactenkunde, 1820, p. 265.

Spirifer sheppardi Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 42, pl. 14, fig. 15.

Delthyris brachynota Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 70, fig. 6.

Orthis and *Delthyris* Owen, Geol. Expl. Iowa, Wisconsin, Illinois, 1844, pl. 15, figs. 3, 7.

Delthyris lynx Hall (partim; non Eichwald), Pal. New York, I, 1847, p. 133, pl. 32D, fig. 1.

Spirifer biforata var. *lynx* Hall, *Ibidem*, II, 1852, p. 65, pl. 22, fig. 1.

Orthis biforatus Billings, Canadian Nat. Geol., I, 1856, p. 206, figs. 6-10.—Nicholson and Hinde, Canadian Jour., XIV, 1874, p. 158.—White, Rep. U. S. Geogr. Geol. Survey west 100th Meridian, IV, 1874, p. 74, pl. 4, fig. 9.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 35, pl. 29, figs. 18-29.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 312.

Orthis lynx Billings, Geol. Canada, 1863, p. 167, fig. 149.—Miller (partim), Cincinnati Quart. Jour. Sci., II, 1875, p. 25.

Platystrophia regularis Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 67.

Orthis (*Platystrophia*) *biforata* Meek, Pal. Ohio, I, 1873, p. 112.—Foerste, Geol. Ohio, VII, 1895, p. 579, pl. 25, figs. 7, 8.

Orthis (*Platystrophia*) *biforata* var. *lynx* Hall, Second Ann. Rep. N. Y. State Geologist, 1883, pl. 35, figs. 11-14 (non figs. 9, 10, 15 of pl. 35 and fig. 30, pl. 34 = *P. biforata* *lynx*).

Orthis biforata var. *lynx* forma *reversata* and *daytonensis* Foerste, Bull. Denison Univ., I, 1885, pp. 81, 82, pl. 13, figs. 7, 8.

Platystrophia lynx Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 202, 223, pl. 5B, fig. 10.—Keyes, Geol. Survey Missouri, V, 1895, p. 64, pl. 39, fig. 5.

Platystrophia biforata Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 455, pl. 33, figs. 51-54.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 177.

Loc. Throughout the horizons mentioned above in North America; also in England, Scotland, Ireland, Gotland, Scandinavia, Oeland, and Russia.

Platystrophia crassa James.

Lorraine (Ord.).

Orthis (*Platystrophia*) *dentata*?? Meek (non Pander), Pal. Ohio, I, 1873, p. 117, pl. 10, fig. 3.

Orthis (*Platystrophia*) *crassa* James, Cincinnati Quart. Jour. Sci., I, 1874, p. 20.

Orthis dentata Miller, *Ibidem*, II, 1875, p. 27.

Orthis centrosa Miller, North American Geol. Pal., 1889, p. 356.

Platystrophia crassa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 223.

Platystrophia biforata var. *crassa* Winchell and Schuchert, Geol. Survey Minnesota, III, 1893, p. 458, pl. 33, figs. 55, 56.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 178.

Loc. Cincinnati, Ohio; Spring Valley, Minnesota; Lake Winnipeg, Manitoba.

Platystrophia laticosta Meek.

Lorraine (Ord.).

Orthis (*Platystrophia*) *laticosta* (James) Meek, Pal. Ohio, I, 1873, p. 116, pl. 10, fig. 4.

Orthis (*Platystrophia*) *cypha* James, Cincinnati Quart. Jour. Sci., I, 1874, p. 20.

Platystrophia laticosta Meek—Continued.

Orthis laticosta Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 27.

Platystrophia biforata var. *laticosta* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 223, pl. 5B, figs. 5-9

Loc. Cincinnati, etc., Ohio.

Platystrophia lynx (Eichwald).

Lorraine (Ord.).

Terebratula lynx Eichwald, Skizze von Podolis, 1830, p. 202.

Delthyris lynx (partim) Hall, Pal. New York, I, 1847, p. 133, pl. 32D, fig. 1.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 820, fig. 616.

Orthis (*Platystrophia*) *biforata* var. *lynx* Meek, Pal. Ohio, I, 1873, p. 114, pl. 10, fig. 1.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 35, figs. 9, 10, 15.

Orthis lynx (partim) Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 25.

Orthis biforata Nicholson, Pal. Province Ontario, 1875, p. 16, fig. 5.

Orthis (*Platystrophia*) *lynx* Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 34, fig. 30.

Platystrophia biforata var. *lynx* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 202, 223, pl. 5B, figs. 1-4.

Loc. Cincinnati, Ohio, and elsewhere in the Ohio Valley.

Platystrophia regularis Shaler = *Platystrophia biforata*.**PLECTAMBONITES** Pander.Genotype *P. planissima* Pander.

Plectambonites Pander, Beitrage zur Geognosie des Russ. Reiches, 1830, p. 90, pl. 3, figs. 8, 16; pl. 28, fig. 19.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 236, 295.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 413.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 290.

Plectambonites arca Shaler = *Plectambonites transversalis*.**Plectambonites gibbosus** Winchell and Schuchert.

Trenton (Ord.).

Plectambonites gibbosa W. and S., American Geol., IX, 1892, p. 288;—Minnesota Geol. Survey, III, 1893, p. 416, pl. 32, figs. 13-17.

Loc. Mantorville, Old Concord, and near Cannon Falls, Minnesota.

Plectambonites glaber Shaler.

Anticosti (Sil.).

Plectambonites glaber Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 64.

Leptaena glabra Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 294.

Loc. Anticosti.

Plectambonites plicatellus (Ulrich).

Utica (Ord.).

Leptaena plicatella Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, 1879, p. 15, pl. 7, fig. 12.

Plectambonites plicatella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15A, figs. 34, 35.

Loc. Cincinnati, Ohio; Covington, Kentucky.

Plectambonites productus Hall and Clarke.

Niagara (Sil.).

Plectambonites producta Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 360, pl. 84, figs. 23-25.

Loc. Yellow Springs, Ohio.

Plectambonites sericeus (Sowerby).

Trenton to Clinton (Ord.-Sil.).

Leptaena sericea J. de C. Sowerby, Murchison's Silurian System, 1839, pl. 19, figs. 1, 2.—Hall, Pal. New York, I, 1847, pp. 110, 287, pl. 31B, fig. 2; pl. 79, fig. 3;—*Ibidem*, II, 1852, p. 59, pl. 21, fig. 1.—Billings, Canadian Nat. Geol., I, 1856, p. 41, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 818, fig. 599.—Billings, Geol. Canada, 1863, p. 163, fig. 139.—Meek, Pal. Ohio, I, 1873, p. 70, pl. 5, fig. 3.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 57.—Kayser, Palaeontographica, Suppl., III, 1876, p. 21, pl. 3, fig. 19.—Hall, Second Ann. Rep.

Plectambonites sericeus (Sowerby)—Continued.

N. Y. State Geol., 1883, pl. 46, figs. 25-29.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 293.—Keyes, Geol. Survey Missouri, V, 1895, p. 75, pl. 39, fig. 9.

Leptæna sericea? White, Wheeler's Expl. Survey west of the 100th Merid., IV, 1875, p. 70, pl. 4, fig. 7.

Strophomena sericea Conrad, Third Ann. Rep. Geol. Survey N. Y., 1840, p. 201.—Emmons, Geol. N. Y.; Rep. Second Dist., 1842, p. 394.

Strophomena semiovalis Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 47.

Leptæna aspera James, Cincinnati Quart. Jour. Sci., I, 1874, p. 151.

Plectambonites sericea, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15, figs. 25-29.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 414, pl. 32, figs. 10-12.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 174.

Leptæna minnesotensis Sardeson, Minnesota Acad. Nat. Sci., III, 1892, p. 329, pl. 4, figs. 24, 25.

Leptæna precosis Sardeson, Ibidem, 1892, p. 329, pl. 4, figs. 26-28.

Leptæna recedens Sardeson, Ibidem, 1892, p. 330, pl. 4, figs. 29-32.

Leptæna saxea Sardeson, Ibidem, 1892, p. 330, pl. 4, figs. 33-35.

Loc. England; New York; Ohio; Indiana; Kentucky; Missouri; Wisconsin; Minnesota; Manitoba; Talacastra, Argentine Republic.

Plectambonites tenera Shaler=**Plectambonites transversalis**.**Plectambonites transversalis** (Wahlenberg). Clinton-Niagara (Sil.).

Anomites transversalis Wahlenberg, Act. Soc. Upsaliensis, III, 1821, p. 64.

Strophomena elegantula Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 72, fig. 1.

Strophomena transversalis Hall, Ibidem, 1843, p. 105, fig. 4.

Leptæna transversalis Hall, Pal. New York, II, 1852, p. 256, pl. 53, fig. 5.—Billings, Canadian Nat. Geol., I, 1856, p. 138, pl. 2, figs. 14, 15.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, figs. 34-36.

Plectambonites arca and *tenera* Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 64.

Leptæna transversalis var. *elegantula* Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 294, pl. 6, fig. 6.

Plectambonites transversalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 298, pl. 15, figs. 34-36.—Foerste, Geol. Ohio, VII, 1895, p. 566, pl. 25, fig. 5; pl. 30, fig. 13; pl. 31, fig. 6.

Loc. Europe; New York; Osgood, Indiana; Wisconsin; Dundas and Hamilton, Ontario; Anticosti; Lake Temiscouata, New Brunswick.

Plectambonites transversalis alabamaensis (Foerste). Clinton (Sil.).

Leptæna transversalis var. *alabamensis* Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 296, pl. 5, fig. 9.

Loc. Collinsville, Alabama.

Plectambonites transversalis prolongatus (Foerste). Clinton (Sil.).

Leptæna prolongata Foerste, Bull. Denison Univ., I, 1885, p. 79, pl. 13, fig. 5.

Leptæna transversalis var. *prolongata* Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 297, pl. 5, fig. 13.

Loc. Dayton, Ohio; Wildwood Station, Georgia.

PLECTORTHIS Hall and Clarke. Genotype *Orthis plicatella* Hall.

Orthis (group of *O. plicatella*) Hall, Bull. Geol. Soc. America, I, 1889, p. 20.

Plectorthis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 221.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 435.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 266.

Plectorthis æquivalvis (Hall). Lorraine (Ord.).

Orthis æquivalvis Hall (non Davidson, 1847), Pal. New York, I, 1847, p. 120, pl. 32, fig. 6.

Plectorthis æquivalvis (Hall)—Continued.

Plectorthis æquivalvis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 221.

Loc. Cincinnati, Ohio; Wisconsin (Whitfield).

Plectorthis (?) aurelia (Billings).

Oriskany (Dev.).

Orthis aurelia Billings, Pal. Fossils, II, 1874, p. 34, pl. 3, fig. 3.

Plectorthis ? aurelia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221.

Loc. Indian Cove, Gaspé.

Plectorthis dichotoma Hall.

Lorraine (Ord.).

Orthis dichotoma Hall, Pal. New York, I, 1847, p. 125, pl. 32, fig. 13.—Miller, American Pal. Fossils, 1877, p. 117.

Orthis fissicosta Meek (non Hall), Pal. Ohio, I, 1873, p. 106, pl. 8, fig. 6.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 30.

Orthis neglecta James, The Palæontologist, 4, 1879, p. 26.

Plectorthis dichotoma Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221, pl. 5, fig. 21.

Loc. Cincinnati, Ohio.

Plectorthis ella Hall.

Lorraine (Ord.).

Orthis ella Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 121.

Orthis ? ella Hall, Fifteenth Rep. Ibidem, 1862, pl. 2, figs. 6-8;—Twenty-fourth Rep. Ibidem, 1872, pl. 7, fig. 21.—Meek, Pal. Ohio, I, 1873, p. 105, pl. 8, fig. 9.—Hall and Whitfield, Ibidem, II, 1875, p. 76, pl. 1, fig. 20.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 32.

Plectorthis ? ella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221, pl. 5, figs. 22, 23.

Loc. Cincinnati, Ohio.

Plectorthis fissicosta Hall.

Lorraine (Ord.).

Orthis fissicosta Hall, Pal. New York, I, 1847, p. 121, pl. 32, fig. 7.

Plectorthis fissicosta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 221.

Loc. Cincinnati, Ohio.

Plectorthis jamesi Hall.

Lorraine (Ord.).

Orthis jamesi Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 89.—

Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 33.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 77, pl. 1, figs. 21, 22.

Plectorthis jamesi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 221.

Loc. Cincinnati, Ohio.

Plectorthis kankakiensis (McChesney).

Lorraine (Ord.).

Orthis kankakiensis McChesney, New Pal. Fossils, 1861, p. 77;—Trans. Chicago Acad. Sci., I, 1868, p. 29, pl. 9, fig. 3.

Plectorthis kankakiensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221, pl. 5, figs. 24, 25.

Loc. Wilmington, Illinois; Wisconsin (Whitfield).

Plectorthis plicatella Hall.

Trenton-Lorraine (Ord.).

Orthis plicatella Hall, Pal. New York, I, 1847, p. 122, pl. 32, fig. 9.—Meek, Pal. Ohio, I, 1873, p. 108, pl. 8, fig. 7.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 30.

?*Orthis plicatella* Billings, Geol. Canada, 1863, p. 165, fig. 145.

Plectorthis plicatella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221, pl. 5, figs. 18-20.

Orthis (*Plectorthis*) *plicatella* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 436, pl. 33, figs. 5-7.

Loc. Cincinnati, Ohio; Middleville and Watertown, New York; Burgin, Kentucky; Cannon Falls, Kenyon, etc., Minnesota; Wisconsin.

- Plectorthis sectistriata** (E. O. Ulrich). Lorraine (Ord.).
Orthis (?) *sectostriata* Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, 1879, p. 15, pl. 7, fig. 11.
Plectorthis? *sectostriata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221.
Loc. Cincinnati, Ohio.
- Plectorthis triplicatella** (Meek). Lorraine (Ord.).
Orthis triplicatella Meek, American Jour. Sci., IV, 1872, p. 281;—Pal. Ohio, I, 1873, p. 109, pl. 8, fig. 8.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 31.
Plectorthis triplicatella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 221.
Loc. Cincinnati, Ohio.
- Plectorthis whitfieldi** (N. H. Winchell). Lorraine (Ord.).
Orthis whitfieldi N. H. Winchell, Ninth Ann. Rep. Geol. and Nat. Hist., Survey of Minnesota, 1881, p. 115.
Orthis pectinella Whitfield (partim, non Emmons non Hall), Geol. Wisconsin, IV, 1882, p. 259, pl. 12, fig. 8.
Plectorthis whitfieldi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221, pl. 5, fig. 26.
Orthis (*Plectorthis*) *whitfieldi* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 437, pl. 33, figs. 8-13.
Loc. Spring Valley and Granger, Minnesota; Delatfield, Wisconsin; Lattners, Iowa; Savanna, Illinois.
- PLETHORHYNCHA** Hall and C. Genotype *Rhynchonella speciosa* Hall.
Plethorhyncha Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 191;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 827.
Obs. Proposed as a subgenus of *Camarotoechia*. It, however, does not seem to be worthy even of that rank. The species referred to *Plethorhyncha* are *Camarotoechia barrandei* Hall, *C. pleioleura* (Conrad), and *C. speciosa* Hall.
- Plicatula striatocostata* Cox=*Meekella striaticostata*.
- POLYTÆCHIA** Hall and Clarke. Genotype *Hemipronites apicalis* Whitf.
Polytæchia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 239, figs. 11, 12;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 275.
- Polytæchia apicalis** (Whitfield). Calciferous (Ord.).
Hemipronites apicalis Whitfield, Bull. American Mus. Nat. Hist., II, 1886, p. 300, pl. 24, figs. 1-5.
Polytæchia apicalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 239, fig. 11, 12, pl. 7A, figs. 26-30.
Loc. Fort Cassin, Vermont.
- PORAMBONITES** Pander. Genotype *Porambonites intermedia* Pander.
Porambonites Pander, Beitrage zur Geognosie des Russ. Reiches, 1830, p. 95, pl. 3, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 225.
Obs. Not represented in America.
- Porambonites obscurus* Hall and Whitfield=*Parastrophia obscurus*.
Porambonites ottawaensis Billings=*Rhynchotrema ottawaensis*.
- PROBOSCIDELLA** Ehlert. Genotype *Productus proboscideus* de Vern.
Proboscidella (Ehlert, Fischer's Manuel de Conchyliologie, 1887, p. 1277.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 333.
- Proboscidella** (?) *clava* (Norwood and Pratten). Upper Carboniferous.
Productus clavus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 10, pl. 1, fig. 4.
Proboscidella clava Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 334.
Loc. Graysville, Illinois.

- PRODUCTELLA** Hall. Genotype *Productus subaculeatus* Murchison.
Productella Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 245;—Pal. New York, IV, 1867, p. 153.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 69.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 328;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 298.
- Productella arctirostrata*** Hall. Chemung (Dev.).
Productus arctirostrata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 177.
Productella arctirostrata Pal. New York, IV, 1867, p. 182, pl. 26, figs. 16–23;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 36.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 36.
Loc. Jasper and Cadiz, New York.
- Productella arcuata*** Hall. Kinderhook (L. Carb.).
Productus arcuatus Hall, Geol. Survey of Iowa, I, Pt. II, 1858, p. 518, pl. 7, fig. 4.—Herrick, Bull. Denison Univ., III, 1888, p. 31, pl. 3, fig. 18.—Keyes, Geol. Survey Missouri, V, 1895, p. 40.
Productella arcuata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 31, 32.
Loc. Burlington, Iowa; Granville, Newark, etc., Ohio; Hannibal, Missouri.
Obs. See *P. cooperensis*.
- Productella bialveata*** Hall. Chemung (Dev.).
Productella bialveata Hall, Pal. New York, IV, 1867, p. 183, pl. 26, figs. 24–28.
Loc. Meadville, Pennsylvania.
- Productella boydi*** Hall. Chemung (Dev.).
Productus boydi Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 179, figs. 1–3.
Productella boydi Hall, Pal. New York, IV, 1867, p. 169, pl. 24, figs. 10–16;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 24.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 24.
Loc. Phillipsburg, Elmira, etc., New York.
- Productella concentrica*** (Hall). Kinderhook (L. Carb.).
Productus concentricus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 180;—Geol. Survey Iowa, I, Pt. II, 1858, p. 517, pl. 7, fig. 3.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 411;—*Ibidem*, 1865, p. 114;—Proc. American Philosophical Soc., XII, 1870, p. 249.—Herrick, Bull. Denison Univ., III, 1888, p. 33, pl. 6, fig. 16.
Loc. Burlington, Iowa; Port aux Barques, Michigan; Rockford, Indiana; Sciotoville, etc., Ohio.
Obs. Compare with *Productella shumardana*.
- Productella costatula*** Hall. Chemung (Dev.).
Productella costatula Hall, Pal. New York, IV, 1867, p. 180, pl. 26, figs. 9, 15;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 18–20, 35.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 18–20, 35.
Loc. Randolph Conewango, New Albion, etc., New York.
- Productella costatula strigata*** Hall. Chemung (Dev.).
Productella costatula var. *strigata* Hall, Pal. New York, IV, 1867, p. 181.
Loc. Near Cadiz, New York.
- Productella dumosa*** Hall. Hamilton (Dev.).
Productus dumosus Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 99.
Productella dumosa Hall, Pal. New York, IV, 1867, p. 162, pl. 23, figs. 38–40;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 21.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 21.
Loc. Delphi, Bellona, Moscow, Hamilton, etc., New York.

- Productella (?) eriensis** Nicholson. Corniferous (Dev.).
Productella eriensis Nicholson, Geol. Magazine London, n. ser., I, 1874, p. 118;—
 Pal. Prov. Ontario, 1874, p. 77, fig. 26.
Loc. Port Colborne and Hagersville, Ontario.
Obs. See *Anoplia nucleata* Hall.
- Productella exanthemata** Hall. Corniferous and Hamilton (Dev.).
Productus exanthematus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857,
 p. 174.
Productella exanthemata Hall, Pal. New York, IV, 1867, p. 163, pl. 23, figs. 45,
 46;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 17.—Hall and
 Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 17.
Productus exanthematus ?? Meek and Worthen, Geol. Survey Illinois, III, 1868,
 p. 412, pl. 10, fig. 3.
Loc. Tinkers Falls and Seneca Lake, New York; Jackson and Union counties,
 Illinois.
- Productella hallana** Walcott. Upper Devonian.
Productus dissimilis Hall (non de Koninek, 1846), Geol. Survey Iowa, I, Pt. II,
 1858, p. 497, pl. 3, fig. 7.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 91,
 pl. 13, fig. 3.
Productus ? Meek, *Ibidem*, 1868, p. 91, pl. 13, fig. 4.
Productus (*Productella*) *hallanus* Walcott, Mon. U. S. Geol. Survey, VIII, 1884,
 p. 130, pl. 13, fig. 17.
Productus hallanus Tschernyschew, Mémoires du Comité Géologique de St.
 Pétersbourg, III, 1887, p. 114, pl. 14, fig. 27.—von Toll, *Wissensch. Resultate*
d. Neusibirischen Exped., 1885 u. 1886, 1889, p. 25, pl. 2, fig. 19.
Productus hallianus Williams, Bull. Geol. Soc. America, I, 1890, pl. 12, figs. 8, 9.
Productella dissimilis Whiteaves, Cont. Canadian Pal., I, 1891, p. 216.
Productella hallana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A,
 figs. 11, 12.
Loc. Rockford, Iowa; High Point, New York; Eureka district, Nevada; Atha-
 basea River, Canada; Urals of Russia.
- Productella hirsuta** Hall. Chemung (Dev.).
Strophomena membranacea Vanuxem (non *Productus membranaceus* von Buch),
 Geol. N. Y.; Rep. Third Dist., 1842, p. 179, figs. 4, 5.
Productus hirsutus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 175,
 figs. 1-3.
Productella hirsuta Hall, Pal. New York, IV, 1867, p. 166, pl. 24, figs. 17-29;—
 Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 28, 39.—Hall and
 Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 28, 39, 45.
Loc. Phillipsburg and Rockville, New York; Covington, Pennsylvania.
- Productella hirsuta rectispina** Hall. Chemung (Dev.).
Productella hirsuta var. *rectispina* Hall, Pal. New York, IV, 1867, p. 168, pl. 24,
 figs. 30-37;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 37.—Hall
 and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 37.
Loc. Meadville, Pennsylvania.
- Productella hirsutiformis** (Walcott). Upper Devonian.
Productus hirsutiforme Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 133, pl.
 2, fig. 10.
Loc. Eureka and White Pine districts, Nevada.
- Productella hystricula** Hall = *Strophalosia hystricula*.
- Productella lachrymosa** (Conrad). Chemung (Dev.).
Strophomena lachrymosa Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII,
 1842, p. 256, pl. 14, fig. 9.

Productella lachrymosa (Conrad)—Continued.

Productus lachrymosus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 177.

Productella lachrymosa Hall, Pal. New York, IV, 1867, p. 172, pl. 25, figs. 23-28.

Loc. Factoryville, Bath, Ellington, etc., New York.

Productella lachrymosa lima (Conrad).

Chemung (Dev.).

Strophomena lima Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 256.

Productella lachrymosa var. *lima* Hall, Pal. New York, IV, 1867, p. 174, pl. 25,

figs. 29-32;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 22, 23.—

Whiteaves, Cont. Canadian Pal., I, 1891, p. 217.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 22, 23.

Productus (Productella) lachrymosus var. *limus* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 132, pl. 13, fig. 18.

Loc. Randolph, Ellington, etc., New York; Eureka district, Nevada; Mackenzie River, Canada.

Productella lachrymosa stigmata Hall. Chem. and Wav. (Dev. and L. Car.).

Productella lachrymosa var. *stigmata* Hall, Pal. New York, IV, 1867, p. 174, pl. 25, figs. 33-41.

?*Productus* ? Meek, Trans. Chicago Acad. Sci., I, 1868, p. 91, pl. 13, fig. 5.

Productus (Productella) lachrymosus var. *stigmatus* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 132.—Herrick, Bull. Denison Univ., III, 1888, p. 34, pl. 3, fig. 28.

Loc. Olean, Conewango, and Randolph, New York; Licking County, Ohio; Eureka district, Nevada; Northwest Territory, Canada.

Productella mæuruensis Rathbun.

Middle Devonian.

Productella mæuruensis Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 17.

Loc. Province of Para, Brazil.

Productella marquessi Rowley.

Hamilton (Dev.).

Productella marquessi Rowley, American Geologist, XIII, 1894, p. 153, figs. 7, 8.

Loc. Callaway County, Missouri.

Productella minneapolis Sardeson = Trematis huronensis.**Productella murchisoniana (de Koninck).**

Hamilton (Dev.).

Productus murchisonianus de Koninck, Mém. de la Soc. Royale des Sciences de Liège, IV, 1846, p. 245, pl. 16, fig. 3.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 21.

Loc. Devils Back Bone, Illinois.

Productella navicella Hall.

Corniferous and Hamilton (Dev.).

Productus navicellus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 172.

Productella navicella Hall, Pal. New York, IV, 1867, p. 156, pl. 23, figs. 1, 3, 9-11;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 8, 9.—Hall and

Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 8, 9;—*Ibidem*, VIII, Pt. II, 1895, pl. 84, fig. 19.

Productus (Productella) navicellus Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 131, pl. 13, fig. 9.

Loc. Schoharie County, Moscow, and Pavilion, New York; Eureka district, Nevada.

Productella onusta Hall.

Chemung (Dev.).

Productella onusta Hall, Pal. New York, IV, 1867, p. 184, pl. 26, figs. 29-42;—Second Ann. Rep. N. Y. State Geologist, 1883, pl. 48, figs. 40-46.—Hall and

Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 40-43, 46.

Loc. Conewango, Napoli, and New Albion, New York.

- Productella papulata** Hall. Hamilton (Dev.).
Productus papulatus Hall, Pal. New York, IV, 1867, p. 165, pl. 23, figs. 47, 48.
Productella papulata Hall, *Ibidem*, 1867, corrigenda.
Loc. Bellona, Yates County, New York.
- Productella productoides** (Murchison). Hamilton (Dev.).
Orthis productoides Murchison, Bull. Soc. Géol. de France, XI, 1840, p. 254, pl. 2, fig. 7.
Strophalosia productoides Whiteaves, Cont. Canadian Pal., I, 1889, p. 112, pl. 15, fig. 2;—*Ibidem*, I, 1891, p. 216.
Productella productoides Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 317.
Productella productoides var. *membranacea* Whiteaves, Cont. Canadian Pal., I, 1892, p. 282.
Loc. Europe; Athabasca River, Lake Manitoba, and Thedford, Canada.
- Productella pyxidata** Hall. Kinderhook (L. Carb.).
Productus pyxidatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 498, pl. 3, fig. 8.—Walcott, Mon. U. S. Geol. Survey, VIII, 1881, p. 130.
Productella pyxidata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 34.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 34; pl. 17A, fig. 14.—Keyes, Geol. Survey Missouri, V, 1895, p. 52.
Loc. Hamburg, Illinois; Louisiana, Missouri.
Obs. Compare with *Productella shumardana*.
- Productella rarispina** Hall. Chemung (Dev.).
Productus rarispinus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 178.
Productella rarispina Hall Pal. New York, IV, 1867, p. 170, pl. 24, figs. 1-9;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 33.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 33.
Loc. Phillipsburg, New York.
- Productella semiglobosa** Nettelroth. Corniferous (Dev.).
Productella semiglobosa Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 70, pl. 26, fig. 7.
Loc. Falls of Ohio.
- Productella shumardana** Hall. Kinderhook (L. Carb.).
Productus shumardianus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 499, pl. 3, fig. 9; pl. 7, fig. 2.
Productella shumardiana Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 7.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 7.
Productus (*Productella*) *shumardianus* Herrick, Bull. Denison Univ., III, 1888, p. 32, pl. 6, fig. 16; pl. 7, fig. 18.
Loc. Clarksville, Missouri; Burlington, Iowa; Licking County, Ohio.
Obs. The identifications of this species from Devonian horizons are here referred to *P. spinulicosta*. *P. shumardana* is probably synonymous with *P. pyxidata* Hall.
- Productella speciosa** Hall. Portage, Chem., and Kinderh. (Dev.-L. Carb.).
Productus speciosus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 176.
Producta speciosa A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 4.
Productella speciosa Hall, Pal. New York, IV, 1867, p. 175, pl. 25, figs. 1-11;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 25, 26.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 25, 26.—Kindle, Bull. American Pal., 6, 1896, p. 35.
Productus (*Productella*) *speciosus* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 133, pl. 13, fig. 8.

Productella speciosa Hall—Continued.

Productus (*Productella*) *speciosus*? Herrick, Bull. Denison Univ., III, 1888, p. 34.
Loc. Leon, New Albion, and Ithaca, New York; Licking County, Ohio; Burlington, Iowa; Eureka district, Nevada.

Productella spinulicosta Hall.

Corniferous to Hamilton (Dev.).

Productella subaculeata Norwood and Pratten (non Murchison), Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 21.—Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 36, pl. 3, fig. 7.

Productus subaculeatus? Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 315, pl. 1, fig. 3.

Productus spinulicostus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 173.

Productella spinulicosta Hall, Pal. New York, IV, 1867, p. 160, pl. 23, figs. 6-8, 25-34;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 3-6.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 217, pl. 29, fig. 3; pl. 31, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 3-6.

Productella subaculeata Hall, Pal. New York, IV, 1867, p. 154, pl. 23, figs. 4, 5.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 283.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 1, 2.

Productella subaculeata? Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 1, 2.

Productus (*Productella*) subaculeata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, pp. 128, 214, pl. 7, fig. 2; pl. 13, figs. 19, 20.

Productus (*Productella*) subaculeatus var. *cataraetus* Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 198;—Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 9, 10.

Productella subaculeata var. *cataracta* Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 69, pl. 17, figs. 5-9.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 217.

Loc. New York; Ohio; Falls of Ohio; Illinois; Iowa; Wisconsin; Eureka district, Nevada; Utah; Mackenzie and Hay rivers, and Lake Manitoba, Canada.

Obs. Some authors are disposed to regard as synonyms of this species, besides the above, *P. pyxidata*, *P. shumardana*, and *P. concentrica*, and all of these forms are thought to be identical with *P. subaculeata* Murchison. For the present it is preferable to retain the name *P. spinulicosta* for these American Devonian forms. *P. pyxidata*, *P. shumardana*, and *P. concentrica* are here arranged as species, but will probably be shown to be synonymous with *P. spinulicosta*.

Productella striatula Hall.

Chemung (Dev.).

Productella striatula Hall, Pal. New York, IV, 1867, p. 177, pl. 25, figs. 14-21;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 27, 38.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 27, 38, 44.

Loc. New Albion, Conewango, and Cold Spring, New York.

Productella subaculeata of American authors = *Productella* sp. *striatula*.

Productella subaculeata *cataracta* Hall and Whitfield = *Productella* spinulicosta.

Productella subalata Hall.

Middle Devonian.

Productus subalatus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 174;—Geol. Survey Iowa, I, Pt. II, 1858, p. 500, pl. 3, fig. 10.

Productus callawayensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 640.

Productella subalata Hall, Pal. New York, IV, 1867, p. 165, pl. 23, fig. 49;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 16.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 16.—Keyes, Geol. Survey Missouri, V, 1895, p. 52.

Loc. Rock Island, Illinois; Callaway County, Missouri; Spring Valley, Minnesota.

Productella truncata Hall=Strophalosia truncata.

Productella tullia Hall.

Hamilton (Dev.).

Productella tullia Hall, Pal. New York, IV, 1867, p. 164, pl. 23, figs. 41-44.

Loc. Tully and Delphi Falls, New York.

PRODUCTUS Sowerby. Genotype *Anomites productus* Martin=*Productus martini* Sowerby=*Productus semireticulatus* (Martin).

Productus Sowerby, Mineral Conchology, I, 1814, p. 153.—de Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 11.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 245;—Pal. New York, IV, 1867, p. 146.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 321;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 297.

Productus æquicostatus Shumard=*Productus cora*.

Productus alternatus Norwood and Pratten. Keokuk (L. Carb.).

Productus alternatus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 20, pl. 2, fig. 1.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, fig. 14.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, fig. 14.

Productus vittatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 639.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, figs. 15-17.—Keyes, Geol. Survey Missouri, V, 1895, p. 43.

Productus vittata Hall, Second Ann. Rep. N. Y. State Geologist, 1883, pl. 49, figs. 15-17.

Loc. Rocky Run, Hancock County, Illinois; Keokuk, Iowa; Burlington group, Burlington, Iowa.

Obs. Compare with *Productus fimbriatus* and *P. gradatus*.

Productus altonensis Norwood and Pratten. St. Louis (L. Carb.).

Productus altonensis Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 7, pl. 1, fig. 1.

Loc. Alton, Illinois.

Productus americanus Swallow=*Productus cora*.

Productus andii d'Orbigny=*Orthis buchi*.

Productus aretirostratus Hall=*Productella aretirostrata*.

Productus arcuatus Hall=*Productella arcuata*.

Productus asperus McChesney=*Productus nebrascensis*.

Productus auriculatus Swallow. ?Upper Carboniferous.

Productus auriculatus Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 92.

Productus (?auriculatus) Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, fig. 24.

Loc. Formation and locality not given. ("Near Kansas City, Missouri," H. and C.)

Productus batesianus Derby.

Upper Carboniferous.

Productus batesianus Derby, Bull. Cornell Univ., I, 1874, p. 54, pl. 1, figs. 2, 10-13, 15; pl. 2, fig. 14; pl. 6, figs. 4, 7, 9.

Loc. Bomjardim and Itaituba, Brazil.

Productus biseriatus Hall.

St. Louis (L. Carb.).

Productus biseriatus Hall, Trans. Albany Institute, IV, 1858, p. 12.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 46, pl. 6, figs. 8-12.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 325, pl. 29, figs. 8-12.—Keyes, Geol. Survey Missouri, V, 1895, p. 43.

Loc. Alton, Illinois; Bloomington and Spergen Hill, Indiana; Crittenden County, Kentucky; Missouri.

Productus blairi Miller.

Chouteau (L. Carb.).

Productus blairi Miller, Seventeenth Rep. State Geol. of Indiana, 1891, p. 79, pl. 13, figs. 16, 17.

Loc. Sedalia, Missouri.

Productus boliviaensis d'Orbigny.

Upper Carboniferous.

Productus boliviensis d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 52, pl. 4, figs. 5-9.—de Koninck, Mém. de la Soc. Royale des Sci. Liège, IV, 1847, p. 177, pl. 8, fig. 2;—Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 76, pl. 8, fig. 2.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 11.

Productus canerini Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 302.

Loc. Yarbichambi and Lake Titicaca, Bolivia; near Richmond, Missouri.

Productus boonensis Swallow.

Upper Carboniferous.

Productus boonensis Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 217.

Loc. Near the mouth of Platte River; Kansas and Missouri.

Obs. Compare with *Productus undiferus* de Koninck.

Productus boonensis elevata Swallow.

Upper Carboniferous.

Productus boonensis var. *elevata* Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 217.

Loc. Near the mouth of Platte River, Missouri.

Productus boydi Hall=*Productella boydi*.**Productus buchianus** de Koninck.

Upper Carboniferous.

Productus buchianus de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 129, pl. 18, fig. 4.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 20.

Loc. Belgium; Big Creek, Posey County, Indiana.

Productus burlingtonensis Hall.

Burlington (L. Carb.).

Productus flemingi var. *burlingtonensis* Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 598, pl. 12, fig. 3.—Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 265, pl. 5, figs. 9-12.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, figs. 6-8.—Herrick, Bull. Denison Univ., III, 1888, p. 32, pl. 3, figs. 20 (?22).—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, figs. 6-8.

Productus burlingtonensis Keyes, Geol. Survey Missouri, V, 1895, p. 41.

Loc. Burlington, Iowa; Quincy, Illinois; Missouri; Oquirrh Mountains, Utah.

Obs. Compare with *P. mesialis*.

Productus calhounianus Geinitz (non Swallow)=*Productus cora*.**Productus calhounianus** Swallow=*Productus semireticulatus*.**Productus calhounianus kansasensis** Swallow=*Productus semireticulatus kansasensis*.**Productus callawayensis** Swallow=*Productella subalata*.**Productus cancrini** Geinitz=*Productus pertenuis*.**Productus cancrini** Gabb=*P. boliviaensis*.**Productus capacii** d'Orbigny.

Upper Carboniferous.

Productus capacii d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 50, pl. 3, figs. 24-26.

Loc. Yarbichambi, Bolivia.

- Productus carbonarius** de Koninck. Carboniferous.
Productus carbonarius de Koninck, Description Animaux Fossiles, 1844, p. 181, pl. 12 bis, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 11.
Loc. Belgium; Fountain Bluff, Illinois.
- Productus cestriensis** Worthen=*Productus fasciculatus*.
- Productus chandlessii** Derby. Upper Carboniferous.
Productus chandlessii Derby, Bull. Cornell Univ., I, 1874, p. 51, pl. 4, figs. 1-4, 7, 9-11, 13, 16; pl. 6, fig. 1;—Bull. Mus. Comp. Zool., III, 1876, p. 280.
Loc. Itaituba, Brazil; Yampopata, Bolivia.
Obs. Compare with *Productus boliviaensis* d'Orbigny.
- Productus clarkianus** Derby. Upper Carboniferous.
Productus clarkianus Derby, Bull. Cornell Univ., I, 1874, p. 59, pl. 6, fig. 6; pl. 9, figs. 12, 13.
Loc. Itaituba and Bomjardim, Brazil.
- Productus clavus** Norwood and Pratten=*Proboscoidella clava*.
- Productus concentricus** Hall=*Productella concentrica*.
- Productus confragosus** Conrad. Upper Carboniferous.
Productus confragosus Conrad, Trans. Geol. Soc. Pennsylvania, I, 1835, p. 268, pl. 12, fig. 5.
Loc. Alleghany Mountains, Pennsylvania.
Obs. Not well established.
- Productus cooperensis** Swallow. Kinderhook (L. Carb.).
Productus cooperensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 64C.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 115.
Productus cooperensis? A. Winchell, Proc. American Philosophical Soc., XII, 1870, p. 249.
Loc. Cooper County, Missouri; Burlington, Iowa; Sciotoville, Ohio.
Obs. Keyes regards this species as a synonym for *Productella arcuata*.
- Productus cora** d'Orbigny. Upper Carboniferous.
Productus cora d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 55, pl. 5, figs. 8-10.—de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 50, pl. 4, fig. 4; pl. 5, fig. 2.—Owen, Geol. Rep. Wisconsin, Iowa, and Minnesota, 1852, pp. 103, 136, pl. 5, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 6.—Marcon, Geol. North America, 1858, p. 45, pl. 6, fig. 4.—Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 174, pl. 9, figs. 22, 23.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 50.—Derby, Bull. Mus. Comp. Zool., III, 1876, p. 281.—Dawson, Acadian Geology, 3d ed., 1878, p. 297, fig. 98.—Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 677.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 126, pl. 26, figs. 1-3.—Herrick, Bull. Denison Univ., II, 1887, p. 47, pl. 2, fig. 26.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 227;—Geol. Survey Missouri, V, 1895, p. 47, pl. 37, fig. 2.
Productus cfr. *cora* Toulia, Sitzb. der k. k. Akad. der Wissensch. zu Wien, LIX, 1869, p. 9.
Productus cora? Derby, Bull. Cornell Univ., I, 1874, p. 49, pl. 2, fig. 17; pl. 6, fig. 17.
Productus lyelli de Verneuil, Lyell's Travels in North America, II, 1845, p. 221.—Dawson, Acadian Geology, 1855, p. 219, fig. g.
Productus sp. Christy, Letters on Geology, 1848, pl. 5, fig. 1.

Productus cora d'Orbigny—Continued.

Productus semireticulatus Hall, Stansbury's Expl. and Survey Valley Great Salt Lake, Utah, 1852, p. 411, pl. 3, figs. 3, 5.

Productus prattenianus Norwood, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 17, fig. 10.—Meek, Final Rep. U. S. Geol. Survey of Nebraska, 1872, p. 163, pl. 2, fig. 5; pl. 5, fig. 13; pl. 8, fig. 10.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 113, pl. 7, fig. 1.—Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 72, pl. 7, fig. 7.

Productus aequicostatus Shumard, Geol. Rep. Missouri, I, 1855, p. 201, Pl. C, fig. 10.—Schiel, Pacific R. R. Reports, II, 1855, p. 108, pl. 2, figs. 4, 5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, figs. 22, 23.

Productus pileiformis McChesney, New Pal. Fossils, 1860, p. 40.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 582, pl. 13, figs. 13, 14;—Geol. Ohio, VII, 1895, p. 470, pl. 9, figs. 13, 14.

Productus americanus Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 91.

Productus flemingi Geinitz (non de Koninck), Carbon und Dyas in Nebraska, 1866, p. 52, pl. 4, figs. 1-4.

Productus koninckianus Geinitz (non de Verneuil), Ibidem, 1866, p. 53, pl. 4, fig. 5.

Productus calhounianus Geinitz (non Swallow), Ibidem, 1866.

Loc. Throughout the Upper Carboniferous of North America; Itaituba and Barreirinha, Brazil; Yampopata, Cochabamba, and Lake Titicaca, Bolivia; Kashmere.

Obs. See *Productus nodosus* and *P. hildrethianus*.

Productus cora mogoyoni Marcou.

Upper Carboniferous.

Productus cora var. *mogoyoni* Marcou, Geol. North America, 1858, p. 45, pl. 6, fig. 5.

Loc. Sierra de Mogoyñ, or Sierra Blanca, near the extinct volcano San Francisco, Arizona.

Productus coriformis Swallow.

St. Louis (L. Carb.).

Productus cora-formis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 91.

Loc. Cooper County, Missouri.

Obs. Keyes regards this species as a synonym for *P. lævicostus*.

Productus costatoides Swallow.

Upper Carboniferous.

Productus costatoides Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 217.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 123.

Loc. Kansas; banks of Colorado River.

Obs. Keyes regards this species as identical with *P. longispinus*.

Productus costatus (Sowerby ?) de Koninck.

Upper Carboniferous.

?*Productus costatus* Sowerby, Mineral Conchology, VI, 1827, p. 115, pl. 560, fig. 1.

Productus costatus de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 92, pl. 8, fig. 3; pl. 10, fig. 3; pl. 18, fig. 3.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 11.—Marcou, Geol. North America, 1858, p. 46, pl. 5, fig. 5.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 51.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 159, pl. 6, fig. 6.—White, Wheeler's Expl. and Survey West 100th Meridian, IV, 1875, p. 109, pl. 8, fig. 2;—Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 516, pl. 8, figs. 7, 8;—Tenth Rep. State Geol. Indiana, 1881, p. 148, pl. 8, figs. 7, 8.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 50, figs. 8-13.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 124, pl. 24, figs. 4-6; pl. 25, figs. 3-5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 19, figs. 8-13.—Keyes, Geol. Survey Missouri, V, 1895, p. 51, pl. 36, fig. 1.

Productus costatus (Sowerby?) de Koninck—Continued.

Productus costatus? Derby, Bull. Mus. Comp. Zool., III, 1876, p. 280.

Productus costatus var. Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 712, pl. 28, figs. 3, 4.—Meek, King's U. S. Geol. Expl. 40th, Parl., IV, 1877, pl. 7, fig. 4.

Productus portlockianus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 15, pl. 1, fig. 9.

Productus sp. Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 833, fig. 687.

Productus viminalis White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 29.

Loc. Europe; throughout the Upper Carboniferous of North America; Yampopata, Bolivia.

Obs. Sowerby's species is of uncertain value. The above synonymy is based upon *P. costatus* as redefined and illustrated by de Koninck.

Productus curtirostratus A. Winchell.

Kinderhook (L. Carb.).

Producta curtirostra A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 114.

Productus curtirostratus Miller, N. American Geol. Pal., 1889, p. 364.

Loc. Burlington, Iowa.

Productus delawarei Marcou.

Carboniferous.

Productus delawarii Marcou, Geol. North America, 1858, p. 45, pl. 5, fig. 3.

Loc. Foot of Delaware Mountain, Texas.

Obs. Compare with *Productus cora* d'Orbigny.

Productus depressus Swallow.

Keokuk (L. Carb.).

Productus depressus Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 93.

Loc. Fenton, St. Louis County, Missouri.

Productus dissimilis Hall (non de Koninck)=*Productella hallana*.**Productus dolorosus** A. Winchell.

Waverly (L. Carb.).

Productus dolorosus A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 114.

Loc. Weymouth, Medina County, Ohio.

Productus dumosus Hall=*Productella dumosa*.**Productus duplicostatus** A. Winchell.

Waverly (L. Carb.).

Productus duplicostatus A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 113.—Herrick, Bull. Denison Univ., IV, 1888, p. 21, pl. 11, figs. 26, 29.

Loc. Knox and Licking counties, Ohio; Battlecreek, Michigan.

Productus elegans Norwood and Pratten (non McCoy)=*Productus fasciculatus*.**Productus exanthematus** Hall=*Productella exanthemata*.**Productus fasciculatus** McChesney.

Kaskaskia (L. Carb.).

Productus elegans Norwood and Pratten (non McCoy), Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 13, fig. 7.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 581, pl. 13, figs. 15–16;—Geol. Ohio, VII, 1895, p. 469, pl. 9, figs. 15, 16.

Productus fasciculatus McChesney, New Pal. Fossils, 1860, p. 38.

Productus cestriencis Worthen, Trans. St. Louis Acad. Sci., I, 1860, p. 570.—Keyes, Geol. Survéy Missouri, V, 1895, p. 44.

?*Productus elegans* Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 268, pl. 5, figs. 3, 4.

Loc. Chester and Kaskaskia, Illinois; Leavenworth and Washington County, Indiana; Missouri; Monongalia County, West Virginia; Caldwell County, Kentucky; Newtonville, Ohio; ?Oquirrh Mountains, Utah.

- Productus fentonensis** Swallow. Keokuk (L. Carb.).
Productus fentonensis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 93.
Loc. Fenton, St. Louis County, Missouri.
Obs. Keyes says this is a synonym for *P. magnus*.
- Productus fimbriatus** Sowerby. ?St. Louis. ?Upper Carboniferous.
Productus fimbriatus Sowerby, Mineral Conchology, V, 1824, p. 85, pl. 459, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 19.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 630.
Loc. Alton, Illinois; Posey County, Indiana; Feilden Isthmus, lat. 82° 43'.
Obs. Compare with *Productus alternatus* Norwood and Pratten.
- Productus flemingi** Geinitz (non de Koninck) = *Productus cora*.
Productus flemingi Marcou, and Roemer = *Productus longispina*.
Productus flemingi burlingtonensis Hall = *Productus burlingtonensis*.
- Productus flexistria** McCoy. Kaskaskia (L. Carb.).
Productus flexistria McCoy, Synopsis Carb. Fossils of Ireland, 1844, p. 109, pl. 20, fig. 16.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, II, 1854, p. 6.
Loc. Chester, Kaskaskia, and Fountain Bluff, Illinois; Stephensport, Kentucky.
- Productus giganteus** (Martin). Upper Carboniferous.
Anomites giganteus Martin, Petrefacta Derbiensia, 1809, p. 6, pl. 15, fig. 1.
Productus giganteus White, Proc. U. S. Nat. Mus., III, 1880, p. 46;—Twelfth Ann. Rep. U. S. Geol. Survey of the Terr., 1883, p. 132, pl. 36, fig. 1.
Loc. Europe; McCloud River, Shasta County, California.
- Productus gracilis** A. Winchell. Waverly (L. Carb.).
Productus gracilis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 112.—Herrick, Bull. Denison Univ., III, 1888, p. 34, pl. 7, fig. 2.
Productus gracilis? A. Winchell, Proc. American Philosophical Soc., XII, 1870, p. 250.
Loc. Near Cuyahoga Falls, Sciotoville, and Granville, Ohio.
- Productus gradatus** Swallow. Keokuk (L. Carb.).
Productus gradatus Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 93.
Loc. Keokuk, Iowa; Lewis and St. Louis counties, Missouri.
Obs. Keyes regards this species as identical with *P. vittatus* = *P. alternatus*.
- Productus granulosus** Phillips. Keokuk (L. Carb.).
Productus granulosus Phillips, Geol. Yorkshire, II, 1836, p. 216, pl. 8, fig. 15.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 21.
Loc. Nauvoo, Illinois.
- Productus hepar** Morton. Upper Carboniferous.
Productus hepar Morton, American Jour. Sci., XXIX, 1836, p. 153, pl. 26, fig. 39.
Loc. Junior Furnace, Scioto County, Ohio.
Obs. Not recognizable.
- Productus hildrethanus** Norwood and Pratten. Upper Carboniferous.
Productus hildrethianus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 18, pl. 1, fig. 11.
Loc. Charboniere, Missouri.
Obs. Keyes regards this form as a synonym for *P. cora*.
- Productus hirsutiforme** Walcott = *Productella hirsutiforme*.
Productus hirsutus Hall = *Productella hirsuta*.
Productus horridus (non Sowerby) = *Productus longispina*.

- Productus humboldti d'Orbigny.** Upper Carboniferous.
Productus humboldti d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 54, pl. 5, figs. 4-7.—de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 114, pl. 12, fig. 2.—Tonla, Sitzb. der k. k. Akad. der Wissensch., XVIII, 1873, p. 16, pl. 2, fig. 3.—Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 695, pl. 76, figs. 1-3.
Productus humboldti ? de Keyserling, Reise in das Petschora-Land, 1846, p. 201, pl. 4, fig. 3.
Loc. Yarbichambi, Bolivia; south end of Spitzbergen; Nishnei-Irginsk, Russia; India; Kashmere.
- Productus inca d'Orbigny = Productus semireticulatus.**
Producta incurvata Shepard = Strophomena incurvata.
- Productus indianensis Hall.** St. Louis (L. Carb.).
Productus indianensis Hall, Trans. Albany Institute, IV, 1858, p. 13.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 47, pl. 6, figs. 6, 7.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 326, pl. 29, figs. 6, 7.
Loc. Spergen Hill, Indiana.
- Productus inflatus McChesney.** Upper Carboniferous.
Productus inflatus McChesney, New Pal. Fossils, 1860, p. 40;—Trans. Chicago Acad. Sci., I, 1868, p. 27, pl. 6, fig. 1.
Loc. Leavenworth, Indiana.
- Productus ivesi Newberry.** Upper Carboniferous.
Productus ivesi Newberry, Ives's Rep. Colorado River of the West, 1861, p. 122, pl. 2, figs. 1-8.
Loc. Colorado River near mouth of Diamond River.
- Productus koninekianus Geinitz (non de Verneuil) = Productus cora.**
- Productus lævicosta White.** Kinderhook (L. Carb.).
Productus lævicostus White, Jour. Boston Soc. Nat. Hist., VII, 1860, p. 230.—Keyes, Geol. Survey Missouri, V, 1895, p. 41, pl. 38, fig. 1.
Productus lævicostus ? Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 266, pl. 5, figs. 7, 8.
Loc. Burlington, Iowa; Louisiana, Missouri; Oquirrh Mountains, Utah.
Obs. Compare with *P. coræformis*.
- Productus lasallensis Worthen.** Upper Carboniferous.
Productus lasallensis Worthen, Geol. Survey Illinois, V, 1873, p. 569, pl. 25, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, fig. 13.
Loc. Lasalle, Illinois.
- Productus latissimus Sowerby.** Carboniferous.
Productus latissimus Sowerby, Mineral Conchology, 1822, pl. 330.—Meek, Bull. U. S. Geol. Survey of the Terr., II, 1876, p. 354, pl. 1, fig. 1.
Loc. Europe; Vancouver Island.
- Productus leuchtenbergensis de Koninck.** Carboniferous.
Productus leuchtenbergensis de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 121, pl. 14, fig. 3.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 19.
Loc. Europe; Masons Landing, Jersey County, Illinois.
- Productus longispina Sowerby?** Upper Carboniferous.
 ? *Productus longispinus* Sowerby, Mineral Conchology, I, 1814, p. 154, pl. 68, fig. 1.
Productus longispinus Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 64, pl. 4, fig. 2.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 161, pl.

Productus longispina Sowerby?—Continued.

- 6, fig. 7; pl. 8, fig. 6.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 569, pl. 25, fig. 10.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 118, pl. 8, fig. 5.—Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 78, pl. 8, fig. 4.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 50, figs. 1-4.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 127, pl. 24, figs. 10, 11.—Herrick, Bull. Denison Univ., II, 1887, p. 48, pl. 2, figs. 25, 27, 28.—Keyes, Geol. Survey Missouri, V, 1895, p. 45, fig. 4.
- Productus flemingi* Roemer (non de Koninck), Kreidebildung Texas, 1852, p. 89, pl. 11, fig. 8.—Marcon, Geol. North America, 1858, p. 47, pl. 6, fig. 7.
- Productus splendens* Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 11, pl. 1, fig. 5.—Schiel, Pacific R. R. Reports, II, 1855, p. 108, pl. 1, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 19, figs. 1-4.
- Productus splendens* (?) Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, III, 1859, p. 25.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 124.
- Productus wabashensis* Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 13, pl. 1, fig. 6.
- Productus horridus* Geinitz, Carbon und Dyas in Nebraska, 1866, p. 55, pl. 4, fig. 7.
- Productus orbignyanus* Geinitz (non de Koninck), Ibidem, 1866, p. 56, pl. 4, figs. 8-11.
- Productus* (*Marginifera*) *splendens* Smith, Proc. American Phil. Soc., XXXV, 1897, p. 29.
- Loc.* Throughout the Upper Carboniferous of the United States; Bolivia.
- Obs.* Since considerable uncertainty exists as to Sowerby's species, it may be better to adopt *P. orbignyanus* de Koninck for the above synonymy. *P. costatoides* is also regarded by Keyes as a synonym for *P. longispinus*.

Productus longus Meek.

Carboniferous.

- Productus* sp. undet. Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 67.
- Productus longus* Meek, Ibidem, 1877, end of description.
- Productus ivesi*? Meek, Ibidem, 1877, pl. 7, fig. 6.
- Loc.* White Pine district, Nevada.

Productus lyelli de Verneuil=Productus cora.**Productus magnicostatus Swallow.**

Upper Carboniferous.

- Productus magnicostatus* Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 641.
- Loc.* Johnson County, Missouri.
- Obs.* Keyes regards this species as a synonym for *P. semireticulatus*.

Productus magnus Meek and Worthen.

Keokuk (L. Carb.).

- Productus magnus* Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 142;—Geol. Survey Illinois, III, 1868, p. 528, pl. 20, fig. 7.—Keyes, Geol. Survey Missouri, V, 1895, p. 41.
- Loc.* Monroe County, Illinois; St. Genevieve County, Missouri.
- Obs.* Compare with *P. fentonensis*.

Productus margaritaceus Phillips.

Upper Carboniferous.

- Producta margaritacea* Phillips, Geol. Yorkshire, II, 1836, p. 215, pl. 8, fig. 8.
- Productus margaritaceus* Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 6.
- Loc.* Near Richmond, Missouri.

Productus marginicinctus Prout.

St. Louis (L. Carb.).

- Productus marginicinctus* Prout, Trans. St. Louis Acad. Sci., I, 1857, p. 43, pl. 2, figs. 1-16.—Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 674, pl. 24, fig. 3.—Keyes, Geol. Survey Missouri, V, 1895, p. 43.
- Loc.* St. Louis, Missouri; Milan, Illinois.
- Obs.* See *Productus wortheni* Hall.

Productus martini Sowerby=**Productus semireticulatus**.

Productus mesialis Hall.

Keokuk (L. Carb.).

Productus mesialis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 636, pl. 19, fig. 2;—
Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, figs. 9, 10.—Hall and Clarke,
Pal. New York, VIII, Pt. I, 1892, pl. 18, figs. 9, 10.

Loc. Keokuk, Iowa; Nauvoo, Illinois.

Obs. Keyes regards this species as identical with *P. burlingtonensis*.

Productus mesolobus Phillips.

Carboniferous.

Productus mesoloba Phillips, Geol. Yorkshire, II, 1836, p. 215, pl. 7, figs. 12, 13.
Productus mesolobus Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878,
p. 630.

Loc. Europe; Feilden Isthmus, lat. 82° 43'.

Productus mexicanus Shumard.

Upper Carboniferous.

Productus mexicanus Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 291.—
Kayser, Richthofens China, IV, 1883, p. 182, pl. 28, fig. 7.

Productus mexicanus? White, Wheeler's Expl. and Survey west 100th Meridian,
IV, 1875, p. 120, pl. 8, fig. 6.

Loc. Guadalupe Mountains, New Mexico; Lincoln County, Nevada; Lo-Ping,
China.

Productus morbillianus A. Winchell.

Burlington (L. Carb.).

Producta morbilliana A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865,
p. 113.

Loc. Burlington, Iowa; Sciotoville, Ohio.

Productus multistriatus Meek.

Carboniferous.

Productus multistriata Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 309.

Productus multistriatus Meek, Simpson's Rep. Expl. Great Basin Terr. Utah,
1876, p. 350, pl. 1, fig. 8;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 76,
pl. 8, fig. 3.

Loc. Utah and Nevada.

Productus muricatus Norwood and Pratten.

Upper Carboniferous.

Productus muricatus Norwood and Pratten (non Phillips), Jour. Acad. Nat. Sci.
Philadelphia, III, 1854, p. 14, pl. 1, fig. 8.—White, Wheeler's Expl. and Survey
west 100th Meridian, IV, 1875, p. 120, pl. 8, fig. 4.—Herrick, Bull. Denison
Univ., II, 1887, p. 49.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 228.

Loc. Pike County, Illinois; near Richmond, Missouri; Des Moines Valley, Iowa;
Flint Ridge, Ohio; Lake County, Colorado; northern New Mexico.

Obs. Since Phillips's *P. muricatus* is regarded as a synonym for *P. costatus*, there
is no need for another specific name for Norwood and Pratten species.

Productus nanus Meek and Worthen.

Upper Carboniferous.

Productus nanus Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1860,
p. 450;—Geol. Survey Illinois, II, 1866, p. 320, pl. 26, fig. 4.—Keyes, Proc. Acad.
Nat. Sci. Philadelphia, 1888, p. 227.

Loc. Jefferson County, Iowa; northern New Mexico (White).

Productus navicella Hall=**Productella navicella**.

Productus nebraskaensis Owen.

Upper Carboniferous.

Productus nebrascensis Owen, Geol. Rep. Wisconsin, Iowa, and Minnesota, 1852,
p. 584, pl. 5, fig. 3.—McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 24, pl.
1, fig. 7.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 165, pl. 2,
fig. 2; pl. 4, fig. 6; pl. 5, fig. 11.—Meek and Worthen, Geol. Survey Illinois,
V, 1873, p. 569, pl. 25, fig. 8.—White, Wheeler's Expl. and Survey west 100th
Meridian, IV, 1875, p. 116, pl. 8, fig. 3.—Meek, King's U. S. Geol. Expl. 40th
Parl., IV, 1877, p. 65.—White, Thirteenth Rep. State Geol. Indiana, 1884,
p. 122, pl. 24, figs. 7-9.—Herrick, Bull. Denison Univ., II, 1887, p. 49, pl. 2,

Productus nebraskaensis Owen—Continued.

fig. 30.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 19, figs. 5-7.—Keyes, Geol. Survey Missouri, V, 1895, p. 48, pl. 37, fig. 3.

Productus nebrascensis? Herrick, Bull. Denison Univ., III, 1888, p. 31, pl. 1, fig. 24; pl. 3, fig. 23.

Productus rogersi Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., III, 1854, p. 9, pl. 1, fig. 3.—Hall, Pacific R. R. Reports, III, 1856, p. 101, pl. 2, figs. 14, 15.—Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 26.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 121.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 50, figs. 17, 18.

Productus asperus McChesney, New Pal. Fossils, 1860, p. 34.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 50, figs. 5-7.

Productus wilberanus McChesney, New Pal. Fossils, 1860, p. 36;—Trans. Chicago Acad. Sci., I, 1868, p. 26, pl. 1, fig. 8.

Strophalosia horrescens Geinitz (non Murchison Vern. and Keyser.), Carbon und Dyas in Nebraska, 1866, p. 49.

Loc. Bellevue, Missouri; Illinois; Indiana; Ohio; Nebraska; New Mexico; Nevada; Arizona; Utah.

Obs. Compare with *P. norwoodi*.

Productus nevadaensis Meek.

Upper Carboniferous.

Productus nevadensis Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 64, pl. 8, fig. 2.

Loc. White Pine district, Nevada.

Obs. Compare with *Productus punctatus* (Martin).

Productus newberryi Hall.

Waverly (L. Carb.).

Productus newberryi Hall, Tenth Rep. N. Y. State Geol., 1857, p. 180.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 115.—Herrick, Bull. Denison Univ., IV, 1888, p. 20, pl. 10, figs. 24, 25.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, figs. 1-3.

Productella newberryi Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, figs. 1-3.

Loc. Medina County and Newark, Ohio.

Productus newberryi annosus Herrick.

Waverly (L. Carb.).

Productus newberryi var. *annosus* Herrick, Bull. Denison Univ., IV, 1888, p. 20, pl. 3, fig. 17;—Geol. Ohio, VII, 1895, pl. 23, fig. 13.

Loc. Alexandria, Ohio.

Productus nodicostatus Herrick.

Waverly (L. Carb.).

Productus nodicostatus Herrick, Bull. Denison Univ., IV, 1888, p. 23.

Loc. Rushville, Ohio.

Productus nodosus Newberry.

Upper Carboniferous.

Productus nodosus Newberry, Ives's Rep. Colorado River of the West, 1861, p. 124, pl. 1, fig. 7;—Macombes' Rep. Expl. Exped. Santa Fe to the Great Colorado River of the West, 1876, p. 140, pl. 3, fig. 3.

Loc. Santa Fe, New Mexico.

Obs. Probably a synonym for *Productus cora d'Orbigny*.

Productus norwoodi Swallow.

Upper Carboniferous.

Productus (*Strophalosia*?) *norwoodii* Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 182.

Productus norwoodi Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 35.

Loc. Cottonwood Valley, Kansas.

Obs. Compare with *Productus pustulosus* Phillips and *P. scabriculus* (Martin).

Regarded by Keyes as a synonym for *P. nebraskaensis*.

- Productus occidentalis** Newberry. Upper Carboniferous.
Productus occidentalis Newberry, Ives's Rep. Colorado River of the West, 1861, p. 122, pl. 2, figs. 9, 10.
Loc. Banks of Cascade River near the junction of Great and Little Colorado rivers.
- Productus orbignyana** Geinitz (non de Koninck) = *Productus longispinus*.
- Productus ovatus** Hall. St. Louis (L. Carb.).
Productus ovatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 674, pl. 24, fig. 1;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, fig. 19.—Hall and Clarke, Pal. New York, VIII, Pt. 1, 1892, pl. 18, fig. 19.
Loc. Ottumwa and Keosauqua, Iowa.
- Productus papilio** Gabb. Upper Carboniferous.
Productus papilio Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 302, pl. 42, fig. 12.
Loc. Lake Titicaca, Bolivia.
- Productus papulatus** Hall = *Productella papulata*.
- Productus parvulus** A. Winchell. Kinderhook (L. Carb.).
Producta parvula A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 4.
Loc. Burlington, Iowa.
- Productus parvus** Meek and Worthen. Kaskaskia (L. Carb.).
Productus parvus Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 450;—Geol. Survey Illinois, II, 1866, p. 297, pl. 23, fig. 4.—White, Wheeler's Expl. and Survey west 100th Merid., IV, 1875, p. 83, pl. 5, fig. 6.
Loc. Chester, Illinois; Mountain Spring, Nevada.
- Productus (?) pectinoideus** Shepard.
Producta pectenoidea Shepard, American Jour. Sci., XXXIV, 1838, p. 150, fig. 4.
Loc. Vermilionville, LaSalle County, Illinois.
Obs. The geological position of this species may be Trenton or Upper Carboniferous. The illustration is unsatisfactory.
- Productus pertenuis** Meek. Upper Carboniferous.
Productus canerini Geinitz (non de Verneuil), Carbon und Dyas in Nebraska, 1866, p. 54, pl. 4, fig. 6.
Productus pertenuis Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 164, pl. 1, fig. 14; pl. 8, fig. 9.
Loc. Nebraska City, Nebraska; Leavenworth, Kansas; Kansas City, Missouri.
- Productus peruvianus** d'Orbigny. Upper Carboniferous.
Productus peruvianus d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 52, pl. 4, fig. 4.
Loc. Yarbichambi, Bolivia.
Obs. Probably a synonym for *Productus semireticulatus*.
- Productus phillipsi** Norwood and Pratten. Carboniferous.
Productus phillipsii Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 8, pl. 1, fig. 2.
Loc. Big Canyon, Humboldt River, Utah.
- Productus pileiformis** McChesney = *Productus cora*.
- Productus pileolus** Shumard. Upper Carboniferous.
Productus pileolus Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 291.
Loc. Guadalupe Mountains, Texas.

Productus pocillum Morton.

Upper Carboniferous.

Productus pocillum Morton, Amer. Jour. Sci., XXIX, 1836, p. 150, pl. 2, fig. 2.*Loc.* Putnam Hill, Ohio.*Obs.* Not recognizable.**Productus popei** Shumard.

Upper Carboniferous.

Productus popei Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 290, pl. 11, fig. 8.*Loc.* New Mexico and Texas.**Productus portlockianus** Norwood and Pratten=**Productus costatus**.**Productus prattenianus** Norwood=**Productus cora**.**Productus punctatus** (Martin).

Upper Carboniferous.

Anomites punctatus Martin, Petrefacta Derbiensia, 1809, p. 8, pl. 37, fig. 6.*Productus punctatus?* Morton, American Jour. Sci., XXIX, 1836, p. 153, pl. 26, fig. 38.

Productus punctatus Shumard, Marey's Rep. U. S. Expl. Red River, Louisiana, 1853, p. 201, pl. 1, fig. 5; pl. 2, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 19.—Marcou, Geol. North America, 1858, p. 48, pl. 6, fig. 12.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 55.—McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 27, pl. 1, figs. 10, 11.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 169, pl. 2, fig. 6; pl. 4, fig. 5.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 569, pl. 25, fig. 13.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 114, pl. 7, fig. 2;—Eleventh Rep. State Geol. Indiana, 1882, p. 373, pl. 42, figs. 1-3.—Hall, Second Ann. Rep. N. Y. State Geol. 1883, pl. 50, figs. 14-16.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 124, pl. 27, figs. 1-3.—Herrick, Bull. Denison Univ., II, 1887, p. 48, pl. 2, fig. 29.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, fig. 21; pl. 19, figs. 14-18.—Keyes, Geol. Survey Missouri, V, 1895, p. 51, pl. 37, fig. 1.—Smith, Proc. American Phil. Soc., XXXV, 1897, p. 29 (extract).

Productus semipunctatus Sheppard, American Jour. Sci., XXXIV, 1838, p. 153, fig. 9.*Productus tubulospinus* McChesney, New Pal. Fossils, 1860, p. 37.*Productus* allied to *punctatus* Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 630.*Loc.* Europe; Ohio; Indiana; Illinois; Missouri; Arkansas; Nebraska; Iowa; Nevada; New Mexico; Feilden Isthmus, lat. 82° 43'.**Productus pustulosus** Phillips.

Upper Carboniferous.

Producta pustulosa Phillips, Geol. Yorkshire, II, 1836, p. 216, pl. 7, fig. 15.*Productus pustulosus* Marcou, Geol. North America, 1858, p. 48, pl. 6, fig. 1.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 55.*Productus pyxidiformis* Marcou, Geol. North America, 1858, p. 48, pl. 6, fig. 3.*Productus pustulosus?* Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 26.*Loc.* Europe; Leavenworth, Kansas; Tigras, New Mexico.*Obs.* See *Productus norwoodi*.**Productus pyxidatus** Hall=**Productella pyxidata**.**Productus pyxidiformis** de Koninck=**Productus pustulosus**.**Productus raricostatus** Herrick.

Waverly (L. Carb.).

Productus raricostatus Herrick, Bull. Denison Univ., IV, 1888, p. 19, pl. 3, fig. 19;—Geol. Ohio, VII, 1895, pl. 22, fig. 9.*Loc.* Moots Run, Ohio.**Productus rarispinus** Hall=**Productella rarispina**.

- Productus reticulatus** Gabb. Upper Carboniferous.
Productus reticulatus Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 302, pl. 42, fig. 13.
Loc. Lake Titicaca, Bolivia.
- Productus rhomianus** Derby. Upper Carboniferous.
Productus rhomianus Derby, Bull. Cornell Univ., I, 1874, p. 56, pl. 3, figs. 20, 41-44, 49.
Loc. Bomjardim and Itaituba, Brazil.
- Productus rogersi** Norwood and Pratten=*Productus nebraskaensis*.
- Productus rushvillensis** Herrick. Waverly (L. Carb.).
Productus rushvillensis Herrick, Bull. Denison Univ., IV, 1888, p. 22, pl. 3, fig. 15;—Geol. Ohio, VII, 1895, pl. 23, fig. 15.
Loc. Rushville, Newark, and Loudonville, Ohio.
- Productus scabriculus** (Martin). Lower and Upper Carboniferous.
Anomites scabriculus Martin, Petrefacta Derbiensia, 1809, p. 8, pl. 36, fig. 5.
Productus scabriculus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 17.—Marcou, Geol. North America, 1858, p. 47, pl. 5, fig. 6.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 125.
Productus scabriculus? Geinitz, Carbon und Dyas in Nebraska, 1866, p. 54.
Loc. Europe; Pecos Village and Santa Fe, New Mexico; Plattsmouth, Nebraska; Caldwell County, Kentucky; Kashmere.
- Productus scitulus** Meek and Worthen. St. Louis (L. Carb.).
Productus scitulus Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 451;—Geol. Survey Illinois, II, 1866, p. 280, pl. 20, fig. 5.
Loc. Alton, Illinois.
- Productus semipunctatus** Sheppard=*Productus punctatus*.
- Productus semireticulatus** Hall, 1852 (non Martin)=*Productus cora*.
- Productus semireticulatus** (Martin). Lower and Upper Carboniferous.
Anomites semireticulatus Martin, Petrefacta Derbiensia, 1809, p. 7, pl. 32, figs. 1, 2; pl. 33, fig. 4.
Productus inca d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 51, pl. 4, figs. 1-3.—Derby, Bull. Mus. Comp. Zool., III, 1876, p. 280.
Productus semireticulatus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 11.—Hall, Pacific R. R. Reports, III, 1856, p. 103, pl. 2, figs. 16, 17;—Geol. Survey Iowa, I, Pt. II, 1858, p. 637.—Marcou, Geol. North America, 1858, p. 46, pl. 5, fig. 4; pl. 6, fig. 6.—Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 292.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 124.—Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 64, pl. 4, fig. 1.—Davidson, Ibidem, XIX, 1863, p. 174, pl. 9, figs. 20, 21.—Meek, Pal. California, I, 1864, p. 11, pl. 2, fig. 4.—Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 115.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 51.—Toula, Sitzb. der k. k. Akad. der Wissensch. zu Wien, IX, 1869, p. 9.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 160, pl. 5, fig. 7.—Derby, Bull. Cornell Univ., I, 1874, p. 47, pl. 4, fig. 8; pl. 6, fig. 18; pl. 7, figs. 5-7, 15, 16.—White, Wheeler's Expl. and Survey west of the 100th Meridian, IV, 1875, p. 111, pl. 8, fig. 1.—Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 69, pl. 7, fig. 5.—Hall and Whitfield, Ibidem, 1867, p. 267, pl. 5, figs. 5, 6.—Dawson, Acadian Geol., 3d ed., 1878, p. 296, fig. 97.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 629.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, figs. 11-13; pl. 50, figs. 19-23.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 125, pl. 24, figs. 1-3.—Herrick, Bull. Denison Univ., III, 1888, p. 31, pl. 1, fig. 26; pl. 3, fig. 24; pl. 7, fig. 11; pl. 10

Productus semireticulatus (Martin)—Continued.

fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, figs. 16-18; pl. 18, figs. 11-13; pl. 19, figs. 19-23.—Keyes, Geol. Survey Missouri, V, 1895, p. 50, pl. 36, fig. 4.

Productus calhounianus Swallow, Trans. St. Louis Acad. Sci., I, 1858, pp. 181, 215.—Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 26.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 123.

Productus setigerus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 638, pl. 19, fig. 3. *Productus setigerus* var. *keokuk* Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 639, pl. 19, fig. 4.

Productus martini A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 4.

Productus magnus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, fig. 15.

Loc. Europe; throughout the Carboniferous of North America; Feilden Isthmus, lat. 82° 43'; Vixixil and Sansiguan, Guatemala; Yarbichambi, Bolivia; Bomjardin and Itaituba, Brazil; Tibet and Kashmere.

Obs. See *Productus peruvianus* d'Orbigny and *P. magnicostatus*.

Productus semireticulatus kansasensis Swallow. Upper Carboniferous.

Productus calhounianus var. *kansasensis* Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 216.

Loc. Kansas and Missouri.

Productus semistriatus Meek. Upper Carboniferous.

Productus semistriatus Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 309.—Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 349, pl. 1, fig. 7;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 74, pl. 7, fig. 8.—White, Wheeler's Expl. and Survey west 100th Meridian, 1881, Appendix, p. V.

Loc. Utah and northern New Mexico.

Productus setigerus Hall=*Productus semireticulatus*.

Productus setigerus var. *keokuk* Hall=*Productus semireticulatus*.

Productus shumardianus Hall=*Productella shumardana*.

Productus speciosus Hall=*Productella speciosa*.

Productus spinulicostus Hall=*Productella spinulicosta*.

Productus splendens Norwood and Pratten=*Productus longispina*.

Productus subaculeatus of American authors=*Productella spinulicosta*.

Productus subalatus Hall=*Productella subalata*.

Productus subhorridus Meek. Carboniferous.

Productus subhorridus Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 75, pl. 7, fig. 3.

Loc. Wasatch Mountains, Utah.

Productus sulcatus Castelnau=*Leptæna rhomboidalis*.

Productus sulcifer de Verneuil=*Leptæna rhomboidalis*.

Productus swallowi Beecher. Kaskaskia (L. Carb.).

Koninckina americana Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 94.

Productus swallowi Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 214.

Loc. Barretts Station, St. Louis County, Missouri.

Productus symmetricus McChesney. Upper Carboniferous.

Productus symmetricus McChesney, New Pal. Fossils, 1860, p. 35;—Trans. Chicago Acad. Sci., I, 1868, p. 25, pl. 1, fig. 9.—Meek, Final Rep. U. S. Geol. Survey of Nebraska, 1872, p. 167, pl. 5, fig. 6; pl. 8, fig. 13.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 123, pl. 25, figs. 1 and 2.—Hall and

Productus symmetricus McChesney—Continued.

Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, figs. 19, 20.—Keyes, Geol. Survey Missouri, V, 1895, p. 48, pl. 36, fig. 2.

Loc. LaSalle and Springfield, Illinois; Iowa; Missouri; Nebraska; Indiana.

Productus tenuicostatus Hall.

St. Louis (L. Carb.).

Productus tenuicostatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 675, pl. 21, fig. 2;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, fig. 18.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, fig. 18.—Keyes, Geol. Survey Missouri, V, 1895, p. 44.

Loc. Milan, Illinois.

Productus truncatus Hall=*Strophalosia truncata*.

Productus tubulospinus Sheppard=*Productus punctatus*.

Productus undiferus de Koninck.

Upper Carboniferous.

Productus undiferus de Koninck, Mém. de la Soc. Royale des Sciences de Liège, IV, 1846, p. 153, pl. 5, fig. 4; pl. 11, fig. 5.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 9.

Loc. Europe; Caseyville, Illinois; Posey County, Indiana.

Obs. See *Productus boonensis* Swallow.

Productus villiersi d'Orbigny.

Upper Carboniferous.

Productus villiersi d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 53, pl. 4, figs. 12, 13.—de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 109, pl. 11, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 17.

Loc. Yarbichambi, Bolivia; Keg Creek, Missouri.

Productus viminalis White.

Burlington (L. Carb.).

Productus viminalis White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 29.

Loc. Burlington, Iowa.

Obs. White regards this species as a synonym for *Productus costatus* Sowerby.

Productus vittatus Hall=*Productus alternatus*.

Productus wabashensis Norwood and Pratten=*Productus longispina*.

Productus wallacianus Derby.

Upper Carboniferous.

Productus wallacianus Derby, Bull. Cornell Univ., I, 1874, p. 57, pl. 3, figs. 46-48; pl. 6, fig. 5.

Loc. Bomjardim and Itaituba, Brazil.

Productus wilberanus McChesney=*Productus nebraskaensis*.

Productus wortheni Hall.

Keokuk (L. Carb.).

Productus wortheni Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 635, pl. 19, fig. 1.

Loc. Nauvoo, Illinois.

Obs. Compare with *Productus marginicinctus* Prout.

Productus weyprechtii Toulou.

Upper Carboniferous.

Productus weyprechtii Toulou, Sitzb. der k. k. Akad. der Wissensch. zu Wien, 1873, p. 138, pl. 1, fig. 4.

Productus weyprechtii? Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 631.

Loc. Cape Joseph Henry, lat. 82° 50'.

PROTORHYNCHA Hall and Clarke.Genotype *Atrypa dubia* Hall.

Protorhyncha Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 180;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 824.

- Protorhyncha (?) antiquata (Billings).** Lower Cambrian.
Camarella antiquata Billings, Pal. Fossils, I, 1861, p. 10, fig. 13;—Geol. Vermont, II, 1861, p. 919, fig. 353;—Geol. Canada, 1863, p. 284, fig. 290.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 122, pl. 7, fig. 8;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 613, pl. 72, fig. 3.
Camarella ? antiquata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 220.
Loc. Swanton, Vermont.
- Protorhyncha dubia Hall.** Chazy (Ord.).
Atrypa dubia Hall, Pal. New York, I, 1847, p. 21, pl. 4 bis, fig. 5.
Rhynchonella dubia Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.
Protorhyncha dubia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 180.
Loc. Chazy, New York; Highbridge, Kentucky; Lascassas, Tennessee.
- Protorhyncha (?) minor (Walcott).** Lower Cambrian.
Camarella (?) minor Walcott, Proc. U. S. Nat. Mus., XII, 1889, p. 36;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 614, pl. 72, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 221.
Loc. Stissingville, New York.
Obs. May be the type of a new genus. Its affinities are rather with the Rhynchonellidae than with Pentameridae.
- Protorthis Hall and Clarke = Billingsella.**
- Protosiphon Matthew.** Genotype *P. kempianus* Matthew.
Protosiphon Matthew, Geol. Mag., dec. IV, IV, 1897, p. 70.
- Protosiphon kempianus Matthew.** Lower Cambrian.
Protosiphon kempianum Matthew, Geol. Mag., dec. IV, IV, 1897, p. 70, figs. 1-4.
Loc. Long Island, Kings County, New Brunswick.
- Protozyga Hall and Clarke = Zygospira.**
- Pseudocrania anomala A. Winchell = Orthothetes anomalus.**
- PTYCHOSPIRA Hall and C.** Genotype *Terebratula ferita* von Buch.
Ptychospira Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 112, fig. 102;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 792.
- Ptychospira sexplicata (White and Whitfield.)** Waverly (L. Carb.).
Retzia sexplicata White and Whitfield, Proc. Boston Soc. Nat. Hist., VIII, 1862, p. 294.
Ptychospira sexplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 112, pl. 50, figs. 13, 14; pl. 83, fig. 28.
Loc. Burlington, Iowa.
- PUGNAX Hall and C.** Genotype *Rhynchonella acuminata* (Martin).
Pugnax Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 202;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 828.
Obs. Subgenus of *Hypothyris*.
- Pugnax (?) dawsoniana (Davidson).** Upper Carboniferous.
Rhynchonella dawsoniana Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 172, pl. 9, figs. 13, 14.
Rhynchonella ? dawsoniana Dawson, Acadian Geology, 3d ed., 1878, p. 294, fig. 93.
Pugnax (?) dawsonianus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 214, pl. 62, figs. 30-33.
Loc. Lennox Passage, Nova Scotia.

- Pugnax globulina** (Phillips sp.?) (Davidson). Upper Carboniferous.
 ?*Terebratula globulina* Phillips, Encycl. Metr., IV, 1834, pl. 3, fig. 3.
Camarophoria? globulina? Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 171, pl. 9, figs. 11, 12.
Camarophoria globulina? Dawson, Acadian Geology, 3d ed., 1878, p. 293, fig. 92.
Pugnax globulina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 214.
Loc. De Bert River, Nova Scotia.
- Pugnax grosvenori** Hall. St. Louis (L. Carb.).
Rhynchonella grosvenori Hall, Trans. Albany Institute, IV, 1858, p. 10.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 53, pl. 6, figs. 31-34.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 331, pl. 29, figs. 31-34.
Pugnax grosvenori Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60, figs. 13-17.
Loc. Spergen Hill and Bloomington, Indiana; Alton, Illinois; near Princeton, Kentucky.
- Pugnax mutata** Hall. Keokuk and St. Louis (L. Carb.).
Rhynchonella mutata Hall, Trans. Albany Institute, IV, 1858, p. 10;—Geol. Survey Iowa, I, Pt. 11, 1858, p. 658, pl. 23, fig. 2.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 52, pl. 6, fig. 46.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 332, pl. 29, figs. 43-45.
Pugnax mutatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204, pl. 60, figs. 18-22.
Loc. Alton and Warsaw, Illinois; Boonville, Missouri.
- Pugnax ottumwa** (White). St. Louis (L. Carb.).
Rhynchonella ottumwa White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 23;—Twelfth Ann. Rep. U. S. Geol. Survey Terr., 1883, p. 165, pl. 41, fig. 5.
Pugnax ottumwa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204, pl. 60, figs. 23-26.
Loc. Ottumwa and Oskaloosa, Iowa; Clark County, Missouri.
- Pugnax pugnus** (Martin). Upper Devonian.
Conchylolithus Anomites pugnus Martin, Petrefacta Derbiensia, 1809, tab. 22, figs. 4, 5.
Terebratula pugnus Sowerby, Mineral Conchology, 1825, pl. 425, figs. 1-6.
Rhynchonella pugnus Davidson, Mon. British Carb. Brach., Pal. Soc., 1860, p. 97, pl. 32, figs. 1-15.—Williams, American Jour. Sci., 3d ser., XXV, 1883, p. 99.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 155, pl. 14, fig. 7.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 73.—Whiteaves, Cont. Canadian Pal., I, 1891, pp. 230, 290.
 ?*Rhynchonella pugnus* Dawson, Acadian Geology, 3d ed., 1878, p. 295.
Pugnax pugnus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 203, pl. 60, figs. 6-10.
Loc. Europe; High Point, New York; Eureka district, Nevada; Mackenzie and Athabasca rivers, Canada; in the Carboniferous of Windsor and East River, Nova Scotia (Dawson); San Saba Valley, Texas (Roemer).
- Pugnax pugnus alta** (Calvin). Upper Devonian.
Rhynchonella alta Calvin; paper read before the Iowa Acad. Sci., and a named photographic plate distributed.
Rhynchonella pugnus var. *alta* Williams, Bull. Geol. Soc. America, I, 1890, pl. 12, figs. 5-7.
Pugnax altus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 203, pl. 60, figs. 1-5.
Loc. Solon, Iowa.

- Pugnax pugnax missouriensis** (Shumard). Waverly (L. Carb.).
Rhynchonella missouriensis Shumard, Geol. Rep. Missouri, 1855, p. 204, pl. 5C, fig. 5a (non figs. 5b, 5c = *Pugnax striaticostata*).—Meek and Worthen, Geol. Survey Illinois, II, 1866, p. 153, pl. 14, fig. 4.—Keyes, Geol. Survey Missouri, V, 1895, p. 100.
Pugnax missouriensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204, pl. 60, figs. 33, 34; pl. 62, figs. 44, 45.
Loc. Cooper County, Missouri; Burlington, Iowa; Rockford, Indiana; Sciotoville and Richfield, Ohio.
- Pugnax rockymontana** (Marcou). Upper Carboniferous.
Terebratula rockymontana Marcou, Geol. N. America, 1858, p. 50, pl. 6, fig. 13.
Rhynchonella eatoniiformis McChesney, New Pal. Fossils, 1860, p. 49.
Rhynchonella rockymontana White, Wheeler's Expl. and Survey west 100th Merid., IV, 1875, p. 131, pl. 9, fig. 1.
Pugnax eatoniiformis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204, pl. 60, figs. 11, 12.
Loc. Pecos Village, New Mexico; Cedar Range, Utah; Graysville, Illinois.
- Pugnax striaticostata** (Meek and Worthen). Kinderhook (L. Carb.).
Rhynchonella missouriensis Shumard, Geol. Rep. Missouri, 1855, p. 204, Pl. C, figs. 5b, 5c (non 5a = *Pugnax pugnax missouriensis*).—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 450, pl. 14, fig. 7.
Rhynchonella striaticostata Meek and Worthen, *Ibidem*, III, 1868, p. 452.
Pugnax striaticostata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204.
Loc. Cooper County, Missouri.
- Pugnax swallowana** (Shumard). Upper Carboniferous.
Camarophoria swallowana Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 394, pl. 11, fig. 1.
Pugnax swallowiana Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 204, pl. 60, figs. 27-32.
Loc. Guadalupe Mountains of New Mexico and Texas.
- Pugnax utah** (Marcou). Upper Carboniferous.
Terebratula utah Marcou, Geol. N. America, February, 1858, p. 51, pl. 6, fig. 12.
Rhynchonella (*Camarophoria*) *osagensis* Swallow, Trans. St. Louis Acad. Sci., I, June, 1858, p. 219.
Rhynchonella utah, Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 27.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 128.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 128, pl. 9, fig. 2;—Thirteenth Rep. State Geol. Indiana, 1884, p. 132, pl. 25, fig. 6.
? *Rhynchonella* species Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 64, pl. 4, fig. 5.
Camarophoria globulina Geinitz (non Phillips), Carbon und Dyas in Nebraska, 1866, p. 38, pl. 3, fig. 5.
Rhynchonella osagensis Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 179, pl. 1, fig. 9; pl. 6, fig. 2.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 571, pl. 26, fig. 22.
Pugnax utah Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204, pl. 60, figs. 39-42.
Rhynchonella uta Keyes, Geol. Survey Missouri, V, 1895, p. 103, pl. 41, fig. 7.
Loc. Salt Lake City, Utah; Indiana; Illinois; Iowa; Missouri; Kansas; Arkansas; Nebraska.
Obs. Compare with *Pugnax pleurodon*.

RAFINESQUINA Hall and C. Genotype *Strophomena alternata* Emmons.

Strophomena (non Rafinesque) Billings, Canadian Nat. Geol., I, 1856, p. 133;—Canadian Jour., VI, 1861, p. 329;—Pal. Fossils, I, 1862, p. 115.—Hall, Pal. New York, IV, 1867, p. 76.—Meek, Pal. Ohio, I, 1873, p. 73.—N. H. Winchell, Ninth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1881, p. 118.—Shaler, Fossil Brachiopoda of the Ohio Valley, 1887, p. 4.—Herrick, Bull. Denison University, IV, 1888, p. 14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 159.

Rafinesquina Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 281.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 400.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 279.

Rafinesquina alternata (Emmons). Trenton to Lorraine (Ord.).

Leptaena alternata Conrad, Second Ann. Rep. N. Y. Geol. Survey, 1838, p. 115 (undefined).—Hall, Pal. New York, I, 1847, pp. 102, 286, pl. 31, fig. 1; pl. 31A, fig. 1; pl. 79, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 818, fig. 600.

Strophomena alternata Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 63 (undefined);—Fourth Rep. Ibidem, 1840, p. 201 (undefined);—Fifth Rep. Ibidem, 1841, p. 37 (undefined).—Emmons, Geol. N. Y.; Rep. Second Dist., 1842, p. 395, fig. 3.—Billings, Canadian Nat. Geol., I, 1856, p. 204, figs. 3, 4;—Canadian Nat. Geol., V, 1860, p. 51;—Pal. Fossils, I, 1862, p. 117;—Geol. Canada, 1863, p. 163, fig. 140.—Meek, Pal. Ohio, I, 1873, p. 88, pl. 7, fig. 1.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 51.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 481, pl. 1, figs. 6, 7;—Tenth Rep. State Geol. Indiana, 1881, p. 113, pl. 1, figs. 6, 7.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 38, figs. 6–11.—Shaler, Fossil Brachiopoda of the Ohio Valley, 1887, p. 4, pls. 2, 3.—Keyes, Geol. Survey Missouri, V, 1895, p. 70, pl. 39, fig. 3.

Orthis huroniensis Castelneau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 37, pl. 14, fig. 6.

Orthis plana Castelneau (non Pander), Ibidem, 1843, p. 38, pl. 14, fig. 1.

Strophomena angulata? Owen, Geol. Expl. Iowa, Wisconsin, and Illinois, 1844, pl. 18, figs. 1, 3.

Strophomena anticostiensis Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 62.

Rafinesquina alternata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 282, pl. 8, figs. 6–11, 27, 28; Pt. II, 1895, pl. 84, figs. 17, 18.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 404, pl. 31, figs. 32–34.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 171.

Loc. New York; Ohio; Indiana; Illinois; Missouri; Wisconsin; Minnesota; Canada; Manitoba; Anticosti.

Obs. This species was not defined or figured by Conrad. The first illustration was given by Emmons, and in the following year it was figured and defined by Castelneau as *Orthis huroniensis*.

Rafinesquina alternata alternistriata Hall. Lorraine (Ord.).

Leptaena alternistriata Hall, Pal. New York, I, 1847, p. 109, pl. 31B, fig. 1.

Strophomena alternistriata Hall, Twelfth Rep. N. Y. State Geol. Nat. Hist., 1859, p. 70.

Strophomena alternata var. *alternistriata* Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 53.

Rafinesquina alternistriata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.

Loc. Cincinnati, Ohio; Maysville, Kentucky; Madison, Indiana.

Obs. Meek regarded this variety as a synonym for *S. alternata*.

- Rafinesquina alternata fracta** (Meek). Lorraine (Ord.).
Strophomena alternata var. *fracta* Meek, Pal. Ohio, I, 1873, p. 91, pl. 7, fig. 3.
Strophomena fracta Miller, Cincinnati Quart. Jour. Sci., I, 1874, p. 13;—*Ibidem*, II, 1875, p. 54.
Loc. Cincinnati, Ohio.
- Rafinesquina alternata loxorhytis** Winchell and Schuchert=R. kingi.
Rafinesquina alternata loxorhytis (Meek). Lorraine (Ord.).
Strophomena alternata var. *loxorhytis* Meek, Pal. Ohio, I, 1873, p. 91.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 53.
Loc. Cincinnati, Ohio.
- Rafinesquina alternata nasuta** (Conrad). Lorraine (Ord.).
Strophomena nasuta Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 260.—Emmons, Geol. New York; Rep. Third Dist., 1842, p. 403, fig. 3.
Strophomena alternata var. *nasuta* Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 53.
Loc. Jefferson County, New York; Cincinnati, Ohio.
- Rafinesquina (?) atava** (Matthew). Calciferous (Ord.).
Strophomena atava Matthew, Trans. Royal Soc. Canada, 1893, p. 102, pl. 7, fig. 8.
Loc. Mary Island, near St. John, New Brunswick.
- Rafinesquina aurora** (Billings). Calciferous (Ord.).
Strophomena aurora Billings, Pal. Fossils, I, 1865, p. 218, fig. 202.
Loc. Table Head, etc., Newfoundland.
- Rafinesquina ceres** (Billings). Lorraine and Anticosti (Ord. and Sil.).
Strophomena ceres Billings, Canadian Nat. Geol., V, 1860, p. 54;—Pal. Fossils, I, 1862, p. 119.
Loc. Anticosti.
- Rafinesquina deltoidea** (Conrad). Trenton and Utica (Ord.).
Strophomena deltoidea Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 64;—Fifth Rep., *Ibidem*, 1841, p. 37.—Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 46, fig. 2.—Emmons, Geol. N. Y.; Rep. Second Dist., 1842, p. 389, fig. 2.—Billings, Geol. Canada, 1863, p. 163, fig. 141.—Keyes, Geol. Survey Missouri, V, 1895, p. 69.
Strophomena camerata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 254, pl. 14, fig. 5.
Leptæna camerata Hall, Pal. New York, I, 1847, p. 106, pl. 31A, fig. 2.
Leptæna deltoidea Hall, *Ibidem*, 1847, p. 106, pl. 31A, fig. 3.
Streptorhynchus (*Strophonella*) *deltoidea* Hall, Second Ann. Rep. New York State Geol., 1883, pl. 42, figs. 1, 2, 4 (non fig. 3).
Rafinesquina deltoidea Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 9A, figs. 1, 2, 4.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 403, pl. 31, figs. 30, 31.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 170.
Loc. Trenton Falls, etc., New York; St. Paul, Cannon Falls, etc., Minnesota; Oshkosh, Wisconsin; Dubuque, Iowa; Pike County, Missouri; Ottawa and Lake Winnipeg, Canada.
- Rafinesquina fasciata** Hall. Chazy (Ord.).
Leptæna fasciata Hall, Pal. New York, I, 1847, p. 20, pl. 4 bis, fig. 3.
Strophomena fasciata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 70.
Rafinesquina fasciata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.
Loc. Chazy, Clinton County, New York.
Obs. Should be compared with *R. alternata*.
- Rafinesquina imbrex** (Pander). Lorraine (Ord.).
Strophomena imbrex (?) Billings, Pal. Fossils, I, 1862, p. 128, fig. 106.
Loc. Europe; Anticosti.

- Rafinesquina incrassata** (Hall). Chazy and Black River (Ord.).
Leptæna incrassata Hall, Pal. New York, I, 1847, p. 19, pl. 4 bis, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 817, fig. 591.
Strophomena incrassata Billings, Canadian Nat. Geol., IV, 1859, p. 443.
Loc. Chazy, New York; Mingau Island, Canada.
- Rafinesquina kingi** (Whitfield). Lorraine (Ord.).
Strophomena kingi Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 72;—Geol. Wisconsin, IV, 1882, p. 261, pl. 12, figs. 15, 16.
Rafinesquina alternata var. *loxorhytis* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 407, pl. 31, figs. 35-37; pl. 32, figs. 59, 60.
Rafinesquina kingi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.
Loc. Delafield, Wisconsin; near Spring Valley, Minnesota.
- Rafinesquina lata** Whiteaves. Lorraine (Ord.).
Rafinesquina lata Whiteaves, Canadian Rec. Sci., 1895, p. 392;—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 172, pl. 19, figs. 2-5.
Loc. Red River Valley and Lake Winnipeg, Manitoba.
- Rafinesquina mesicosta** (Shumard). ? Trenton (Ord.).
Leptæna mesacosta Shumard, Geol. Rep. Missouri, 1855, p. 205, Pl. C, fig. 2.—Keyes, Geol. Survey Missouri, V, 1895, p. 76.
Loc. Cape Girardeau, Missouri.
- Rafinesquina minnesotaensis** (N. H. Winchell). Trenton (Ord.).
Strophomena deltoidea Owen (non Conrad), Geol. Expl. Iowa, Wisconsin, and Illinois, 1844, pl. 16, fig. 8; pl. 17, fig. 6.
Leptæna deltoidea Owen, Geol. Rep. Wisconsin, Iowa, and Minnesota, 1852, p. 620, tab. 2B, fig. 10 (not the middle figure).
Strophomena incrassata Hall (non 1847), Geol. Wisconsin, I, 1862, p. 42, fig. 16.—Hall (non 1847), Second Ann. Rep. N. Y. State Geol., 1883, pl. 38, figs. 1-5.
Strophomena minnesotensis N. H. Winchell, Ninth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1881, p. 120.
Rafinesquina minnesotensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 401, pl. 31, figs. 25-29.
Loc. Minneapolis, etc., Minnesota; Beloit, Wisconsin; Decorah and McGregor, Iowa; central Kentucky; Lebanon, Tennessee.
Obs. This species is probably not identical with *R. incrassata* (Hall) of the Chazy terrane.
- Rafinesquina minnesotaensis inquassa** (Sardeson). Trenton (Ord.).
Strophomena inquassa Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 334, pl. 5, figs. 22-24.
Rafinesquina minnesotensis var. *inquassa* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 403, pl. 31, figs. 27, 28.
Loc. Minneapolis and St. Paul, Minnesota; Mineralpoint, Wisconsin.
- Rafinesquina nitens** (Billings). Lorraine (Ord.).
Strophomena nitens Billings, Canadian Nat. Geol., V, 1860, p. 53, fig. 1;—Pal. Fossils, I, 1862, p. 118, fig. 97;—Geol. Canada, 1863, p. 209, fig. 208.
Rafinesquina nitens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.
Loc. Anticosti.
- Rafinesquina** (?) *obscura* Hall. Clinton (Sil.).
Leptæna obscura Hall, Pal. New York, II, 1852, pp. 62, 103, pl. 21, figs. 2, 6.
Strophomena obscura Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.
Strophomena obscura? Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 306, pl. 6, figs. 15, 16.
Rafinesquina ? *obscura* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.
Loc. Near Utica and Kirkland, New York; Cumberland Gap, Tennessee.

- Rafinesquina squamula** (James). Lorraine (Ord.).
Strophomena squamula James, Cincinnati Quart. Jour. Sci., I, 1874, p. 335.
Rafinesquina squamula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.
Loc. Cincinnati, Ohio.
- Rafinesquina tenuilineata** (Conrad). Trenton (Ord.).
Strophomena tenuilineata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 259.—Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 70.
Leptena tenuilineata Hall, Pal. New York, I, 1847, p. 115, pl. 31B, fig. 8.
Loc. "Occurs in Trenton limestone."
- Rafinesquina ulrichi** (James). Utica (Ord.).
Strophomena (?) *ulrichi* James, The Palæontologist, I, 1878, p. 6.
Rafinesquina ulrichi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283, pl. 15A, figs. 37, 38.
Loc. Cincinnati, Ohio.
- RENSELÆRIA** Hall. Genotype *Terebratula ovoides* Eaton.
Rensselæria Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 39;—Pal. New York, III, 1859, p. 454.—Dall, American Jour. Conchology, VI, 1870, p. 105.—Claypole, Proc. American Philosophical Soc., 1883, p. 235.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 255;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 849.
- Rensselæria æquiradiata** (Conrad). Lower Helderberg (Dev.).
Atrypa æquiradiata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 266, pl. 16, fig. 17.
Meganteris æquiradiata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 99, figs. 1-3.
Rensselæria æquiradiata Hall, Pal. New York, III, 1859, p. 255, pl. 45, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 258, pl. 76, figs. 23-25.
Loc. Cherry Valley, Schoharie, and Carlisle, New York; Arisaig, Nova Scotia (Ami).
- Rensselæria cayuga** Hall and Clarke. Oriskany (Dev.).
Rensselæria cayuga Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 258, 370, pl. 75, figs. 1, 2.
Loc. Cayuga, Ontario.
- Rensselæria condoni** McChesney=*Megalanteris condoni*.
- Rensselæria cumberlandiæ** Hall. Oriskany (Dev.).
Meganteris cumberlandiæ Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 101.
Rensselæria cumberlandiæ Hall, Pal. New York, III, 1859, p. 464, pl. 108, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 258, pl. 77, figs. 23-25.
Loc. Cumberland, Maryland.
- Rensselæria elliptica** Hall. Lower Helderberg (Dev.).
Meganteris elliptica Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 98.
Rensselæria elliptica Hall, Pal. New York, III, 1859, p. 256, pl. 45, fig. 4.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 258, pl. 76, figs. 26-28.
Loc. Schoharie County, New York.
- Rensselæria elongata** Hall=*Amphigenia elongata*.
- Rensselæria intermedia** Hall. Oriskany (Dev.).
Rensselæria intermedia Hall, Pal. New York, III, 1859, p. 463, pl. 108, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 77, figs. 26-28.
Loc. Cumberland, Maryland.
- Rensselæria johanni** Hall=*Newberrya johannis*.

Rensselæria lævis Hall = *Meristella lævis*.

Rensselæria lævis Meek = *Newberrya lævis*.

Rensselæria marylandica Claypole = *Newberrya claypolei*.

***Rensselæria marylandica* Hall.** Oriskany (Dev.).

Rensselæria marylandica Hall, Pal. New York, III, 1859, p. 461, pl. 108, fig. 3.—

Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 258, pl. 76, figs. 8–20.

Loc. Cumberland, Maryland.

***Rensselæria mutabilis* Hall.** Lower Helderberg (Dev.).

Meganteris mutabilis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 97.

Rensselæria mutabilis Hall, Pal. New York, III, 1859, p. 254, pl. 45, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 258, 259, figs. 178, 179; pl. 76, figs. 1–3a, 21, 22.

Loc. Albany and Columbia counties, New York.

Rensselæria ovalis Hall = *Megalanteris ovalis*.

***Rensselæria ovoides* (Eaton).** Oriskany (Dev.).

Terebratula ovoides Eaton, Geological Text-Book, 1832, p. 45.

Terebratula perovalis Eaton, *Ibidem*, 1832, p. 45.

Atrypa elongata Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 65.—

Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 123, fig. 2.—Hall, *Ibidem*,

Fourth Dist., 1843, p. 138, fig. 2;—(Conrad) Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, pl. 11, fig. 14.

Pentamerus deshayesii Castelnau, *Essai Système Silurien l'Amérique Septentrionale*, 1843, p. 38, pl. 15, figs. 1, 2.

Meganteris ovoides Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 102.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 826, fig. 649.

Rensselæria ovoides Hall, Pal. New York, III, 1859, p. 456, pl. 104, figs. i–4; pl. 105, figs. 1–6.—Billings, Geol. Canada, 1863, p. 961, fig. 470;—Pal. Fossils, II, 1874, p. 41, pl. 3, figs. 7, 10.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 258, pl. 75, figs. 5–9; pl. 76, figs. 16, 18.

Loc. New York; Pennsylvania; Maryland; Virginia; Gaspé, Canada.

***Rensselæria ovulum* Hall and Clarke.** Oriskany (Dev.).

Rensselæria ovulum Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pl. 75, figs. 3, 4.

Loc. Cayuga, Canada.

Rensselæria portlandica Billings = *Trigleria portlandica*.

Rensselæria suessana Hall = *Beachia suessana*.

Rensselandia Hall = *Newberrya*.

RETICULARIA McCoy. Genotype *Terebratula* ? *imbricata* Sowerby.

Reticularia McCoy, Carboniferous Fossils of Ireland, 1844, p. 142.—Waagen, *Palæontologica Indica*, Ser. XIII, I, 1883, p. 538.

***Reticularia bicostata* (Vanuxem).** Niagara (Sil.).

Orthis bicostatus Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, pp. 91, 94.

Spirifer bicostatus Hall, Pal. New York, II, 1852, p. 263, pl. 54, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 37, pl. 36, fig. 7.

Spirifera bicostata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, fig. 7.

Loc. Vernon Center, New York; Louisville, Kentucky.

***Reticularia bicostata petila* (Hall).** Niagara (Sil.).

Spirifera bicostata ? var. *petila* Hall, *Descrip. n. sp. of Fossils from Waldron, Indiana*, 1879, p. 15.

Spirifera bicostata var. *petila* Hall, Eleventh Rep. State Geol. Indiana, 1882, p. 279, pl. 27, figs. 8, 9;—*Trans. Albany Institute*, X, 1883, p. 71.

Reticularia bicostata petila (Hall)—Continued.

Spirifer bicostatus var. *petilus* Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 75, pl. 6, figs. 1-3.

Loc. Waldron, Indiana.

Reticularia canandaiguæ (Hall and Clarke).

Hamilton (Dev.).

Spirifer canandaiguæ Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 360, pl. 37, figs. 23-25.

Loc. Centerfield and Canandaigua Lake, New York.

Reticularia clara (Swallow).

Kaskaskia (L. Carb.).

Spirifera clara Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 86.

Loc. St. Genevieve County, Missouri.

Reticularia cooperensis (Swallow).

Kinderhook (L. Carb.).

Spirifera cooperensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 643.—Meek and Worthen, Geol. Survey Illinois, II, 1866, p. 155, pl. 14, fig. 5.—Keyes, Geol. Survey Missouri, V, 1895, p. 78.

Spirifer hirtus White and Whitfield, Proc. Boston Soc. Nat. Hist., VIII, 1862, p. 293.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 21, 37, pl. 38, fig. 14 (? pl. 84, figs. 36, 37).

Spirifera simplicata Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 111.

Spirifer hirtus ? A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 119;—Proc. American Phil. Soc., XII, 1870, p. 251.

Loc. Chouteau Springs, etc., Missouri; Rockford, Indiana; Burlington, Iowa; Hickman County, Tennessee.

Reticularia fimbriata (Conrad).

Oriskany-Ithaca (Dev.).

Delthyris fimbriatus Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 263.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 208, fig. 10.

Spirifer fimbriatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 505, pl. 4, fig. 5.—Billings, Canadian Jour., VI, 1861, p. 257, figs. 68-70;—Geol. Canada, 1863, p. 372, fig. 393.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 20, 21, 33, 37, pl. 36, figs. 17-22; pl. 38, figs. 9, 10.

Spirifera fimbriata Hall, Pal. New York, IV, 1867, p. 214, pl. 33, figs. 1-11;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 17-22.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 286.

Spirifer compactus Meek, Trans. Chicago Acad. Sci., I, 1868, p. 102, pl. 14, fig. 11.

Spirifer (*Martinia*) *richardsoni* Meek, Trans. Chicago Acad. Sci., I, 1868, p. 104, pl. 14, fig. 2.

Spirifera (*M.*) *richardsoni* Whiteaves, Cont. Canadian Pal., I, 1891, p. 226;—*Ibidem*, 1892, p. 287, pl. 37, fig. 7.

Spirifera conradana Miller, American Pal. Foss., 2d ed., 1883, p. 372.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 110, pl. 7, figs. 11-13.

Spirifera (*M.*) *undifera* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, pl. 3, figs. 3, 6; pl. 14, fig. 11.

Loc. New York; Ohio; Falls of Ohio; Illinois; Iowa; Maryland; Virginia; Eureka district, Nevada; Ontario and lakes Manitoba and Winnipegosis; Mackenzie River, Northwest Territory, Canada.

Obs. Mr. Walcott is correct in regarding this species the same as *Spirifer undiferus* Roemer. Conrad's species, however, was published in 1842, while that of Roemer is two years later, or in 1844. *S. richardsoni* is a young specimen of *S. compacta* which Mr. Walcott has shown to be a synonym for *S. undiferus*. See *Reticularia knappiana*.

- Reticularia franklini** (Meek). Hamilton (Dev.).
Spirifer (Martinia) franklini Meek, Trans. Chicago Acad. Sci., I, 1868, p. 107, pl. 14, fig. 12.
Spirifera (M.) glabra var. franklini Whiteaves, Cont. Canadian Pal., I, 1891, p. 225.
Loc. Mackenzie River, Northwest Territory, Canada.
Obs. The type specimen in the U. S. National Museum collection proves to be closely related to *Reticularia lævis* Hall.
- Reticularia guadalupensis** (Shumard). Upper Carboniferous.
Spirifera guadalupensis Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 391.
Loc. Guadalupe Mountains, Texas.
- Reticularia knappiana** (Nettelroth). Corniferous (Dev.).
Spirifera knappiana Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 122, pl. 7, fig. 14.
Loc. Falls of Ohio.
Obs. Probably the same as *R. fimbriata*.
- Reticularia lævis** (Hall). Portage (Dev.).
Delthyris lævis Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 245, fig. 1.
Spirifera lævis Hall, Pal. New York, IV, 1867, p. 239, pl. 39, figs. 1-12.
Spirifer lævis Williams, American Jour. Sci., 3d ser., XX, 1880, p. 456.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 33, 37, pl. 38, figs. 11-13; pl. 84, fig. 29.—Kindle, Bull. American Pal., 6, 1896, p. 36.
Spirifera (Martinia) glabra var. lævis Williams, Ann. New York Acad. Sci., II, 6, 1881, pl. 14, figs. 1, 2.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 140.
Loc. Ithaca and Cortlandville, New York.
- Reticularia modesta** (Hall). Lower Helderberg (Dev.).
Spirifer modestus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 61;—Pal. New York, III, 1859, p. 203, pl. 28, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 37, pl. 38, figs. 1, 3.
Loc. Cumberland, Maryland.
- Reticularia nevadaensis** (Walcott). Upper Devonian.
Spirifera (M.) glabra var. nevadaensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 139, pl. 3, fig. 5; pl. 14, fig. 14.
Loc. Eureka district, Nevada.
- Reticularia (?) nympha** (Billings). Lower Helderberg (Dev.).
Spirifera nympha Billings, Proc. Portland Soc. Nat. Hist., I, 1863, p. 116, pl. 3, fig. 15.
Loc. Masardis, Maine.
- Reticularia perplexa** (McChesney). Upper Carboniferous.
Spirifer lineatus Shumard, Geol. Survey Missouri, 1855, p. 216.—Hall, Pacific R. R. Reports, III, 1856, p. 101, pl. 2, figs. 6-8.—Marcou, Geol. N. America, 1858, p. 50, pl. 7, fig. 5.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 127.—Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 408.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 10, 11, 17, 21, 30, 39, pl. 38, figs: 2, 4, 7, 8.
Spirifer perplexus McChesney, New Pal. Fossils, 1860, p. 43.
Spirifer lineatus? Meek, Geol. Survey California, I, 1864, p. 13, pl. 2, fig. 6.
Spirifer lineatus var. *perplexus* Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 408.
Spirifera lineata Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, pl. 2, fig. 3.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 230.
Spirifer (Martinia) *perplexa* Derby, Bull. Cornell Univ., I, 1874, p. 16, pl. 3, figs. 27, 39, 40, 45, 50; pl. 8, fig. 13.

Reticularia perplexa (McChesney)—Continued.

Spirifera (*Martinia*) *lineata*? White, Wheeler's Expl. and Survey west 100th Meridian, III, Appendix, 1881.

Spirifera (*Martinia*) *lineata* White, Eleventh Rep. State Geol. Indiana, 1882, p. 372, pl. 42, figs. 4-6;—Thirteenth Rep. State Geol. Indiana, 1884, p. 133, pl. 27, figs. 4-6.—Herrick, Bull. Denison Univ., 11, 1887, p. 46, pl. 1, fig. 13.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 603, pl. 16, figs. 3-5;—Geol. Ohio, VII, 1895, p. 488, pl. 12, figs. 3-5.

Spirifera perplexa Keyes, Geol. Survey Missouri, V, 1895, p. 84.

Loc. Ohio; Indiana; Illinois; Missouri; Iowa; Kentucky; California; Texas; Pecos and Tigras, New Mexico; Shasta County, California; Bomjardim and Itaituba, Brazil.

Obs. This species is not identical with *Reticularia lineata* Martin, as found in England and Belgium. *Reticularia pseudolineata* (Hall) is more closely allied to that species than *R. perplexa* (McChesney).

Reticularia perplexa striatilineata (Swallow). Upper Carboniferous.

Spirifer lineatus var. *striatilineatus* Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 408.

Loc. Missouri.

Obs. Regarded by Keyes as a synonym for *R. perplexa*.

Reticularia præmatura (Hall). Chemung (Dev.).

Spirifera præmatura Hall, Proc. American Philosophical Soc., X, 1866, p. 246;—Pal. New York, IV, 1867, p. 250, pl. 33, figs. 31-35;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 23-25.

Martinia præmatura Herrick, Geol. Ohio, VII, 1895, pl. 23, fig. 12.

Spirifer præmaturus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 37, pl. 36, figs. 23-25.

Loc. Meadville and Oil Creek, Pennsylvania.

Reticularia pseudolineata (Hall). Burlington-Keokuk (L. Carb.).

Spirifer pseudolineatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 645, pl. 20, fig. 4.—Herrick, Bull. Geol. Soc. America, II, 1891, p. 45, pl. 1, fig. 18.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 21, 37, pl. 36, figs. 28-30.

Spirifera lineatoides Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 645.

Spirifera pseudolineata Safford, Geol. Tennessee, 1869, p. 360.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 28-30.

Reticularia pseudolineata Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 542.

Spirifera lineatoides and *pseudolineata* Keyes, Geol. Survey Missouri, V, 1895, pp. 81, 82, pl. 40, fig. 6.

Loc. Keokuk, Iowa; Warsaw, Illinois; Crawfordsville, Indiana; Missouri.

Obs. See *R. perplexa* (McChesney).

Reticularia setigera (Hall). Kaskaskia (L. Carb.).

Spirifer setigerus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 705, pl. 27, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 21, 37, pl. 36, figs. 26, 27.

Spirifera setigera Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 270, pl. 5, figs. 17, 18.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 26, 27.—Keyes, Geol. Survey Missouri, V, 1895, p. 83.

Reticularia setigera Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 542.

Loc. Kaskaskia and Chester, Illinois; Caldwell and Crittenden counties, Kentucky; Oquirrh Mountains, Utah.

Obs. See *R. translata*.

Reticularia subundifera (Meek and Worthen). Hamilton (Dev.).

Spirifera subundifera Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 434, pl. 10, fig. 5.

Reticularia subundifera (Meek and Worthen)—Continued.

Spirifera (M.) *undifera* var. *subundifera* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 145.

Loc. Rock Island, Illinois.

Reticularia (?) **temeraria** (Miller).

Lower Carboniferous.

Spirifera temeraria Miller, Jour. Cincinnati Soc. Nat. Hist., IV, 1881, p. 314, pl. 7, fig. 9.

Loc. Lake Valley mining district, New Mexico.

Reticularia tenuispinata (Herrick).

Waverly (L. Carb.).

Spirifera (*Martinia*) *tenuispinata* Herrick, Bull. Denison Univ., IV, 1888, p. 27, pl. 2, fig. 4.

Spirifer tenuispinatus Herrick, Geol. Ohio, VII, 1895, pl. 15, fig. 4.

Loc. Granville, Ohio.

Reticularia translata (Swallow).

Kaskaskia (L. Carb.).

Spirifera translata Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 85.

Loc. Chester, Illinois; St. Marys, Missouri.

Obs. Regarded by Keyes as a synonym for *R. setigera*.

RETZIA King.Genotype *Terebratula adrieni* de Verneuil.

Retzia King, Mon. Permian Fossils, Pal. Soc., 1850, p. 137.—Hall, Sixteenth Rep.

N. Y. State Cab. Nat. Hist., 1863, p. 53, figs. 1-3 on p. 55.—Hall and Clarke,

Pal. New York, VIII, Pt. II, 1893, p. 103, figs. 80-100 on pp. 106, 107;—

Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 787.

Obs. It is very probable that all of the species here referred to *Retzia* will prove to belong to other genera.

Retzia altirostris White=*Eumetria altirostris*.

Retzia chloe Billings=*Parazyga hirsuta*.

Retzia (?) **circularis** Miller.

Chouteau (L. Carb.).

Retzia circularis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 316, pl. 9, figs. 32-34.

Loc. Sedalia, Missouri.

Retzia compressa Meek=*Hustedia mormoni*.

Retzia dubia Billings=*Trematospira dubia*.

Retzia electra Billings=*Rhynchospira electra*.

Retzia eugenia Billings=*Rhynchospira eugenia*.

Retzia evax Hall=*Homœospira evax*.

Retzia formosa Whitfield=*Rhynchospira formosa*.

Retzia (?) **granulifera** Meek.

Lorraine (Ord.).

Retzia (*Trematospira*) *granulifera* Meek, Proc. Acad. Nat. Sci. Philadelphia, 1872, p. 318;—Pal. Ohio, I, 1873, p. 128, pl. 11, fig. 6.

Trematospira (?) *granulifera* Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 61.

Loc. Cincinnati, Ohio.

Obs. This species is probably a rhynchonelloid.

Retzia hippolyte Billings=*Trematospira hippolyte*.

Retzia (?) **jamesiana** Rathbun.

Middle Devonian.

Retzia jamesiana (Hartt) Rathbun, Bull. Buffalo Soc. Nat. Hist., I, 1874, p. 243, pl. 10, figs. 23, 27-38.

Retzia ? *jamesiana* Derby, Archives do Museu Nacional do Rio de Janeiro, IX, 1890, p. 79.

Retzia cf. *jamesiana* A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 68, pl. 4, fig. 14.

Loc. Erere and Rio Maecuru, Province of Para, Brazil; Bolivia.

- Retzia marcyi* Shumard = *Eumetria marcyi*.
Retzia meekana Shumard = *Hustedia meekana*.
Retzia mormoni Marcou = *Hustedia mormoni*.
Retzia osagensis Swallow = *Acambona osagensis*.
Retzia papillata Shumard = *Hustedia papillata*.
- Retzia* (?) *plicata* Miller.** Chouteau (L. Carb.).
Retzia plicata Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 316, pl. 9, figs. 29-31.
Loc. Sedalia, Missouri.
- Retzia polypleura* A. Winchell.** Portage (Dev.).
Retzia polypleura A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 406.
Loc. Port aux Barques, Michigan.
- Retzia* (?) *popcana* Swallow.** ? Chouteau (L. Carb.).
Retzia (?) *popcana* Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 654.
Loc. Locality and formation not given.
- Retzia punctulifera* Shumard = *Hustedia mormoni*.
Retzia radialis Walcott (non Phillips) = *Hustedia mormoni*.
Retzia sexplicata White and Whitfield = *Ptychospira sexplicata*.
Retzia sobrina Beecher and Clarke = *Homœospira sobrina*.
- Retzia* (?) *subglobosa* Hall.** Schoharie (Dev.).
Rhynchospira subglobosa Hall, Pal. New York, IV, 1867, p. 421, pl. 63, figs. 23-25.—
Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 49, fig. 22.
Retzia subglobosa Miller, N. American Geol. and Pal., 1889, p. 367.
Loc. Schoharie, New York.
- Retzia subglobosa* McChesney = *Hustedia mormoni*.
Retzia triangularis Miller = *Hustedia triangularis*.
Retzia vera Hall = *Eumetria marcyi*.
Retzia vera costata Hall = *Eumetria marcyi costata*.
Retzia verneuiliana Hall = *Eumetria marcyi*.
Retzia ? *wardiana* Rathbun = *Trigeria wardiana*.
Retzia woosteri White = *Eumetria woosteri*.
- RHINOBOLOUS** Hall. Genot. *Rhynobolus* sp. H. = ? *Oboius galtensis* Bill.
Rhynobolus Hall, Notes on some New or Imperfectly Known Forms among the Brachiopoda, 1871, p. 5;—*Ibidem*, 1872, p. 5, pl. 13, fig. 10;—Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 247, pl. 13, fig. 10.—*Waagen*, Palæontologica Indica, Ser. XIII, I, 1885, p. 761.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 44, 46, 164;—Eleventh Ann. Rep. N. Y. State Geologist, 1891, p. 239.
- Rhinobolus davidsoni* Hall and Clarke.** Niagara (Sil.).
Rhinobolus davidsoni Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 45, 176, pl. 413, figs. 10-12.
Loc. Near Grafton, Wisconsin.
- Rhinobolus galtensis* (Billings).** Guelph (Sil.).
Obolus galtensis Billings, Pal. Fossils, I, 1862, p. 168, fig. 153.
Obolellina galtensis Billings, Canadian Nat. Geol., VI, 1871, p. 222;—*Ibidem*, 1872, p. 328.
Trimerella minor Dall, American Jour. Conch., VII, 1871, p. 83, pl. 11, fig. 6.
? *Rhynobolus* sp. ? Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 247, pl. 13, fig. 10.

Rhinobolus galtensis (Billings)—Continued.

Trimerella (?) *galtensis* Davidson and King, *Quart. Jour. Geol. Soc. London*, XXX, 1874, p. 151, pl. 18, fig. 13; pl. 19, fig. 4.

Rhinobolus galtensis Whiteaves, *Pal. Fossils*, III, 1884, p. 7, pl. 2, fig. 1; pl. 8, fig. 3.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 45, pl. 4B, figs. 7-9.

Loc. Galt, Elora, Hespelar, and Durham, Ontario.

RHIPIDOMELLA Ehlert. Genotype *Terebratula michelini* L'Éveillé.

Rhipidomys Ehlert (non Wagner, 1844), *Fischer's Manuel de Conchyliologie*, 1887, p. 1288.—Hall, *Bull. Geol. Soc. America*, I, 1889, p. 21.

Rhipidomella Ehlert, *Journal de Conchyliologie*, 1891, p. 372.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 209;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 271.

Rhipidomella alsa Hall.

Scholarie (Dev.).

Orthis alsus Hall, *Sixteenth Rep. N. Y. State Cab. Nat. Hist.*, 1863, p. 33;—*Pal. New York*, IV, 1867, p. 36, pl. 4, figs. 2-7.

Rhipidomella alsa Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 225.

Loc. Albany County, New York.

Obs. Probably a synonym for *R. peloris* Hall.

Rhipidomella assimilis Hall.

Lower Helderberg (Dev.).

Orthis assimilis Hall, *Pal. New York*, III, 1859, p. 175, pl. 15, fig. 1.

Rhipidomella assimilis Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 224.

Loc. Schoharie, New York.

Rhipidomella burlingtonensis Hall.

Burlington (L. Carb.).

Orthis michelini var. *burlingtonensis* Hall, *Geol. Survey Iowa*, I, Pt. II, 1858, p. 596, pl. 12, fig. 4.

Rhipidomella burlingtonensis Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 225, pl. 6A, fig. 13; pl. 20, figs. 5, 6.

Orthis burlingtonensis Keyes, *Geol. Survey Missouri*, V, 1895, p. 63, pl. 38, fig. 7.

Loc. Burlington, Iowa; Quincy, Illinois; Hannibal, Missouri.

Rhipidomella circulus Hall.

Clinton (Sil.).

Orthis circulus Hall, *Geol. N. Y.*; *Rep. Fourth Dist.*, 1843, p. 71, fig. 1;—*Pal. New York*, II, 1852, p. 56, pl. 20, fig. 6.—Billings, *Canadian Nat. Geol.*, I, 1856, p. 134, pl. 2, fig. 1.

Rhipidomella circulus Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 210, 224, pl. 6A, figs. 1, 2.

Loc. Reynales Basin, New York; Hamilton, Ontario.

Rhipidomella clarkensis (Swallow).

Keokuk (L. Carb.).

Orthis clarkensis Swallow, *Trans. St. Louis Acad. Sci.*, II, 1863, p. 81.

Rhipidomella clarkensis Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 225.

Loc. Clark County, Missouri.

Obs. Keyes regards this species as a synonym for *Schizophoria swallowi*.

Rhipidomella cleobis Hall.

Onondaga (Dev.).

Orthis cleobis Hall, *Sixteenth Rep. N. Y. State Cab. Nat. Hist.*, 1863, p. 35;—*Pal. New York*, IV, 1867, p. 41, pl. 5, figs. 9, 10.

Rhipidomella cleobis Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 225.

Loc. Williamsville and Clarence, New York.

Rhipidomella cumberlandiæ Hall.

Oriskany (Dev.).

Orthis cumberlandiæ Hall, *Pal. New York*, III, 1859, p. 481, pl. 95A, figs. 20, 21.

Rhipidomella cumberlandiæ Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 225.

Loc. Cumberland, Maryland.

- Rhipidomella (?) cuneata** (Owen). Hamilton (Dev.).
Orthis cuneata Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 585, pl. 3A, fig. 10.
Rhipidomella cuneata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.
Loc. New Buffalo, Iowa.
- Rhipidomella cyclas** Hall. Marcellus and Hamilton (Dev.).
Orthis cyclas Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 78;—Pal. New York, IV, 1867, p. 52, pl. 7, figs. 2, 3.
Rhipidomella cyclas Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.
Loc. York, Pavilion, Bellona, etc., New York.
- Rhipidomella dalyana** (Miller). Burlington (L. Carb.).
Orthis dalyana Miller, Jour. Cincinnati Soc. Nat. Hist., IV, 1881, p. 313, pl. 7, fig. 8.
Rhipidomella dalyana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.
Loc. Lake Valley mining district, New Mexico.
- Rhipidomella discus** Hall. Lower Helderberg (Dev.).
Orthis discus Hall, Pal. New York, III, 1859, p. 165, pl. 10A, figs. 7-12.
Rhipidomella discus Hall and Clarke, *Ibidem*, VIII, Pt. I, 1892, pp. 210, 225.
Loc. Hudson, Catskill, etc., New York; Square Lake, Maine.
- Rhipidomella dubia** Hall. St. Louis (L. Carb.).
Orthis dubius Hall, Trans. Albany Institute, IV, 1858, p. 12.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 45, pl. 6, figs. 1-5.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 324, pl. 29, figs. 1-5.
Orthis cooperensis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 82.
Rhipidomella dubia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 225, pl. 6A, figs. 18-22.
Orthis dubia Keyes, Geol. Survey Missouri, V, 1895, p. 64.
Loc. Spergen Hill and Bloomington, Indiana; Alton, Appanoose, etc., Illinois; Boonville and Barretts Station, Missouri; Keokuk, Iowa; Caldwell County, Kentucky.
Obs. Typical examples of *R. cooperensis* have been studied in Professor Hall's collection.
- Rhipidomella eminens** Hall. Lower Helderberg (Dev.).
Orthis eminens Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 42, figs. 1, 2;—Pal. New York, III, 1859, p. 167, pl. 11, figs. 7-14.
Rhipidomella eminens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 225.
Loc. Schoharie, Carlisle, etc., New York.
- Rhipidomella goodwini** (Nettelroth). Hamilton (Dev.).
Orthis goodwini Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 39, pl. 17, figs. 30-32.
Loc. Falls of Ohio.
- Rhipidomella hartti** (Rathbun). Middle Devonian.
Orthis hartti Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 23.
Loc. Province of Para, Brazil.
- Rhipidomella hybrida** (Sowerby). Niagara (Sil.).
Orthis hybrida Sowerby, Murchison's Silurian System, 1839, p. 630, pl. 13, fig. 11.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 105, fig. 7;—Pal. New York, II, 1852, p. 253, pl. 52, fig. 4.—Roemer, Die Silurische Fauna des West. Tennessee, 1860, p. 63, pl. 5, fig. 6.—Meek and Worthen, Geol. Survey Illinois, 1868, p. 371, pl. 7, fig. 7.—Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 149, pl. 21, figs. 18-25;—Eleventh Rep. State Geol. Indiana, 1882, p. 285, pl. 21, figs. 18-25;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36,

Rhipidomella hybrida (Sowerby)—Continued.

figs. 1-5.—Foerste, Bull. Denison Univ., I, 1885, p. 83, pl. 13, fig. 10.—Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 17, pl. 1, figs. 13-18.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 39, pl. 32, figs. 32-35.

Orthis hybrida? Hall, Trans. Albany Institute, IV, 1863, p. 209.

Rhipidomella hybrida Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 224, pl. 6, figs. 1-5.

Orthis (*Rhipidomella*) *hybrida* Foerste, Geol. Ohio, VII, 1895, p. 584, pl. 25, fig. 10. *Loc.* Europe; Lockport, etc., New York; Waldron, Indiana; Dayton, Ohio; Louisville, Kentucky; Perry County, Tennessee; Perry County, Missouri; Arisaig, Nova Scotia (Ami).

Rhipidomella idonea Hall.

Hamilton (Dev.).

Orthis idonea Hall, Pal. New York, IV, 1867, p. 52, pl. 63, figs. 1-5.

Rhipidomella idonea Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225. *Loc.* Moscow and Eighteen Mile Creek, New York.

Rhipidomella inca (d'Orbigny).

Devonian.

Orthis inca d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 38.

Spirifer inca d'Orbigny, Ibidem, 1842, pl. 2, figs. 10-12.

Loc. Cochabamba, Bolivia.

Rhipidomella leucosia Hall.

Hamilton (Dev.).

Orthis leucosia Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 80;—Pal. New York, IV, 1867, pp. 48, 63, pl. 7, fig. 4; pl. 8, figs. 9, 10;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, fig. 16.

Rhipidomella leucosia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225, pl. 6, fig. 16; pl. 6A, fig. 9.

Loc. Eighteen Mile Creek, Canandaigua Lake, etc., New York; Cumberland, Maryland.

Rhipidomella livia (Billings).

Corniferous (Dev.).

Orthis livia Billings, Canadian Journal, n. ser., V, 1860, p. 267, figs. 14-16;—Geol. Canada, 1863, p. 369, fig. 385.—Hall, Pal. New York, IV, 1867, p. 38, pl. 5, fig. 4.—Billings, Pal. Fossils, II, 1874, p. 32, figs. 14-16.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 40, pl. 16, figs. 23, 24; pl. 17, figs. 33-35.

Rhipidomella livia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. Walpole, Ontario; New York; Columbus, Ohio; Falls of Ohio; Indian Cove, Gaspé.

Rhipidomella lucia (Billings).

Oriskany (Dev.).

Orthis lucia Billings, Pal. Fossils, II, 1874, p. 35, pl. 3, fig. 4.

Rhipidomella lucia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. Indian Cove, Gaspé.

Rhipidomella media (Shaler).

Anticosti (Sil.).

Orthis media Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 65.—Billings, Catalogue Silurian Fossils of Anticosti, 1866, p. 41.

Loc. Anticosti.

Rhipidomella michelini (L'Éveillé).

Waverly (L. Carb.).

Terebratula michelini L'Éveillé, Mém. Société Géol. de France, II, 1835, p. 39, pl. 2, figs. 14-17.

Orthis michelini Yandell and Shumard, Cont. Geol. Kentucky, 1847, p. 21.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 116.

Orthis michelini? A. Winchell, Proc. American Philosophical Soc., XII, 1870, p. 251.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 19-21.

Rhipidomella michelini (L'Éveillé)—Continued.

Rhipidomella michelini Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 225, pl. 6A, fig. 12.

Loc. South of Louisville, and near Lebanon, Kentucky; Newark, Granville, etc., Ohio; Shafers, Pennsylvania; Lake Valley mining district, New Mexico.

Obs. It is probable that the American identifications of this species are the same as *R. oweni* Hall and Clarke.

Rhipidomella missouriensis (Swallow).

Chouteau (L. Carb.).

Orthis missouriensis Swallow (non Shumard, 1855), Trans. St. Louis Acad. Sci., I, 1860, p. 639.

Rhipidomella missouriensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225, pl. 6A, figs. 16, 17.

Loc. Cooper and Marion counties, Missouri.

Rhipidomella (?) *mitis* (Hall).

Schoharie (Dev.).

Orthis mitis Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 34;—Pal.

New York, IV, 1867, p. 37.

Loc. Albany and Schoharie counties, New York.

Rhipidomella musculosa Hall.

Oriskany (Dev.).

Orthis musculosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 46;—Pal. New York, III, 1859, p. 409, pl. 91, figs. 1-3; pl. 95, figs. 1-7.

Rhipidomella musculosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 190, 210, 225, pl. 6A, fig. 5.

Loc. Schoharie and Albany counties, New York; Cumberland, Maryland.

Rhipidomella nevadaensis (Meek).

Carboniferous.

Orthis michelini (non L'Éveillé) var. Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 63, pl. 7, fig. 1.

Orthis nevadensis Meek, *Ibidem*, 1877; end of description.

Rhipidomella nevadensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. White Pine district, Nevada.

Rhipidomella oblata Hall.

Lower Helderberg (Dev.).

Orthis oblata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 41, figs. 1-5;—Pal. New York, III, 1859, p. 162, pl. 10, figs. 1-22.—Whitfield, Geol. Wisconsin, IV, 1882, p. 320, pl. 25, figs. 1, 2.

Rhipidomella oblata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 225, pl. 6A, figs. 3, 4.

Loc. Schoharie, Carlisle, Hudson, etc., New York; Waunakee, Wisconsin.

Rhipidomella oblata emarginata (Hall).

Lower Helderberg (Dev.).

Orthis oblata var. *emarginata* Hall, Pal. New York, III, 1859, p. 164, pl. 10A, figs. 4-6.

Loc. Cumberland, Maryland.

Rhipidomella occasus Hall.

Kinderhook (L. Carb.).

Orthis occasus Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 111.

Rhipidomella occasus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. Rockford, Indiana.

Obs. Compare with *R. thiemei* White.

Rhipidomella oweni Hall and Clarke.

Waverly (L. Carb.).

Orthis (*Rhipidomella*) *oweni* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 342, pl. 6, figs. 19-21.

Loc. Buttonmould Knobs, south of Louisville, Kentucky.

Obs. See *R. michelini* L'Éveillé.

- Rhipidomella pecosi** (Marcou). Upper Carboniferous.
Orthis pecosi Marcou, Geol. N. America, February 1858, p. 48, pl. 6, fig. 14.—
 White, Wheeler's Expl. Survey west 100th Meridian, IV, 1875, p. 125, pl. 9,
 fig. 5.—Kayser, Riechthofen's China, IV, 1883, p. 177, pl. 24, fig. 1.—Waagen,
 Palæontologica Indica, Ser. XIII, I, 1884, p. 573, pl. 56, figs. 1-3.—White,
 Thirteenth Rep. State Geol. Indiana, 1884, p. 129, pl. 32, figs. 20-22.—Keyes,
 Geol. Survey Missouri, V, 1895, p. 64.—Smith, Proc. American Phil. Soc.,
 XXXV, 1897, p. 27 (extract).
Orthis carbonaria Swallow, Trans. St. Louis Acad. Sci., I, June, 1858, p. 218.—
 Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 173, pl. 1, fig. 8.—
 Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 571, pl. 25, fig. 4.—Hall,
 Second Ann. Rep. N. Y. State Geol., 1883, pl. 37, figs. 1-4.
Orthis sp. undet. Meek, Pal. California, I, 1864, p. 10, pl. 2, fig. 5.
Rhipidomella pecosi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210,
 226, pl. 7, figs. 1-4.
Loc. Throughout the Upper Carboniferous of North America; Lo-Ping, China;
 Amb, India.
- Rhipidomella peloris** Hall. Schoharie (Dev.).
Orthis peloris Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 32;—
 Pal. New York, IV, 1867, p. 34, pl. 4, figs. 1, 8-10.
Rhipidomella peloris Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225,
 pl. 6A, fig. 6.
Loc. Clarksville and Knox, New York.
Obs. Probably the same as *R. alsa* Hall.
- Rhipidomella penelope** Hall. Hamilton (Dev.).
Orthis penelope Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 79,
 figs. 1, 2;—Pal. New York, IV, 1867, p. 50, pl. 6, fig. 2;—Second Ann. Rep.
 N. Y. State Geol., 1883, pl. 36, figs. 6-13.
Rhipidomella penelope Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp.
 211, 225, pl. 6, figs. 6-13; pl. 6A, fig. 10 (? 11).
Loc. Hamburg, Alexander, Pavilion, York, Moscow, etc., New York.
- Rhipidomella penniana** (Derby). Upper Carboniferous.
Orthis penniana Derby, Bull. Cornell Univ., I, 1874, p. 26, pl. 5, figs. 13, 15, 17,
 19-22; pl. 8, fig. 2.
Rhipidomella penniana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp.
 210, 225, pl. 7, figs. 5-10.
Loc. Bomjardin and Itaituba, Brazil.
- Rhipidomella pennsylvanica** (Simpson). Chemung (Dev.).
Orthis pennsylvanica Simpson, Trans. American Philosophical Soc., n. ser., XVI,
 1889, p. 437, fig. 1.
Loc. Tioga and McKean counties, Pennsylvania.
- Rhipidomella rhynchonelliformis** (Shaler). Anticosti (Sil.).
Orthis rhynchonelliformis Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 66.—Bill-
 ings, Catalogue Sil. Foss. Anticosti, 1866, p. 42.
Loc. Anticosti.
Obs. Probably a variety of *Rhipidomella uberis* (Billings).
- Rhipidomella semele** Hall. Onondaga (Dev.).
Orthis semele Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 34;—Pal.
 New York, IV, 1867, p. 40, pl. 5, figs. 7, 8.
Rhipidomella semele Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.
Loc. Erie County, New York; Columbus, Ohio.

- Rhipidomella solitaria** Hall. Hamilton (Dev.).
Orthis solitaria Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 80;—Pal. New York, IV, 1867, p. 45, pl. 7, fig. 1.
Rhipidomella solitaria Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.
Loc. York, New York.
- Rhipidomella subcirculus** (Simpson). Clinton (Sil.).
Orthis subcircula Simpson, Trans. American Philosophical Soc., n. ser., XVI, 1889, p. 437, fig. 2.
Loc. Midlin and Huntington counties, Pennsylvania.
- Rhipidomella subelliptica** (White and Whitfield). Kinderhook (L. Carb.).
Orthis subelliptica White and Whitfield, Proc. Boston Soc. Nat. Hist., VIII, 1862, p. 292.
Rhipidomella subelliptica Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.
Loc. Burlington, Iowa.
- Rhipidomella suborbicularis** Hall. Hamilton (Dev.).
Orthis suborbicularis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 486, pl. 2, fig. 1.
Rhipidomella suborbicularis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.
Loc. Rock Island, Illinois.
- Rhipidomella thiemei** (White). Chemung (Dev.) and Kinderhook (L. Carb.).
Orthis thiemii, White, Jour. Boston Soc. Nat. Hist., VII, 1860, p. 231;—Twelfth Rep. Hayden's U. S. Geol. Survey Terr., 1883, p. 164, pl. 41, fig. 4.
Orthis thiemii? Hall, Pal. New York, IV, 1867, p. 63, pl. 8, fig. 2.
Rhipidomella thiemii Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225, pl. 6A, figs. 14, 15.
Loc. Burlington, Iowa; In the Chemung group at Leon, Napoli, and New Albion, New York.
- Rhipidomella tubulistriata** Hall. Lower Helderberg (Dev.).
Orthis tubulostriata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 42;—Pal. New York, III, 1859, p. 166, pl. 11, figs. 1-6.
Rhipidomella tubulostriata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 225.
Loc. Albany County, New York.
- Rhipidomella uberis** (Billings). Anticosti (Sil.).
Orthis æquivalvis Shaler (non Hall, 1847), Bull. Mus. Comp. Zool., 4, 1865, p. 66.
Orthis uberis Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 42.
Rhipidomella uberis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.
Loc. Anticosti.
Obs. See *Rhipidomella rhyntonelliformis* (Shaler).
- Rhipidomella vanuxemi** Hall. Corniferous-Hamilton (Dev.).
Orthis vanuxemi Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 135, figs. 1-7;—Geol. Survey Iowa, I, Pt. II, 1858, p. 487, pl. 2, figs. 2, 3.—Billings, Canadian Jour., V, 1860, p. 269.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 409.—Billings, Geol. Canada, 1863, p. 384, fig. 417.—Hall, Pal. New York, IV, 1867, pp. 40, 47, pl. 5, fig. 6; pl. 6, fig. 3;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 14, 15.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 45, pl. 16, figs. 4-6, 12-14.—Herrick, Geol. Ohio, VII, 1895, pl. 20, fig. 10.

Rhipidomella vanuxemi Hall—Continued.

Rhipidomella vanuxemi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225, pl. 6, figs. 14, 15; pl. 6A, figs. 7, 8.

Loc. New York; Columbus, Ohio; Falls of Ohio; Rock Island, Illinois; Buffalo, Iowa; Bosanquet, Ontario; Huron group, Port aux Barques, Michigan.

Rhipidomella vanuxemi pulchella (Herrick.) Waverly (L. Carb.).

Orthis vanuxemi var. *pulchella* Herrick, Bull. Denison Univ., III, 1888, p. 38, pl. 5, fig. 9.

Orthis vanuxemi var. *gracilis* Herrick, Geol. Ohio, VII, 1895, pl. 21, fig. 9.

Loc. Granville, Ohio.

RHYNCHONELLA Fischer de Waldheim. Genotype *R. loxia* Fischer de Waldheim.

Rhynchonella Fischer de Waldheim, Notice des Fos. Gouv. Moscon, 1809, p. 35, tab. II, figs. 5, 6.—Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 65.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 70.—Hall, Pal. New York, IV, 1867, p. 332;—Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 269.—Dall, American Jour. Conch., VI, 1870, p. 151;—*Ibidem*, VII, 1871, p. 70.—Billings, Pal. Fossils, II, 1874, p. 35.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 72.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 177, 178;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 822.

Rhynchonella ænigma (d'Orbigny). Jurassic.

Terebratula ænigma d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 62, pl. 22, figs. 10-13.

Terebratula concinna (non Sowerby) Bayle and Coquand, Mém. Soc. Géol. France, ser. ii, IV, 1851, p. 23, pl. 8, figs. 4-6.

Rhynchonella ænigma Gottsche, Palæontographica, Suppl., III, 1878, p. 34.

Rhynchonella cfr. *ænigma* Steinman. Neues Jahrb. f. Min., Beilageband, 1881, p. 253.

Loc. Guasco, Coquimbo, Dona Ana, Chile; Copiapo, Caracoles, and Iquique, Peru.

Rhynchonella æquiplicata Gabb. Triassic.

Rhynchonella æquiplicata Gabb, Geol. Survey California, Pal., I, 1864, p. 35, pl. 6, fig. 37.

Loc. Cinnabar district, Humboldt Mountain, Nevada.

Rhynchonella æquiradiata Miller = *Camarotoechia æquiradiata*.

Rhynchonella æquivalvis Hall = *Lissopleura æquivalvis*.

Rhynchonella abrupta Hall = *Uncinulus abruptus*.

Rhynchonella acadiaensis Davidson. Upper Carboniferous.

Rhynchonella acadiaensis Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 172, pl. 9, fig. 16.—Dawson, Acadian Geol., 3d ed., 1878, p. 294, fig. 94.

Loc. Brookfield, Nova Scotia.

Rhynchonella acinus Hall = *Camarotoechia acinus*.

Rhynchonella acinus convexa Foerste = *Camarotoechia acinus convexa*.

Rhynchonella acutiplicata Hall. Lower Helderberg (Dev.).

Rhynchonella acutiplicata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 73, fig. 7;—Pal. New York, III, 1859, p. 232, pl. 33, fig. 3.

Loc. Schoharie, New York.

- Rhynchonella (?) acutirostris** Hall. Chazy (Ord.).
Atrypa acutirostra Hall, Pal. New York, I, 1847, p. 21, pl. 4 bis, fig. 6.
Rhynchonella acutirostris Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 65.
Loc. Chazy, New York.
Obs. This species is referred to *Zygospira* by Whitfield.
- Rhynchonella ainsliei** Winchell=*Rhynchotrema ainsliei*.
- Rhynchonella algeri** McChesney. Upper Carboniferous.
Rhynchonella algeri McChesney, New Pal. Fossils, 1860, p. 51.
Loc. Near New Harmony, Indiana.
- Rhynchonella allegania** Williams. Chemung (Dev.).
Rhynchonella allegania Williams, Bull. U. S. Geol. Survey, 41, 1887, p. 87, pl. 4, figs. 1-8.
Loc. Olean and Little Genesee, New York; Bradford, Pennsylvania.
- Rhynchonella alta** Calvin=*Pugnax pugnax alta*.
- Rhynchonella altilis** Hall=*Camarotoechia plena*.
- Rhynchonella altiplicata** Hall. Lower Helderberg (Dev.).
Rhynchonella altiplicata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 72, figs. 1-4;—Pal. New York, III, 1859, p. 231, pl. 33, fig. 2.
Loc. Albany and Schoharie counties, New York.
- Rhynchonella alveata** Hall=*Centronella alveata*.
- Rhynchonella ambigua** Calvin. Middle Devonian.
Rhynchonella ambigua Calvin, Bull. U. S. Geol. and Geogr. Survey Terr., IV, 1878, p. 729.
Loc. Independence, Iowa.
- Rhynchonella anduin** Gottsche. Jurassic.
Terebratulna enigma (non d'Orb.) Darwin, Geol. Observations South America, 1846, pp. 215, 233, pl. 5, figs. 10-12.—Burmeister and Giebel, Abh. Naturf. Gessel. Halle, VI, 1862, p. 128.
Terebratulna subtetrada (non Davidson) Conrad, U. S. Astronomical Exped. Southern Hemisphere, 1855, p. 282, pl. 42, fig. 8.
Rhynchonella anduin Gottsche, Palæontographica, Suppl., III, 1878, p. 34, pl. 4, figs. 4-7.
Loc. Iquique, Portezuelo de Manflas, and Cordillera de Dona Ana, Chile.
- Rhynchonella angulata** Geinitz (non Linné)=*Eteletes hemiplicatus*.
- Rhynchonella (?) anticostiensis** Billings. Lorraine (Ord.).
Rhynchonella anticostiensis Billings, Pal. Fossils, I, 1862, p. 142, fig. 119;—Geol. Canada, 1863, p. 211, fig. 212.
Rhynchonella (?) anticostiensis Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 464, fig. 34.
Rhynchonella anticostiensis var. *Whiteaves*, Pal. Foss., III, Pt. III, 1897, p. 179.
Loc. Anticosti; Wilmington and Savanna, Illinois; Lattuers, Iowa; Wisconsin; Manitoba.
Obs. Compare with *R. argenturbica* White.
- Rhynchonella (?) antisienensis** (d'Orbigny). Lower Devonian.
Terebratulna antisienensis d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 36, pl. 2, figs. 26-28.
 ? *Rhynchonella* cf. *antisienensis* A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 57, pl. 4, figs. 1-7.
Loc. Cochabamba, Tarabuco, Bolivia.

- Rhynchonella antonii Gabb.** ? Cretaceous.
Rhynchonella antonii Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., IV, 1881, p. 299, pl. 42, fig. 10.
Loc. Cerro de San Antonio, and near Chota, Peru.
- Rhynchonella arctirostrata Swallow.** St. Louis (L. Carb.).
Rhynchonella arctirostrata Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 84.
Loc. Cooper County, Missouri.
Obs. Regarded by Keyes as a synonym for *R. subcuneata* = *Camarophoria subcuneata*.
- Rhynchonella (?) argentea Billings.** Anticosti (Sil.).
Rhynchonella ? argentea Billings, Catalogue Silurian Fossils Anticosti, 1866, p. 43.
Loc. Anticosti.
- Rhynchonella argenturbica White** = *Rhynchotreta inaequalvis*.
- Rhynchonella aspasia Billings.** Lower Helderberg (Dev.).
Rhynchonella aspasia Billings, Proc. Portland Soc. Nat. Hist., I, 1863, p. 111, pl. 3, fig. 6.
Loc. Square Lake, Maine.
- Rhynchonella barquensis A. Winchell.** Marshall (L. Carb.).
Rhynchonella barquensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 408.
Loc. Port aux Barques, Michigan.
- Rhynchonella barrandi Hall** = *Camarotœchia barrandei*.
- Rhynchonella (?) belliformis Nettelroth.** Niagara (Sil.).
Rhynchonella bellaforma Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 73.
Loc. Louisville, Kentucky.
- Rhynchonella belemnitica Quenstedt.** Jurassic.
Rhynchonella belemnitica (Quenst.) Moricke, N. Jahrb. f. Mineral., Beilageband, IX, 1894, p. 61.
 For locality and observations see *R. plicatissima*.
- Rhynchonella bialveata Hall.** Lower Helderberg (Dev.).
Rhynchonella ? bialveata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 73;—Pal. New York, III, 1859, p. 233, pl. 34, figs. 1-4.
Loc. Albany County, New York; Square Lake, Maine.
- Rhynchonella (?) bidens Hall.** Clinton (Sil.).
Atrypa bidens Hall, Pal. New York, II, 1852, p. 69, pl. 23, fig. 3.
Rhynchonella bidens Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.
Loc. Lockport, New York.
- Rhynchonella (?) bidentata (Hisinger).** Niagara (Sil.).
Terebratula bidentata Hisinger, Kongl. Svenska Vet.-Akad. Handl., för 1825, 1826, p. 343, pl. 7, fig. 5.
Atrypa bidentata Hall, Pal. New York, II, 1852, p. 276, pl. 57, fig. 3.
Rhynchonella bidentata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.
Loc. Lockport, New York.
- Rhynchonella billingsi Hall** = *Camarotœchia billingsi*.
- Rhynchonella boeensis Shumard** = *Leiorhynchus boeense*.
- Rhynchonella brevirostris Billings** = *Anastrophia brevirostris*.

- Rhynchonella camerifera** A. Winchell. Marshall (L. Carb.).
Rhynchonella camerifera A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862,
 p. 408.
Loc. Port aux Barques, Michigan.
- Rhynchonella campbellana** Hall=*Uncinulus campbellanus*.
Rhynchonella camura Hall=*Trematospira camura*.
Rhynchonella capax Hall=*Rhynchotrema capax*.
Rhynchonella caput-testudinis White=*Camarophoria caput-testudinis*.
- Rhynchonella caracolensis** Gottsche. Jurassic.
Rhynchonella caracolensis Gottsche, Palaeontographica, Suppl., III, 1878, p. 44,
 pl. 4, fig. 8.—Steinman, Neues Jahrb. f. Mineral., Beilageband, 1881, p. 253.—
 Möricke, Ibidem, Beilageband, IX, 1894, p. 61.
Loc. Iquique, Chile; Caracoles, Bolivia.
- Rhynchonella carbonaria** McChesney. Upper Carboniferous.
Rhynchonella carbonaria McChesney, New Pal. Fossils, 1860, p. 51.
Loc. Near Farmington, Illinois.
- Rhynchonella carica** Hall=*Camarotœchia carica*.
Rhynchonella carolina Hall=*Camarotœchia carolina*.
Rhynchonella castanea Meek=*Hypothyris castanea*.
Rhynchonella congregata Hall=*Camarotœchia congregata*.
Rhynchonella contracta Hall=*Camarotœchia contracta*.
Rhynchonella contracta var. *saxatilis* Hall=*Camarotœchia contracta*
saxatilis.
- Rhynchonella colletti** Miller. Niagara (Sil.).
Rhynchonella colletti Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894,
 p. 311, pl. 9, figs. 8, 9.
Loc. Wabash, Indiana.
- Rhynchonella cooperensis** Shumard. Kinderhook (L. Carb.).
Rhynchonella cooperensis Shumard, Geol. Rep. Missouri, 1855, p. 204, pl. C,
 fig. 4.
 ?*Camarophoria cooperensis* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 224,
 pl. 18, fig. 6.
Loc. Cooper County, Missouri; Eureka district, Nevada.
- Rhynchonella (?) corinthia** Billings. Calciferous (Ord.).
Rhynchonella corinthia Billings, Pal. Fossils, I, 1865, p. 220.
Loc. Table Head, Newfoundland.
- Rhynchonella cuneata** Billings, and Hall=*Rhynchotrema cuneata*
americana.
Rhynchonella dawsoniana Davidson=*Pugnax dawsoniana*.
- Rhynchonella (?) decemplicata** Sowerby. Clinton (Sil.).
Rhynchonella decemplicata Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890,
 p. 320, pl. 6, figs. 23, 24.
Loc. England; Cumberland Gap, Tennessee.
- Rhynchonella dentata** Hall=*Rhynchotrema dentatum*.
Rhynchonella dotis Hall=*Camarotœchia dotis*.
- Rhynchonella dryope** Billings. Oriskany (Dev.).
Rhynchonella dryope Billings, Pal. Fossils, II, 1874, p. 37, pl. 3A, fig. 1.
Loc. Grand Greve, Gaspé.

- Rhynchonella dubia* Hall = *Protorhyncha dubia*.
Rhynchonella duplicata Hall = *Camarotæchia duplicata*.
Rhynchonella eatoniæformis McChesney = *Pugnax rockymontana*.
***Rhynchonella emacerata* Hall.** Clinton (Sil.).
Atrypa emacerata Hall, Pal. New York, II, 1852, p. 71, pl. 23, fig. 6.—Dawson, *Acadian Geology*, 3d ed., 1878, p. 599.
Rhynchonella emacerata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.
Loc. Sodus and Rochester, New York; Arisaig, Nova Scotia.
- Rhynchonella eminens* Hall.** Lower Helderberg (Dev.).
Rhynchonella eminens Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 78;—Pal. New York, III, 1859, p. 237, pl. 37, figs. 3, 4.
Loc. Albany County, New York.
- Rhynchonella emmonsii* Hall and Whitfield = *Hypothyris emmonsii*.
Rhynchonella endlichi Meek = *Camarotæchia endlichi*.
***Rhynchonella ererensis* Rathbun.** Middle Devonian.
Rhynchonella ererensis Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 32.
Loc. Erere, Province of Para, Brazil.
- Rhynchonella eurekaensis* Walcott.** Lower Carboniferous.
Rhynchonella eurekensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 223, pl. 18, fig. 8.
Loc. Eureka district, Nevada.
- Rhynchonella* (?) *eva* Billings.** Anticosti (Sil.).
Rhynchonella eva Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 41.
Loc. Anticosti.
- Rhynchonella evangelina* Hartt.** Upper Carboniferous.
Rhynchonella evangelina Hartt, Dawson's *Acadian Geology*, 3d ed., 1878, p. 299.
Loc. Windsor, Nova Scotia.
Obs. Compare with *Pugnax pugnax* as identified by Davidson, from the same locality.
- Rhynchonella excellens* Billings.** Oriskany (Dev.).
Rhynchonella excellens Billings, Pal. Fossils, II, 1874, p. 36, figs. 17, 18.
Loc. Indian Cove, Gaspé.
- Rhynchonella eximia* Hall = *Camarotæchia eximia*.
Rhynchonella explanata McChesney = *Camarophoria explanata*.
***Rhynchonella fitchana* Hall.** Oriskany (Dev.).
Rhynchonella fitchana Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 85;—Pal. New York, III, 1859, p. 441, pl. 103, fig. 1.
Loc. Carlisle, New York.
- Rhynchonella formosa* Hall = *Rhynchotrema formosum*.
Rhynchonella fringilla Billings = *Camarotæchia fringilla*.
***Rhynchonella gainesi* Nettelroth.** Hamilton (Dev.).
Rhynchonella gainesi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geological Survey, 1889, p. 76, pl. 31, figs. 6-9.
Loc. Jefferson County, Kentucky.
- Rhynchonella glacialis* Billings = *Camarotæchia glacialis*.
Rhynchonella glansfagea Hall = *Centronella glansfagea*.

- Rhynchonella gnathophora** Meek. Jurassic.
Rhynchonella gnathophora Meek, Geol. Survey California, Pal., I, 1864, p. 39, pl. 8, fig. 1.
Rhynchonella gnathophora? Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 284, pl. 7, fig. 6.
Loc. Plumas County, California; Uinta Range, Utah.
- Rhynchonella greenana** Ulrich = *Leiorhynchus greeneanum*.
- Rhynchonella guadalupæ** Shumard. Upper Carboniferous.
Rhynchonella guadalupæ Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 295, pl. 11, fig. 6.
Loc. Guadalupe Mountains, New Mexico and Texas.
- Rhynchonella halli** Gabb. Triassic.
Rhynchonella halli Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., IV, 1860, p. 308, pl. 48, fig. 29.
Loc. Bath County, Virginia.
- Rhynchonella heteropsis** A. Winchell. Kinderhook (L. Carb.).
Rhynchonella heteropsis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 121.
Loc. Burlington, Iowa; Hamburg, Illinois; Medina County, Ohio.
- Rhynchonella horsfordi** Hall = *Camarotoëchia horsfordi*.
- Rhynchonella hubbardi** A. Winchell. Marshall (L. Carb.).
Rhynchonella hubbardi A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 407;—*Ibidem*, 1865, p. 122.
Loc. Marshall and Port aux Barques, Michigan; Summit County, Ohio.
- Rhynchonella huronensis** A. Winchell. Huron (Dev.).
Rhynchonella huronensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 409.
Loc. Port aux Barques, Michigan.
- Rhynchonella huronensis precipua** A. Winchell. Huron (Dev.).
Rhynchonella huronensis var. *precipua* A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 409.
Loc. Port aux Barques, Michigan.
- Rhynchonella (?) hydraulica** Whitfield. Waterlime (Sil.).
Rhynchonella hydraulica Whitfield, Annals N. Y. Acad. Sci., II, 1882, p. 194;—*Ibidem*, V, 1891, p. 512, pl. 5, fig. 17;—Geol. Ohio, VII, 1895, p. 414, pl. 1, fig. 17.
Loc. Greenfield, Ohio.
- Rhynchonella ida** Hartt. Upper Carboniferous.
Rhynchonella ida Hartt, Dawson's Acadian Geology, 3d ed., 1878, p. 298.
Loc. Windsor, Nova Scotia.
- Rhynchonella illinoisensis** Worthen. Upper Carboniferous.
Rhynchonella illinoisensis Worthen, Bull. Illinois State Mus. Nat. Hist., 2, 1884, p. 24;—Geol. Survey Illinois, VIII, 1890, p. 104, pl. 11, fig. 3.
Loc. Peoria, Illinois.
- Rhynchonella increbescens** Hall, 1860 (non 1847) = *Rhynchotrema capax*.
- Rhynchonella increbescens** Hall = *Rhynchotrema inæquivalve*.
- Rhynchonella indentata** Shumard. Upper Carboniferous.
Rhynchonella indentata Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 393.
Loc. Guadalupe Mountains, New Mexico.
- Rhynchonella indianensis** Hall = *Camarotoëchia indianaensis*.

- Rhynchonella inæquuplicata** Hall. Upper Helderberg (Dev.).
Rhynchonella inequuplicata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 126.
Loc. "Western New York."
- Rhynchonella intermedia** Barris=*Hypothyris emmonsii*.
- Rhynchonella inutilis** Hall. Lower Helderberg (Dev.).
Rhynchonella inutilis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 74;—
 Pal. New York, III, 1859, p. 223, pl. 34, figs. 7, 8.
Loc. Albany County, New York.
- Rhynchonella (?) janea** Billings. Lorraine and Anticosti (Ord. and Sil.).
Rhynchonella janea Billings, Catalogue Sil. Fossils Anticosti, 1866, p. 43.—
 Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 316, pl. 5, figs. 23, 24.
Loc. Anticosti; Collinsville, Alabama.
- Rhynchonella kokomoensis** Miller=*Wilsonia kokomoensis*.
- Rhynchonella lacunosa** (Schlotheim). Jurassic.
Terebratulites lacunosa Schlotheim, Leonhardt's Min. Taschen., VII, 1813, pl. 1, fig. 2.
Rhynchonella lacunosa Davidson, British Oolitic and Liassic Brach., Pal. Soc., 1852, p. 96, pl. 16, figs. 13, 14.—Aguilera, Datos para la Geologia de Mexico, 1893, p. 18;—Bol. Com. Geológica de Mexico, I, 1895, p. 1, pl. 1, figs. 1-13.
Loc. Europe; Rancho Alamitos, Sierra de Catorce, Mexico.
- Rhynchonella lacunosa arolica** Oppel. Jurassic.
Rhynchonella lacunosa var. *arolica* Aguilera, Datos para la Geologia de Mexico, 1893, p. 18;—Bol. Com. Geológica de Mexico, I, 1895, p. 1, pl. 1, figs. 14-25; pl. 2, figs. 1, 2.
Loc. Europe; Rancho Alamitos, Sierra de Catorce, Mexico.
- Rhynchonella lævis** Simpson. Clinton (Sil.).
Rhynchonella (*Stenochisma*) *lævis* Simpson, Trans. American Philosophical Soc., n. ser., XVI, 1889, p. 443, fig. 8.
Loc. Blair County, Pennsylvania.
- Rhynchonella (?) lamellata** Hall. Coralline (Sil.).
Atrypa lamellata Hall, Pal. New York, II, 1852, p. 329, pl. 74, fig. 11.
Rhynchonella lamellata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.
Loc. Schoharie, New York.
- Rhynchonella laura** Billings=*Leiorhynchus laura*.
- Rhynchonella lingulata** Gabb. Triassic.
Rhynchonella lingulata Gabb, Geol. Survey California, Pal., I, 1864, p. 34, pl. 6, fig. 36.
Loc. Humboldt County, Nevada.
- Rhynchonella louisvillensis** Nettelroth. Corniferous (Dev.).
Rhynchonella louisvillensis Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 77, pl. 31, figs. 1-4.
Loc. Falls of Ohio.
- Rhynchonella macra** Hall. St. Louis (L. Carb.).
Rhynchonella macra Hall, Trans. Albany Institute, IV, 1858, p. 11.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 52, pl. 6, figs. 40-42.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 334, pl. 29, figs. 40-42.
Loc. Alton, Illinois.

- Rhynchonella mainensis** Billings. Lower Helderberg (Dev.).
Rhynchonella mainensis Billings, Proc. Portland Soc. Nat. Hist., I, 1863, p. 110,
 pl. 3, fig. 4.
Loc. Square Lake, Maine.
- Rhynchonella manflasensis** Mörricke. Jurassic.
Rhynchonella manflasensis Mörricke, Neues Jahrb. f. Mineral., Beilageband, IX,
 1894, p. 62, pl. 5, figs. 7a-7c.
Loc. Manflas and Melon, Chile.
- Rhynchonella mansoni** Salter=*Atrypa mansonii*.
- Rhynchonella marshallensis** A. Winchell=*Camarotoechia marshallensis*.
- Rhynchonella maugensis** Whiteaves. Cretaceous.
Rhynchonella maugensis Whiteaves, Mesozoic Fossils, Geol. Surv. Canada, I,
 1884, p. 252, pl. 33, fig. 8.
Loc. Maud Island.
- Rhynchonella medea** Billings. Corniferous (Dev.).
Rhynchonella medea Billings, Canadian Jour., n. ser., V, 1860, p. 271;—Geol.
 Canada, 1863, p. 370, fig. 388.
Loc. Township of Rainham, Ontario.
- Rhynchonella medialis** Simpson. Waverly (L. Carb.).
Rhynchonella medialis Simpson, Trans. American Philosophical Soc., n. ser.,
 XVI, 1889, p. 444, fig. 9.
Loc. Warren, Pennsylvania.
- Rhynchonella (?) metallica** White. Upper Carboniferous.
Rhynchonella metallica White, Wheeler's Expl. and Survey west 100th Merid.,
 Prel. Rep., 1874, p. 20;—*Ibidem*, Final Rep., IV, 1875, p. 129, pl. 10, fig. 10.
Loc. Lincoln County, Nevada.
Obs. Probably an *Uncinulus*.
- Rhynchonella mica** Billings=*Zygospira mica*.
- Rhynchonella (?) micropoleura** A. Winchell. Marshall (L. Carb.).
Rhynchonella (*Retzia*?) *micropoleura* A. Winchell, Proc. Acad. Nat. Sci. Phila-
 delphia, 1865, p. 122.
Loc. Battlecreek, Michigan.
- Rhynchonella minnesotensis** Sardeson=*Rhynchotrema inæquivalvis*.
- Rhynchonella missouriensis** Shumard, fig. 5a (non 5b, 5c)=*Pugnax*
pugnax missouriensis.
- Rhynchonella missouriensis** Shumard, figs. 5b, 5c (non 5a)=*Pugnax*
striaticostata.
- Rhynchonella multistriata** Hall. Oriskany (Dev.).
Rhynchonella multistriata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857,
 p. 85;—Pal. New York, III, 1859, p. 440, pl. 102, fig. 3; pl. 106, fig. 3.
Loc. Helderberg Mountains, New York.
- Rhynchonella mutabilis** Hall=*Uncinulus mutabilis*.
- Rhynchonella mutata** Hall=*Pugnax mutata*.
- Rhynchonella myrina** Hall and Whitfield. Jurassic.
Rhynchonella species? Meek and Hayden, Smithsonian Cont. to Knowl., XIV,
 172, 1865, p. 71, pl. 4, fig. 3.
Rhynchonella myrina Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl.,
 IV, 1877, p. 284, pl. 7, figs. 1-5.—Whitfield, Powell's Geol. Geogr. Survey
 Rocky Mountain Region, 1880, p. 347, pl. 3, figs. 6, 7.
Loc. Uinta Range, Utah; Black Hills, Dakota.

- Rhynchonella neenah** Whitfield. Lorraine (Ord.).
Rhynchonella neenah Whitfield, Geol. Wisconsin, IV, 1882, p. 265, pl. 12, figs. 19-22.
Rhynchonella (?) *neenah* Winchell and Schuchert, Geol. Survey Minnesota, III, 1893, p. 465, pl. 34, figs. 35-37.
Loc. Ironridge, Clifton, etc., Wisconsin; Savanna, Illinois; Lattners, Iowa.
- Rhynchonella neglecta* Hall = *Camarotæchia neglecta*.
Rhynchonella neglecta var. *scobina* Meek = *Camarotæchia neglecta*.
Rhynchonella nitens Dana = *Terebratula nitens*.
Rhynchonella nobilis Hall = *Uncinulus nobilis*.
Rhynchonella nucleolata Hall = *Uncinulus nucleolatus*.
- Rhynchonella nucula** (Sowerby). Silurian.
Terebratula nucula Sowerby, Murchison's Silurian System, 1839, pl. 5, fig. 20.
Rhynchonella nucula Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 595.
Loc. England; Bessels Bay, lat. 81° 6'.
- Rhynchonella nutrix** Billings. Anticosti (Sil.).
Rhynchonella nutrix Billings, Catalogue Silurian Fossils Anticosti, 1866, p. 43.
Loc. Anticosti.
- Rhynchonella oblata** Hall. Oriskany (Dev.).
Rhynchonella oblata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 86;—
 Pal. New York, III, 1859, p. 439, pl. 102, figs. 1, 2.
Loc. Albany and Schoharie counties, New York.
- Rhynchonella obsolescens** Hall. Kinderhook (L. Carb.).
Rhynchonella (*Eatonia*) *obsolescens* Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 111.
Loc. Rockford, Indiana.
- Rhynchonella obtusiplicata* Hall = *Camarotæchia obtusiplicata*.
- Rhynchonella occidentens** Walcott. Lower Devonian.
Rhynchonella occidentens Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 152, pl. 15, fig. 3.
Loc. Eureka district, Nevada.
- Rhynchonella opposita** White and Whitfield. Kinderhook (L. Carb.).
Rhynchonella opposita White and Whitfield, Proc. Boston Soc. Nat. Hist., VIII, 1862, p. 294.
Loc. Burlington, Iowa.
- Rhynchonella orbicularis* Hall = *Camarotæchia orbicularis*.
- Rhynchonella orientalis** Billings. Chazy (Ord.).
Rhynchonella orientalis Billings, Canadian Nat. Geol., IV, 1859, p. 443, fig. 21;—
 Geol. Canada, 1863, p. 126, fig. 51.
Loc. Mingan Island.
- Rhynchonella osagensis* Swallow = *Pugnax utah*.
Rhynchonella ottumwa White = *Pugnax ottumwa*.
Rhynchonella parvini McChesney = *Camarophoria subtrigona*.
Rhynchonella perlamellosa Whitfield = *Rhynchotrema perlamellosum*.
- Rhynchonella perrostellata** Swallow. St. Louis (L. Carb.).
Rhynchonella perrostellata Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 85.
Loc. Cooper County, Missouri.

- Rhynchonella persinuata** A. Winchell. Kinderhook (L. Carb.).
Rhynchonella persinuata A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 121.
Loc. Burlington, Iowa.
- Rhynchonella phoca** Salter=*Atrypa phoca*.
- Rhynchonella pipira** Derby. Upper Carboniferous.
Rhynchonella pipira Derby, Bull. Cornell Univ., I, 1874, p. 24, pl. 3, figs. 18, 23, 25, 26, 31.
Loc. Bomjardim and Itaituba, Brazil.
- Rhynchonella pisa** Hall and Whitfield. Niagara (Sil.).
Rhynchonella pisa Hall and Whitfield, Pal. Ohio, II, 1875, p. 135, pl. 7, figs. 18-22.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geological Survey, 1883, p. 78, pl. 32, figs. 24-27.
Loc. Highland County, Ohio; Louisville, Kentucky.
- Rhynchonella planiconvexa** Hall. Lower Helderberg (Dev.).
Rhynchonella planoconvexa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 75;—Pal. New York, III, 1859, p. 235, pl. 34, fig. 22.
Loc. Albany County, New York.
- Rhynchonella plena** Hall=*Camarotoechia plena*.
- Rhynchonella pleiopleura** Hall=*Camarotoechia pleiopleura*.
- Rhynchonella pleurodon** (Phillips). Upper Carboniferous.
Terebratula pleurodon Phillips, Geol. Yorkshire, II, 1836, p. 222, pl. 12, figs. 25-30.
Rhynchonella pleurodon Davidson, Mon. British Carb. Brach., 1860, p. 101, pl. 23, figs. 1-15.—Toula, Sitzungsber. der k. k. Akad. zu Wien, LIX, 1869, p. 7, pl. 1, fig. 6.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 632.
Loc. Europe; "Common in the Carboniferous rocks of America," Davidson; Bolivia; Feilden Isthmus, lat. 82° 43'.
Obs. Compare with *Pugnax utah* (Marcou).
- Rhynchonella plicata** Hall. Medina (Sil.).
Atrypa plicata Hall, Pal. New York, II, 1852, p. 10, pl. 4, fig. 6.
Rhynchonella plicata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.
Loc. Lockport, New York.
- Rhynchonella plicatella** (Linné). Niagara (Sil.).
Atrypa plicatella? Hall, Pal. New York, II, 1852, p. 279, pl. 58, figs. 3, 4.
Rhynchonella plicatella Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.
Atrypa plicatella Miller, N. American Geol. Pal., 1889, p. 337.
Loc. Europe; Wolcott, New York.
- Rhynchonella plicatilis** (Sowerby). Cretaceous.
Terebratula plicatella Sowerby, Mineral Conch., V, 1825, p. 167, tab. 503, fig. 1.
Rhynchonella plicatilis Davidson, British Cretaceous Brach., Pal. Soc., I, 1852, p. 75, pl. 10, figs. 37, 42.—Eichwald, Geog. Paleont. Bemerk. Halb. Mang. Aleutischen Inseln, 1871, p. 200.
Loc. England; Alaska.
- Rhynchonella plicatissima** Quenstedt. Jurassic.
Rhynchonella plicatissima (Quenst.) Mörücke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 61.
Loc. Sierra de la Ternera, Coquimbo, Guasco, and Copiapo, Chile.
Obs. Mörücke says that *Terebratula ænigma* Forbes in great part belong to this species and *R. belemnitica*.

Rhynchonella plicifera Hall=*Camarotœchia plena*.

Rhynchonella principalis Hall.

Oriskany (Dev.).

Rhynchonella principalis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 84;—Pal. New York, III, 1859, p. 443, pl. 106, fig. 4.

Loc. Auburn, New York.

Rhynchonella prolifica Hall=*Camarotœchia prolifica*.

Rhynchonella pugnus of authors=*Pugnax pugnus*.

Rhynchonella pustulosa White=*Rhynchopora pustulosa*.

Rhynchonella pyramidata Hall=*Uncinulus pyramidatus*.

Rhynchonella pyrrrha Billings.

Anticosti (Sil.).

Rhynchonella pyrrrha Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 44.

Loc. Anticosti.

Rhynchonella ramsayi Hall.

Oriskany (Dev.).

Rhynchonella ramsayi Hall, Pal. New York, III, 1859, p. 446, pl. 101A, figs. 7, 8.

Loc. Cumberland, Maryland.

Rhynchonella (?) *raricosta* Whitfield.

Corniferous (Dev.).

Rhynchonella ? *raricosta* Whitfield, Annals N. Y. Acad. Sci., II, 1882, p. 201;—*Ibidem*, V, 1891, p. 522, pl. 6, fig. 6;—Geol. Ohio, VII, 1895, p. 421, pl. 2, fig. 6.

Loc. Columbus, Ohio.

Rhynchonella reticulata Hall=*Dictyonella reticulata*.

Rhynchonella ricinula Hall.

St. Louis (L. Carb.).

Rhynchonella ricinula Hall, Trans Albany Institute, IV, 1858, p. 9.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 53, pl. 6, fig. 46.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 330, pl. 29, fig. 46.

Loc. Spergen Hill, Indiana.

Rhynchonella ringens Swallow=*Camarophoria ringens*.

Rhynchonella robusta Hall.

Clinton (Sil.).

Atrypa robusta Hall, Pal. New York, II, 1852, p. 71, pl. 23, fig. 7.

Rhynchonella robusta Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Loc. Lockport, New York.

Rhynchonella rockymontana Marcou=*Pugnax rockymontana*.

Rhynchonella royana Hall.

Corniferous (Dev.).

Rhynchonella ? (*Stenocisma* ?) *royana* Hall, Pal. New York, IV, 1867, p. 338, pl. 54, figs. 20-23.

Loc. Near Leroy, New York.

Rhynchonella rudis Hall.

Lower Helderberg (Dev.).

Rhynchonella rudis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 75;—Pal. New York, III, 1859, p. 235, pl. 34, figs. 20, 21.

Loc. Hudson, New York.

Rhynchonella rugicosta Nettelroth.

Niagara (Sil.).

Rhynchonella rugicosta Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 78, pl. 32, figs. 48-51.

Loc. Louisville, Kentucky.

Rhynchonella saffordi Hall=*Wilsonia saffordi*.

Rhynchonella saffordi var. *depressa*=*Wilsonia saffordi depressa*.

Rhynchonella sageriana A. Winchell=*Camarotœchia sageriana*.

Rhynchonella sancta Sardeson=*Rhynchotrema inaequivalve laticostatum*.

Rhynchonella sappho Hall=*Camarotœchia sappho*.

- Rhynchonella schucherti** Stanton. Upper Cretaceous (Knoxville).
Rhynchonella schucherti Stanton, Bull. U. S. Geol. Survey, 133, 1896, p. 31, pl. 1, figs. 1-4.
Loc. Paskenta, California.
- Rhynchonella scobina** Meek = *Camarotoechia neglecta*.
- Rhynchonella semiplicata** (Conrad). Lower Helderberg (Dev.).
Atrypa semiplicata Conrad, Fifth Ann. Rep. Geol. Survey N. Y., 1841, p. 56.
Rhynchonella semiplicata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 65, figs. 1, 2;—Pal. New York, III, 1859, p. 224, pl. 29, fig. 1.
Loc. Schoharie and Carlisle, New York.
- Rhynchonella septata** Hall. Oriskany (Dev.).
Rhynchonella septata Hall, Pal. New York, III, 1859, p. 443, pl. 103, fig. 2.
Loc. Albany County, New York.
- Rhynchonella sordida** Hall. Trenton (Ord.).
Atrypa sordida Hall, Pal. New York, I, 1847, p. 148, pl. 33, fig. 16.
Rhynchonella sordida Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.
Loc. Not given.
- Rhynchonella speciosa** Hall = *Camarotoechia speciosa*.
- Rhynchonella stephani** Hall = *Camarotoechia stephani*.
- Rhynchonella (?) striata** Simpson. Waverly (L. Carb.).
Rhynchonella striata Simpson, Trans. American Phil. Soc., n. ser., XVI, 1889, p. 444, fig. 10.
Loc. Near Warren, Pennsylvania.
Obs. Compare with *Camarophoria ringens* and *C. caput-testudinis*.
- Rhynchonella striatocostata** Meek and Worthen = *Pugnax striaticostata*.
- Rhynchonella stricklandi** Sowerby = *Uncinulus stricklandi*.
- Rhynchonella subacuminata** Webster. Chemung (Dev.).
Rhynchonella subacuminata Webster, American Naturalist, XXII, 1888, p. 1015.
Loc. Near Rockford, Iowa.
- Rhynchonella subcircularis** A. Winchell. Marshall (L. Carb.).
Rhynchonella subcircularis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 408.
Loc. Port aux Barques, Michigan.
- Rhynchonella subcuneata** Hall = *Camarophoria subcuneata*.
- Rhynchonella subtetrædra** (Conrad). ? Cretaceous.
Terebratula subtetrædra Conrad, U. S. Astronomical Exped. Southern Hemisphere, 1855, p. 282, pl. 42, fig. 8.
Loc. Portezuelo de Manplas and Cordillera de Dona Ana at an altitude of 13,432 feet above the ocean.
- Rhynchonella subtrigona** Meek and Worthen = *Camarophoria subtrigona*.
- Rhynchonella subtrigonalis** Hall. Trenton (Ord.).
Atrypa subtrigonalis Hall, Pal. New York, I, 1847, p. 145, pl. 33, fig. 12.
Rhynchonella subtrigonalis Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.
Loc. Turin, New York.
Obs. Compare with *Rhynchotrema inaequivalve*.

- Rhynchonella sulcuplicata** Hall. Lower Helderberg (Dev.).
Rhynchonella sulcuplicata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 76.—Pal. New York, III, 1859, p. 236, pl. 35, fig. 1.
Loc. Albany County, New York.
- Rhynchonella tayloriana** (Lea). ? Jurassic.
Terebratula tayloriana Lea, Trans. American Phil. Soc., n. ser., VII, 1841, p. 259, pl. 10, fig. 12.
Loc. Habana, Cuba.
- Rhynchonella tennesseensis** Hall (non Roemer) = *Uncinulus stricklandi*.
- Rhynchonella tennesseensis** Roemer. Niagara (Sil.).
Rhynchonella tennesseensis Roemer, Die Sil. Fauna des West. Tennessee, 1860, p. 72, pl. 5, fig. 14.—Hall and Whitfield, Twenty-seventh Rep. N. Y. State Cab. Nat. Hist., 1875, pl. 9, figs. 24-26;—Pal. Ohio, II, 1875, p. 136, pl. 7, figs. 16, 17.
Loc. Perry County, Tennessee; Louisville, Kentucky; Yellow Springs, Ohio.
- Rhynchonella tethys** Billings = *Camarotoechia tethys*.
- Rhynchonella tetraëdra** (Sowerby). Liassic.
Terebratula tetraëdra Sowerby, Mineral Conchology, I, 1812, p. 191, pl. 83, fig. 5.—Bayle and Coquand, Mém. Soc. Géol. France, ser. ii, IV, 1851, p. 17, pl. 7, figs. 9-10.
Rhynchonella tetraëdra Davidson, British Oolitic and Liassic Brach., Pal. Soc., 1852, p. 93, pl. 18, figs. 5-10.—Behrendsen, Zeit. der Deutschen geol. Gessel., XLIII, 1891, p. 396.—Möricke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 63.
Loc. Europe; Portezuelo Ancho, Argentine Republic; Manflas, Las Amolanas, etc., Chile.
- Rhynchonella (?) tetrptyx** A. Winchell. Kinderhook (L. Carb.).
Rhynchonella ? tetrptyx A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 120.
Loc. Rockford, Indiana.
- Rhynchonella tenuistriata** Nettelroth. Corniferous (Dev.).
Rhynchonella tenuistriata Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 82, pl. 7, figs. 27-29.
Loc. Falls of Ohio.
- Rhynchonella texana** Shumard. Upper Carboniferous.
Rhynchonella texana Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 393.
Loc. Mouth of Delaware Creek, Texas.
- Rhynchonella thalia** Billings = *Camarotoechia billingsi*.
- Rhynchonella thera** Walcott = *Camarophoria thera*.
- Rhynchonella transversa** Hall. Lower Helderberg (Dev.).
Rhynchonella transversa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 74, figs. 5, 6;—Pal. New York, III, 1859, p. 234, pl. 34, figs. 9-16.
Loc. Albany County, New York.
- Rhynchonella triplicata** Quenstedt. Jurassic.
Rhynchonella triplicata (Quenst.) Möricke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 63.
Loc. Europe; Quebrada de la Iglesia, etc., Chile.

- Rhynchonella tuta** Miller. Burlington (L. Carb.).
Rhynchonella tuta Miller, Jour. Cincinnati Soc. Nat. Hist., IV, 1881, p. 315, pl. 7, fig. 11.
Loc. Lake Valley mining district, New Mexico.
- Rhynchonella unica** A. Winchell. Kinderhook (L. Carb.).
Rhynchonella unica A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 122.
Loc. Burlington, Iowa.
- Rhynchonella unisulcata* Hall = *Pentagonia unisulcata*.
Rhynchonella utah of authors = *Pugnax utah*.
Rhynchonella vellicata Hall = *Uncinulus vellicatus*.
Rhynchonella ventricosa Hall = *Camarotoechia ventricosa*.
Rhynchonella venustula Hall = *Hypothyris cuboides*.
- Rhynchonella vicina** Billings. Anticosti (Sil.).
Rhynchonella vicina Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 44.
Loc. Anticosti.
- Rhynchonella (?) warrenensis** Swallow. Lower Devonian.
Rhynchonella warrenensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 653.
Loc. Callaway County, Missouri.
- Rhynchonella wasatchensis* White = *Seminula wasatchensis*.
Rhynchonella whitiana Miller = *Camarotoechia whitei*.
Rhynchonella whitii Hall (non Winchell) = *Camarotoechia whitei*.
- Rhynchonella whitei** A. Winchell. Marshall (L. Carb.).
Rhynchonella whitei A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 407.
Loc. Marshall, Michigan.
- Rhynchonella whitneyi** Gabb. Cretaceous (Shasta).
Terebratella whitneyi Gabb, Geol. Survey California, Pal., II, 1869, p. 35, pl. 2, fig. 62.
Rhynchonella whitneyi Gabb, Ibidem, 1869, p. 204, pl. 34, fig. 105.—Stanton, Bull. U. S. Geol. Survey, 133, 1896, p. 32, pl. 1, figs. 5-10.
Loc. Napa and Colusa counties, California.
- Rhynchonella wilmingttonensis** (Lyell and Sowerby). Eocene.
Terebratula wilmingttonensis Lyell and Sowerby, Quart. Jour. Geol. Soc. London, I, 1845, p. 431.
Rhynchonella wilmingttonensis Conrad, American Jour. Conch., I, 1865, p. 35.
Loc. Wilmington, North Carolina.
- Rhynchonella wilsoni* Sowerby = *Wilsonia wilsoni*.
Rhynchonella wortheni Hall = *Camarophoria wortheni*.
- RHYNCHOPORA** King. Genotype *Terebratula geinitziana* de Verneuil.
Rhynchopora King, Ann. Mag. Nat. Hist., 2d ser., XVII, 1856, p. 506.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 210;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 832.
Rhynchopora (Ehler), Fischer's Manuel de Conchyliologie, 1887, p. 1305.
- Rhynchopora pustulosa** (White). Kinderhook (L. Carb.).
Rhynchonella pustulosa White, Jour. Boston Soc. Nat. Hist., VIII, 1860, p. 226.—Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 257, pl. 4, figs. 12-14.
Rhynchopora pustulosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 210, pl. 58, figs. 1-4.
Loc. Burlington, Iowa; Wasatch Range, Utah; Lake Valley mining district, New Mexico (Miller).

RHYNCHOSPIRA Hall. Genotype *Waldheimia formosa* Hall.

Rhynchospira Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 29;—Pal. New York, III, 1859, pp. 213, 484;—Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 58, figs. 12–17;—Pal. New York, IV, 1867, p. 276.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 108, fig. 101;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 791.

Retzia Billings, Canadian Journal, VI, 1861, p. 147.

Rhynchospira (?) *acadiæ* (Hall). Arisaig (Sil.).

Trematospira acadiæ Hall, Canadian Nat. Geol., V, 1860, p. 146, fig. 4.—Dawson, *Acadian Geology*, 3d ed., 1878, p. 597.

Loc. Nova Scotia.

Rhynchospira aprinis Hall=*Homœospira apriniformis*.**Rhynchospira** (?) *ashlandensis* Herrick. Waverly (L. Carb.).

Rhynchospira ? ashlandensis Herrick, Bull. Denison Univ., IV, 1888, p. 25, pl. 3, fig. 16;—Geol. Ohio, VII, 1895, pl. 23, fig. 16.

Loc. Lyon Falls, Ohio.

Rhynchospira electra (Billings). Lower Helderberg (Dev.).

Retzia electra Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 114, pl. 3, fig. 11.

Rhynchospira electra Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 111, pl. 50, figs. 29–31.

Loc. Square Lake, Maine.

Rhynchospira equiradiata Hall=*Camarotæchia æquiradiata*.**Rhynchospira** (?) *eugenia* (Billings). Corniferous (Dev.).

Retzia eugenia Billings, Canadian Jour., VI, 1863, p. 147, fig. 58;—Geol. Canada, 1863, p. 373, fig. 395.

Rhynchospira (?) eugenia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 111, pl. 50, figs. 41–43.

Loc. Walpole, Ontario.

Rhynchospira evax Hall=*Homœospira evax*.**Rhynchospira formosa** Hall. Lower Helderberg (Dev.).

Waldheimia formosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 88.

Trematospira (Rhynchospira) formosa Hall, Pal. New York, III, 1859, p. 215, pl. 36, fig. 2; pl. 95A, figs. 7–11.

Rhynchospira formosa Hall, Pal. New York, IV, 1867, p. 278, figs. 1–6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 109, fig. 101, pl. 50, figs. 21–25.

Retzia formosa Miller, N. American Geol. Pal., 1889, p. 366.—Whitfield, *Annals N. Y. Acad. Sci.*, V, 1891, p. 512, pl. 5, figs. 15, 16;—Geol. Ohio, VII, 1895, p. 413, pl. 1, figs. 15–16.

Loc. Helderberg Mountains, New York; Square Lake, Maine; Greenfield, Ohio.

Rhynchospira globosa Hall. Lower Helderberg (Dev.).

Waldheimia globosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 87.

Trematospira (Rhynchospira) globosa Hall, Pal. New York, III, 1859, p. 215, pl. 36, fig. 1.

Rhynchospira globosa Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 111.

Loc. Helderberg Mountains, New York.

Rhynchospira (?) *helena* (Nettelroth). Niagara (Sil.).

Trematospira helena Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 137, pl. 32, figs. 40–43.

Loc. Louisville, Kentucky.

Rhynchospira lepida Hall=*Trigeria lepida*.

Rhynchospira nobilis Hall=*Cyclorhina nobilis*.

***Rhynchospira rectirostris* Hall.**

Oriskany (Dev.).

Waldheimia rectirostra Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 89.

Trematospira (Rhynchospira) rectirostra Hall, Pal. New York, III, 1859, p. 217, pl. 95A, fig. 1, and p. 485.

Rhynchospira rectirostra Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 111.

Loc. Cumberland, Maryland.

***Rhynchospira scansa* Hall and Clarke.**

Waverly (L. Carb.).

Rhynchospira scansa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 50, fig. 45.

Loc. McKean County, Pennsylvania.

***Rhynchospira* (?) *sinuata* Hall.**

Arisaig (Sil.).

Rhynchospira sinuata Hall, Canadian Nat. Geol., V, 1860, p. 146.—Dawson, *Aeolian Geology*, 3d ed., 1878, p. 597.

Retzia sinuata Miller, N. American Geol. Pal., 1889, p. 367.

Loc. Arisaig, Nova Scotia.

Rhynchospira subglobosa Hall=*Retzia subglobosa*.

RHYNCHOTREMA Hall.

Genotype *Rhynchonella capax* Conrad.

Rhynchotrema Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 68,

figs. 12-14.—Waagen, *Palæontologica Indica*, Ser. XIII, I, 1883, p. 410.—

Winchell and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 458.—Hall

and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 182;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 825.

***Rhynchotrema ainsliei* N. H. Winchell.**

Trenton (Ord.).

Rhynchonella ainsliei N. H. Winchell, Fourteenth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1886, p. 315, pl. 2, figs. 5, 6.

Rhynchotrema ainsliei Winchell and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 459, pl. 34, figs. 1-8.

Loc. Minneapolis, St. Paul, etc., Minnesota; Decorah, Iowa.

***Rhynchotrema capax* (Conrad).**

Lorraine (Ord.).

Atrypa capax Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 264, pl. 14, fig. 21.

Atrypa increbescens (partim) Hall, Pal. New York, I, 1847, p. 146, pl. 33, figs. 13i, 13k-13y.—Billings, Canadian Nat. Geol., I, 1856, p. 207, figs. 15, 16.—Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 66, figs. 6, 7, 9-11.

Rhynchonella increbescens (partim) Hall, Geol. Wisconsin, I, 1862, p. 123, pl. 11, fig. 2.

Rhynchonella capax Billings, Geol. Canada, 1863, p. 211, fig. 213.—Meek, Pal. Ohio, I, 1873, p. 123, pl. 11, fig. 2.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 17.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 489, pl. 1, figs. 9-11;—Tenth Rep. State Geol. Indiana, 1881, p. 121, pl. 1, figs. 9-11.—Whitfield, Geol. Wisconsin, IV, 1882, p. 263, pl. 12, figs. 26, 27.—Keyes, Geol. Survey Missouri, V, 1895, p. 99, pl. 41, fig. 12.

Rhynchotrema capax Winchell and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 462, pl. 34, figs. 30-34.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 183, 185, pl. 56, figs. 14-18, 20-27; pl. 83, fig. 31.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 178.

Loc. Richmond, Indiana; Oxford, etc., Ohio; Wilmington, Illinois; Cape Girardeau, Missouri; Stockbridge, Ironridge, etc., Wisconsin; Lattners, Iowa; Spring Valley, Minnesota; Anticosti; Lake Winnipeg, Manitoba; Fort Churchill, Hudson Bay.

- Rhynchotrema dentatum** Hall. Trenton and Lorraine (Ord.).
Atrypa dentata Hall, Pal. New York, I, 1847, p. 148, pl. 33, fig. 14.
Rhynchonella dentata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 65.—Meek, Pal. Ohio, I, 1873, p. 121, pl. 11, fig. 3.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 18.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 490, pl. 1, figs. 12-14;—Tenth Rep. State Geol. Indiana, 1881, p. 122, pl. I, figs. 12-14.
Rhynchotrema dentata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 185.
 ?*Rhynchonella dentata* Keyes, Geol. Survey Missouri, V, 1895, p. 100, pl. 41, fig. 3.
Loc. Turin, New York; Dayton and Oxford, Ohio; Richmond, Indiana; near Nashville, Tennessee.
- Rhynchotrema formosum** (Hall). Lower Helderberg (Dev.).
Rhynchonella formosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 76, figs. 1-5;—Pal. New York, III, 1859, p. 236, pl. 35, fig. 6.
Stenocisma formosa Hall, Pal. New York, IV, 1867, p. 334.—Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 187, pl. 56, figs. 41-45.
Loc. Schoharie and Albany counties, New York; Lake Temiscouata, New Brunswick, and Arisaig, Nova Scotia (Ami).
- Rhynchotrema inæquivalve** (Castelnau). Trenton (Ord.).
Spirifer inæquivalvis Castelnau, Essai Système Sil. l'Amérique Septentrionale, 1813, p. 40, pl. 14, fig. 8.
Atrypa increbescens (partim) Hall, Pal. New York, I, 1847, pp. 146, 289, pl. 33, figs. 13a-13h; ?pl. 79, fig. 6.
Rhynchonella increbescens (partim) Billings, Canadian Nat. Geol., I, 1856, p. 207, figs. 11-14.—Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.—Billings, Geol. Canada, 1863, p. 168, fig. 153.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 83, pl. 34, figs. 26-29.
Rhynchonella argenturbeia White, Wheeler's Expl. and Survey west 100th Merid., IV, Prel. Rep., 1874, p. 14;—*Ibidem*, Final Rep., 1875, p. 75, pl. 4, fig. 12.
Trematospira (?) *quadruplicata* Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 60, figs. 6, 7.
Rhynchotreta quadruplicata Miller, N. American Geol. Pal., 1889, p. 370.
Rhynchonella minnesotensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 333, pl. 4, figs. 21-23.
Rhynchotrema inæquivalvis Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 459, pl. 34, figs. 9-25.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 179.
Rhynchotrema increbescens Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 183, 185.
Loc. Drummonds Island (Castelnau); New York; Kentucky; Tennessee; Illinois; Wisconsin; Iowa; Minnesota; Silver City, New Mexico; Ottawa, Canada; Lake Winnipeg, Manitoba.
Obs. Compare *Rhynchonella subtrigonalis*.
- Rhynchotrema inæquivalve laticostatum** Win. and Schuch. Trenton (Ord.).
Rhynchotrema inæquivalvis var. *laticostata* W. and S., American Geol., IX, April 1, 1892, p. 293;—Minnesota Geol. Survey, III, 1893, p. 461, pl. 34, figs. 26-29.
Rhynchonella sancta Sardeson, Bull. Minnesota Acad. Nat. Sci., III, April 9, 1892, p. 333, pl. 4, figs. 19, 20.
Loc. Cannon Falls, Minnesota.
- Rhynchotrema ottawaense** (Billings). Trenton (Ord.).
 Porambonites? *ottawaensis* Billings, Pal. Fossils, I, 1862, p. 140, fig. 117.

Rhynchotrema ottawaense (Billings)—Continued.

Protorhyncha? and Orthorhynchula? ottawaensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 181, 228.

Loc. Pauquette Rapids, Canada; near Murfreesboro, Tennessee.

Rhynchotrema perlamellosum (Whitfield).

Lorraine (Ord.).

Rhynchonella perlamellosa Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 73.—James, The Paleontologist, 2, 1878, p. 15.—Whitfield, Geol. Wisconsin, IV, 1882, p. 265, pl. 12, figs. 23–25.

Loc. Delafield and Iron Ridge, Wisconsin; Oxford, Ohio.

RHYNCHOTRETA Hall.Genotype *Rhynchonella cuneata* Dalman.

Rhynchotrema Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 166, figs. 1–4;—Eleventh Rep. State Geol. Indiana, 1882, p. 309.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 84.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 185;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 825.

Rhynchotrema cuneata americana Hall.

Niagara (Sil.).

Atrypa cuneata Hall (non Dalman), Geol. N. Y.; Rep. Fourth Dist., 1843, Table of Organic Remains, 13, figs. 3, 4;—Pal. New York, II, 1852, p. 276, pl. 57, fig. 4.—Billings, Canadian Nat. Geol., I, 1856, p. 138, pl. 2, fig. 13.

Rhynchonella cuneata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.—Billings, Geol. Canada, 1863, p. 315, fig. 323.

Rhynchotrema cuneata var. *americana* Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 167, pl. 25, figs. 29–38;—Eleventh Rep. State Geol. Indiana, 1882, p. 310, pl. 25, figs. 29–38.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 85, pl. 32, figs. 58, 59, 62, 63.—Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 47, pl. 4, figs. 12–22.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 187, pl. 56, figs. 31–38.

Loc. Lockport, etc., New York; Hamilton, Ontario; Waldron and Osgood, Indiana; Louisville, Kentucky; Milwaukee, Wisconsin.

Rhynobolus Hall=**Rhinobolus**.**RÖMERELLA** Hall and Clarke.Genotype *Orbicula grandis* Vanux.

Römerella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 137, fig. 65;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 257.

Römerella grandis (Vanuxem).

Hamilton (Dev.).

Orbicula grandis Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 152, fig. 4.

Discina grandis Hall, Pal. New York, IV, 1867, p. 17, pl. 1, fig. 18; pl. 2, figs. 32, 33.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 33, pl. 3, fig. 3.

Discina (*Orbiculoidea*?) *grandis* Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 187;—Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 33–35.

Römerella grandis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 137, fig. 65, pl. 4E, figs. 29–31.

Loc. Cazenovia and Pratts Falls, New York; Columbus, Ohio; Falls of Ohio.

ROMINGERINA Hall and Cl.Genotype *Centronella julia* A. Winchell.

Romingerina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 272;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 855.

Romingerina julia (A. Winchell).

Waverly (L. Carb.).

Centronella julia A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 405;—Ibidem, 1865, p. 123.—Hall, Pal. New York, IV, 1867, p. 419, pl. 61A, figs. 41–46.—Herrick, Bull. Denison Univ., III, 1888, p. 49, pl. 2, fig. 5.

Romingerina julia (A. Winchell)—Continued.

Romingerina julia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 271, figs. 187, 188, pl. 79, figs. 28-30.

Loc. Port Aux Barques, Michigan; Cuyahoga and Licking counties, Ohio. ? In the Chemung at Rushford, New York (Williams).

SCAPHIOCÆLIA Whitfield.Genotype *S. boliviaensis* Whitfield.

Scaphiocælia Whitfield, Trans. American Inst. Min. Engi., XIX, 1891, p. 106.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 275;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 857.

Scaphiocælia boliviaensis Whitfield.

Middle Devonian.

Scaphiocælia boliviensis Whitfield, Trans. American Inst. Min. Engi., XIX, 1891, p. 106, figs. 1-4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 276, figs. 193-196.

Loc. Serere or Quechista, Bolivia.

SCENIDIUM Hall.Genotype *Orthis insignis* Hall.

Skenidium Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 70, figs. 1-5.—Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 549.

Scenidium Ehlert, Bull. Societe d'Etudes Scientifiques d'Angers, 1887, p. 4, extract.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 241.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 381.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 276.

Scenidium anthonense Sardeson.

Trenton (Ord.).

Skenidium halli Safford, Geol. Tennessee, 1869, p. 287 (undefined).

Skenidium anthonensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 333, pl. 4, fig. 7.

Scenidium halli Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 242, pl. 7A, figs. 33-39.

Scenidium anthonensis Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 381, figs. 20-23.

Loc. Minneapolis, St. Paul, and Cannon Falls, Minnesota; Dixon, Illinois; Lebanon, Tennessee.

Scenidium devonicum Walcott=*Dalmanella devonica*.

Scenidium halli Safford=*S. anthonense*.

Scenidium insigne Hall.

Lower Helderberg (Dev.).

Orthis insignis Hall, Pal. New York, III, 1859, p. 173.

Skenidium (*Orthis*) *insignis* Hall, *Ibidem*, 1859, pl. 10A, figs. 13-15.

Skenidium insignis Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 70, figs. 1-5;—Second Ann. Rep. N. Y. State Geol., 1883, p. 37, figs. 31-35.

Scenidium insigne Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 242, pl. 7, figs. 31-35.

Loc. Helderberg Mountains, New York; Perry County, Tennessee.

Scenidium (?) merope (Billings).

Trenton and Lorraine (Ord.).

Orthis merope Billings, Pal. Fossils, I, 1862, p. 139, fig. 116.

Scenidium ? merope Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 242, pl. 7A, figs. 31, 32.

Loc. Ottawa, Canada; Cincinnati, Ohio; Burgin, Kentucky.

Scenidium pyramidale Hall.

Niagara (Sil.).

Orthis pyramidalis Hall, Pal. New York, II, 1852, p. 251, pl. 52, fig. 2.

Skenidium pyramidalis Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 70.

Skenidium pyramidata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 37, figs. 29, 30.

Scenidium pyramidale Hall—Continued.

Scenidium pyramidale Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 242, pl. 7, figs. 29, 30; pl. 7A, figs. 40-42.

Loc. Lockport, New York; Arisaig, Nova Scotia (Ami).

SCHIZAMBON Walcott.Genotype *S. typicalis* Walcott.

Schizambon Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 69.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 113, 167.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 360.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 253.

Schizambonia (Ehlerst, Fischer's Manuel de Conchyliologie, 1887, p. 1266.

Schizambon (?) dodgei Winchell and Schuchert.

Trenton (Ord.).

Schizambon (?) *dodgii* W. and S., Minnesota Geol. Survey, III, 1893, p. 361, pl. 30, figs. 5-7.

Loc. Sandyhill, New York.

Schizambon (?) fissus canadaensis (Ami).

Utica (Ord.).

Siphonotreta scotica Whiteaves, American Jour. Sci., 3d ser., XXIV, 1882, p. 278;—Canadian Nat. Geol., X, 1883, p. 396.

Siphonotreta scotica var. *canadensis* Ami, Ottawa Naturalist, I, 1887, p. 124.

Schizambon (?) *fissus* var. *canadensis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 115, pl. 4, figs. 32-36.

Loc. Gloucester, Ontario.

Schizambon (?) lockei Winchell and Schuchert.

Lorraine (Ord.).

Schizambon (?) *lockii* Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 362, pl. 30, figs. 8-10.

Loc. Cincinnati, Ohio.

Schizambon typicalis Walcott.

Pogonip or Calciferous (Ord.).

Schizambon typicalis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 70, pl. 1, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 114, fig. 65, pl. 4, figs. 27-30.

Loc. Eureka district, Nevada; Manitou, Colorado.

SCHIZOBOLUS Ulrich.Genotype *Discina truncata* Hall=*Lingula concentrica* Vanuxem.

Schizobolus Ulrich, Cont. American Pal., I, 1886, p. 25, pl. 3, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 87, 165;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 246.

Schizobolus concentricus (Vanuxem).

Genesee (Dev.).

Lingula concentrica Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 168, fig. 4.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 223, fig. 4.

Discina truncata Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 28;—Pal. New York, IV, 1867, p. 23, pl. 1, fig. 15; pl. 2, figs. 36, 37.

Discina (*Trematis*) *truncata* Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 187.

Trematis truncata Hall, Twenty-third Rep. Ibidem, 1873, pl. 13, fig. 20.

Schizobolus truncatus Ulrich, Cont. American Pal., I, 1886, p. 25, pl. 3, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 87, pl. 3, figs. 11-14.

Loc. Ogdens Ferry, Cayuga Lake, etc., New York; Falls of Ohio; Madison County, Kentucky.

SCHIZOCRANIA Hall and Whitfield. Genotype *Orbicula ? filosa* Hall.

Schizocrania Hall and Whitfield, Pal. Ohio, II, 1875, p. 71.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 142, 168.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 369.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 259.

- Schizocrania filosa** Hall. Trenton-Lorraine (Ord.).
Orbicula? *filosa* Hall, Pal. New York, I, 1847, p. 99, pl. 30, fig. 9.
Trematis filosa Billings, Geol. Canada, 1863, p. 159, fig. 126.—Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, pl. 13, figs. 21, 22.
Trematis (?) *filosa* Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 15.
Schizocrania filosa Hall and Whitfield, Pal. Ohio, II, 1875, p. 73, pl. 1, figs. 12-15.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 143, pl. 4G, figs. 22-30.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 370, fig. 31; pl. 29, figs. 29-31.
Loc. Middleville, Utica, etc., New York; Ottawa, Canada; Cincinnati, Ohio; Cannon Falls and Minneapolis, Minnesota.
- Schizocrania** (?) **helderbergia** Hall. Lower Helderberg (Dev.).
Schizocrania (?) *helderbergia* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 144, 179, pl. 4G, figs. 34, 35.
Loc. Near Clarksville, New York.
- Schizocrania** (?) **rudis** Hall. Trenton (Ord.).
Trematis rudis Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 243, pl. 13, fig. 19.
Schizocrania (?) *rudis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 144, pl. 4G, fig. 21.
Loc. Clifton, Tennessee.
- Schizocrania schucherti** Hall and Clarke. Trenton (Ord.).
Schizocrania schucherti Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 143, 179, pl. 4G, figs. 31-33.
Loc. Covington, Kentucky.
- Schizocrania superincretata** Barrett. Lower Helderberg (Dev.).
Trematis (*Schizocrania*) *superincretata* Barrett, Annals N. Y. Acad. Sci., I, 1878, p. 122.
Schizocrania (?) *superincretata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 144.
Loc. Port Jervis, New York.
- SCHIZOPHORIA** King. Genotype *Orthis resupinata* (Martin).
Schizophoria King, Mon. Permian Fossils, Pal. Soc., 1850, p. 106.—Hall, Bull. Geol. Soc. America, I, 1889, p. 21.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 211;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 272.
- Schizophoria carinata** Hall. Chemung (Dev.).
Orthis carinata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 267, fig. 1;—Pal. New York, IV, 1867, p. 58, pl. 8, figs. 30-32;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, fig. 22.
Schizophoria carinata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 213, 226, pl. 6, fig. 22.
Loc. Painted Post, High Point, etc., New York.
- Schizophoria cora** (d'Orbigny). Upper Carboniferous.
Orthis cora d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 48.
Terebratula cora d'Orbigny, Ibidem, 1842, pl. 3, figs. 21-23.
Orthis resupinata var. *latirostrata* Toulou, Sitzungsber. der k. k. Akad. der Wissensch. zu Wien, LIX, 1869, p. 8, pl. 1, fig. 7.—Derby, Bull. Cornell Univ., I, 1874, p. 63.
Loc. Yarbichambi and Cochabamba, Bolivia.
- Schizophoria macfarlani** (Meek). Middle and Upper Devonian.
Orthis macfarlani Meek, Trans. Chicago Acad. Sci., I, 1868, p. 88, pl. 12, fig. 1.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 423, pl. 13, fig. 10.—

Schizophoria macfarlani (Meek)—Continued.

Kaysers, Richthofen's China, IV, 1883, p. 91, pl. 13, fig. 3.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 114.

Schizophoria macfarlanii Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 190, 212, 225, pl. 6A, figs. 28-32.

Loc. Independence, Iowa; Howard and High Point, New York; Mackenzie River, Canada; Lower Devonian, Enreka district, Nevada; Southwestern China.

Schizophoria manitobaensis Whiteaves.

Upper Devonian.

Orthis (*Schizophoria*) *manitobensis* Whiteaves, Cont. Canadian Pal., I, 1892, p. 283, pl. 37, figs. 3, 4, 5.

Loc. Lake Winnipegosis, Canada.

Schizophoria multistriata Hall.

Lower Helderberg (Dev.).

Orthis multistriata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 45, figs. 1, 2;—Pal. New York, III, 1859, p. 176, pl. 15, fig. 2.

Schizophoria multistriata Hall and Clarke, *Ibidem*, VIII, Pt. I, 1892, pp. 212, 226, pl. 6A, fig. 25.

Loc. Schoharie and Catskill, New York.

Schizophoria (?) peduncularis Hall.

Lower Helderberg (Dev.).

Orthis peduncularis Hall, Pal. New York, III, 1859, p. 174, pl. 13, fig. 16.

Schizophoria ? peduncularis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 226.

Loc. Helderberg Mountains, New York.

Schizophoria propinqua Hall.

Upper Helderberg (Dev.).

Orthis propinqua Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 110;—Pal. New York, IV, 1867, p. 43, pl. 5, fig. 3;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 30, 31.

Schizophoria propinqua Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 212, 226, pl. 6, fig. 30.

Loc. New York; Columbus, Ohio.

Schizophoria resupinata (Martin).

Carboniferous.

Orthis resupinata Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 265, pl. 5, figs. 1, 2.

Schizophoria resupinata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 213, 226.

Loc. Oquirrh Mountains, Utah; Lake Valley mining district, New Mexico.

Schizophoria resupinoides (Cox).

Upper Carboniferous.

Orthis resupinoides Cox, Owen's Geol. Survey Kentucky, II, 1857, p. 570, pl. 9, fig. 1.—Worthen, Geol. Survey Illinois, VIII, 1890, p. 106, pl. 11, fig. 4.

Orthis resupinoides? White, Wheeler's Expl. and Survey west 100th Meridian, Appendix, 1881, p. xxiii.

Schizophoria resupinoides Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 213, 226.

Schizophoria cfr. *resupinoides* Smith, Proc. American Phil. Soc., XXXV, 1897, p. 28 (extract).

Loc. Hancock County, Kentucky; Manuelitos Creek, New Mexico; ? White and Conway counties, Arkansas.

Obs. Probably identical with *Schizophoria resupinata*.

Schizophoria senecta Hall and Clarke.

Clinton (Sil.).

Orthis (*Schizophoria*) *senecta* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 343, pl. 6A, figs. 23, 24.

Loc. Reynales Basin, Niagara County, New York.

- Schizophoria striatula** (Schlotheim). Middle and Upper Devonian.
Anomia Terebratulites striatulus Schlotheim, Min. Taschenbuch, VIII, 1813, pl. 1, fig. 6.
Orthis striatula Davidson, Brit. Devonian Brach., Pal. Soc., 1865, p. 87, pl. 17, figs. 4-7.—Whiteaves (non Schlotheim), Cont. Canadian Pal., I, 1891, pp. 218, 283.
Orthis impressa Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 267, fig. 2;—Pal. New York, IV, 1867, p. 60, pl. 8, figs. 11-19.—Whitfield, Geol. Wisconsin, IV, 1882, p. 326, pl. 25, figs. 13-15.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 115, pl. 13, fig. 13.—Kindle, Bull. American Pal., 6, 1896, p. 36.
Orthis lentiformis? Owen (non Hall), Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 3, figs. 10, 10a, young specimen. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17918.]
Orthis iowensis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 488, pl. 2, fig. 4.—Billings, Hind's Rep. Expl. Assiniboine and Saskatch., 1859, p. 187, fig. 1.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 90, pl. 12, fig. 2.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 501, pl. 5, figs. 10-12;—Tenth Rep. State Geol. Indiana, 1881, p. 133, pl. 5, figs. 10-12.—Keyes, Geol. Survey Missouri, V, 1895, p. 62, pl. 38, fig. 6.
Orthis iowensis var. *furnarius* Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 489, pl. 2, fig. 5.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 424, pl. 13, fig. 9.
?Orthis iowensis? A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 410.
Orthis propinqua Nettelroth (non Hall), Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 43, pl. 16, figs. 1-3, 7-11.
Schizophoria iowensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 212, 226, pl. 6A, fig. 29.
Schizophoria impressa Hall and Clarke, Ibidem, 1892, pp. 212, 216, pl. 6, fig. 31; pl. 6A, figs. 26, 27.
Loc. New York; Falls of Ohio; Illinois; Iowa; Milwaukee, Wisconsin; Perry County, Missouri; Eureka district, Nevada; Mackenzie River Valley, Northwest Territory, Canada.
Obs. The writer has compared American forms with *O. striatula* from the Eifel, Germany, and he agrees with authors in regarding both as one species. *Orthis* (*Schizophoria*) *macfarlani* is often found associated with *O. striatula* and may be only a variety of it.

Schizophoria swallowi Hall. Burlington (L. Carb.).

- Orthis swallowi* Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 597, pl. 12, fig. 5;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 23, 24.—Keyes, Geol. Survey Missouri, V, 1895, p. 63, pl. 38, fig. 5.
Schizophoria swallowi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 213, 226, pl. 6, figs. 23, 24.
Loc. Burlington, Iowa; Quincy, Illinois; Pike County, Missouri.
Obs. Compare with *Rhipidomella clarkensis*.

Schizophoria tioga Hall. Portage and Chemung (Dev.).

- Orthis interlineata* Hall (non Sowerby), Geol. N. Y.; Rep. Fourth Dist., 1843, p. 267, figs. 3, 4.
Orthis tioga Hall, Pal. New York, IV, 1867, p. 59, pl. 8, figs. 20-29;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 17, 18.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 561, pl. 12, fig. 3;—Geol. Ohio, VII, 1895, p. 453, pl. 8, fig. 3.
Schizophoria tioga Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 212, 226, pl. 6, figs. 17, 18.
Loc. Factoryville, Elmira, etc., New York; Lake County, Ohio.

Schizophoria tulliensis (Vanuxem). Tully (Dev.).

Orthis tulliensis Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 164, fig. 2.—Hall, Pal. New York, IV, 1867, p. 55, pl. 7, fig. 5.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 115, pl. 2, fig. 12.—Williams, Bull. Geol. Soc. America, I, 1890, p. 492, pl. 12, fig. 16.

Orthis resupinata Hall (non Martin), Geol. N. Y.; Rep. Fourth Dist., 1843, p. 215, fig. 2.

Orthis (*Schizophoria*) *tulliensis* Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 25–29.

Schizophoria tulliensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 212, 226, pl. 6, figs. 25–29.

Loc. Tully, Tinkers Falls, and Ovid, New York; Eureka district, Nevada.

SCHIZOTRETA Kutorga. Genotype *S. elliptica* Kutorga.

Schizotreta Kutorga, Verhand. Kais. Min. Gessel. zu St. Petersburg, VII, 1848, p. 273.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 135, 169.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 365.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 257.

Schizotreta conica (Dwight). Trenton (Ord.).

Orbiculoidea conica Dwight, American Jour. Sci., 3d ser., XIX, 1880, p. 452, pl. 21, figs. 1–11.

Schizotreta conica Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 126, 135, pl. 4E, figs. 6–8; pl. 4F, fig. 7.

Loc. Near Newburg, New York.

Schizotreta minutula Winchell and Schuchert. Lorraine (Ord.).

Schizotreta minutula Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 366, fig. 28.

Loc. Near Granger, Minnesota.

Schizotreta ovalis Hall and Clarke. Trenton (Ord.).

Orbiculoidea (*Schizotreta*) *ovalis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 177, pl. 4E, figs. 4, 5.

Loc. Middleville, New York.

Schizotreta pelopea (Billings). Trenton and Lorraine (Ord.).

Discina pelopea Billings, Pal. Fossils, I, 1862, p. 52, fig. 56;—Geol. Canada, 1863, p. 159, fig. 124.

Discina concordensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 328, pl. 4, figs. 13, 14.

Schizotreta pelopea, Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 365, pl. 29, figs. 26–28.

Loc. Montreal, Canada; Mantorville, Old Concord, and Spring Valley, Minnesota; Dubuque, Iowa; Neenah, Wisconsin; in the Utica at Ottawa, Canada (Ami).

Schizotreta tenuilamellata (Hall). Niagara (Sil.).

Orbicula tenuilamellata Hall, Pal. New York, II, 1852, p. 250, pl. 53, fig. 3.

Discina forbesi Nicholson (non Davidson), Pal. Prov. Ontario, 1875, p. 62.

Discina solitaria Ringueberg, American Naturalist, 1882, p. 175, figs. a–e.

Discina clara Spencer, Bull. Univ. State Missouri, 1, 1884, p. 56;—Trans. St. Louis Acad. Sci., IV, 1886, p. 606, pl. 8, fig. 5.

Schizotreta tenuilamellata Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 357, pl. 17, fig. 11.

Orbiculoidea (*Schizotreta*?) *tenuilamellata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 127, 135, pl. 4E, figs. 9–11; pl. 4F, figs. 2–6.

Loc. Lockport, New York; Hamilton, Ontario, and Arisaig, Nova Scotia (Ami).

SELENELLA Hall and Clarke. Genotype *S. gracilis* Hall and Clarke.

Selenella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 271;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 855.

Selenella gracilis Hall and Clarke. Corniferous (Dev.).

Selenella gracilis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 271, figs. 184–186.

Loc. Ontario.

SEMINULA McCoy emend Hall and Clarke.Genotype *Terebratula pentædra* Phillips=*Athyris ambigua* (Phillips).

Seminula McCoy, Synopsis Carb. Fossils Ireland, 1844, pp. 150, 158.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 93;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 781.

Seminula argentea (Shepard).

Upper Carboniferous.

Terebratula argentea Shepard, American Jour. Sci., XXXIV, 1838, p. 152, fig. 8.

Terebratula roissyi d'Orbigny (non L'Éveillé), Voyage dans l'Amérique Méridionale, Pal., 1842, p. 46.

Terebratula antisensis d'Orbigny, Ibidem, 1842, p. 46 (non p. 36).

Terebratula peruviana d'Orbigny, Ibidem, 1842, pl. 3, figs. 17–19 (non p. 36).

Terebratula subtilita Hall, Stansbury's Exped. Great Salt Lake of Utah, 1852, p.

409, pl. 4, figs. 1, 2.—Shumard, Marcy's Rep. U. S. Expl. Red River of Louisiana, 1853, p. 202, pl. 4, fig. 8.—Schiel, Pacific Railroad Rep., II, 1855, p. 108,

pl. 1, fig. 2.—Hall, Ibidem, III, 1856, p. 104, pl. 2, figs. 3–5.—Marcou, Geol. N. America, 1858, p. 52, pl. 6, fig. 9.—Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 714.

Terebratula (?) *subtilita* Davidson, Mon. British Carboniferous Brach., Pal. Soc., 1857, p. 18, pl. 1, figs. 21, 22; 1860, p. 86; 1862, p. 217, pl. 17, figs. 8–10.

Spirigera subtilita Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 20.—White, Wheeler's Expl. and Survey west of the 100th Meridian, IV, 1875, p. 141, pl. 10, fig. 6.

Athyris differentis McChesney, New Pal. Fossils, 1860, p. 47.

Athyris subtilita Newberry, Ives's Rep. Colorado River of the West, 1861, p. 126.—

Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 64, pl. 4, fig. 4.—Geinitz,

Carbon und Dyas in Nebraska, 1866, p. 40, pl. 3, figs. 7–9.—Meek, Final Rep.

U. S. Geol. Survey, Nebraska, 1872, p. 180, pl. 1, fig. 12; pl. 5, fig. 9; pl. 8, fig.

4.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 570, pl. 25, fig. 14.—

Derby, Bull. Cornell Univ., I, 1874, p. 7, pl. 1, figs. 5, 8 (not 7 = *Spirigarella*

derbyi); pl. 3, figs. 8, 16, 19; pl. 6, fig. 2; pl. 9, fig. 4.—Meek, Simpson's Rep.

Expl. Great Basin Terr. Utah, 1876, p. 350, pl. 2, fig. 4;—Bull. U. S. Geol. and

Geogr. Survey Terr., II, 4, 1876, pl. 1, fig. 2.—Derby, Bull. Mus. Comp. Zool.,

III, 1876, p. 279.—Newberry, Macomb's Rep. Expl. Exped. from Santa Fe to

the Great Colorado River of the West, 1876, p. 138.—Meek, King's U. S.

Geol. Expl. 40th Parl., IV, 1877, p. 83, pl. 8, fig. 6.—White, Thirteenth Rep.

State Geol. Indiana, 1884, p. 136, pl. 35, figs. 6–9.—de Koninck, Annales du

Musée Royal d'Histoire Naturelle de Belgique, XIV, 1887, p. 73, pl. 18, figs.

1–4, 7–10, 12–28; pl. 19, figs. 47–56.—Herrick, Bull. Denison Univ., II, 1887,

p. 44, pl. 2, fig. 23.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 231.—

Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 604, pl. 16, figs. 7–9;—Geol.

Ohio, VII, 1895, p. 488, pl. 12, figs. 7–9.

Spirifera (*Athyris*) *subtilita* Toulou, Sitzungsber. der k. k. Akad. der Wissensch. zu Wien, LIX, 1869, p. 6, pl. 1, fig. 5.

Seminula subtilita Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 95, figs.

66, 67, and 58, 59 on p. 86; pl. 47, figs. 17–31.

Athyris argentea Keyes, Geol. Survey Missouri, V, 1895, p. 92, pl. 39, fig. 11.

Loc. Throughout the Upper Carboniferous of North America; Brazil and Bolivia, South America; England; India; Thibet and Kashmere.

Obs. See *Seminula charitouensis*, *S. caput-serpentis*, *S. hawni*, and *S. singletonii* Swallow.

- Seminula caput-serpentis** (Swallow). Upper Carboniferous.
Spirigera caputserpentis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 90.
Loc. Missouri and Kansas.
Obs. Regarded by Keyes as a synonym for *S. argentea*.
- Seminula charitonensis** (Swallow). Upper Carboniferous.
Spirigera charitonensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 651.
Loc. Chariton and Randolph counties, Missouri.
Obs. Probably a synonym for *Seminula argentea*.
- Seminula claytoni** (Hall and Whitfield). Kinderhook (L. Carb.).
Athyris claytoni Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, p. 256, 1877, pl. 4, figs. 15-17.
Loc. Little Cottonwood, Wasatch Range, Utah.
- Seminula dawsoni** Hall and Clarke. Upper Carboniferous.
Athyris subtilita Davidson (non Hall), Quart. Jour. Geol. Soc. London, XIX, 1863, p. 170, pl. 9, figs. 4, 5.—Dawson, Acadian Geology, 3d ed., 1878, p. 290, fig. 88.
Seminula dawsoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 95, 96, 364, figs. 69-71; pl. 47, figs. 32-34.
Loc. Windsor, Nova Scotia.
- Seminula formosa** (Swallow). Keokuk (L. Carb.).
Spirigera formosa and *euzona* Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 91.
Athyris formosa Keyes, Geol. Survey Missouri, V, 1895, p. 91.
Loc. Boonville, Missouri.
- Seminula hawni** (Swallow). Upper Carboniferous.
Spirigera hawni Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 652.
Loc. Missouri.
Obs. Probably a synonym for *Seminula argentea*.
- Seminula maconensis** (Swallow). Upper Carboniferous.
Spirigera maconensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 651.
Loc. Montgomery County, Missouri.
- Seminula parva** (Swallow). Keokuk (L. Carb.).
Terebratula parva Swallow (non d'Archiac, 1846), Trans. St. Louis Acad. Sci., II, 1863, p. 83.—Keyes, Geol. Survey Missouri, V, 1895, p. 105.
Terebratula cooperensis Miller, N. American Geol. and Pal., 1889, p. 384.
Loc. Keokuk, Iowa; Monroe and Cooper counties, Missouri.
Obs. Specimens of this species in Professor Hall's collection seen by the writer do not show a punctate shell structure, but are distinctly fibrous.
- Seminula persinuata** (Meek). Carboniferous.
Athyris (?) *persinuata* Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 81, pl. 9, fig. 4.
Loc. White Pine district, Nevada.
- Seminula** (?) **plattensis** (Swallow). Upper Carboniferous.
Spirigera plattensis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 87.
Loc. Missouri; Kansas; Nebraska.
- Seminula** (?) **rogersi** Hall and Clarke. Upper Helderberg (Dev.).
Seminula rogersi Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 97, 364, pl. 47, figs. 1-4.
Loc. Pendleton, Indiana.
- Seminula singletonii** (Swallow). Upper Carboniferous.
Spirigera singletonii Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 87.
Loc. Boone and Andrain counties, Missouri.
Obs. Probably a synonym for *Seminula argentea*.

- Seminula subquadrata** Hall. Kaskaskia (L. Carb.).
Athyris subquadrata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 703, pl. 27, fig. 2, woodcut p. 708.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 585, pl. 14, figs. 1-3;—Geol. Ohio, VII, 1895, p. 472, pl. 10, figs. 1-3.—Keyes, Geol. Survey Missouri, V, 1895, p. 92.
Athyris subquadrata? Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 271, pl. 5, figs. 19, 20.
Seminula subquadrata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 95, pl. 47, figs. 7-9, 15, 16; pl. 84, figs. 30, 31.
Loc. Chester, Illinois; Crittenden County, Kentucky; Newtonville and Maxville, Ohio; Oquirrh Mountains, Utah.
Obs. See *Cleiothyris elintonensis*.
- Seminula titicacaensis** (Gabb). Upper Carboniferous.
Terebratula titicacaensis Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 302, pl. 42, fig. 11.
Loc. Lake Titicaca, Bolivia.
- Seminula trinucleus** Hall. St. Louis (L. Carb.).
Terebratula trinucleus Hall, Trans. Albany Institute, IV, 1858, p. 7;—Geol. Survey Iowa, I, Pt. II, 1858, p. 659, pl. 23, figs. 4, 5.
Athyris trinuclea Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 50, pl. 6, figs. 22-27.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 329, pl. 29, figs. 22-27.
Seminula trinuclea Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 94, 95, fig. 65; pl. 47, figs. 5, 6, 10-14.
Loc. Bloomington and Spergen Hill, Indiana; Alton, Illinois; Boonville, Missouri; Princeton, Kentucky.
Obs. See *Cleiothyris reflexa*.
- Seminula wasatchensis** (White). Upper Carboniferous.
Rhynchonella wasatchensis White, Wheeler's Expl. and Survey west of 100th Meridian, Prel. Rep. 1874, p. 19;—Ibidem, Final Rep., 1875, p. 130, pl. 9, fig. 3.
Loc. Wasatch Range, near Provo, Utah.
Obs. Is related to *S. subtilita*. The great anterior thickening is due to old age.
- Sieberella** Ehlert, and Hall and Clarke=*Gypidula*.
Obs. It may prove that *Sieberella* will be useful as a subgenus of *Gypidula*.
- SIPHONOTRETA** de Vern. Genotype *Crania unguiculata* Eichwald.
Siphonotreta de Vernueil, Géol. de la Russie d'Europe et des Mont. de l'Oural, II, 1845, p. 286.—Dall, Bull. U. S. Nat. Mus., 8, 1877, p. 62.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 110, 167.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 358.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 252.
- Siphonotreta (?) micula** McCoy. Calciferous (Ord.).
Siphonotreta ? micula Ami, Rep. Progress Geol. Nat. Hist. Survey Canada for 1887-88, 1889, p. 52K.
Loc. Great Britain; near *Laevis*, Canada.
- Siphonotreta (?) minnesotaensis** Hall and Clarke. Trenton (Ord.).
Siphonotreta ? minnesotensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 112, 177, pl. 4, figs. 37, 38.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 358, pl. 29, figs. 23, 24.
Loc. Minneapolis, Minnesota.
- Siphonotreta scotica** Whiteaves=*Schizambon ? fissus americanus*.
- SPHÆROBOLUS** Matthew. Genotype *Lingulella ? spissa* Billings.
Sphærobolus Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 263.

Sphærobolus spissus (Billings).

Lower Ordovician.

Lingulella ? spissa Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 468, fig. 5;—Pal. Fossils, II, 1874, p. 67, fig. 36.

Sphærobolus spissus Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 263, pl. 1, fig. 5.

Loc. Bell Island, Newfoundland.

SPIRIFER Sowerby.Genotype *Anomites striatus* Martin.

Spirifer Sowerby, Mineral Conchology, II, 1815, p. 41.—Billings, Canadian Nat. Geol., I, 1856, p. 134.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowledge, XIV, 172, 1864, p. 17.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 1-10;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 751.

Spirifera Billings, Canadian Journal, VI, 1861, p. 253.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 251;—Pal. New York, IV, 1867, p. 186.—White, Wheeler's Expl. and Survey west of the 100th Merid., 1875, p. 90.—Herrick, Bull. Denison University, IV, 1888, p. 14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 105.—Hall, Bull. Geol. Soc. America, I, 1890, p. 567;—Ninth Ann. Rep. N. Y. State Geol., 1890, p. 9.

Spirifer acanthopterus (Conrad).

? Hamilton (Dev.).

Delthyris acanthoptera Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 264.

Loc. Oneonta, Otsego County, New York.

Spirifer acuminatus (Conrad).

Corniferous and Hamilton (Dev.).

Delthyris acuminata Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 65.

Delthyris prora Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 263.

Terebratula acuminatissima Castelnau, Essai Syst. Silurien l'Amérique Septentrionale, 1843, p. 40, pl. 14, fig. 16.

Spirifer cultrijugatus Yandell and Shumard (non Roemer, 1844), Cont. Geol. Kentucky, 1847, p. 10.

Spirifer acuminata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 135.

Spirifera acuminata Hall, Pal. New York, IV, 1867, pp. 198, 231, pl. 29, figs. 9-18; pl. 35, fig. 24.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 105, pl. 8, figs. 1-8.

Spirifer acuminatus White, Second Rep. Indiana Bureau of Statistics and Geol., 1880, p. 503, pl. 4, figs. 1-3;—Tenth Rep. State Geol. Indiana, 1881, p. 135, pl. 4, figs. 1-3.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 31, 39, pl. 39, figs. 39-42.

Loc. Schoharie, Williamsville, Clarence Hollow, Hamilton, Madison, etc., New York; Columbus and Sandusky, Ohio; Falls of Ohio.

Spirifer acuticostatus de Koninck.

Upper Carboniferous.

Spirifer acuticostatus de Koninck, Animaux Fos. Carb. Belgique, p. 265, pl. 17, fig. 6.

Spirifera acuticostata Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 171, pl. 9, figs. 7, 8.—Dawson, Acadian Geol., 3d ed., 1878, p. 292, fig. 91.

Loc. Europe; Brookfield and Shubenacadie, Nova Scotia.

Spirifer agelaius Meek.

Lower Carboniferous.

Spirifer triradialis? Meek (non Phillips), Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 470.

Spirifer agelaius Meek, Ibidem, 1873, p. 470, footnote.—White, Twelfth Ann. Rep. U. S. Geol. Survey Terr., 1883, p. 135, pl. 34, fig. 10.

Loc. Near Virginia City, Montana.

Spirifer alatus Castelnau (non Schlotheim)=**Spirifer aliformis**.

- Spirifer aliformis** de Verneuil. Upper Helderberg (Dev.).
Spirifer alatus Castelnau (non Schlotheim), Essai Système Silurien l'Amérique Septentrionale, 1843, p. 42, pl. 12, fig. 4.
Spirifer aliformis de Verneuil, Ibidem, 1843, p. 42, footnote.
Loc. Schoharie, New York.
Obs. Compare with *Spirifer arenosus*.
- Spirifer alba-pinensis** Hall and Whitfield. Kinderhook (L. Carb.).
Spirifera albapinensis Hall and Whitfield, King's U. S. Geol. Expl., 40th Parl., IV, 1877, p. 255, pl. 4, figs. 7, 8.
Loc. Wasatch Range, Utah.
Obs. Appears to be a synonym of *S. centronatus*.
- Spirifer aldrichi** Etheridge. Devonian.
Spirifer aldrichi Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 634, pl. 29, fig. 2.
Loc. Dana Bay, lat. 82° 42'.
- Spirifer alta** Hall=*Cyrtia alta*.
- Spirifer amarus** Swallow. Hamilton (Dev.).
Spirifer amarus Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 642.
Loc. On page 658 it is given as Callaway County, Missouri, in association with Hamilton terrane fossils. It is probably the same as *S. annæ* Swallow.
- Spirifer angustus** Hall. Hamilton and Portage (Dev.).
Spirifer angusta Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 164, fig. in text.
Spirifera angusta Hall, Pal. New York, IV, 1867, p. 230, pl. 38A, figs. 23-32.—Whitfield, Geol. Wisconsin, IV, 1882, p. 329, pl. 26, fig. 3.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 54, figs. 14-17.
Spirifer angustus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 31, 39, pl. 24, figs. 14-17.
Loc. Livingston and Genesee counties, and Ithaca, New York; Portage group of New York (Williams); Milwaukee, Wisconsin.
- Spirifer annæ** Swallow. Hamilton (Dev.).
Spirifer annæ Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 641.
Loc. Callaway County, Missouri.
Obs. See *S. amarus*.
- Spirifer annectans** Walcott. Lower Carboniferous.
Spirifera annectans Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 216, pl. 18, fig. 7.
Loc. Eureka district, Nevada.
- Spirifer antarcticus** Morris and Sharpe. Lower Devonian.
Spirifer antarcticus Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 276, pl. II, fig. 2.
Loc. Falkland Islands.
Obs. Compare with *S. boliviaensis*, *S. chuquisaca*, and *S. orbigny*.
- Spirifer arata** Hall=*Spirifer granulosus*.
- Spirifer arcticus** Houghton. Devonian.
Spirifer arcticus Houghton, Jour. Royal Dublin Soc., I, 1857, p. 183.
Obs. The writer has not seen this journal.
- Spirifer arctisegmentum** Hall. Upper Helderberg (Dev.).
Spirifer arctisegmenta Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 131.
Spirifera arctisegmenta Hall, Pal. New York, IV, 1867, p. 208, pl. 31, figs. 9, 10;—

Spirifer arctisegmentum Hall—Continued.

Second Ann. Rep. N. Y. State Geol., 1883, pl. 59, figs. 10-12.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 108, pl. 12, figs. 14, 15.

Spirifer arctisegmentum Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 36, pl. 31, figs. 10-12.

Loc. Stafford and Genesee counties, New York; Falls of Ohio.

Spirifer arenosus (Conrad).

Oriskany and Corniferous (Dev.).

Delthyris arenosa Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 65.—Mather, Geol. N. Y.; Rep. First Dist., 1843, p. 342, fig. 1.—Hall, *Ibidem*, Rep. Fourth Dist., 1843, p. 148, fig. 1.

Delthyris arenaria Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 123, fig. 1; p. 124, fig. 5.

Spirifer arenosa Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 826, fig. 650.—Hall, Pal. New York, III, 1859, p. 425, pl. 98, figs. 1-8; pl. 99, figs. 1-10; pl. 100, figs. 1-8.

Spirifera arenosa Billings, Geol. Canada, 1863, p. 960, fig. 465.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 3-7.

Spirifera unica Hall, Pal. New York, IV, 1867, p. 203, pl. 30, fig. 21; pl. 55, fig. 8.

Spirifer arenosus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 24, 27, 37, pl. 29, figs. 1-4; pl. 30, figs. 3-8.

Loc. Schoharie, Clarence Hollow, etc., New York; Cumberland, Maryland; Virginia; Frankstown, Pennsylvania; Cayuga, Ontario.

Spirifer argentarius Meek = **Spirifer pinonensis**.**Spirifer arrectus** Hall = **Spirifer murchisoni**.**Spirifer asper** Hall.

Hamilton (Dev.).

Spirifer aspera Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 508, pl. 4, fig. 7.

Spirifera (Cyrtina) aspera Whitfield, Geol. Wisconsin, IV, 1882, p. 331, pl. 26, figs. 1, 2.

Spirifer asper Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29, 31, 32, 39, pl. 25, figs. 20-25.

Loc. Independence and Rockford, Iowa; Rock Island, Illinois; Milwaukee, Wisconsin; Canandaigua, New York.

Spirifer asperatus Ringueberg.

Niagara (Sil.).

Spirifera asperata Ringueberg, Bull. Buffalo Soc. Nat. Sci., V, 1886, p. 16, pl. 2, fig. 5.

Loc. Lockport, New York.

Spirifer atwateranus Miller = **Spirifer iowaensis**.**Spirifer audaculus** (Conrad).

Marcellus and Hamilton (Dev.).

Delthyris audacula Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 262.

Delthyris medialis Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 208, fig. 8.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 828, fig. 669.

Spirifer eatoni Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 157.

Spirifer medialis Hall, *Ibidem*, 1857, p. 164, fig. 1.

Spirifera medialis Hall, Pal. New York, IV, 1867, p. 227, pl. 38, figs. 1-25,—Second Ann. Rep. N. Y. State Geol., 1883, pl. 54, figs. 1-13.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 125, pl. 26, figs. 2-5.

Spirifera medialis var. *eatoni* Hall, Pal. New York, IV, 1867, pl. 38, figs. 12-18.

Spirifera audacula Whitfield, Geol. Wisconsin, IV, 1882, p. 329, pl. 25, figs. 25, 26.

Spirifer audaculus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29-31, 39, pl. 24, figs. 1-13; pl. 29, fig. 5.

Loc. Otsego, Cayuga, Moscow, Darien, etc., New York; Falls of Ohio; Milwaukee, Wisconsin.

- Spirifer audaculus macronotus** Hall. Hamilton (Dev.).
Delthyris macronota Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 206, fig. 5.
Spirifera macronota Hall, Pal. New York, IV, 1867, p. 231, pl. 38A, figs. 1-22;—
 Second Ann. Rep. N. Y. State Geol., 1883, pl. 54, figs. 18-27.
Spirifer audaculus var. *macronotus* Hall and Clarke, Pal. New York, VIII, Pt. II,
 1895, pl. 24, figs. 18-27.
Loc. Bristol, Moscow, Darien, etc., New York.
- Spirifer buarquianus** Rathbun. Middle Devonian.
Spirifera buarquiana Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 28.
Loc. Rio Maecuru, Province of Para, Brazil.
- Spirifer belphegor** Clarke. Genesee (Dev.).
Spirifera belphegor Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 30, pl. 3, fig. 13.
Loc. Ontario County, New York.
- Spirifer bicostatus** Hall=*Reticulara bicostata*.
Spirifer bicostatus var. *petilus* Hall=*Reticularia bicostata* petila.
- Spirifer bidorsalis** Winchell. Hamilton (Dev.).
Spirifera bidorsalis A. Winchell, Geol. Rep. Lower Peninsula of Michigan, 1866,
 p. 93.
Loc. Grand Traverse district, Michigan.
- Spirifer biforatus** var. *lynx* Hall=*Platystrophia biforata*.
Spirifer bifurcatus Hall=*Spirifer leidyi*.
- Spirifer billingsanus** Miller. Oriskany (Dev.).
Spirifera superba Billings (non Eichwald), Pal. Fossils, II, 1874, p. 45, pl. 3A,
 fig. 3.
Spirifera billingsana Miller, N. American Geol. Pal., 1889, p. 372.
Loc. Indian Cove, Gaspé.
- Spirifer bilobus** Hall=*Bilobites bilobus*.
- Spirifer bimesialis** Hall. Upper Devonian.
Spirifer bimesialis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 507, pl. 4, fig. 6.—Hall
 and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 36, pl. 34, figs. 23-26.
Spirifera bimesialis Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 59, figs.
 23-26.
Loc. Independence, Iowa; Naples, New York (Clarke).
- Spirifer buplicatus** Meek (non Hall)=*Spirifer centronatus*.
- Spirifer buplicatus** Hall. Kinderhook (L. Carb.).
Spirifer buplicata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 519, pl. 7, fig. 5.
Spirifera buplicata Herrick, Bull. Denison Univ., III, 1888, p. 45; IV, 1888, p. 25,
 pl. 2, fig. 8.
Spirifer buplicatus Herrick, Geol. Ohio, VII, 1895, pl. 15, fig. 8.
Loc. Burlington, Iowa; Quincy, Illinois; Richfield, etc., Ohio.
- Spirifer boliviaensis** d'Orbigny. Devonian.
Spirifer boliviensis d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842,
 p. 37, pl. 2, figs. 8, 9.
Loc. Cochabamba and Chuquisaca, Bolivia.
Obs. Compare with *S. antarcticus* and *S. hawkinsi*.
- Spirifer boonensis** Swallow. Upper Carboniferous.
Spirifer boonensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 646.
Loc. Boone, Randolph, and Monroe counties, Missouri.
Obs. Regarded by Keyes as a synonym for *S. rockymontanus*.

Spirifer byrnesi Nettelroth. **Hamilton** (Dev.).

Spirifera byrnesi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 109, pl. 10, figs. 1-5?, 31-34, 36-39.

Loc. Falls of Ohio.

Spirifer cameratus Derby (non Morton) = **Spirifer condor**.**Spirifer cameratus** Morton. Upper Carboniferous.

Spirifer cameratus Morton, American Jour. Sci., XXIX, 1836, p. 150, pl. 2, fig. 3.—Hall, Pacific Railroad Reports, III, 1856, p. 102, pl. 2, figs. 9, 12;—Geol. Survey Iowa, I, Pt. II, 1858, p. 709, pl. 28, fig. 2.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 44.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 183, pl. 6, fig. 12; pl. 8, fig. 15.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 573, pl. 25, fig. 7.—Toula, Neues Jahrbuch f. Mineral., 1874, p. 240;—Sitzungsber. der Kais. Akad. der Wissen. zu Wien, 1875, p. 543.—White, Wheeler's Expl. Survey west 100th Meridian, IV, 1875, p. 132, pl. 10, fig. 1.—Newberry, Macomb's Rep. Expl. Exped. from Santa Fe to the Great Colorado River of the West, 1876, p. 138.—Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 353, pl. 2, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 26, 38, pl. 32, figs. 9-15.

Spirifer mensebachanus Roemer, Kreidebildung Texas, 1852, p. 88, pl. 11, fig. 7.

Spirifer triplicatus Hall, Stansbury's Expl. Survey of the Valley of Great Salt Lake, Utah, 1852, p. 410, pl. 4, fig. 5.

Spirifer inequicostatus? Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 586, pl. 5, fig. 6. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17954.]

Spirifer spifer Owen (non Keyserling), *Ibidem*, 1852, pl. 5, fig. 4.

Spirifer striatus var. *triplicatus* Marcou, Geol. N. America, 1858, p. 49, pl. 7, fig. 3.

Spirifer species Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 833, fig. 694.

Spirifer camerata Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 27.

Spirifera camerata Newberry, Ives's Rep. Colorado River of the West, 1861, p. 127.—White, Second Ann. Rep. Indiana Bureau Statistics and Geol., 1880, p. 517, pl. 8, fig. 3;—Tenth Rep. State Geol. Indiana, 1881, p. 149, pl. 8, fig. 3.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 57, figs. 9-15.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 132, pl. 35, figs. 3-5.—Herrick, Bull. Denison Univ., II, 1887, p. 45, pl. 2, fig. 22.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 230;—Geol. Survey Missouri, V, 1895, p. 83, pl. 40, fig. 5.

Spirifera camerata var. *kansasensis* Swallow, Trans. St. Louis Acad. Sci., II, 1867, p. 409.

Spirifer (*Trigonotreta*) *camerata* Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 91, pl. 9, fig. 2.

Loc. Putnam Hill, Ohio; throughout the Upper Carboniferous of North America; western side of Spitzbergen (Toula).

Obs. *S. cameratus* is often regarded as identical with *S. striatus* (Martin). The latter species, however, is closely and finely reticulated with concentric growth lines, while in *S. cameratus* the plications are crowded with small pustules arranged in radiating lines. See *S. condor* and *S. striatus*.

Spirifer cameratus var. **kansasensis** Swallow = **Spirifer cameratus**.**Spirifer cameratus percrassus** Swallow. Upper Carboniferous.

Spirifer cameratus var. *percrassus* Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 409.

Loc. Missouri and Kansas.

Obs. Regarded by Keyes as a synonym for *S. cameratus*.

Spirifer capax Hall=*Spirifer euryteines*.

Spirifer canandaiguæ Hall and Clarke=*Reticularia canandaiguæ*.

Spirifer carteri Hall=*Syringothyris carteri*.

Spirifer carteri Meek (non Hall)=*Syringothyris texta*.

Spirifer catskillensis Emmons=*Spirifer mesistrialis*.

Spirifer cedarensis Owen=*S. iowaensis*.

***Spirifer centronatus* A. Winchell.** Waverly (L. Carb.).

Spirifer centronatus A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 118.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 86, pl. 5, fig. 8.

Spirifera (*Trigonotreta*) *biplicata* (Hall??) Meek, Pal. Ohio, II, 1875, p. 290, pl. 14, fig. 5.

Spirifera centronata Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 254, pl. 4, figs. 5, 6.

Loc. Cuyahoga Falls, Ohio; Black Hills, South Dakota; Wasatch Range, Utah; Mountain Spring, Nevada; Yellowstone Park.

Obs. See *S. alba-pinensis*.

Spirifer chilensis Forbes=*Spiriferina rostrata*.

***Spirifer chuquisaca* A. Ulrich.** Middle Devonian.

Spirifer chuquisaca A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 65, pl. 4, figs. 19, 20.

Loc. Chahuarani, Tarabuco, etc., Bolivia.

Obs. Compare with *S. boliviaensis* and *S. antarcticus*.

Spirifer clarus Swallow=*Reticularia clara*.

***Spirifer clavatus* McChesney.** Burlington (L. Carb.).

Spirifera clavata McChesney, New Pal. Fossils, 1861, p. 84;—Trans. Chicago Acad. Sci., I, 1868, p. 36, pl. 6, fig. 5.

Loc. Burlington, Iowa.

Spirifer clintoni Hall=*Spirifer granulatus*.

Spirifer clio Hall=*Delthyris consobrina*.

Spirifer compactus Meek=*Reticularia fimbriata*.

***Spirifer concinnus* Hall.** Lower Helderberg (Dev.).

Spirifer concinna Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 60, figs. 1-3.

Spirifera concinna Hall, Pal. New York, III, 1859, p. 200, pl. 25, fig. 2; pl. 28, fig. 7;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 1, 2.

Spirifer concinnus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 24, 27, 38, pl. 30, figs. 1, 2.

Loc. Helderberg Mountains, New York.

***Spirifer condor* d'Orbigny.** Upper Carboniferous.

Spirifer condor d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 46, pl. 5, figs. 11-14.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 514.

Spirifer striatus var. *multicostatus* Toulà, Sitzungsab. der kais. Akad. der Wissenschaften zu Wien, 1869, p. 3, pl. 1, figs. 2-4.

Spirifera camerata Derby (non Morton), Bull. Cornell Univ., I, 1874, p. 12, pls. 1, 2, 4, 5;—Bull. Mus. Comp. Zool., III, 1875, p. 279.

Loc. Bolivia; Bomjardim and Itaituba, Brazil; Yampopata and the Island of Titicaca, Bolivia; Pichis River, Peru.

Spirifer condor d'Orbigny—Continued.

Obs. "It has for a long time been considered a synonym of *S. striatus* and later of *S. cameratus*. It is distinct, however, from the former by the lamellose striae of growth and from the latter by these as well by the nearly entire absence of bundling of the ribs" (Waagen).

Spirifer conradanus Miller = *Reticularia fimbriata*.

Spirifer consobrina d'Orbigny = *Delthyris consobrina*.

Spirifer consors A. Winchell.

Hamilton (Dev.).

Spirifer consors A. Winchell, Geol. Rep. Lower Peninsula of Michigan, 1866, p. 93.

Loc. Grand Traverse district, Michigan.

Spirifer cooperensis Waagen = *Reticularia cooperensis*.

Spirifer corticosus Hall.

Hamilton (Dev.).

Spirifer corticosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 160.

Spirifera corticosa Hall, Pal. New York, IV, 1867, p. 236.

Loc. Cumberland, Maryland.

Obs. Compare with *S. granulatus*.

Spirifer(?) costalis Castelneau.

? Upper Helderberg (Dev.).

Spirifer costalis Castelneau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 41, pl. 14, fig. 7.

Loc. Schoharie, New York.

Spirifer crispatus Hall and Clarke.

Niagara (Sil.).

Spirifer crispatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 360, pl. 36, figs. 9, 10.

Loc. "Maryland."

Spirifer crispus (Hisinger).

Niagara and Coralline (Sil.).

Terebratulula crisper Hisinger, Svenska Vet.-Akad. Handlingar, 1826, tab. 7, fig. 4.

Delthyris staminea Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 105, fig. 3.

Spirifer crispus Hall, American Jour. Sci., XX, 1849, p. 228;—Pal. New York, II, 1852, p. 262, pl. 54, fig. 3; p. 328, pl. 74, fig. 9.—Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 75, pl. 6, figs. 6, 7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 20, 36, pl. 36, figs. 1-6.

Spirifera crisper Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 157, pl. 24, figs. 6-12, 19;—Eleventh Rep. State Geol. Indiana, 1882, p. 295, pl. 24, figs. 6-12, 19;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 1-6.

Loc. Europe; Lockport, Lewiston, and Schoharie, New York; Hamilton and Arisaig, Nova Scotia (Ami); Ontario; Waldron, Indiana.

Spirifer crispus simplex Hall.

Niagara (Sil.).

Spirifera crisper var. Hall, Trans. Albany Institute, IV, 1863, p. 212.

Spirifera crisper var. simplex Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 157, pl. 24, figs. 1-5;—Eleventh Rep. State Geol. Indiana, 1882, p. 296, pl. 24, figs. 1-5.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 111, pl. 17, figs. 36, 37.

Spirifer crispus var. simplex Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 75, pl. 6, figs. 4, 5.

Loc. Waldron, Indiana; Louisville, Kentucky.

Spirifer cultrijugatus Yandell and Shumard = *Spirifer acuminatus*.

Spirifer cumberlandiæ Hall.

Oriskany (Dev.).

Spirifer cumberlandiæ Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 63;—Pal. New York, III, 1859, p. 421, pl. 96, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 36, pl. 33, figs. 16-23.

Spirifer cumberlandiæ Hall—Continued.

Spirifera cumberlandiæ Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 58, figs. 16-23.

Loc. Cumberland, Maryland.

Spirifer cuspidatus of American authors = *Syringothyris carteri*.**Spirifer cuspidatiformis Miller = *Syringothyris texta*.****Spirifer cyclopterus Hall. Lower Helderberg and Oriskany (Dev.).**

Spirifer cycloptera Hall, Tenth Ann. Rep. N. Y. State Geol. Nat. Hist., 1857, p. 58;—Pal. New York, III, 1859, p. 199, pl. 25, fig. 1.

Spirifera cycloptera Billings, Geol. Canada, 1863, p. 957, fig. 457;—Pal. Fossils, II, 1874, p. 48, pl. 3A, fig. 4.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 12, 13.

Spirifer cyclopterus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 36, pl. 36, figs. 12, 15.

Loc. Helderberg Mountains, New York; Gaspé and New Brunswick.

Spirifer cyrtinaformis Hall and Whitfield = *Cyrtia cyrtiniformis*.**Spirifer davisi Nettelroth. Hamilton (Dev.).**

Spirifera davisi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 112, pl. 12, figs. 1-4.

Loc. Falls of Ohio.

Spirifer deltoideus Herrick. Waverly (L. Carb.).

Spirifera deltoidea Herrick, Bull. Denison Univ., IV, 1888, p. 27, pl. 2, fig. 7.

Spirifer deltoideus Herrick, Geol. Ohio, VII, 1895, pl. 15, fig. 7.

Loc. Licking County, Ohio.

Spirifer desideratus Walcott. Lower Carboniferous.

Spirifera desiderata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 217, pl. 7, fig. 8.

Loc. Eureka district, Nevada.

Spirifer disjunctus Sowerby. Chemung (Dev.).

Spirifera disjuncta Sowerby, Trans. Geol. Soc., 2d ser., V, 1840, pl. 53, fig. 8; pl. 54, figs. 12, 13.—Davidson, Mon. British Devonian Brach., Pal. Soc., 1864, p. 23, pl. 5, figs. 1-12; pl. 6, figs. 1-5.—Hall, Pal. New York, IV, 1867, p. 243, pl. 41, figs. 1-19; pl. 42, figs. 1-20;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 14-17.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 134.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 221, pl. 29, fig. 4.

Delthyris perlatus Conrad, Fifth Ann. Rep. N. Y. Geol. Survey, 1841, p. 54.

Delthyris chemungensis Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 263.

Delthyris prolata Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 179, fig. 3.

Delthyris cuspidata Hall (non Martin), Geol. N. Y.; Rep. Fourth Dist., 1843, p. 270, fig. 1.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 829, fig. 683.

Delthyris disjuncta? Hall, Geology N. Y.; Rep. Fourth Dist., 1843, p. 269, fig. 3.

Delthyris acanthota Hall, Ibidem, 1843, p. 270, fig. 2.

Delthyris inermis Hall, Ibidem, 1843, p. 270, fig. 4.

Spirifer disjunctus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 21, 24, 27, 37, 49, pl. 30, figs. 14, 15, 17.—Herrick, Geol. Ohio, VII, 1895, pl. 23, fig. 11.

Loc. Europe; New York; Pennsylvania; Eureka district, Nevada; Peace, Hay, and Liards rivers, Canada.

Spirifer disjunctus occidentalis Whiteaves. Upper Devonian.

Spirifera disjuncta var. *occidentalis* Whiteaves, Cont. Canadian Pal., I, 1891, p. 222, pl. 29, fig. 5.

Loc. Hay River, Canada.

- Spirifer disjunctus sulcifer** Hall and Clarke. Chemung (Dev.).
Spirifera disjunctus var. *sulcifer* Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 361, pl. 30, fig. 16.
Loc. Near Olean, New York.
- Spirifer disparilis** Hall = *Metaplasia disparilis*.
- Spirifer divaricatus** Hall. Corniferous and Hamilton (Dev.).
Spirifer divaricata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 133.
Spirifer venustus Hall, Thirteenth Rep. Ibidem, 1860, p. 82.
Spirifera divaricata Hall, Pal. New York, IV, 1867, p. 213, pl. 32, figs. 1-6.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 113, pl. 11, figs. 6-11; pl. 12, figs. 5-11.
Spirifer divaricatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 24, 27, 39, pl. 38, figs. 15-17.
Loc. Schoharie, Stafford, Williamsville, York, etc., New York; Port Colborne, Canada; Falls of Ohio; Lebanon, Kentucky.
Obs. Compare with *S. multicostatus* Castelnau.
- Spirifer dubius** Hall = *Pentamerella dubia*.
- Spirifer dubius** Nettelroth. †Niagara (Sil.).
Spirifera dubia Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 115, pl. 33, figs. 23, 24.
Loc. Louisville, Kentucky.
- Spirifer duodenarius** (Hall). Upper Helderberg (Dev.).
Delthyris duodenaria Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 171, fig. 5.
Spirifera duodenaria Billings, Canadian Jour., n. ser., V, 1861, p. 256, figs. 65-67;—Geol. Canada, 1863, p. 372, fig. 394.—Hall, Pal. New York, IV, 1867, p. 189, pl. 27, figs. 13-16; pl. 28, figs. 24-33;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 58, figs. 8-13.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 114, pl. 12, figs. 12, 13, 16.
Spirifera duodenaria? Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 25.
Spirifer duodenarius Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 37, pl. 33, figs. 8-15.
Loc. New York, Ontario, Columbus, Ohio; Falls of Ohio; Rio Maecurn, Province of Para, Brazil.
- Spirifer duplicatus** Hall = *Spirifer duplicatus*.
- Spirifer duplicicosta** Phillips. Carboniferous.
Spirifer duplicicostus Phillips, Geol. Yorkshire, II, 1829, p. 218, pl. 10, fig. 1.
Spirifera duplicicosta Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 628.
Loc. Europe; Feilden Isthmus, lat. 82° 43'.
- Spirifer duplicatus** (Conrad). Hamilton (Dev.).
Delthyris duplicata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 261, pl. 14, fig. 16.
Spirifera duplicata Hall, Pal. New York, IV, 1867, pp. 223, 236.
Loc. Near Smyrna, New York.
Obs. Compare with *S. granulatus* Conrad.
- Spirifer eatoni** Hall = *Spirifer audaculus*.
- Spirifer elizæ** Rathbun. Middle Devonian.
Spirifer elizæ (Hartt MS.) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 239, pl. 8, figs. 15, 21; pl. 9, fig. 22.
Spirifera elizæ Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 28.
Loc. Erere, Province of Para, Brazil.

Spirifer engelmanni Meek and Worthen (non Meek)=*Spirifer worthenianus*.

***Spirifer engelmanni* Meek.**

Middle Devonian.

Spirifera engelmanni Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 308.—Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 346, pl. 1, fig. 1.—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 41, pl. 3, fig. 3.

Loc. Neils Valley, Utah; White Pine district, Nevada.

***Spirifer eudora* Hall.**

Niagara (Sil.).

Spirifera eudora Hall, Annual Rep. Geol. Survey Wisconsin, 1861, p. 25;—Geol. Rep. Wisconsin, I, 1863, p. 69, pl. 5; p. 436;—Trans. Albany Inst., IV, 1863, p. 211;—Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 370, pl. 13, figs. 5, 7;—*Ibidem*, Twenty-eighth Rep., 1879, p. 156, pl. 24, figs. 13-18;—Eleventh Rep. State Geol. Indiana, 1882, p. 294, pl. 24, figs. 13-18;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 51, figs. 19-21, 29.

Spirifer eudora Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 13, 35, pl. 21, figs. 19-21, 29.

Loc. Racine, Wisconsin; Waldron, Indiana; Louisville, Kentucky.

***Spirifer euruteines* Hall (non Owen)=*S. fornacula*.**

***Spirifer euruteines* var. *fornacula* Hall=*S. fornacula*.**

***Spirifer euryteines* Owen.**

Hamilton (Dev.).

Delthyris euruteines Owen, Rep. Geol. Expl. Iowa, Wisconsin, and Illinois, 1844, p. 69, pl. 12, fig. 9.

Spirifer euruteines Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 586, pl. 3, figs. 2, 6. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17924.]

Spirifer parryana Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 509, pl. 4, fig. 8.—Keyes, Geol. Surv. Missouri, V, 1895, p. 77, pl. 40, fig. 4.

Spirifer capax Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 520, pl. 7, fig. 7.

Spirifera parryana Billings, Canadian Jour., VI, 1861, p. 261, figs. 77, 78;—Geol. Canada, 1863, p. 386, fig. 422.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, figs. 8, 9.—Calvin, Bull. Lab. State Univ. Iowa, 1888, p. 19.

Spirifera fornacula Meek and Worthen (non Hall), Geol. Survey Illinois, III, 1868, p. 433, pl. 13, fig. 8.

Spirifera capax Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, figs. 15-17.

?*Spirifera parryana* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 137, pl. 14, fig. 10.

Spirifer parryannus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29, 31, 39, pl. 22, figs. 8, 9, 15-17.

Loc. Pine Creek and elsewhere in Iowa; Eureka district, Nevada; Bosanquet, Ontario, Canada.

Obs. Owen described this species in 1839, but it was not published until 1844. In 1841 Owen sent Professor Hall specimens from the Falls of the Ohio labeled *S. euruteines*. This species was again refigured in his report of 1852, where he cites the same localities as in 1844 (p. 32 last paragraph), adding Falls of Ohio and Columbus, Ohio. Professor Hall is correct in regarding the Ohio specimens as distinct from those of the Mississippi Valley, but is in error in thinking that figures 6-6b of the 1852 report are drawn from an Ohio Falls specimen. These figures are of the same specimen as of figure 9 of the 1844 report, which is from Pine Creek, Iowa. The type specimens are in the National Museum collection. Owen's figure 2 is the same species as Hall's *S. capax*, while his figure 6 is a small individual of *S. parryana* Hall. Professor Calvin has shown these two species to be identical. Therefore it follows that *S. euryteines* must be restricted to the specimens from the Mississippi Valley. For the specimens from the Falls of the Ohio *S. fornaculus* Hall will be the proper name.

Spirifer extenuatus Hall=*Syringothyris extenuata*.

Spirifer fasciger Owen (non Keyserling)=*Spirifer cameratus*.

Spirifer fastigatus Meek and Worthen (non Morton)=*Spirifer mortonanus*.

***Spirifer fastigatus* Morton.** ?Lower Carboniferous.

Spirifer fastigatus Morton, American Jour. Sci., XXIX, 1836, p. 152, pl. 14, fig. 35.

Loc. Junior Furnace, Scioto County, Ohio.

Obs. Not recognizable.

***Spirifer flicosta* A. Winchell.** Hamilton (Dev.).

Spirifer flicosta A. Winchell, Report Lower Peninsula of Michigan, 1866, p. 94.

Loc. Grand Traverse district, Michigan.

***Spirifer* (?) *fimbriatus* Morton** Upper Carboniferous.

Spirifer fimbriatus Morton, American Jour. Sci., XXIX, 1836, p. 150, pl. 2, fig. 1.

Loc. Putnam Hill, Ohio.

Obs. Not recognizable.

Spirifer fimbriatus Hall=*Reticularia fimbriata*.

Spirifer fischeri Castelnau=*Spirifer macropleura*.

***Spirifer foggi* Nettelroth.** Niagara (Sil.).

Spirifer foggi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 117, pl. 32, figs. 28-31.

Loc. Louisville, Kentucky.

***Spirifer forbesi* Norwood and Pratten.** Burlington (L. Carb.).

Spirifer forbesi Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 73, pl. 9, fig. 3.—Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 600, pl. 13, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 26, 38, pl. 37, fig. 18.

Spirifer forbesi Keyes, Geol. Survey Missouri, V, 1895, p. 80, pl. 40, fig. 3.

Loc. Burlington, Iowa; Hannibal, Louisiana, and Sedalia, Missouri.

***Spirifer formosus* Hall.** Hamilton (Dev.).

Spirifer formosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 154.

Spirifer formosa Hall, Pal. New York, IV, 1867, p. 220, pl. 28, figs. 12-16.

Loc. Bakeoven, Illinois.

***Spirifer fornacula* Meek and Worthen (non Hall)=*Spirifer euryteines*.**

***Spirifer fornacula* Hall.** Hamilton (Mid. Dev.).

Spirifer fornacula Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 154.

Spirifer euryteines Hall (non Owen), Pal. New York, IV, 1867, p. 209, pl. 31, figs. 14-19.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 504, pl. 4, figs. 4, 5;—Tenth Rep. State Geol. Indiana, 1881, p. 136, pl. 4, figs. 4, 5.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 115, pl. 6, figs. 1-7, 9, 11-17.

Spirifer euryteines var. *fornacula* Hall, Pal. New York, IV, 1867, p. 211, pl. 31, figs. 11-13.—Whitfield, Geol. Wisconsin, IV, 1882, p. 330, pl. 25, fig. 22.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 117, pl. 6, figs. 8, 10, 18-20.

Loc. Jackson County, Illinois; Falls of Ohio; Columbus, Ohio; Milwaukee, Wisconsin (Whitfield).

Obs. See remarks on *S. euryteines* Owen.

***Spirifer fornax* Hall.** Hamilton (Dev.).

Spirifer fornax Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 155.

Loc. Illinois.

Spirifer franklini Meek = *Reticularia franklini*.

Spirifer fultonensis Worthen.

Upper Carboniferous.

Spirifera fultonensis Worthen, Geol. Survey Illinois, V, 1873, p. 572, pl. 25, fig. 5.

Loc. Canton, Illinois.

Spirifer gaspensis Billings.

Oriskany (Dev.).

Spirifera gaspensis Billings, Pal. Fossils, II, 1874, p. 44, pl. 3, fig. 8.

Loc. Gaspé.

Spirifer gibbosus Hall.

Niagara (Sil.).

Spirifer gibbosus Hall, Ann. Rep. Geol. Survey Wisconsin, 1861, p. 25.

Spirifera gibbosa Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 370, pl. 13, figs. 6, 8.

Loc. Racine, Wisconsin.

Obs. Probably the same as *S. eudora* Hall.

Spirifer glabrus Davidson = *Martinia glabra*.

Spirifer glabrus var. *contractus* Meek and Worthen = *Martinia glabra contracta*.

Spirifer glabrus nevadensis Walcott = *Reticularia nevadaensis*.

Spirifer glaucescens White = *Martinia glaucescens*.

Spirifer granuliferus Hall = *Spirifer granulatus*.

Spirifer granulatus (Conrad).

Hamilton (Dev.).

Delthyris granulosa Conrad, Third Ann. Rep. Geol. Survey N. Y., 1839, p. 65.

Delthyris granulifera Hall, Geology N. Y.; Rep. Fourth Dist., 1843, p. 206, fig. 1.

Delthyris congesta Hall, *Ibidem*, 1843, p. 206, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 828, figs. 670, 673.

Spirifer huroniensis Castelneau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 41, pl. 12, fig. 6.

Spirifer osteolatus Yandell and Shumard, Cont. Geol. Kentucky, 1847, p. 14.

Spirifer granulifera Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 163.

Spirifer arata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 161.

Spirifer clintoni Hall, *Ibidem*, 1857, p. 157.

Spirifer oweni Hall, *Ibidem*, 1857, p. 129.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 22, figs. 1-7.

Spirifera oweni Hall, Pal. New York, IV, 1867, p. 197, pl. 29, figs. 1-8;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, figs. 1-7.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 126, pl. 7, figs. 1-10.

Spirifera granulifera Hall, Pal. New York, IV, 1867, p. 223, pl. 36, figs. 1-13;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 53, figs. 1-15.

Spirifera arata Hall, Pal. New York, IV, 1867, p. 235.

Spirifer granulatus Hall, Pal. New York, VIII, Pt. II, 1893, pp. 29, 30, 31, 38, pl. 23, figs. 1-15; pl. 29, figs. 9-12.

Loc. Schoharie, Moscow, Darien, Canandaigua, etc., New York; Pennsylvania; Cumberland, Maryland; Virginia; Falls of Ohio; Alpena, Michigan.

Spirifer gregarius Clapp.

Upper Helderberg (Dev.).

Delthyris gregaria Yandell and Shumard, Cont. Geol. Kentucky, 1847, pp. 9, 10. (Nomina nudum.)

Spirifer gregaria (Clapp MS.) Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 127.

Spirifera gregaria Billings, Canadian Jour., n. ser., VI, 1861, p. 260, figs. 74-76;—Geol. Canada, 1863, p. 372, fig. 391.—Hall, Pal. New York, IV, 1867, p. 195, pl. 28, figs. 1-11.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, pl. 4, figs. 10, 11;—Tenth Rep. State Geol. Indiana, 1881, p. 136, pl. 4, figs. 10, 11.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 119, pl. 8, figs. 9-13; pl. 10, figs. 6-10.

Spirifer gregarius Clapp—Continued.

Spirifer gregarius Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 36, pl. 29, fig. 7; pl. 37, figs. 11, 12.

Loc. Falls of Ohio; Columbus, Ohio; Genesee and Erie counties, New York; Ontario.

Spirifer grieri Hall.

Upper Helderberg (Dev.).

Spirifer grieri Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 127;—Pal. New York, IV, 1867, p. 194, pl. 27, fig. 29; pl. 28, figs. 17-23.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 24, 27, 38, pl. 30, figs. 9-13.

Spirifera grieri Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 9-13.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 120, pl. 9, figs. 8-14.

Loc. Clarence, Williamsville, etc., New York; Columbus, Ohio; Falls of Ohio.

Spirifer grimesi Hall.

Kinderhook and Burlington (L. Carb.).

Spirifer grimesi Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 604, pl. 14, figs. 1-5.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 23, 25, 38, pl. 31, figs. 8, 16-19.

Spirifer allied to *grimesi* Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 628, pl. 25, fig. 5.

Spirifera grimesi Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 56, figs. 8, 16-19.—Keyes, Geol. Survey Missouri, V, 1895, p. 79.

Loc. Burlington, Iowa; Quincy, Illinois; Fielden Isthmus, lat. 82° 43'; Hannibal, Louisiana, Sedalia, etc., Missouri.

Spirifer guadalupensis Shumard = *Reticularia guadalupensis*.

Spirifer hannibalensis Swallow = *Syringothyris carteri*.

Spirifer hartti Rathbun.

Middle Devonian.

Spirifera hartti Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 29.

Loc. Rio Maecuru, Province of Para, Brazil.

Spirifer hawkinsi Morris and Sharpe.

Lower Devonian.

Spirifer hawkinsii Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 276, pl. 11, fig. 1.

Loc. Falkland Islands.

Spirifer hemicyclus Meek and Worthen.

Oriskany (Dev.).

Spirifer hemicyclus Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 399, pl. 8, figs. 6, 7.

Loc. Union and Alexandria counties, Illinois.

Spirifer hemiplicatus Hall = *Enteletes hemiplicatus*.

Spirifer hesione Billings = *Delthyris raricosta*.

Spirifer hirtus White and Whitfield = *Reticularia cooperensis*.

Spirifer hobbsi Nettelroth.

Hamilton (Dev.).

Spirifera varicosa var. Hall, Pal. New York, IV, 1867, p. 206, pl. 31, fig. 23.

Spirifera hobbsi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 121, pl. 10, figs. 21, 22, 26-30, 35, 40.

Loc. Falls of Ohio.

Spirifer homfrayi Gabb = *Spiriferina homfrayi*.

Spirifer hungerfordi Hall.

Chemung (Dev.).

Spirifer hungerfordi Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 501, pl. 4, fig. 1.—Tschernyschew, Mémoires du Comité Géologique de St. Petersburg, III, 3, 1887, p. 62.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 23, 25, 37, pl. 29, fig. 6; pl. 37, figs. 26-30.—Webster, American Naturalist, XXII, 1888, p. 1101.

Loc. Rockford, Iowa.

Spirifer huroniensis Castelnau = *Spirifer granulatus*.

***Spirifer huronensis* A. Winchell.**

Portage (Dev.).

Spirifer huronensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 406.

Loc. Port aux Barques, Michigan.

***Spirifer imbrex* Hall.**

Burlington (L. Carb.).

Spirifer imbrex Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 601, pl. 13, fig. 2.—

Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 26, 38, pl. 31, figs. 11, 12.

Spirifera imbrex Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 56, figs. 11, 12.

Loc. Burlington, Iowa; Hannibal and Louisiana, Missouri.

Spirifer inæquivalvis Castelnau = *Rhynchotrema inæquivalvis*.

***Spirifer incertus* Hall.**

Burlington (L. Carb.).

Spirifer incerta Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 602, pl. 13, fig. 3.

Loc. Burlington, Iowa.

Spirifer inconstans Hall = *Spirifer nobilis*.

***Spirifer increbescens* Hall.**

Kaskaskia (L. Carb.).

Spirifer increbescens Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 706, pl. 27, fig.

6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 27, 39, pl. 30, figs. 27-30; pl. 31, figs. 1-3.—Keyes, Geol. Survey Missouri, V, 1895, p. 82.

Spirifera increbescens Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 27-30; pl. 56, figs. 1-3.

Loc. Kaskaskia and Chester, Illinois; Kentucky.

Obs. Not synonymous with *S. bisulcatus* Sowerby, as stated by Meek and Safford.

It has also been referred to *S. trigonalis* (Martin).

***Spirifer increbescens americanus* Swallow.**

Kaskaskia (L. Carb.).

Spirifer increbescens var. *americana* Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 410.

Loc. Illinois and Missouri.

Obs. Regarded by Keyes as a synonym for *S. increbescens*.

***Spirifer increbescens transversalis* Hall.**

Kaskaskia (L. Carb.).

Spirifer increbescens var. *transversalis* Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 708, pl. 27, fig. 6.

Loc. Kaskaskia and Chester, Illinois.

Spirifer inequicostatus Owen = *Spirifer cameratus*.

Spirifer insolitus Winchell = *Martinia* ? *insolita*.

***Spirifer intermedius* Hall.**

Oriskany (Dev.).

Spirifer intermedia Hall (non Brongniart, 1829), Pal. New York, III, 1859, p. 424.

Loc. Cumberland, Maryland.

***Spirifer inutilis* Hall.**

Upper Devonian.

Spirifer inutilis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 505, pl. 4, fig. 4.

Spirifera inutilis Whiteaves, Cont. Canadian Pal., I, 1891, p. 223.

Loc. Independence, Iowa; Athabasca River, Canada.

***Spirifer iowaensis* Owen.**

Middle Devonian.

Spirifer iowensis Owen, Geol. Survey Iowa, Wisconsin, and Minnesota, 1852, p.

585, pl. 3, fig. 1. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17925.]

Spirifer pennatus Owen (non Atwater), *Ibidem*, 1852, p. 585, pl. 3, figs. 3, 8. [Ibidem, Cat., 17919, 17920.]

Spirifer lignus Owen, *Ibidem*, 1852, p. 585, pl. 3, fig. 4, and pl. 3A, fig. 2 [Ibidem, Cat., 17921, 17922].—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 31, 39, pl. 22, figs. 19-24; pl. 29, fig. 13.—Keyes, Geol. Survey Missouri, V, 1895, p. 77.

Spirifer iowaensis Owen—Continued.

Spirifer cedarensis Owen, Geol. Survey Iowa, Wisconsin, and Minnesota, 1852, p. 586, pl. 3, fig. 5. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17 923.]

Spirifer pennata Hall, Geol. Survey, Iowa, I, Pt. II, 1858, p. 510, pl. 5, fig. 1.

?*Spirifera* allied to *pennata* Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 633, pl. 29, fig. 1.

Spirifera atwaterana Miller, Proc. Davenport Acad. Sci., 1878, p. 222.—Nettelroth. Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 107.

Spirifera pennata Whitfield, Geol. Wisconsin, IV, 1882, p. 330, pl. 26, fig. 4.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, figs. 19-24.

Loc. New Buffalo, Independence, etc., Iowa; Rock Island, Illinois; Milwaukee, Wisconsin; Falls of Ohio; south of Cape Joseph Henry, lat. 82° 42'.

Obs. Owen's type specimens of *S. iowaensis*, *S. pennatus*, *S. lignus*, and *S. cedarensis* are preserved in the National Museum collection. The six specimens of these species show, when compared with a large series of similar shells from Iowa, that they are but variations of a very variable and widely distributed *Spirifer* of the Devonian of the Mississippi Valley. The width and degree of curvature of the ventral area and the length of the cardinal line are extremely variable features in *S. iowaensis*. Upon these characters Owen has based his species. The name *S. iowaensis* has been selected not only because it is very appropriate but also since it is the first one described. *S. parryanus* is another closely allied species, but can be separated generally by its wider ventral area and in the cardinal lines not being drawn out into more or less mucronate extensions.

Spirifer kelloggi Swallow.

Keokuk (L. Carb.).

Spirifera kelloggi Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 86.—Keyes, Geol. Survey Missouri, V, 1895, p. 81.

Spiriferina kelloggi Safford, Geol. Tennessee, 1869, p. 360.

Loc. Keokuk, Iowa; Tennessee.

Spirifer kennicotti Meek.

Middle Devonian.

Spirifer kennicotti Meek, Trans. Chicago Acad. Sci., I, 1868, p. 101, pl. 14, fig. 9.

Loc. Mackenzie River Valley, Northwest Territory, Canada.

Obs. This species is much like *S. pennatus* Miller, but with the fold and sinus plicated. It is unlike *S. disjunctus*, to which it has been referred by Whiteaves, in its shallow visceral cavity.

Spirifer kentuckiensis Shumard=*Spiriferina cristata*.**Spirifer kentuckiensis** var. *propatula* Swallow=*Spiriferina cristata*.**Spirifer keokuk** Hall.

Keokuk (L. Carb.).

Spirifer striatus? var. *attenuatus?* Owen (non Sow.), Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 3A, fig. 8. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17944.]

Spirifer keokuk Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 642, pl. 20, figs. 3 and 2d;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 21-24.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 27, 38, pl. 30, figs. 21-24; pl. 37, figs. 13-15.

Spirifer keokuk var. Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 676, pl. 24, fig. 4.

Spirifer keokuk? Meek, Bull. U. S. Geol. Geogr. Survey Terr., II, 1876, p. 355, pl. 1, fig. 3.

Spirifera keokuk Keyes, Geol. Survey Missouri, V, 1895, p. 81, pl. 40, fig. 2.

Loc. Keokuk, Iowa; Nauvoo and Warsaw, Illinois; Utah; Rushville and Loudonville, Ohio (Herrick).

Obs. See *S. littoni*.

- Spirifer keokuk shelbyensis** Swallow. Warsaw (L. Carb.).
Spirifer keokuk var. *shelbyensis* Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 410.
Loc. Shelby County, Missouri.
- Spirifer knappanus** Nettelroth = *Reticularia knappiana*.
- Spirifer lateralis** Hall. Warsaw (L. Carb.).
Spirifer lateralis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 661, pl. 23, fig. 7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 32, figs. 1-3; pl. 37, fig. 19.
 ? *Spirifera lateralis* Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 57, figs. 1-3.
Loc. Clifton and Warsaw, Illinois.
- Spirifer latior** Swallow. Chouteau (L. Carb.).
Spirifer latior Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 86.
Loc. Cooper County, Missouri.
Obs. Compare with *S. marionensis*.
- Spirifer laevigatus** Swallow = *Martinia laevigata*.
- Spirifer laevis** Hall = *Reticularia laevis*.
- Spirifer laminosus** Geinitz (non McCoy) = *Spiriferina cristata*.
- Spirifer leidy** Norwood and Pratten. St. Louis (L. Carb.).
Spirifer leidy Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 72, pl. 9, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 27, 39, pl. 30, figs. 25, 26.
Spirifer bifurcatus Hall, Trans. Albany Institute, IV, 1857, p. 8.
Spirifera bifurcata Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 47, pl. 6, figs. 13-15.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 326, pl. 29, figs. 13-15.
Spirifera leidy Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 25, 26.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 216, pl. 18, fig. 4.—Keyes, Geol. Survey Missouri, V, 1895, p. 82.
Loc. Chester, Illinois; Spergen Hill, Indiana; Princeton, Kentucky; Utah; Eureka district, Nevada.
- Spirifer leidy chesterensis** Swallow. Kaskaskia (L. Carb.).
Spirifer leidy var. *chesterensis* Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 409.
Loc. "Above the St. Louis limestone," Missouri.
Obs. Regarded by Keyes as a synonym for *S. leidy*.
- Spirifer leidy merimacensis** Swallow. Warsaw (L. Carb.).
Spirifer leidy var. *merimacensis* Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 410.
Loc. Barrets Station, St. Louis County, Missouri.
Obs. Regarded by Keyes as a synonym for *S. leidy*.
- Spirifer ligus** Owen = *S. iowaensis*.
- Spirifer lineatoides** Swallow = *Reticularia pseudolineata*.
- Spirifer lineatus** of American authors = *Reticularia perplexa*.
- Spirifer lineatus striatolineatus** Swallow = *Reticularia perplexa striatilineata*.
- Spirifer linguiferoides** Forbes = *Spiriferina rostrata*.
- Spirifer littoni** Swallow. St. Louis (L. Carb.).
Spirifer littoni Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 646.
Loc. St. Louis County, Missouri.
Obs. Regarded by Keyes as a synonym for *S. keokuk*.

- Spirifer logani** Hall. Keokuk (L. Carb.).
Spirifer logani Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 647, pl. 20, fig. 7; pl. 21, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 25, 38, pl. 32, figs. 7, 8.
Spirifera logani A. Winchell, Proc. American Phil. Soc., XII, 1870, p. 245.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 57, figs. 7, 8.—Keyes, Geol. Survey Missouri, V, 1895, p. 81.
Loc. Nauvoo, Illinois; Clark County, Missouri; Tennessee.
- Spirifer lyelli** de Verneuil=*Spirifer pennatus*.
- Spirifer macbridei** Calvin. Upper Devonian.
Spirifera macbridei Calvin, American Jour. Sci., 3d ser., XXV, 1883, p. 433.—Calvin, Bull. Lab. Nat. Hist. State Univ. Iowa, II, 1892, p. 166, pl. 12, fig. 3.
Spirifer macbridii Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29, 31, 39, pl. 25, figs. 9-16 (?17-19).
Loc. Rockford, Iowa.
- Spirifer macconathei** Nettelroth. Hamilton (Dev.).
Spirifera macconathii Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 123, pl. 11, figs. 1-5.
Loc. Falls of Ohio.
- Spirifer macra** Meek (non Hall)=*Spirifer strigosus*.
- Spirifer macrus** Hall. Upper Helderberg (Dev.).
Spirifer macra Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 134.
Spirifera macra Hall, Pal. New York, IV, 1867, p. 190, pl. 27, figs. 17-28;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 59, figs. 1-3.
Spirifer macrus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 36, pl. 34, figs. 1-3.
Loc. Schoharie, Williamsville, etc., New York; Columbus, Ohio.
- Spirifer macronotus** Hall=*S. audaculus macronotus*.
- Spirifer macropleura** (Conrad). Lower Helderberg (Dev.).
Delthyris macropleura Conrad, Fourth Ann. Rep. N. Y. Geol. Survey, 1840, p. 207.—Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 120, fig. 1.—Mather, *Ibidem*, Rep. First Dist., 1843, p. 343, fig. 1.
Spirifer macropleurus Castelnau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 41, pl. 13, fig. 5.
Spirifer fischeri Castelnau, *Ibidem*, 1843, p. 42, pl. 13, fig. 4.
Spirifer macropleura Hall, Pal. New York, III, 1859, p. 202, pl. 27, fig. 1; pl. 28, fig. 8.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 13, 35, pl. 20, figs. 22-24, 27.
Spirifera macropleura Billings, Geol. Canada, 1863, p. 957, fig. 456;—Proc. Portland Soc. Nat. Hist., 1863, p. 117, pl. 3, fig. 16.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 51, figs. 22-24, 27.
Loc. Schoharie, Carlisle, Catskill, etc., New York; Square Lake, Maize; Cumberland, Maryland; Perry County, Tennessee.
- Spirifer macrothyris** Hall. Upper Helderberg (Dev.).
Spirifer macrothyris Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 132.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29, 31, 39, pl. 23, figs. 16-18.
Spirifera macrothyris Hall, Pal. New York, IV, 1867, p. 202, pl. 30, figs. 16-20;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 53, figs. 16-18.
Loc. Williamsville and Clarence Hollow, New York; Cayuga, Ontario; Columbus, Ohio.

- Spirifer mæcuruensis** Rathbun. Middle Devonian.
Spirifer mæcuruensis Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 30.
Loc. Rio Maecuru, Province of Para, Brazil.
- Spirifer maius** Billings=*Martinia maia*.
- Spirifer manni** Hall. Upper Helderberg (Dev.).
Spirifer manni Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 128.
Spirifera manni Hall, Pal. New York, IV, 1867, p. 211, pl. 31, figs. 20-30.
Loc. Sandusky and Columbus, Ohio; Williamsville, New York.
- Spirifer marcoui** Waagen. Upper Carboniferous.
Spirifer striatus Marcou (non Martin), Geol. North America, 1858, p. 49, pl. 7, fig. 2.
Spirifer marcoui Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 510, pl. 47.
Loc. Shasta County, California; Tigras, New Mexico; Vancouver Island.
- Spirifer marcyi** Hall. Hamilton (Dev.).
Spirifer marcyi Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 158, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29, 39, pl. 22, figs. 10-14.
Spirifera marcyi Hall, Pal. New York, IV, 1867, p. 226, pl. 37, figs. 10-20;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, figs. 10-14.
Loc. Covington; Cayuga and Seneca lakes, New York; Columbus, Ohio (Whitfield).
- Spirifer marionensis** Shumard. Chouteau (L. Carb.).
Spirifer marionensis Shumard, Geol. Rep. Missouri, 1855, p. 203, pl. C, fig. 8.—Hall, Geol. Survey, Iowa, I, Pt. II, 1858, p. 501, pl. 6, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 25, 38, pl. 31, fig. 15.—Herrick, Geol. Ohio, VII, 1895, pl. 15, fig. 2.
Spirifera marionensis A. Winchell, Proc. American Phil. Soc., XII, 1870, p. 252.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 56, fig. 15.—Herrick, Bull. Denison Univ., III, 1888, p. 43, pl. 6, figs. 2-4; pl. 7, fig. 11; IV, 1888, p. 26, pl. 2, fig. 2.—Keyes, Geol. Surv. Missouri, V, 1895, p. 78.
 ?*Spirifera marionensis* Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 124.
Loc. Louisiana and Hannibal, Missouri; Portsmouth, Sciotoville, etc., Ohio; ? Falls of Ohio.
Obs. Compare with *S. osagensis*, *S. missouriensis*, and *S. vernonensis*.
- Spirifer medialis** Hall=*Spirifer audaculus*.
- Spirifer meeki** Swallow. Burlington (L. Carb.).
Spirifer meeki Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 645.
Loc. Pettis and Saline counties, Missouri.
- Spirifer meristoides** Meek=*Martinia meristoides*.
- Spirifer mesacostalis** Hall=*Delthyris mesicostalis*.
- Spirifer mesastrialis** Hall. Portage and Chemung (Dev.).
Delthyris mesastrialis Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 269, fig. 1.
Spirifer catskillensis Emmons, Manual of Geology, 1860, p. 151.
Spirifera mesastrialis Hall, Pal. New York, IV, 1867, p. 242, pl. 40, figs. 14-22, and p. 417.
Spirifer mesastrialis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 14, 35, pl. 37, figs. 4, 5.
Loc. Schoharie, Cortlandville, Cayuta Creek, and Ithaca, New York.
- Spirifer metus** Hall=*Cyrtia meta*.
- Spirifer meusebachanus** Roemer=*Spirifer cameratus*.

- Spirifer mexicanus** Shumard. Upper Carboniferous.
Spirifera Mexicana Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 292, pl. 11, fig. 4, and p. 390.
Loc. Guadalupe Mountains, New Mexico and Texas.
- Spirifer missouriensis** Swallow. Chouteau (L. Carb.).
Spirifer missouriensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 643.
Loc. Cooper County, Missouri.
Obs. Regarded by Keyes as a synonym for *S. marionensis*.
- Spirifer modestus** Hall=Reticularia modesta.
- Spirifer mortonanus** Miller. Keokuk (L. Carb.).
Spirifera fastigata Meek and Worthen (non Worthen), Proc. Acad. Nat. Sci. Philadelphia, 1870, p. 36;—Geol. Survey Illinois, VI, 1875, p. 521, pl. 30, fig. 3.
Spirifera mortonana Miller, American Pal. Fossils, 2d ed., 1883, p. 298.
Spirifer mortonanus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 26, 38, pl. 38, figs. 18, 19.
Loc. Crawfordsville, Indiana; Kings Mountain and Lebanon, Kentucky.
- Spirifer mucronatus** Conrad=Spirifer pennatus.
- Spirifer multicostatus** Castelnau. ?Corniferous (Dev.).
Spirifer multicostatus Castelnau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 42, pl. 12, fig. 3.
Loc. Schoharie, New York.
Obs. See *S. divaricatus*.
- Spirifer multigranosus** Worthen=Spirifer texanus.
- Spirifer multistriata** Hall=Trematospira multistriata.
- Spirifer mundulus** Rowley. Burlington (L. Carb.).
Spirifera mundula Rowley, American Geologist, XII, 1893, p. 307, pl. 14, figs. 10-12.
Loc. Louisiana, Missouri.
- Spirifer murchisoni** Castelnau. Oriskany (Dev.).
Spirifer murchisoni Castelnau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 41, pl. 12, figs. 1, 2.
Spirifer arrecta Hall, Pal. New York, III, 1859, p. 422, pl. 97, figs. 1, 2.
Spirifera arrecta Billings, Geol. Canada, 1863, p. 960, fig. 466.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 58, figs. 24-27.
Spirifer sp. a A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 67, pl. 4, fig. 22.
Spirifer arrectus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 19, 37, pl. 33, figs. 24-27.
Loc. Schoharie and Albany counties, New York; Cumberland, Maryland; Cayuga, Ontario; near Totora, Bolivia.
Obs. Castelnau's figures prove conclusively that he was the first to describe this species.
- Spirifer mysticensis** Meek. Lower Carboniferous.
Spirifera mysticensis Meek, Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 466.—Miller, North American Geol. and Pal., 1889, p. 374.
Loc. Outlet of Mystic Lake, Montana.
- Spirifer neglectus** Hall. Keokuk (L. Carb.).
Spirifer neglectus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 643, pl. 20, fig. 5.
Spirifera neglecta Meek and Worthen, Geol. Survey Illinois, VI, 1875, p. 523, pl. 30, figs. 1c, 2a.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 217, pl. 18, fig. 10.

Spirifer neglectus Hall—Continued.

- ? *Spirifera neglecta* de Koninek, *Annales du Musée Royal d'Historie Nat. de Belgique*, XIV, 1887, p. 134, pl. 31, figs. 10-15.
Loc. Keokuk, Iowa; Warsaw and Nauvoo, Illinois; Eureka district, Nevada;
 ? Belgium.

Spirifer newberryi Hall.

Waverly (L. Carb.).

- Spirifera newberryi* Hall, *Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 56, figs. 9, 10.
Spirifer newberryi Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, p. 362, pl. 31, figs. 9, 10.
Loc. Northern Ohio.

Spirifer niagaraensis (Conrad).

Niagara (Sil.).

- Delthyris niagarensis* Conrad, *Jour. Acad. Nat. Sci. Philadelphia*, VIII, 1842, p. 261.—Hall, *Geol. N. Y.*; *Rep. Fourth Dist.*, 1843, p. 105, fig. 1.
Spirifer niagarensis Hall, *Pal. New York*, II, 1852, p. 264, pl. 54, fig. 5.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, pp. 14, 35, pl. 21, figs. 1-4, 25; pl. 37, fig. 1.
Spirifera niagarensis Billings, *Canadian Nat. Geol.*, I, 1856, p. 137, pl. 2, fig. 8;—*Geol. Canada*, 1863, p. 317, fig. 329.—Hall, *Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 51, figs. 1-4, 25.
Loc. Lockport, Rochester, etc., New York; Osgood, Indiana.

Spirifer niagaraensis oligoptychus Roemer.

Niagara (Sil.).

- Spirifera niagarensis* var. *oligoptychus* Roemer, *Sil. Fauna West. Tennessee*, 1860, p. 68, pl. 5, fig. 8.
Spirifer macroleurus Safford, *Geol. Tennessee*, 1869, p. 321.
Loc. Decatur County, Tennessee.
Obs. Compare with *S. eudorus* Hall and *S. macroleurus* Conrad.

Spirifer nictauvensis Dawson.

Oriskany (Dev.).

- Spirifera nictavensis* Dawson, *Acadian Geology*, 3d ed., 1878, p. 499, fig. 176;—*Canadian Nat. Geol.*, n. ser., IX, 1879, p. 3.
Loc. Near Nictaux, Nova Scotia.

Spirifer nobilis Barrande.

Niagara (Sil.).

- Spirifer nobilis* Barrande, *Ueber die Brach. der Sil. Schicht von Böhmen*, 1847.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, pp. 14, 35, pl. 29, fig. 16; pl. 37, figs. 2, 3.
Spirifer racinensis McChesney, *New Pal. Fossils*, 1861, p. 84.
Spirifer inconstans Hall, *Ann. Rep. Geol. Survey Wisconsin*, 1861, p. 26;—*Geol. Rep. Wisconsin*, I, 1862, p. 69, fig. 6; p. 436.
Spirifera nobilis Hall, *Twentieth Rep. N. Y. State Cab. Nat. Hist.*, 1867, p. 372, pl. 13, figs. 14-16.
Spirifera racinensis McChesney, *New Pal. Fossils*, 1868, p. 84.
Loc. Racine, Wisconsin; Chicago, Illinois.

Spirifer norwoodana Hall=Spiriferina norwoodana.**Spirifer norwoodi Meek=Cyrtia norwoodi.****Spirifer nova-mexicanus Miller.**

Burlington (L. Carb.).

- Spirifera novamexicana* Miller, *Jour. Cincinnati Soc. Nat. Hist.*, IV, 1881, p. 314, pl. 7, fig. 10.
Loc. Lake Valley mining district, New Mexico.

Spirifer nymphus Billings=Reticularia nympa.**Spirifer obtusus Gabb=Spiriferina obtusa.**

- Spirifer octocostatus** Hall. Lower Helderberg (Dev.).
Spirifer octocostata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 62;—
 Pal. New York, III, 1859, p. 205, pl. 28, fig. 4.
Loc. Cumberland, Maryland.
- Spirifer octoplicatus** Hall = *Spiriferina cristata*.
Spirifer opimus Hall = *Spirifer rockymontanus*.
- Spirifer orbignyi** Morris and Sharpe. Lower Devonian.
Spirifer orbignii Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846,
 p. 276, pl. 11, fig. 3.
Loc. Falkland Islands.
Obs. Probably identical with *S. antarcticus*.
- Spirifer oregonensis** Shumard. Upper Carboniferous.
Spirifer oregonensis Shumard, Trans. St. Louis Acad. Sci., II, 1863, p. 108.
Loc. Near Fort Filmore, New Mexico.
- Spirifer orestes** Hall and Whitfield. Chemung (Dev.).
Spirifera orestes Hall and Whitfield, Twenty-third Rep. N. Y. State Cab. Nat.
 Hist., 1872, p. 237, pl. 11, figs. 16-20.—Hall, Second Ann. Rep. N. Y. State
 Geol., 1883, pl. 55, fig. 20.
Spirifer orestes Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 27, 38, pl.
 30, fig. 20.
Loc. Rockford, Iowa; Naples, New York.
Obs. Compare with *S. strigosus*.
- Spirifer osagensis** Swallow. Chouteau (L. Carb.).
Spirifer osagensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 641.
Loc. Pettis County, Missouri.
Obs. Regarded by Keyes as a synonym for *S. marionensis*.
- Spirifer ovalis** Phillips. Carboniferous.
Spirifer ovalis Phillips, Geol. Yorkshire, II, 1836, p. 219, pl. 10, fig. 5.—Ether-
 idge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 629.
Loc. Europe. Feilden Isthmus, lat. 82° 43'.
- Spirifer oweni** Hall = *Spirifer granulosis*.
- Spirifer paradoxus** (Schlotheim). Corniferous (Dev.).
Terebratula paradoxa Schlotheim, Petrefactenkunde, VII, 1813, p. 249, tab. 2,
 fig. 6.
Spirifer paradoxus? Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 415,
 pl. 10, fig. 2.
Loc. Europe; Union and Jackson counties, Illinois.
- Spirifer parryana** Hall = *S. euryteines* Owen.
- Spirifer peculiaris** Shumard. Kinderhook (L. Carb.).
Spirifer? peculiaris Shumard, Geol. Rep. Missouri, 1855, p. 202, Pl. C, fig. 7.
Spirifera (Martinia) peculiaris White, Wheeler's Expl. and Survey west 100th
 Meridian, IV, 1875, p. 90, pl. 5, fig. 7.
Loc. Cooper County, Missouri; Mountain Spring, Nevada.
- Spirifer pedroanus** Rathbun. Middle Devonian.
Spirifera pedroana (Hartt) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 237,
 pl. 8, figs. 1-9, 13, 14, 16-20;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 27.
Loc. Erere and Province of Para, Brazil.
- Spirifer pennatus** Owen = *Spirifer iowaensis*.

- Spirifer pennatus** (Atwater). Marcellus, Hamilton, and Chemung (Dev.).
Terebratula pennata Atwater, *American Jour. Sci. Arts*, II, 1820, p. 244, pl. 1, figs. 2, 3.
Delthyris mucronata Conrad, *Fifth Ann. Rep. Geol. Survey New York*, 1841, p. 54.—Vanuxem, *Geol. N. Y.*; *Rep. Third Dist.*, 1842, p. 150, fig. 3.—Hall, *Ibidem*, *Rep. Fourth Dist.*, 1843, p. 198, figs. 2, 3; p. 205, fig. 3 (non p. 270, fig. 3=*S. pennatus posterus*).—(Conrad) Hall, *Fifteenth Rep. N. Y. State Cab. Nat. Hist.*, 1862, pl. 11, fig. 18.
Spirifer sowerbyi Castelneau, *Essai Syst. Silurien l'Amérique Septentrionale*, 1843, pl. 13, fig. 1 (non Fischer).
Spirifer lyelli de Verneuil, *Ibidem*, 1843, p. 43.
Spirifer mucronata Billings, *Canadian Nat. Geol.*, I, 1856, p. 474, pl. 7, figs. 9, 10.—Rogers, *Geol. Pennsylvania*, II, 1858, p. 828, fig. 668.
Spirifera mucronata Billings, *Canadian Jour.*, n. ser., VI, 1861, p. 254, figs. 59-62;—*Geol. Canada*, 1863, p. 386, fig. 424.—Hall, *Pal. New York*, IV, 1867, p. 216, pl. 34, figs. 1-32.—Nicholson, *Pal. Prov. Ontario*, 1874, p. 80.—Whitfield, *Geol. Wisconsin*, IV, 1882, p. 328, pl. 25, figs. 27, 28.—Hall, *Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 59, figs. 13-22.—Calvin, *American Geologist*, I, 1888, p. 82.—Nettelroth, *Kentucky Fossil Shells*, *Mem. Kentucky Geol. Survey*, 1889, p. 126, pl. 31, figs. 10, 11.
Spirifer mucronatus var. Williams, *Bull. Geol. Soc. America*, I, 1890, pl. 12, fig. 13.
Spirifer mucronatus Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, pp. 14, 17, 36, pl. 29, fig. 8; pl. 34, figs. 13-22.
Loc. New York, Pennsylvania, Maryland, Virginia; Bosanquet, Ontario; Milwaukee, Wisconsin.
Obs. Atwater's specimen was found in the drift of Ohio. Mr. Miller is correct in regarding it the same as the well-known *S. mucronatus*.
- Spirifer pennatus posterus** Hall and Clarke. Chemung (Dev.).
Delthyris mucronata (partim) Hall, *Geol. New York*; *Rep. Fourth Dist.*, 1843, p. 270, fig. 3.
Spirifer mucronatus var. *posterus* Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, p. 361, pl. 34, figs. 27-31.
Loc. Tompkins County, New York.
- Spirifer pennatus tulliensis** Williams. Tully (Dev.).
Spirifer mucronatus var. *tulliensis* Williams, *Bull. Geol. Soc. America*, I, 1890, p. 491, pl. 12, fig. 12.
Loc. Tinkers Falls, New York.
- Spirifer pentlandi** d'Orbigny. Carboniferous.
Spirifer pentlandi d'Orbigny, *Voyage dans l'Amérique Méridionale*, Pal., 1842, p. 48, pl. 5, figs. 15.
Loc. Lake Titicaca, Bolivia.
- Spirifer perforata* Hall=*Trematospira perforata*.
- Spirifer perextensus** Meek and Worthen. Corniferous (Dev.).
Spirifera perextensa Meek and Worthen, *Geol. Survey Illinois*, III, 1868, p. 414, pl. 10, fig. 1.
Loc. Near Jonesboro, Union County, Illinois.
Obs. Regarded by Keyes as a synonym for *S. ligus*=*S. iowaensis*.
- Spirifer perlamellosus* Hall=*Delthyris perlamellosa*.
Spirifer perplexus McChesney=*Reticularia perplexa*.

- Spirifer pertenuis** Hall. Hamilton (Dev.).
Spirifer pertenuis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 163.
Spirifera perextensa Hall, Pal. New York, IV, 1867, p. 236.
Loc. Cumberland, Maryland (Whitfield).
Obs. Compare with *S. macronota* Hall.
- Spirifer pharovicinus** A. Winchell. Huron (Dev.).
Spirifera pharovicina A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 406.
Loc. Port aux Barques, Michigan.
- Spirifer pinonensis** Meek. Lower to Upper Devonian.
Spirifer (*Trigonotreta*) *pinonensis* Meek, Proc. Acad. Nat. Sci. Philadelphia, 1870, p. 60;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 45, pl. 1, fig. 9.
Spirifer (*Trigonotreta*) *argentarius* Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 42, pl. 4, fig. 4.
Spirifera pinonensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 138, pl. 4, fig. 1.
Loc. White Pine and Eureka districts, Nevada.
- Spirifer planoconvexus** Shumard = *Ambocoëlia planiconvexa*.
Spirifer plenus Hall = *Syringothyris plena*.
Spirifer plicatella of authors = *Spirifer radiatus*.
- Spirifer pluto** Clarke. Genesee (Dev.).
Spirifera pluto Clarke, Bull U. S. Geol. Survey, 16, 1885, p. 31, pl. 3, fig. 12.
Loc. Ontario County, New York.
Obs. See *Leiorhynchus hecate* Clarke.
- Spirifer præmatura** Hall = *Reticularia præmatura*.
Spirifer propinquus Hall = *Syringothyris texta*.
Spirifer prorus Conrad = *Spirifer acuminatus*.
Spirifer pseudolineatus Hall = *Reticularia pseudolineata*.
Spirifer pulchrus Meek = *Spiriferina pulchra*.
Spirifer pyramidalis Hall = *Cyrtina pyramidalis*.
Spirifer pyxidatus Hall = *Metaplasia pyxidata*.
- Spirifer quichuus** d'Orbigny. Devonian.
Spirifer quichua d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 37, pl. 2, fig. 21.
Loc. Chuquisaca, Bolivia.
- Spirifer racinensis** McChesney = *Spirifer nobilis*.
- Spirifer radiatus** Sowerby. Clinton and Niagara (Sil.).
Spirifer plicatella var. *radiata* Sowerby, Mineral Conchology, V, 1825, p. 493, figs. 1, 2.
Delthyris bialveata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 261, pl. 14, fig. 17.
Delthyris radiata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 105, fig. 2.
Spirifer radiata Hall, Pal. New York, II, 1852, pp. 66, 265, pl. 22, figs. 2d–25 (non 2a–2c = *Cyrtia meta*); pl. 54, fig. 6.
Spirifera radiata Billings, Canadian Nat. Geol., I, 1856, p. 135, pl. 2, figs. 2, 3;—Geol. Canada, 1863, p. 317, fig. 328.—Hall and Whitfield, Twenty-seventh Rep. N. Y. State Cab. Nat. Hist., 1875, pl. 9, figs. 17, 18.—Hall, Twenty-eighth Rep. Ibidem, 1879, p. 157, pl. 21, figs. 20–30.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 497, pl. 3, figs. 5, 6;—Tenth Rep. State Geol. Indiana, 1881, p. 129, pl. 3, figs. 5, 6.—Hall, Eleventh

Spirifer radiatus Sowerby—Continued.

Rep. *Ibidem*, 1882, p. 296, pl. 24, figs. 20–30.—Whitfield, *Geol. Wisconsin*, IV, 1882, p. 287, pl. 17, figs. 1, 2.—Hall, *Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 51, figs. 9–13, 26 (?14–17).—Nettelroth, *Kentucky Fossil Shells*, Mem. *Kentucky Geol. Survey*, 1889, p. 130, pl. 29, figs. 13–16.—Foerste, *Proc. Boston Soc. Nat. Hist.*, XXIV, 1890, p. 313, pl. 5, fig. 6.

Spirifer radiatus Beecher and Clarke, *Mem. N. Y. State Mus.*, I, 1889, p. 77, pl. 6, figs. 9–11.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, pp. 13, 35, pl. 21, figs. 5, 9–13, 26 (?14–18).

Spirifer tenuistriatus Shaler (non Hall), *Bull. Mus. Com. Zool.*, 1, 1865, p. 70.
Spirifera plicatella Billings, *Catalogue Silurian Fossils of Anticosti*, 1866, p. 48.
Spirifera plicatella var. *radiata* Hall, *Twentieth Rep. N. Y. State Geol.*, 1867, p. 371, pl. 13, figs. 9–11.

Loc. Europe; Lockport, Rochester, etc., New York; Hamilton, Ontario; Squaw Lake, New Brunswick; Waldron and Osgood, Indiana; Louisville, Kentucky; Cumberland Gap, Tennessee; Bridgeport, Illinois; Racine, Wauwatosa, and Milwaukee, Wisconsin.

Spirifer raricostus Hall = *Delthyris raricosta*.

Spirifer rectiplicatus (Conrad).

?Oriskany (Dev.).

Atrypa rectiplicata Conrad, *Jour. Acad. Nat. Sci. Philadelphia*, VIII, 1842, p. 265.

Loc. "Helderberg Mountains in Middle Silurian limestone."

Obs. May be the same as *Metaplasia pyxidata* Hall.

Spirifer richardsoni Meek = *Reticularia fimbriata*.

Spirifer rockymontanus Marcou.

Upper Carboniferous.

Spirifer rockymontani Marcou, *Geol. North America*, March, 1858, p. 50, pl. 7, fig. 4.

Spirifer opima Hall, *Geol. Survey Iowa*, I, Pt. II, December, 1858, p. 711.

Spirifera subventricosa McChesney, *New Pal. Fossils*, 1860, p. 44;—*Trans. Chicago Acad. Sci.*, I, 1868, p. 35, pl. 1, fig. 4.

Spirifera opima Derby, *Bull. Cornell University*, I, 1874, p. 15, pl. 1, fig. 4; pl. 2, fig. 7; pl. 4, fig. 12.—Hall, *Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 56, figs. 4–7.—Herrick, *Bull. Denison Univ.*, II, 1887, p. 44, pl. 2, fig. 23.

Spirifera (*Trigonotreta*) *opima* Meek, *Pal. Ohio*, II, 1875, p. 329, pl. 19, figs. 14a–14d (?14e);—King's *U. S. Geol. Expl. 40th Parl.*, IV, 1877, p. 88, pl. 9, fig. 6.

Spirifera rockymontana White, *Wheeler's Expl. and Survey west 100th Merid.*, IV, 1875, p. 134, pl. 11, fig. 9.—Keyes, *Proc. Acad. Nat. Sci. Philadelphia*, 1888, p. 231;—*Geol. Survey Missouri*, V, 1895, p. 84.

?*Spirifera rockymontana*? Whitfield, *Annals N. Y. Acad. Sci.*, V, 1891, p. 584, pl. 13, fig. 20;—*Geol. Ohio*, VII, 1895, p. 471, pl. 9, fig. 20.

Spirifer opimus Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, pp. 27, 39, pl. 31, figs. 4–7.

Loc. Tigras and Canyon of San Antonio, New Mexico; Oquirrh Range, Utah; Arkansas; Iowa; Missouri; Illinois; Indiana; Ohio; Maryland; West Virginia; Bomjardim and Itaituba, Brazil; ?Chester group at Newtonville, Ohio (Whitfield).

Obs. See *S. boonensis*.

Spirifer rostellatus Hall.

Keokuk (L. Carb.).

Spirifer rostellata Hall, *Geol. Survey Iowa*, I, Pt. II, 1858, p. 641, pl. 20, fig. 2.

Spirifer rostellatus Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 26, pl. 32, fig. 5.

Loc. Skunk River, Iowa.

- Spirifer rostellum** Hall and Whitfield. Niagara (Sil.).
Spirifera rostellum Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 182;—Hall, Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 11-13.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 129, pl. 29, fig. 25; pl. 27, figs. 17-19.
Spirifera (*Cyrtia*) *rostellum* Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 313, pl. 5, fig. 5.
Loc. Louisville, Kentucky; Collinsville, Alabama.
- Spirifer rostratus** Morton. Upper Carboniferous.
Spirifer rostrata Morton, American Jour. Sci. Arts, 1836, p. 152, pl. 14, fig. 34.
Loc. Junior Furnace, Scioto County, Ohio.
Obs. Poorly defined. May be a species of *Athyris*.
- Spirifer rugicostus** Hall=*Delthyris rugicosta*.
- Spirifer saffordi** Hall. Lower Helderberg (Dev.).
Spirifer saffordi Hall, Pal. New York, III, 1859, p. 203, pl. 28, fig. 2.
Loc. Decatur County, Tennessee; Hudson, New York.
- Spirifer scobina** Meek. Carboniferous.
Spirifera scobina Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 310.
Spirifer (*Spiriferina*?) *scobina* Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 351, pl. 2, fig. 5.
Spirifera (*Trigonotreta*) *scobina* Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 90, pl. 9, fig. 1.
Loc. Divide between Long and Ruby Valleys, Utah.
- Spirifer sculptilis** Hall=*Delthyris sculptilis*.
- Spirifer segmentum** Hall. Upper Helderberg (Dev.).
Spirifer segmentus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 131.
Spirifera segmenta Hall, Pal. New York, IV, 1867, p. 207, pl. 31, figs. 14-19.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 132, pl. 13, figs. 36-38.
Loc. Falls of Ohio; Columbus, Ohio.
- Spirifer semiplicatus** Hall=*Reticularia cooperensis*.
- Spirifer setigerus** Hall=*Reticularia setigera*.
- Spirifer sheppardi** Castelnau=*Platystrophia biforata*.
- Spirifer sillanus** A. Winchell. Waverly (L. Carb.).
Spirifera sillana A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 119.
Loc. Near Cuyahoga Falls, Ohio.
- Spirifer similior** Winchell and Marcy. Niagara (Sil.).
Spirifera (*Martinia*) *similior* W. and M., Mem. Boston Soc. Nat. Hist., I, 1865, p. 93.
Pentamerus similior Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1868, p. 397.
Loc. Bridgeport, Illinois.
Obs. This shell has spirals.
- Spirifer solidirostris** White=*Spiriferina solidirostris*.
- Spirifer sowerbyi** Castelnau (non Fischer)=*Spirifer pennatus*.
- Spirifer spinosus** Norwood and Pratten=*Spiriferina spinosa*.
- Spirifer striatiformis** Meek. Waverly (L. Carb.).
Spirifera (*Trigonotreta*) *striatiformis* Meek, Pal. Ohio, II, 1875, p. 280, pl. 14, fig. 8.
Spirifer striatiformis Herrick, Bull. Denison Univ., III, 1888, p. 44, pl. 3, fig. 26; pl. 6, figs. 6, 7;—Geol. Ohio, VII, 1895, pl. 15, fig. 9.
Loc. Sciotoville and Licking County, Ohio.

Spirifer striatus Marcou (non Martin) = *Spirifer marcoui*.

Spirifer striatus (Martin).

Carboniferous.

Anomites striatus Martin, *Petrefacta Derbiensia*, 1809, pl. 23.

Spirifera striata Davidson, *Mon. British Carb. Brach.*, *Pal. Soc.*, 1857, p. 19, pl. 2, figs. 12-21; pl. 3, figs. 2-6.—White, *Wheeler's Expl. and Survey west of 100th Meridian*, IV, 1875, pp. 88, 134, pl. 5, fig. 10.—Hall and Whitfield, *King's U. S. Geol. Expl. 40th Parl.*, IV, 1877, p. 269, pl. 5, figs. 13-15.—Hartt, *Dawson's Acadian Geology*, 3d ed., 1878, p. 301.—Miller, *Jour. Cincinnati Soc. Nat. Hist.*, IV, 1881, p. 2.

Loc. Mountain Spring, Nevada; Oquirrh Mountains, Utah; Lake Valley mining district, New Mexico; Windsor, Nova Scotia.

Spirifer striatus attenuatus Owen = *S. keokuk*.

Spirifer striatus multicostatus Toulou = *Spirifer condor*.

Spirifer striatus triplicatus Marcou = *Spirifer camaratus*.

Spirifer strigosus Meek.

Devonian.

Spirifera macra Meek (non Hall), *Proc. Acad. Nat. Sci. Philadelphia*, 1860, p. 309.

Spirifera strigosa Meek, note appended to extras of the paper mentioned above.—Webster, *American Nat.*, XXII, 1888, p. 1102.

Spirifer strigosus Meek, *Simpson's Rep. Expl. Great Basin Terr. Utah*, 1876, p. 347, pl. 1, fig. 5.

Spirifera (*Trigonotreta*) *strigosa* Meek, *King's U. S. Geol. Expl. 40th Parl.*, IV, 1877, p. 43, pl. 3, fig. 5.

Loc. Neils Valley, Utah; Nevada; Rockford, Iowa.

Obs. See *S. orestes*.

Spirifer subæqualis Hall.

Warsaw (L. Carb.).

Spirifer subæqualis Hall, *Geol. Survey Iowa*, I, Pt. II, 1858, p. 663, pl. 23, fig. 9;—*Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 56, figs. 13, 14.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, pp. 26, 36, pl. 31, figs. 13, 14.

Loc. Warsaw, Illinois.

Spirifer subattenuatus Hall.

Chemung and Marshall (Dev.-L. Carb.).

Spirifer sp. undet. Owen, *Rep. Geol. Survey Wisconsin, Iowa, and Minnesota*, 1852, pl. 3, fig. 9.

Spirifera submucronata Hall, *Geol. Survey Iowa*, I, Pt. II, 1858, p. 504, pl. 4, fig. 3.

Spirifer subattenuata A. Winchell, *Proc. Acad. Nat. Sci. Philadelphia*, 1862, p. 405.—Whiteaves, *Cont. Canadian Pal.*, I, 1891, p. 223.

Loc. Independence and Buffalo, Iowa; Rock Island, Illinois; Naples, New York; Athabasca River, Canada; in the Marshall group at Port aux Barques, Michigan.

Spirifer subcardiformis Hall.

Warsaw (L. Carb.).

Spirifer subcardiformis Hall, *Geol. Survey Iowa*, I, Pt. II, 1858, p. 660, pl. 23, fig. 6.

Spirifera subcardiformis White, *Twelfth Ann. Rep. U. S. Geol. Survey Terr.*, 1883, p. 165, pl. 41, fig. 2.

Loc. Alton, Illinois; Spergen Hill, Indiana.

Spirifer subcuspidatus Hall = *Syringothyris texta*.

Spirifer subdecussatus Whiteaves.

Hamilton (Dev.).

Spirifera subdecussata Whiteaves, *Cont. Canadian Pal.*, I, 1889, p. 114, pl. 15, fig. 3.

Loc. Moravianton Thames River, Canada.

Spirifer subelliptica McChesney = *Spiriferina subelliptica*.

Spirifer sublineata Meek = *Martinia sublineata*.

Spirifer submucronatu Hall, 1858 (non 1857) = *Spirifer subattenuatus*.

- Spirifer submucronatus** Hall. Oriskany (Dev.).
Spirifer submucronata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 62;—
 Pal. New York, III, 1859, p. 419, pl. 96, fig. 7.
Spirifera submucronata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 58,
 figs. 5-7.
Spirifer submucronatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17,
 36, pl. 33, figs. 5-7.
Loc. Cumberland, Maryland.
Obs. Possibly the young of *Spirifer cumberlandia*.
- Spirifer suborbicularis** Hall. Keokuk (L. Carb.).
Spirifer suborbicularis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 644.
Spirifera suborbicularis Meek and Worthen, Geol. Survey Illinois, VI, 1875, p.
 523, pl. 30, fig. 1.
Loc. Keokuk, Iowa; Warsaw and Nauvoo, Illinois.
- Spirifer subrotundatus** Hall. Kinderhook (L. Carb.).
Spirifer subrotundata Hall (non McCoy, 1855), Geol. Survey Iowa, I, Pt. II, 1858,
 p. 521, pl. 7, fig. 8.
Spirifera subrotundata Keyes, Geol. Survey Missouri, V, 1895, p. 78.
Loc. Burlington, Iowa; Sciotoville, Ohio (Winchell).
Obs. This specific name was first used by McCoy in 1855 but is usually regarded
 as a synonym for *S. pinguis* Sowerby. De Koninck, however, retains
 McCoy's name as late as 1887.
- Spirifer substrigosus** Webster. Chemung (Dev.).
Spirifera substrigosa Webster, American Nat., XXII, 1888, p. 1101.
Loc. Near Rockford, Iowa.
- Spirifer subsulcatus** Hall. Arisaig (Sil.).
Spirifer subsulcata Hall (non Dalman, 1828), Canadian Nat. Geol., V, 1860, p.
 145.
Spirifera subsulcata Dawson, Acadian Geology, 3d ed., 1878, p. 597.—Miller, N.
 American Geol. and Pal., 1889, p. 376.
Loc. Arisaig, Nova Scotia.
- Spirifer subumbona* Hall=*Martinia subumbona*.
Spirifer subundifera Meek and Worthen=*Reticularia subundifera*.
- Spirifer subvaricosus** Hall and Whitfield. ? Hamilton (Dev.).
Spirifera subvaricosa Hall and Whitfield, Twenty-third Rep. N. Y. State Cab.
 Nat. Hist., 1872, p. 237, pl. 11, figs. 12-15.
Loc. Waterloo, Iowa.
- Spirifer subventricosus* McChesney=*Spirifer rockymontana*.
Spirifer sulcatus Hall=*Delthyris sulcata*.
- Spirifer sulcifer** Shumard. Upper Carboniferous.
Spirifer sulcifera Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 293, pl. 11,
 fig. 3.
Loc. Guadalupe Mountains, New Mexico.
- Spirifer superbus* Billings (non Eichwald)=*Spirifer billingsana*.
- Spirifer taneyensis** Swallow. Chouteau (L. Carb.).
Spirifer taneyensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 645.
Spirifera taneyensis Keyes, Geol. Survey Missouri, V, 1895, p. 78.
Loc. Taney County, Missouri.
- Spirifer temeraria* Miller=*Reticularia temeraria*.

- Spirifer tenuicostatus** Hall. Keokuk and Warsaw (L. Carb.).
Spirifer tenuicostata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 632, pl. 23, fig. 8.
Loc. Keokuk, Iowa; Warsaw and Dallas, Illinois.
- Spirifer tenuimarginatus** Hall. Keokuk (L. Carb.).
Spirifer tenuimarginata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 641, pl. 20, fig. 1.
Spirifera tenuimarginata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 57, figs. 4-6.
Spirifer tenuimarginatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 38, pl. 32, figs. 4, 6.
Loc. Warsaw, Illinois.
- Spirifer tenuis** Hall. Hamilton (Dev.).
Spirifer tenuis Hall, Tenth Rep. N. Y. State Geol. Nat. Hist., 1857, p. 162.
Spirifera tenuis Hall, Pal. New York, IV, 1867, p. 236.
Loc. Cumberland, Maryland.
Obs. Compare with *Spirifer granulatus* Conrad.
- Spirifer tenuispinatus** Herrick=*Reticularia tenuispinata*.
Spirifer tenuistriatus Shaler (non Hall)=*Spirifer radiatus*.
- Spirifer tenuistriatus** Hall. Lower Helderberg (Dev.).
Spirifer tenuistriata Hall, Pal. New York, III, 1859, p. 201, pl. 28, fig. 3.
Spirifera tenuistriata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, fig. 8.
Spirifer tenuistriatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 36, fig. 8.
Loc. Decatur County, Tennessee.
- Spirifer texanus** Meek. Upper Carboniferous.
Spirifer (*Trigonotreta*?) *texana* Meek, Proc. Acad. Nat. Sci. Philadelphia, 1871, p. 179.
Spirifer (*Trigonotreta*?) *texanus* Meek, Macomb's Rep. Expl. Exped. from Santa Fe to the Great Colorado of the West, 1876, p. 139, pl. 3, fig. 5.
Spirifera multigranosa Worthen, Geol. Survey Illinois, VIII, 1890, p. 105, pl. 11, fig. 5.
Spirifer texanus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 26, 38, pl. 37, figs. 16, 17.
Loc. Young and Jack counties, Texas; Springfield, Illinois.
- Spirifer textus** Hall=*Syringothyris texta*.
Spirifer translatus Swallow=*Reticularia translata*.
Spirifer transversus MeChesney=*Spiriferina transversa*.
- Spirifer tribulis** Hall. Oriskany (Dev.).
Spirifer tribulis Hall, Pal. New York, III, 1859, p. 420, pl. 96, fig. 8;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 58, figs. 1-4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 37, pl. 33, figs. 1-4.
Loc. Cumberland, Maryland.
Obs. Possibly the young of *Spirifer murchisoni*.
- Spirifer trigonalis** (Martin). Carboniferous.
Anomites trigonalis Martin, Petrefacta Derbiensia, tab. 36, 1809, fig. 1.
Spirifera trigonalis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 215, pl. 18, fig. 11.
Loc. Europe; Eureka district, Nevada.
- Spirifer triplicatus** Hall=*Spirifer camaratus*.
Spirifer triradialis Meek (non Phillips)=*Spirifer agelaius*.

- Spirifer troosti** Castelnau. ? Formation.
Spirifer troosti Castelnau, *Essai Système Silurien l'Amérique Septentrionale*, 1843, p. 41, pl. 12, fig. 5.
Loc. "Kentucky."
- Spirifer tullius** Hall. Hamilton (Dev.).
Spirifera tullia Hall, *Pal. New York*, IV, 1867, p. 218, pl. 35, figs. 1-9;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, fig. 18.
Spirifera tullia var. *Whiteaves*, *Cont. Canadian Pal.*, I, 1891, p. 224, pl. 32, fig. 1.
Spirifer tullius Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, pp. 14, 35, pl. 22, fig. 18; pl. 37, figs. 6, 7.
Loc. Tully, Apulia, etc., New York; Athabasca River, Canada.
- Spirifer tumidus** Bayle and Coquand = *Spiriferina rostrata*.
- Spirifer undiferus** Roemer = *Reticularia undifera*.
- Spirifer unica** Hall = *Spirifer arenosus*.
- Spirifer urbanus** Calvin. Hamilton (Dev.).
Spirifera urbana Calvin, *Bull. Lab. Univ. of Iowa*, 1888, p. 28.—*Bull. Lab. Nat. Hist. State Univ. Iowa*, II, 1892, p. 166, pl. 12, fig. 1.
Loc. Iowa City and Linn County, Iowa.
- Spirifer utahensis** Meek = *Cyrtia norwoodi*.
- Spirifer valenteana** Rathbun. Middle Devonian.
Spirifera valenteana (Hartt MS.) Rathbun, *Bull. Buffalo Soc. Nat. Sci.*, I, 1874, p. 241, pl. 8, fig. 11.
Loc. Erere, Province of Para, Brazil.
- Spirifer vanuxemi** Hall. Tentaculite (Sil.).
Orthis plicata Vanuxem (non Sowerby), *Geol. New York*; *Rep. Third Dist.*, 1842, p. 112, fig. 1.
Orthis? (*Deltthyris*) *plicatus* Hall, *Ibidem*, Fourth Dist., 1843, p. 142, fig. 1.
Spirifer vanuxemi Hall, *Pal. New York*, III, 1859, p. 198, pl. 8, figs. 17-23;—Second Rep. N. Y. State Geol., 1883, pl. 61, fig. 11.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1893, pp. 19, 36, pl. 36, fig. 11.—Whitfield, *Geol. Ohio*, VII, 1895, p. 411, pl. 1, figs. 4, 5.
Spirifera vanuxemi Whitfield, *Annals N. Y. Acad. Sci.*, V, 1891, p. 509, pl. 5, figs. 4, 5.
Loc. Albany and Schoharie counties, New York; Put in Bay Island, Lake Erie.
Obs. Vanuxem's specific name is restored, since Sowerby's species is an *Orthis*.
- Spirifer varicosus** Hall. Corniferous (Dev.).
Spirifer varicosa Hall, *Tenth Rep. N. Y. State Cab. Nat. Hist.*, 1857, p. 130.
Spirifera varicosa Billings, *Canadian Jour.*, VI, 1861, p. 255, figs. 63, 64;—*Geol. Canada*, 1863, p. 960, fig. 467.—Hall, *Pal. New York*, IV, 1867, p. 205, pl. 31, figs. 1-4;—Second Rep. N. Y. State Geol., 1883, pl. 59, figs. 4-8.—Walcott, *Mon. U. S. Geol. Survey*, VIII, 1884, p. 136.—Nettelroth, *Kentucky Fossil Shells*, *Mem. Kentucky Geol. Survey*, 1889, p. 131, pl. 10, figs. 11-20, 23-25.
Spirifer varicosus Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, pp. 17, 36, pl. 31, figs. 4-8.
Loc. Williamsville, New York; Woodstock, Canada; Columbus, Ohio; Louisville, Kentucky; Eureka district, Nevada.
- Spirifer ventricosa** Hall = *Nucleospira ventricosa*.
- Spirifer venustus** Hall = *Spirifer divaricatus*.
- Spirifer vernonensis** Swallow. Chouteau (L. Carb.).
Spirifer vernonensis Swallow, *Trans. St. Louis Acad. Sci.*, I, 1860, p. 644.—A. Winchell, *Proc. Acad. Nat. Sci. Philadelphia*, 1865, p. 119.
Loc. St. Louis County, Missouri.
Obs. Regarded by Keyes as a synonym for *S. mariouensis*.

- Spirifer vernonensis ozarkensis** Swallow. Chouteau (L. Carb.).
Spirifer vernonensis var. *ozarkensis* Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 644.
Loc. Taney County, Missouri.
Obs. Regarded by Keyes as a synonym for *S. marionensis*.
- Spirifer vogeli** von Ammon. Middle Devonian.
Spirifer vogeli von Ammon, Zeits. Gesell. für Erdk., Berlin, XXVIII, 1893, p. 362, fig. 6.
Loc. Taquarassu, Mato Grosso, Brazil.
- Spirifer waldronensis** Miller and Dyer=*Mimulus waldronensis*.
- Spirifer waverlyensis** A. Winchell. Waverly (L. Carb.).
Spirifer waverlyensis A. Winchell, Proc. Amer. Phil. Soc., XII, 1870, p. 251.
Loc. "Newark, Ohio" (A. Winchell's MS.).
- Spirifer whitneyi** Hall. Chemung (Dev.).
Spirifer whitneyi Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 502, pl. 4, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 24, 57, pl. 30, figs. 18, 19.
Spirifera whitneyi Hall, Pal. New York, IV, 1867, pp. 243, 417;—Second Rep. N. Y. State Geol., 1883, pl. 55, figs. 18, 19.—Tschernyschew, Mém. du Comité Géol. de St. Petersburg, III, 1887, p. 60.
Loc. Rockford, Iowa; North Saskatchewan, Canada; Russia.
- Spirifer williamsi** Hall and Clarke. Chemung (Dev.).
Spirifer williamsi Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 361, pl. 37, figs. 20-22.
Loc. Allegany County, New York.
- Spirifer winchelli** Herrick. Waverly (L. Carb.).
Spirifer winchelli Herrick, Bull. Denison Univ., III, 1888, p. 46, pl. 5, figs. 2, 3; pl. 2, fig. 16;—Geol. Ohio, VII, 1895, pl. 21, figs. 2, 3.
Loc. Granville, Ohio.
- Spirifer worthenanus** Schuchert. Oriskany (Dev.).
Spirifera engelmanni Meek and Worthen (non Meek, 1860), Geol. Survey Illinois, III, 1868, p. 398, pl. 8, fig. 5.
Spirifera wortheni Meek (non Hall, 1857), King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 42.
Spirifera worthenana Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 54.
Loc. Union County, Illinois.
- Spirifer wortheni** Meek (non Hall)=*Spirifer worthenanus*.
- Spirifer wortheni** Hall. Hamilton (Dev.).
Spirifer wortheni Hall, Tenth Rep., N. Y. State Cab. Nat. Hist., 1857, p. 156.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 27, figs. 19, 20.
Loc. Calhoun County, Illinois.
- Spirifer ziczac** Hall (non Roemer)=*Delthyris consobrina*.
- SPIRIFERINA** d'Orbigny.
 Genotype *Spirifer walcotti* Sowerby=*S. rostrata* (Schlotheim).
Spiriferina d'Orbigny, Paris Acad. Sci., Comptes Rendus, XXV, 1847, p. 268;—Ann. Sci. Nat., XIII, 1850, p. 334.—White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 24.—Waagen, Paleontologica Indica, Ser. XIII, 1, 1883, p. 498.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 51;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 764.

- Spiriferina aciculifera** (Rowley). Kinderhook (L. Carb.).
Spirifera aciculifera Rowley, American Geologist, XII, 1893, p. 307;—*Ibidem*, 1893, pl. 14, figs. 13, 14.
Loc. Louisiana, Missouri.
- Spiriferina** (?) *alia* Hall and Whitfield. Triassic.
Spirifera (*Spiriferina*?) *alia* Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 281, pl. 6, fig. 17.
Loc. Dun Glen Pass, Pah-Ute Range, Nevada.
- Spiriferina billingsi** Shumard. Upper Carboniferous.
Spiriferina billingsi Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 294, 391.
Loc. Guadalupe Mountains, New Mexico and Texas.
- Spiriferina binacuta** A. Winchell. Burlington (L. Carb.).
Spiriferina binacuta A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 120.
Loc. Burlington, Iowa.
- Spiriferina borealis** Whiteaves. Triassic.
Spiriferina borealis Whiteaves, Cont. Canadian Pal., I, 1888, p. 128, pl. 17, fig. 1, abstract.
Loc. Liard River, Canada.
- Spiriferina clarksvillensis** A. Winchell. Chouteau (L. Carb.).
Spiriferina clarksvillensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 119.—Keyes, Geol. Survey Missouri, V, 1895, p. 85.
Loc. Clarksville, Missouri.
- Spiriferina cristata** Walcott=S. *spinosa*.
- Spiriferina cristata** (Schlotheim). Upper Carboniferous.
Terebratulites cristatus Schlotheim, Beit. zur Naturg. der Verst.; Akad. der Wiss. zu München, 1816, pl. 1, fig. 3.
- Spirifer octoplicata*? Hall (non Sowerby), Stansbury's Exped. Great Salt Lake of Utah, 1852, p. 409, pl. 4, fig. 4.
- Spirifer kentuckyensis* Shumard, Geol. Survey Missouri, I, 1855, p. 203.—Hall, Pacific Railroad Rep., III, 1856, p. 102, pl. 2, figs. 10, 11.—Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 27.
- Spiriferina cristata* Davidson, Quart. Jour. Geol. Soc. London, 1863, p. 170, pl. 9, fig. 6.—Dawson, Acadian Geol., 3d ed., 1878, p. 291, fig. 90.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 218, pl. 18, figs. 12, 13.—Smith, Proc. American Phil. Soc., XXV, 1897, p. 32.
- Spirifer laminosus* Geinitz (non McCoy), Carb. und Dyas in Nebraska, 1866, p. 45, pl. 3, fig. 19.
- Spirifer kentuckyensis* var. *propatulus* Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 489.
- ?*Spiriferina octoplicata* Toulza, Sitzungsab. der kais. Akad. der Wissensch. zu Wien, LIX, 1869, p. 5.
- Spiriferina kentuckyensis* Meek, Final Rep. U. S. Geol. Survey of Nebraska, 1872, p. 185, pl. 6, fig. 3; pl. 8, fig. 11.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 138, pl. 10, fig. 4;—Thirteenth Rep. Indiana State Geol., 1884, p. 135, pl. 35, figs. 13, 14.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1890, p. 231.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 52, fig. 41, pl. 29, fig. 17.—Keyes, Geol. Survey Missouri, V, 1895, p. 86.
- Spiriferina cristata*? Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 629.
- Spirifer* (*Spiriferina*) *kentuckyensis* Hall, Second Rep. N. Y. State Geol., 1883, pl. 61, figs. 14–16.

Spiriferina cristata (Schlotheim)—Continued.

Loc. Europe; Kentucky; Indiana; Illinois; Missouri; Iowa; Kansas; Arkansas; Nebraska; Texas; New Mexico; Utah; Arizona; Nevada; Nova Scotia; Cape Joseph Henry, lat. 82° 43'; near Cochabamba, Bolivia.

Obs. See *Spiriferina octoplicata* and *S. norwoodana*.

Spiriferina depressa Herrick.

Waverly (L. Carb.).

Spiriferina depressa Herrick, Bull. Denison Univ., III, 1888, p. 47, pl. 10, fig. 3.

Loc. Near Granville, Ohio.

Spiriferina gonionotus Meek.

Upper Carboniferous.

Spiriferina sp. undet. Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 84, pl. 8, fig. 5.

Spiriferina gonionota Meek, *Ibidem*, 1877, at end of description.

Loc. Diamond Mountains, Nevada.

Obs. Compare with *Spiriferina laminosa* (McCoy).

Spiriferina homfrayi (Gabb).

Triassic.

Spirifer ? *homfrayi* Gabb, Geol. Survey California, Pal., I, 1864, p. 35, pl. 6, fig. 38.

Spiriferina homfrayi Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 281, pl. 6, fig. 18.

Loc. Star Canyon, Humboldt County, Nevada; Dun Glen Pass, Pah-Ute Range, Nevada.

Spiriferina kentuckyensis Shumard = *Spiriferina cristata*.**Spiriferina kentuckyensis** propatula Swallow = *Spiriferina cristata*.**Spiriferina** cfr. *munsteri* Davidson.

Jurassic.

Spiriferina cf. *munsteri* (Dav.) Mörücke, Neues Jahrbuch f. Mineral., Beilageband, IX, 1894, p. 60.

Loc. Europe; Cordillere of Copiapo, Chile.

Spiriferina norwoodana (Hall).

Warsaw (L. Carb.).

Spirifer norwoodana Hall, Trans. Albany Inst., IV, 1858, p. 7.

Spiriferina norwoodana Whitfield, American Mus. Nat. Hist., I, 1882, p. 48, pl. 6, figs. 16, 17.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 327, pl. 29, figs. 16, 17.

Loc. Spergen Hill, Indiana; Alton, Illinois; Princeton, Kentucky.

Obs. Probably identical with *Spiriferina cristata*.

Spiriferina obtusa (Gabb).

Triassic.

Spirifer obtusus Gabb, American Jour. Conch., V, 1870, p. 17, pl. 7, fig. 16.

Loc. "Volcano," Nevada.

Spiriferina octoplicata (Sowerby).

Upper Carboniferous.

Spirifer octoplicata Sowerby, Mineral Conch., 1827, p. 120, pl. 562, figs. 2-4.

Spiriferina cristata var. *octoplicata* Davidson, Mon. British Carb. Brach., Pal. Soc., 1857, p. 38, pl. 7, figs. 37-47.

Spiriferina spinosa var. *campestris* White, Wheeler's Expl. and Survey west 100th Merid., Prel. Rep., 1874, p. 21.

Spiriferina octoplicata White, *Ibidem*, Final Rep., 1875, p. 139, pl. 10, fig. 8.

Loc. Europe; Santa Fe, New Mexico; northern Colorado; Lincoln County, Nevada.

Obs. Probably identical with *Spiriferina cristata*.

Spiriferina pulchra Meek.

Upper Carboniferous.

Spirifera pulchra Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 310.

Spiriferina pulchra Meek, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 1864, 172, p. 19;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 85, pl. 8, fig. 1; pl. 12, fig. 12.

Spiriferina pulchra Meek—Continued.

Spirifer (*Spiriferina*) *puleher*, Meek. Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 352, pl. 2, fig. 1.

Loc. White Pine district, Nevada; Long and Ruby valleys, Utah.

Spiriferina rostrata Schlothheim.

Jurassic.

Spirifer chilensis Forbes, Darwin's Geol. Observations S. America, 1846, p. 267, pl. 5, figs. 15, 16.

Spirifer linguiferoides Forbes, *Ibidem*, 1846, p. 267, pl. 5, figs. 17, 18.

Spirifer tumidus Bayle and Coquand, Mém. Géol. Soc. France, ser. ii, IV, 1851, p. 19, pl. 7, figs. 11, 12.

Spirifer chilensis and *rostratus* Burmeister and Geibel, Abh. Naturf. Gesell. Halle, VI, 1862, p. 125.

Spiriferina rostrata (Schl.) Möricke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 59.

Loc. Europe; Sierra de la Ternera, Las Amolanes, Rio Claro, Tres Cruces, Manflas, Cordillera de Guaseo, and Juntas, Chile.

Spiriferina solidirostris White.

Kinderhook (L. Carb.).

Spirifer solidirostris White, Jour. Boston Soc. Nat. Hist., VII, 1860, p. 232.

Spiriferina solidirostris White, *Ibidem*, IX, 1862, p. 24.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 120.—Herrick, Bull. Denison Univ., III, 1888, p. 47, pl. 2, figs. 9–11; pl. 5, fig. 13;—Geol. Ohio, VII, 1895, pl. 21, fig. 13.

Loc. Burlington, Iowa; Hamburg, Illinois; Newark and Sciotoville, Ohio.

Spiriferina spinosa (Norwood and Pratten).

Kaskaskia (L. Carb.).

Spirifer spinosa Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., III, 1856, p. 71, pl. 9, fig. 1.—Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 706, pl. 27, fig. 5.

Spiriferina spinosa? Derby, Bull. Cornell Univ., I, 1874, p. 23, pl. 6, figs. 8, 13, 14.

Spiriferina spinosa Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 60, figs. 26–29.

Spiriferina cristata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 218, pl. 18, figs. 12, 13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 52–54, pl. 35, figs. 26–29.

? *Spiriferina spinosa* Herrick, Bull. Geol. Soc. America, II, 1891, p. 46, pl. 1, fig. 19.

Loc. Kaskaskia, Alton, and Chester, Illinois; Bloomington, Indiana; Crittenden County, Kentucky; Itaituba, Brazil.

Spiriferina spinosa campestris White = Spiriferina octoplicata.**Spiriferina subelliptica (McChesney).**

Keokuk (L. Carb.).

Spirifer subelliptica McChesney, New Pal. Fossils, 1860, p. 43.

Spiriferina subelliptica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 54, pl. 35, figs. 21, 22.

Loc. Buttonmould Knob, Kentucky; New Providence, Indiana.

Spiriferina subtexta White.

Burlington (L. Carb.).

Spiriferina ? *subtexta* White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 25.

Loc. Burlington, Iowa.

Spiriferina transversa (McChesney).

Kaskaskia (L. Carb.).

Spirifer transversa McChesney, New Pal. Fossils, 1860, p. 42;—Trans. Chicago Acad. Sci., I, 1868, p. 34, pl. 6, fig. 3.—Hall, Second Rep. N. Y. State Geol., 1883, pl. 60, figs. 19–22.

Spiriferina transversa (McChesney)—Continued.

Spiriferina transversa Derby, Bull. Cornell Univ., I, 1874, p. 21, pl. 2, figs. 4, 5, 6, 13; pl. 13, figs. 12-14, 17; pl. 5, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 46, 64, pl. 35, figs. 19, 20, 23-25.

Loc. Buzzard's Roost, Alabama; Litchfield, Kentucky; Bonjardim and Itaituba, Brazil.

Spirigera d'Orbigny = *Athyris*.

Spirigera eborea A. Winchell = *Athyris fultonensis*.

Spirigera planosulcata White (non Phillips) = *Cleiothyris crassicornialis*.

SPIRIGERELLA Waagen.Genotype *S. derbyi* Waagen.

Spirigerella Waagen, *Palaeontologica Indica*, Ser. XIII, I, 1883, p. 450.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 98;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 782.

Spirigerella derbyi Waagen.

Upper Carboniferous.

Athyris subtilita (partim) Derby, Bull. Cornell Univ., I, 1874, p. 7, pl. 1, fig. 7 (not the other figures).

Spirigerella derbyi Waagen, *Palaeontologica Indica*, Ser. XIII, I, 1883, p. 453, pl. 35, figs. 4-7, 9-13; pl. 37, figs. 11-13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 99, fig. 73.

Loc. Bonjardim and Itaituba, Brazil.

Stenochisma Ehlert (non Conrad or Hall) = *Camarophoria*.

STENOCHISMA Conrad. Genotype *Terebratulites schlotheimii* Conrad (non von Buch) = *Rhynchonella formosa* Hall.

Stenochisma Conrad, Second Ann. Rep. N. Y. Geol. Survey, 1839, pp. 58, 59.—Meek and Hayden (partim), Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 16, footnote.—Hall, Pal. New York, IV, 1867, pp. 334, 335.—Waagen, *Palaeontologica Indica*, Ser. XIII, I, 1883, pp. 411, 431, 436.—Miller, N. American Geol. and Pal., 1890, p. 337.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 187;—Thirteenth Ann. Rep. N. Y. State Geol., 1895, p. 826.

Obs. The above synonymy is retained for historical purposes. The only species left in the genus by Hall and Clarke is the type species, *Rhynchonella formosa*, which seems to be nothing more than a *Rhynchotrema*. This will leave *Stenochisma* without a species. This name, however, should not displace either *Rhynchotrema* or *Camarotectia*, since it was not defined, and in addition to this was founded by Conrad upon an erroneous identification. Nor can the view of Ehlert be adopted, i. e., that *Stenochisma* should displace *Camarophoria* King, because Conrad gave as the type *C. schlotheimii*. This name did not apply to von Buch's species, but to the shell now known as *Rhynchonella formosa* Hall.

All the species formerly referred to *Stenochisma* will be found under *Camarotectia* except *R. formosa*, which is referred to *Rhynchotrema*.

Stenochisma Hall, 1857 (non Conrad, 1839, Hall, 1867) = *Zygospira*.

STREPTIS Davidson.Genotype *Terebratula grayi* Davidson.

Streptis Davidson, Geol. Mag., VIII, 1881, p. 150, pl. v, fig. 13.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 274;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 289.

Streptis grayi Davidson.

Niagara (Sil.).

Terebratula grayii Davidson, Bull. Soc. Géol. France, 2d ser., V, 1848, p. 331, pl. iii, fig. 33.

Streptis grayi Davidson—Continued.

Atrypa? *grayi* Davidson, British Sil. Brach., Paleontographical Soc. (1866), 1867, p. 141, pl. xiii, figs. 14-22.

Streptis grayi Williams, American Jour. Sci., 3d ser., XLVIII, 1894, p. 331.
Loc. England; Batesville, Arkansas.

Streptis waldronensis Beecher and Clarke=*Mimulus waldronensis*.

STREPTORHYNCHUS King.

Genotype *Terebratulites pelargonatus* Schlotheim.

Streptorhynchus King, Mon. Permian Fossils, Pal. Soc., 1850, p. 107.—Derby (partim), Bull. Cornell Univ.; I, 1874, pp. 32, 39.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 267;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 288.

Streptorhynchus æquivalvis Hall=*Orthotheses inæqualis*.

Streptorhynchus agassizi Rathbun=*Orthotheses agassizi*.

Streptorhynchus approximata James=*Strophomena approximata*.

Streptorhynchus aretostriata Walcott=*Orthotheses chemungensis aretostriatus*.

Streptorhynchus biloba Hall=*Derbya biloba*.

Streptorhynchus cardinale Whitfield=*Strophomena cardinalis*.

Streptorhynchus chemungensis Hall=*Orthotheses chemungensis*.

Streptorhynchus coreanus Derby=*Derbya correana*.

Streptorhynchus crenistria Keyes (non Phillips)=*Derbya crassa*.

Streptorhynchus crenistrius American authors=*Orthotheses crenistria*.

Streptorhynchus elongatus James=*Strophomena rugosa*.

Streptorhynchus filitextus Hall=*Strophomena incurvata*.

Streptorhynchus flabellum Whitfield=*Orthotheses flabellum*.

Streptorhynchus hallianus Derby.

Upper Carboniferous.

Streptorhynchus hallianus Derby, Bull. Cornell Univ., I, 1874, p. 35, pl. 5, figs. 1, 2, 5, 8, 12, 14, 16, 18; pl. 8, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 268, pl. 11, figs. 6-17.

Loc. Bomjardim and Itaituba, Brazil.

Streptorhynchus hallanum Miller=*Strophomena halli*.

Streptorhynchus hemiaster Winchell and Marcy=*Orthotheses subplanus*.

Streptorhynchus hydraulicum Whitfield=*Orthotheses hydraulicus*.

Streptorhynchus inæqualis Winchell=*Orthotheses inæqualis*.

Streptorhynchus inflatus White and Whitfield=*Orthotheses inflatus*.

Streptorhynchus lens White=*Orthotheses lens*.

Streptorhynchus minor Walcott=*Strophomena minor*.

Streptorhynchus (?) multistriata (Meek and Hayden).

Upper Carboniferous.

Orthisina umbraculum? Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 26.

Orthisina multistriata Meek and Hayden, Ibidem, 1859, at end of description.

Loc. Fort Riley, Kansas.

Streptorhynchus neglectus James=*Strophomena neglecta*.

Streptorhynchus occidentalis Newberry=*Meekella occidentalis*.

- Streptorhynchus pandora* Billings=*Orthothetes pandora*.
Streptorhynchus perversus=*Orthothetes chemungensis perversus*.
Streptorhynchus planoconvexus Hall=*Strophomena planiconvexa*.
Streptorhynchus planumbonus Hall=*Strophomena rugosa*.
Streptorhynchus primordiale Whitfield=*Billingsella primordialis*.
Streptorhynchus pyramidalis Newberry=*Meekella pyramidalis*.
Streptorhynchus robusta Hall=*Derbya robusta*.
Streptorhynchus subplanus Hall=*Orthothetes subplanus*.
Streptorhynchus subsulcatum Sardeson=*Strophomena scofieldi*.
Streptorhynchus subtenta Hall, 1883=*Strophomena trentonensis*.
Streptorhynchus tapajotensis Derby=*Orthothetes tapajotensis*.
Streptorhynchus tennis Hall=*Orthothetes tenuis*.
- Streptorhynchus ulrichi*** Hall and Clarke. Kaskaskia (L. Carb.).
Streptorhynchus ulrichi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 268, 351, pl. 11B, fig. 15.
Loc. Crittenden County, Kentucky.
- Streptorhynchus umbraculum* Winchell=*Orthothetes umbraculum*.
Streptorhynchus vetusta James=*Strophomena vetusta*.
Streptorhynchus woolworthianus Hall=*Orthothetes woolworthianus*.
Stricklandia Billings=*Stricklandinia*.
Stricklandia arachne Billings=*Syntrophia arachne*.
Stricklandia arethusa Billings=*Syntrophia arethusa*.
- STRICKLANDINIA** Billings. Genotype *Stricklandia gaspensis* Bill.
Stricklandia Billings, Canadian Nat. and Geol., IV, 1859, p. 132;—Canadian Journal, VI, 1861, p. 265;—Pal. Fossils, I, 1862, p. 84;—Proc. Portland Soc. Nat. Hist., 1863, p. 114.—Waagen, Palaeontologica Indica, Ser. XIII, I, 1883, p. 412.
Stricklandinia Billings, Canadian Nat. and Geol., VIII, 1863, p. 370.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 160;—Pal. New York, IV, 1867, p. 369.—Billings, Pal. Fossils, II, 1874, p. 78.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 64.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 249;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 847.
- Stricklandinia anticostiensis*** Billings. Anticosti (Sil.).
Stricklandinia anticostiensis Billings, Canadian Nat. and Geol., VIII, 1863, p. 370.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73, figs. 12-14.
Loc. Anticosti.
- Stricklandinia billingsiana*** Dawson. Arisaig (Sil.).
Stricklandinia billingsiana Dawson, Canadian Nat. and Geol., 2d ser., IX, 1880, p. 341.
Loc. Nova Scotia.
- Stricklandinia brevis*** Billings. Anticosti (Sil.).
 ?*Spirifer* species? Hall, Pal. New York, II, 1852, p. 66, pl. 22, fig. 3.
Stricklandia brevis Billings, Canadian Nat. and Geol., IV, 1859, p. 135.
Stricklandinia brevis Billings, Pal. Fossils, II, 1874, p. 84, pl. 6, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251.
Loc. Anticosti; ?*Sodus*, Wayne County, New York.

- Stricklandinia canadaensis** Billings. Clinton (Sil.).
Stricklandia canadensis Billings, Canadian Nat. and Geol., IV, 1859, p. 135.
Stricklandinia canadaensis Billings, Pal. Fossils, II, 1874, p. 81.—Hall and Clarke,
 Pal. New York, VIII, Pt. II, 1893, p. 251.
Loc. Near Thorold, Ontario.
- Stricklandinia castellana** White. Niagara (Sil.).
Stricklandinia castellana White, Proc. Acad. Nat. Sci. Philadelphia, 1876, p. 30.—
 Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73, figs. 3-7.
Loc. Castle Grove, Jones County, Iowa.
- Stricklandinia chapmani** Hall and Clarke. Niagara (Sil.).
Stricklandinia chapmani Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl.
 83, fig. 40.
Loc. Hamilton, Ontario.
- Stricklandinia davidsoni** Billings. Anticosti (Sil.).
Stricklandinia davidsoni Billings, Geol. Mag., V, 1868, p. 59, pl. 4, figs. 1-1*d*;—
 Pal. Fossils, II, 1874, p. 86, pl. 6, fig. 1.—White, Proc. U. S. Nat. Mus., III,
 1880, p. 48.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73,
 fig. 15.
Loc. Anticosti; eastern Canada; Ringgold, Catoosa County, Georgia.
- Stricklandinia deformis** Meek and Worthen. Niagara (Sil.).
Stricklandinia deformis Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia,
 1870, p. 37;—Geol. Survey Illinois, VI, 1875, p. 502, pl. 24, fig. 5.—Hall and
 Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73, figs. 8-10.
Loc. Carroll County, Illinois.
Obs. Probably the same as *S. melissa*.
- Stricklandinia elongata** Billings = *Amphigenia elongata*.
Stricklandinia elongata curta Meek and Worthen = *Amphigenia curta*.
- Stricklandinia gaspiensis** Billings. Gaspé (Sil.).
Stricklandia gaspiensis Billings, Canadian Nat. and Geol., IV, 1859, p. 134.
Stricklandinia gaspiensis Billings, Pal. Fossils, II, 1874, p. 83, fig. 49;—Hall and
 Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73, fig. 11.
Loc. Bay of Chaleurs, Canada.
- Stricklandinia lens** (Sowerby). Silurian.
Atrypa lens Sowerby, Murchison's Silurian System, 1839, pl. 21, fig. 3.
Stricklandinia lens Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 45.—Foerste,
 Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 321, pl. 5, figs. 1-4.
Loc. England; Anticosti; Collinsville, Alabama.
- Stricklandinia lirata** (Sowerby). Anticosti (Sil.).
Spirifer liratus Sowerby, Murchison's Silurian System, 1839, pl. 22, fig. 6.
Stricklandinia lirata Davidson, Mon. British Sil. Brach., Pal. Soc., 1867, p. 159,
 pl. 20, figs. 1-13.—Billings, Cat. Sil. Foss. Anticosti, 1866, p. 45.
Loc. Enrope; Anticosti.
- Stricklandinia (?) louisvillensis** Nettelroth. Niagara (Sil.).
Stricklandinia louisvillensis Nettelroth, Kentucky Fossil Shells, Mem. Kentucky
 Geol. Survey, 1889, p. 65, pl. 34, figs. 31-34.
Loc. East of Louisville, Kentucky.
- Stricklandinia melissa** Billings. Anticosti (Sil.).
Stricklandinia melissa Billings, Pal. Fossils, II, 1874, p. 89, pl. 7, fig. 4.—Hall
 and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251.
Loc. Anticosti.
Obs. Probably the same as *S. deformis*.

- Stricklandinia multilirata** Whitfield. Guelph (Sil.).
Stricklandinia multilirata Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 81;—Geol. Wisconsin, IV, 1882, p. 315, pl. 23, figs. 3-5.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73, figs. 1, 2.
Loc. Sheboygan, Wisconsin.
- Stricklandinia salteri** Billings. Anticosti (Sil.).
Stricklandinia salteri Billings, Geol. Mag., V, 1868, p. 61, pl. 4, figs. 2-2a;—Pal. Fossils, II, 1874, p. 87, pl. 7, fig. 1.—White, Proc. U. S. Nat. Mus., III, 1880, p. 48.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251.
Loc. Anticosti; Ringgold, Catoosa County, Georgia.
- Stricklandinia (?) subquadrata** Herrick. Upper Carboniferous.
Stricklandinia ? subquadrata Herrick, Bull. Denison Univ., II, 1887, p. 49, pl. 1, fig. 14.
Loc. Flint ridge, near Newark, Ohio.
Obs. Probably a terebratuloid.
- Stricklandinia triplesiana** Foerste. Clinton (Sil.).
Stricklandinia triplesiana Foerste, Bull. Denison Univ., I, 1885, p. 89, pl. 14, figs. 13, 14.—Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 323;—Geol. Ohio, VII, 1895, p. 594, pl. 26, figs. 13, 14.
Loc. Dayton, Ohio.
- STRINGOCEPHALUS** Defrance. Genotype *S. burtini* Defrance.
Strygocephalus Defrance, Diet. Sci. Nat., LI, 1827, p. 102, pl. 75, fig. 1.
Stringocephalus Sandberger, Leonhard and Bronn's Jahrb. für Min., 1842, p. 386.—Dall, American Jour. Conch., VI, 1870, p. 112.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 282, figs. 203-207.
- Stringocephalus burtoni** Defrance. Middle Devonian.
Strygocephalus burtoni Defrance, Diet. Sci. Nat., LI, 1827, p. 102, pl. 75, fig. 1.
Stringocephalus burtoni Whiteaves, Trans. Royal Soc. Canada, VIII, 1891, p. 93;—Cont. to Canadian Pal., I, 1891, p. 235, pl. 29, figs. 10-11; p. 290.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 283, fig. 203.
Loc. Europe; Lakes Manitoba and Winnipegosis and the "Ramparts," Mackenzie River, British America. Two loose specimens have been found near Devonian rocks in southern Minnesota.
- STROPHALOSIA** King. Genotype *Orthis excavata* Geinitz.
Strophalosia King, Ann. and Mag. Nat. Hist., XIV, 1844, p. 313;—*Ibidem*, XVII, 1846, p. 92;—Mon. Permian Fossils, Pal. Soc., 1850, p. 93.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 245;—Pal. New York, IV, 1867, p. 146.—Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 240.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 314;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 295.
- Strophalosia beecheri** Rowley. Kinderhook (L. Carb.).
Strophalosia beecheri Rowley, American Geologist, XII, 1893, p. 308, pl. 14, figs. 18, 19.
Loc. Louisiana, Missouri.
- Strophalosia cornelliana** Derby. Upper Carboniferous.
Strophalosia cornelliana Derby, Bull. Cornell Univ., I, 1874, p. 45, pl. 3, figs. 28, 30, 32, 33, 35-38; pl. 4, fig. 5; pl. 8, fig. 17; pl. 9, figs. 10, 11.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 153, figs. 36, 37.
Loc. Bomjardim, Brazil.
- Strophalosia cymbula** Hall and Clarke. Keokuk (L. Carb.).
Strophalosia cymbula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, figs. 3, 4, 8, 9.
Loc. Near Louisville and Lebanon, Kentucky.
 Bull. 87—27

- Strophalosia (?) guadalupensis** (Shumard). Upper Carboniferous.
Aulosteges guadalupensis Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 292, pl. 11, fig. 5; p. 390.
Strophalosia ? guadalupensis Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 241.
Loc. Guadalupe Mountains, New Mexico and Texas.
- Strophalosia horrescens** Geinitz (non Murchison, de Verneuil, and Keyserling)=*Productus nebraskaensis*.
- Strophalosia hystricula** Hall. Chemung (Dev.).
Productella hystricula Hall, Pal. New York, IV, 1867, p. 178, pl. 26, figs. 1-8;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 29, 30.
Strophalosia hystricula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 15B, fig. 31; pl. 17, figs. 29, 30.
Loc. Forestville, Conewango, and East Randolph, New York.
- Strophalosia keokuk** Beecher. Keokuk (L. Carb.).
Strophalosia keokuk Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 244, pl. 9, figs. 18-24.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 17A, figs. 5-7.
Loc. Keokuk, Iowa.
- Strophalosia muricata** (Hall). Chemung (Dev.).
Chonetes muricata Hall, Pal. New York, IV, 1867, p. 143, pl. 22, figs. 29-43.
Chonetes (Productella?) muricata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 47, figs. 12, 16, 30, 38, 42.
Strophalosia ? muricata Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 241.
Strophalosia muricata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 16, figs. 12, 16, 30, 38, 42.
Loc. Ellington, New York, and Meadville, Pennsylvania.
- Strophalosia nummulina** A. Winchell. Kinderhook (L. Carb.).
Strophalosia ? nummularis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 4.
Strophalosia ? nummulina Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 242.
Strophalosia nummularis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316.
Loc. Burlington, Iowa.
- Strophalosia radicans** (A. Winchell). Hamilton (Dev.).
Crania radicans A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 92.
Strophalosia radicans Beecher, American Jour. Sci., 3d ser., XL, 1890, pp. 240, 243, pl. 9, figs. 14-17.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 15B, figs. 27-30.
Loc. Grand Traverse region, Michigan.
- Strophalosia rockfordensis** Hall and Clarke. Upper Devonian.
Strophalosia rockfordensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 316, 353, pl. 17A, figs. 1-3; Pt. II, 1895, pl. 84, figs. 20-22.
Loc. Rockford, Iowa.
- Strophalosia scintilla** Beecher. Chouteau (L. Carb.).
Strophalosia scintilla Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 243, pl. 9, figs. 10-13.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 15B, figs. 32-31.
Loc. Pike County, Missouri.
- Strophalosia spondyliiformis** (White and St. John). Upper Carboniferous.
Aulosteges spondyliiformis White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 118, fig. 2.

Strophalosia spondyliformis (White and St. John)—Continued.

Strophalosia spondyliformis Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 242.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, figs. 25, 26.

Loc. Appanoose and Pottawattamie counties, Iowa.

Strophalosia truncata (Hall). Hamilton, Portage, and Ithaca (Dev.).

Strophomena pustulosa Hall (non *Productus pustulosus* Phillips), Geol. N. Y.; Rep. Fourth Dist., 1843, p. 189, fig. 4.

Productus truncatus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 171.

Productella truncata Hall, Pal. New York, IV, 1867, p. 160, pl. 23, figs. 12-24;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 10-15.—Kindle, Bull. American Pal., 6, 1896, p. 35.

Productus (P.) *truncatus* Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 131, pl. 14, fig. 2.

Productella (*Strophalosia*?) *truncata* Whiteaves, Cont. Canadian Pal., I, 1889, p. 112, pl. 16, figs. 1, 2.

Strophalosia truncata Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 247.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 15B, figs. 24-26; pl. 17, figs. 10-15.

Loc. New York; Thedford, Ontario; Eureka district, Nevada.

STROPHEODONTA Hall. Genotype *Strophomena demissa* Conrad.

Stropheodonta Hall, Pal. New York, II, 1852, p. 63.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 284.

Strophodonta Hall, Geol. Survey Iowa, I, 1858, p. 491.—Billings, Canadian Jour. Sci. Arts, n. ser., VI, 1861, p. 332;—Proc. Portland Soc. Nat. Hist., 1863, p. 108.—Hall, Pal. New York, IV, 1867, p. 78.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 142.

Brachyprion Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 63.

Brachyprion and *Douvilina* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 220, 286, 288, 289, 292; Eleventh Ann. Rep. N. Y. State Geologist, 1894, pp. 280, 281.

Stropheodonta acanthoptera (Whiteaves). Upper Silurian.

Strophomena acanthoptera Whiteaves, Canadian Rec. Sci., 1891, p. 294, pl. 3, figs. 1, 2.

Loc. District of Saskatchewan and Lake Winnipegosis, Canada.

Stropheodonta alveata Hall. Upper Helderberg (Dev.).

Strophodonta alveata Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 36;—Pal. New York, IV, 1867, p. 81, pl. 11, figs. 1-3.

Loc. Albany County, New York.

Stropheodonta arcuata Hall. Chemung (Dev.).

Strophodonta arcuata Hall, Geol. Survey Iowa, I, 1858, p. 492, pl. 3, figs. 1a-1c, 2a-2f.—Calvin, Bull. U. S. Geol. Survey, IV, 1878, p. 728.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 285.

Strophodonta arcuata? Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 121.

Stropheodonta arcuata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 289, pl. 15B, figs. 1-3.

Loc. Rockford, Iowa; Naples, New York; Eureka district, Nevada; Lake Winnipegosis, Canada.

Stropheodonta beckei Hall. Lower Helderberg (Dev.).

Strophodonta beckii Hall, Pal. New York, III, 1859, p. 191, pl. 22, figs. 1a-1t.—Meek, American Jour. Sci., 2d ser., XL, 1865, p. 33.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 44, figs. 23, 24.

Strophomena (*Strophodonta*) *beckii* Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 52, figs. 1-4.

Stropheodonta beckeii Hall—Continued.

Stropheodonta (*Leptostrophia*) *beckii* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288, pl. 13, figs. 23, 24.

Loc. Albany and Schoharie counties, New York; Kennedy Channel, Arctic region.

Stropheodonta blainvillei (Billings).

Lower Devonian.

Strophomena blainvillei Billings, Pal. Fossils, II, 1874, p. 28, pl. 2, fig. 1; pl. 3, fig. 1.

Stropheodonta (*Leptostrophia*) *blainvillii* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288.

Loc. Gaspé, Canada.

Obs. Compare with *S. perplana*.

Stropheodonta callawayensis Swallow.

Hamilton (Dev.).

Strophodonta callawayensis, *quadrata*, and *aquicostata* Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 638.

Loc. Callaway County, Missouri.

Obs. See *S. navalis*.

Stropheodonta callosa Hall.

Upper Helderberg (Dev.).

Strophodonta callosa Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 36;—Pal. New York, IV, 1867, p. 82, pl. 11, figs. 4–10; pl. 12, figs. 8, 9.

Chonetes (*Strophodonta*?) *callosa* Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 47, fig. 37.

Stropheodonta callosa Hall and Clarke, VIII, Pt. I, 1892, pl. 16, fig. 37.

Loc. Albany County, New York.

Stropheodonta calvini Miller.

Chemung (Dev.).

Strophodonta quadrata Calvin (non Swallow, 1860), Bull. U. S. Geol. Geogr. Survey Terr., IV, 1878, p. 728.

Strophodonta calvini Miller, Cat. American Pal. Foss., 2d ed., January, 1883, p. 298.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 122, pl. 13, fig. 6.

Strophodonta exilis Calvin, American Jour. Sci., 3d ser., XXV, June, 1883, p. 443.

Loc. Rockford and Independence, Iowa; Eureka district, Nevada.

Stropheodonta canace Hall and Whitfield.

Chemung (Dev.).

Strophodonta canace Hall and Whitfield, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 236, pl. 11, figs. 8–11; abstract of same in 1872;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 246, pl. 3, figs. 1–3.

Loc. Rockford, Iowa; White Pine district, Nevada; Naples, New York.

Stropheodonta cincta A. Winchell.

Hamilton (Dev.).

Strophodonta cincta A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 93.

Loc. Grand Traverse region, Michigan.

Obs. Insufficiently defined to be recognized.

Stropheodonta concava Hall.

Corniferous and Hamilton (Dev.).

Strophomena (*Strophodonta*) *concava* Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, pp. 115, 140, fig. 1.

Strophodonta concava Hall, Pal. New York, IV, 1867, p. 96, pl. 16, figs. 1a–1h;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, figs. 16–22.

Stropheodonta concava Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 14, figs. 16–23.

Loc. New York, from Cayuga Lake westward to Lake Erie.

Stropheodonta corrugata (Conrad).

Clinton (Sil.).

Strophomena corrugata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 256, pl. 14, fig. 8.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 73, fig. 2 on p. 72;—Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 303, pl. 6, fig. 25.

Stropheodonta corrugata (Conrad)—Continued.

Leptaena corrugata Hall, Pal. New York, II, 1852, p. 59, pl. 21, figs. 2a-2c.

Strophodonta corrugata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, fig. 1.

Stropheodonta corrugata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15, fig. 1; Pt. II, 1895, pl. 84, fig. 14.

Loc. Rochester, Wolcott, etc., New York; Cumberland Gap, Tennessee.

Stropheodonta (?) corrugata pleuristriata (Foerste.) Clinton (Sil.).

Leptaena corrugata (partim) Hall, Pal. New York, II, 1852, p. 59, pl. 21, figs. 2d, 2e.

Strophomena corrugata var. *pleuristriata* Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 303, pl. 6, figs. 26, 27.

Loc. Cumberland Gap, Tennessee.

Stropheodonta (?) costata Owen. Hamilton (Dev.).

Strophodonta (?) *costata* Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 585, pl. 3A, fig. 5; pl. 3, figs. 11, 11a.

Loc. Davenport, Iowa.

Stropheodonta crebristriata Hall. Upper Helderberg (Dev.).

Strophomena crebristriata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 254, pl. 14, fig. 3.

Strophodonta crebristriata Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 37;—Pal. New York, IV, 1867, p. 86, pl. 11, figs. 12, 13, 18-21.

Loc. Albany and Schoharie counties, New York.

Stropheodonta demissa (Conrad). Middle and Upper Devonian.

Strophomena demissa Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 258, pl. 14, fig. 14.—Rogers, Geol. Pennsylvania, II, 1858, p. 827, fig. 666.—Billings, Canadian Jour. Sci. Arts, 2d ser., VI, 1861, p. 341, figs. 116-118;—Geol. Canada, 1863, p. 367, figs. 377a-d.

Strophodonta dimosa (?) Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, tab. 3A, fig. 14. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17917.]

Strophomena (*Strophodonta*) *demissa* Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 137, fig. 1.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 87, figs. 6a-c.

Strophomena (*Strophodonta*) *subdemissa* Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 145.—Meek (non Hall), Trans. Chicago Acad. Sci., I, 1868, p. 88, pl. 13, fig. 7.

Strophodonta demissa Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 495, pl. 3, fig. 5;—Pal. New York, IV, 1867, p. 81, pl. 11, figs. 14-17; pl. 12, figs. 1-5.—Nicholson, Pal. Prov. Ontario, 1873, p. 65.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 500, pl. 4, figs. 6, 7;—Tenth Rep. Indiana State Geol., 1881, p. 132, pl. 4, figs. 6, 7.—Whitfield, Geol. Wisconsin, IV, 1882, p. 327, pl. 25, fig. 18.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, figs. 7-12.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 118, pl. 2, fig. 9.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 143, pl. 18, figs. 10-16; pl. 33, fig. 22.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 219.—Keyes, Geol. Survey Missouri, V, 1895, p. 70, pl. 39, fig. 7.

Stropheodonta demissa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 14, figs. 7-12.

Loc. New York; Pennsylvania; Ohio; Indiana; Kentucky; Illinois; Iowa; Wisconsin; Ontario; Mackenzie and Athabasca rivers, Canada; Eureka district, Nevada.

Stropheodonta demissa imitata Winchell. Hamilton (Dev.).

Strophodonta imitata A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 93.

Loc. Grand Traverse region, Michigan.

- Stropheodonta erratica** A. Winchell. Hamilton (Dev.).
Strophodonta erratica and varieties *solidicosta* and *fissicosta* A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 93.
Loc. Grand Traverse region, Michigan.
Obs. This species may prove to be only a local variation of *S. costata* Owen.
- Stropheodonta feildeni** Etheridge. ? Lower Devonian.
Strophodonta feildeni Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 598, pl. 25, fig. 4.
Loc. Cape Hilgard, lat. 79° 41'.
Obs. Since this species is very closely related to *S. magnifica* of the Oriskany sandstone the horizon is probably Lower Devonian.
- Stropheodonta galatea** (Billings). Lower Devonian.
Strophomena galatea Billings, Pal. Fossils, II, 1874, p. 20, fig. 9.
Loc. Indian Cove, Gaspé, Canada.
- Stropheodonta (?) geniculata** (Shaler). Anticosti (Sil.).
Brachyprion geniculatum Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 63.
Loc. Near Southwest Point, Anticosti.
- Stropheodonta (?) gilpeni** (Dawson). Upper Arisaig (Sil.).
Strophomena gilpeni Dawson, Canadian Nat. Geol., n. ser., IX, 1880, p. 341.
Loc. Nova Scotia, Canada.
- Stropheodonta hemispherica** Hall. Upper Helderberg (Dev.)
Strophomena (Strophodonta) hemispherica Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 113.
Strophodonta hemispherica Hall, Pal. New York, IV, 1867, p. 90, pl. 13, figs. 12, 13;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, fig. 23.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 144, pl. 18, figs. 4-6.
Loc. New York; Ohio; Indiana; Kentucky; Ontario.
- Stropheodonta inæquiradiata** Hall. Upper Helderberg (Dev.).
Strophomena (Strophodonta) inæquiradiata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 113, figs. 1-3.
Strophomena inæquistriata Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 338, fig. 113;—Geol. Canada, 1863, p. 367, fig. 375;—Pal. Fossils, II, 1874, p. 24, fig. 13; pl. 2, fig. 4; p. 240.
Strophodonta inæquiradiata Hall, Pal. New York, IV, 1867, p. 87, pl. 11, figs. 24-31; pl. 12, fig. 12; pl. 13, figs. 6-11;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, figs. 13, 14.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 120, pl. 11, fig. 11.
Stropheodonta inæquiradiata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 14, figs. 13, 14.
Loc. Albany and Schoharie counties, New York; Columbus, Ohio; Eureka district, Nevada; Gaspé Bay, Canada.
- Stropheodonta inæquistriata** (Conrad). Corniferous to Hamilton (Dev.).
Strophomena inæquistriata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 254, pl. 14, fig. 2.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 200, fig. 4.—Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 338, figs. 113, 114;—Geol. Canada, 1863, p. 367, fig. 375.
Strophomena (Strophodonta) inæquistriata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 142.
Strophodonta inæquistriata Hall, Pal. New York, IV, 1867, p. 93, pl. 12, figs. 6-8; p. 106, pl. 18, fig. 2;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, figs. 1-6.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 145, pl. 17, figs. 10, 11.

Stropheodonta inæquistriata (Conrad)—Continued.

Stropheodonta (*Douvillina*) *inæquistriata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 289, pl. 14, figs. 1-6; pl. 15B, fig. 9.

Loc. Caledonia, Moscow, Darien, etc., New York; Ontario, Canada; Milwaukee, Wisconsin; Falls of Ohio.

Stropheodonta indenta (Conrad).

Lower Helderberg (Dev.).

Leptaena indenta Conrad, Second Ann. Rep. N. Y. Geol. Survey, 1838, pp. 112, 117.

Strophomena indenta Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 109, pl. 3, fig. 3.

Stropheodonta indenta Miller, American Pal. Fossils, 1877, p. 135.

Loc. "Helderberg Mountains," New York; Square Lake, Maine; Gaspé, Canada.

Stropheodonta interstitialis (Phillips).

Middle Devonian.

Orthis interstitialis Phillips, Pal. Foss. Cornw. and W. Somerset, 1841, p. 61, pl. 25, fig. 103.

Stropheodonta interstitialis Whiteaves, Cont. Canadian Pal., 1, 1892, p. 286, pl. 37, fig. 6.

Loc. Europe; Lake Winnipegosis, Canada.

Stropheodonta interstitialis (Vanuxem).

Ithaca (Dev.).

Strophomena interstitialis Vanuxem (non Phillips), Geol. N. Y.; Rep. Third Dist. 1842, p. 174, fig. 1.

Stropheodonta mucronata Hall, Pal. New York, IV, 1867, p. 111, pl. 15, figs. 13, 14.

Loc. Ithaca, Elmira, Bath, etc., New York.

Obs. My attention was directed to the above synonymy by Professor Williams and as well that of *S. mucronata* Conrad (non Hall).

Stropheodonta iowaensis Owen.

?Upper Devonian.

Stropheodonta iowensis Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 585.

Loc. Pine Creek, near Rockford, Iowa.

Stropheodonta irene (Billings).

Upper Helderberg (Dev.).

Strophomena irene Billings, Pal. Fossils, II, 1874, p. 27, pl. 2, fig. 5.

Stropheodonta (*Leptostrophia*) *irene* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288.

Loc. Grand Greve, Gaspé Bay, Canada.

Stropheodonta junia Hall.

Hamilton (Dev.).

Strophomena (*Stropheodonta*) *textilis* Hall (non 1852), Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 141, figs. 1-3.

Stropheodonta textilis Hall, Pal. New York, IV, 1867, p. 108, pl. 18, figs. 3, 4.

Stropheodonta junia Hall, *Ibidem*, 1867, corrigenda;—Second Ann. Rep. N. Y. State Geologist, 1883, pl. 46, fig. 16.

Stropheodonta (*Leptostrophia*) *junia* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288, pl. 15, fig. 16.

Loc. York, Moscow, Darien, etc., New York.

Stropheodonta kemperi Swallow.

Hamilton (Dev.).

Stropheodonta kemperi Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 636.

Loc. Callaway County, Missouri.

Stropheodonta(?) leda (Billings).

Anticosti (Sil.).

Strophomena leda Billings, Canadian Nat. and Geol., V, 1860, p. 55, figs. 2, 3;—Pal. Fossils, I, 1862, p. 120, figs. 98, 99;—Geol. Canada, 1863, p. 311, fig. 316.

Brachyprion leda Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 63.

Stropheodonta leda Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288.

Rafinesquina leda Whiteaves, Pal. Foss. III, Pt. III, 1897, p. 172.

Loc. East Point, Anticosti, Lake Winnipeg, Manitoba.

- Stropheodonta lincklaeni** Hall. Oriskany (Dev.).
Stropheodonta lincklaeni Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 55;—Pal. New York, III, 1859, p. 415, pl. 93, figs. 2, 3.
Loc. Albany and Schoharie counties, New York.
- Stropheodonta macra** (Winchell and Marcy). Niagara (Sil.).
Strophomena macra W. and M., Mem. Boston Soc. Nat. Hist., I, 1865, p. 91.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 392.
Loc. Probably near Chicago, Illinois.
- Stropheodonta macrostriata** (Walcott). Lower Devonian.
Chonetes macrostriata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 126, pl. 2, fig. 13; pl. 13, fig. 14.
Loc. Eureka district, Nevada.
Obs. The type material proves it to be a *Stropheodonta*.
- Stropheodonta magnifica** Hall. Oriskany (Dev.).
Stropheodonta magnifica Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 54;—Pal. New York, III, 1859, pp. 414, 482, pl. 93, fig. 4; pl. 94, fig. 2; pl. 95, fig. 8; pl. 95A, figs. 15-19;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 44, figs. 27, 28.
Strophomena magnifica Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 348;—Geol. Canada, 1863, p. 961, fig. 468.
Stropheodonta (*Leptostrophia*) *magnifica* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288, pl. 13, figs. 27, 28.
Loc. Albany and Schoharie counties, New York; Cumberland, Maryland; county of Haldimand, Ontario, Canada.
- Stropheodonta magniventer** Hall. Oriskany (Dev.).
Stropheodonta magniventra Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 54;—Pal. New York, III, 1859, p. 411, pl. 92, figs. 2, 3; pl. 95, fig. 9;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 44, figs. 25, 26.
Strophomena magniventra Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 349;—Geol. Canada, 1863, p. 961, fig. 469;—Pal. Fossils, II, 1874, p. 22, figs. 10-12, and pl. 2, fig. 2.
Stropheodonta (*Leptostrophia*) *magniventra* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288, pl. 13, figs. 25, 26.
Loc. Albany and Schoharie counties, New York; Cayuga, Ontario, and Gaspé Bay, Canada.
- Stropheodonta mucronata** (Conrad). Portage and Chemung (Dev.).
Strophomena mucronata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 257, pl. 14, fig. 10.
Strophomena interstitialis Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 266, fig. 5.
Stropheodonta cayuta Hall, Pal. New York, IV, 1867, p. 110, pl. 19, figs. 1-5;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, figs. 18, 19.
Stropheodonta (*Douvillina*) *cayuta* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 289, pl. 15, figs. 18, 19; pl. 15B, figs. 7, 8; Pt. II, 1895, pl. 84, fig. 13.
Loc. Steuben County, New York.
Obs. See *S. interstitialis*.
- Stropheodonta navalis** Swallow. Hamilton (Dev.).
Stropheodonta navalis, *cymbiformis*, *subcymbiformis*, and *altidorsata* Swallow, Trans. St. Louis Acad. Sci., I, 1860, pp. 635, 636, 637.
Stropheodonta cymbiformis Keyes, Geol. Survey Missouri, V, 1895, p. 74.
Loc. Callaway County, Missouri.
Obs. The ten species of *Stropheodonta* described in this transaction by Swallow are all from one locality and appear to be nothing more than peculiar variations of *S. demissa* Conrad. No other locality is known where a species

Stropheodonta navalis Swallow—Continued.

of Brachiopoda has taken on as many variations as has *S. demissa* in the vicinity of Fulton, Missouri. Mr. D. K. Greger has furnished the writer over one hundred examples of this species and no two are exactly alike. Swallow's ten species are here reduced to three and one variety: *S. navalis* and var. *boonensis*, *S. kemperi*, and *S. callawayensis*.

Keyes (Geol. Survey Missouri, V, 1895) regards *S. navalis*, *callawayensis*, *quadrata*, and *aequicostata* as synonyms for *S. demissa*, while *S. cymbiformis*, *subcymbiformis*, *kemperi*, *inflexa*, and *boonensis* are regarded by him as but one species, *S. cymbiformis*. *S. altidorsata* is regarded as "insufficiently described."

Stropheodonta navalis boonensis Swallow. Hamilton (Dev.).

Strophodonta boonensis and *inflexa* Swallow Trans. St. Louis Acad. Sci., 1, 1860, pp. 637, 638.

Loc. Callaway County, Missouri.

Stropheodonta nearpassi Barrett. Coralline limestone (Sil.).

Leptaena—Hall, Pal. New York, II, 1852, pl. 74, fig. 3.

Strophodonta nearpassi Barrett, American Jour. Sci., 3d ser., XV, 1878, p. 372.

Loc. Near Port Jervis, New York.

Stropheodonta parva Owen. Hamilton (Dev.).

Strophodonta parva Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 584, pl. 3A, fig. 9.

Loc. New Buffalo, Iowa.

Obs. This may prove to be young *S. demissa*.

Stropheodonta parva Hall. Upper Helderberg (Dev.).

Strophodonta parva Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 37;—Pal. New York, IV, 1867, p. 85, pl. 11, figs. 5, 11.

Loc. Albany and Schoharie counties, New York.

Stropheodonta patersoni Hall. Oriskany to Corniferous (Dev.).

Strophomena (*Strophodonta*) *patersoni* Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 114, figs. 1-5.

Strophomena ? *patersoni* Billings, Canadian Jour. Sci. Arts, 2d ser., VI, 1861, p. 310, fig. 115.

Strophomena patersoni Billings, Geol. Canada, 1863, p. 367, fig. 374.—Nicholson, Pal. Prov. Ontario, 1873, p. 67.

Strophodonta patersoni Hall, Pal. New York, IV, 1867, p. 89, pl. 12, figs. 9-11; pl. 13, figs. 1-5;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, fig. 15.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 119.

Strophodonta patersoni Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 14, fig. 15.

Loc. Schoharie, Stafford, Williamsville, etc., New York; Columbus, Ohio; Bakeoven, Illinois; Eureka district, Nevada; county of Haldimand, Ontario, Canada.

Stropheodonta perplana (Conrad). Upper Helderberg-Chemung (Dev.).

Strophomena perplana Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 257, pl. 14, fig. 11.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 827, fig. 665.—Billings, Canadian Jour. Sci. Arts, 2d ser., VI, 1861, p. 343;—Proc. Portland Soc. Nat. Hist., 1863, p. 109.—Nicholson, Pal. Prov. Ontario, 1873, p. 64.

Strophomena delthyris Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 258, pl. 14, fig. 19.

Strophomena pluristriata Conrad, Ibidem, 1842, p. 259.

Strophomena crenistria Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 171, fig. 4.

Stropheodonta perplana (Conrad)—Continued.

Strophomena (Strophodonta) erenistria Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 111.

Strophomena (Strophodonta) fragilis Hall, *Ibidem*, 1857, p. 143.

Strophodonta fragilis Hall, Geol. Iowa, I, Pt. II, 1858, p. 496, pl. 3, fig. 6.

Strophodonta perplana Hall, Pal. New York, IV, 1867, pp. 92, 98, pl. 11, fig. 22; pl. 12, figs. 13-15; pl. 17, fig. 1.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 25.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, figs. 2-15.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 120, pl. 13, fig. 11.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 147, pl. 18, fig. 17.—Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 357, pl. 17, fig. 17.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 220.

Stropheodonta (Leptostrophia) perplana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288, pl. 15, figs. 2-13.

Loc. New York; Pennsylvania; Maryland; Ohio; Indiana; Kentucky; Illinois; Iowa; Wisconsin; Eureka district, Nevada; Square Lake, Maine; Ontario and Peace River, Canada; Rio Maccuru and Rio Curua, Province of Para, Brazil.

Stropheodonta perplana nervosa Hall. Portage and Chemung (Dev.).

Strophomena nervosa Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 266, fig. 1.

Strophodonta perplana var. *nervosa* Hall, Pal. New York, IV, 1867, p. 113, pl. 19, figs. 13-16;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, fig. 17.

Stropheodonta perplana var. *nervosa* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, figs. 14, 15, 17.

Loc. Ithaca, Bath, Campbelltown, etc., New York.

Stropheodonta perplana tulliensis Williams. Tully (Dev.).

Strophodonta perplana var. *tulliensis* Williams, Bull. Geol. Soc. America, I, 1890, p. 493, pl. 12, figs. 1-4.

Loc. Cuyler, New York.

Stropheodonta planulata Hall. Lower Helderberg (Dev.).

Strophodonta planulata Hall, Pal. New York, III, 1859, p. 184, pl. 16, figs. 9-12.

Loc. Schoharie, Dryhill, and Litchfield, New York.

Stropheodonta plicata Hall. Hamilton (Dev.).

Strophodonta plicata Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 90;—Pal. New York, IV, 1867, p. 114.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 149.

Loc. Iowa City and Independence, Iowa; Thedford, Ontario; Falls of Ohio.

Stropheodonta prisca Hall. Clinton (Sil.).

Stropheodonta prisca Hall, Pal. New York, II, 1852, p. 63, pl. 21, fig. 9.

Loc. Kirkland, Oneida County, New York.

Stropheodonta profunda Hall. Clinton and Niagara (Sil.).

Leptaena profunda Hall, Pal. New York, II, 1852, p. 61, pl. 21, figs. 4, 5.

Strophomena profunda Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.

Strophomena niagarensis Winchell and Marey, Mem. Boston Soc. Nat. Hist., I, 1865, p. 92, pl. 2, fig. 9.

Strophodonta profunda Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, pp. 369, 392, pl. 13, figs. 3, 4;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 151, pl. 23, figs. 9, 10;—Eleventh Rep. Indiana State Geol., 1882, p. 289, pl. 23, figs. 9, 10; pl. 27, fig. 18;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 41, figs. 1-5 (? figs. 19, 20).—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 148, pl. 29, fig. 26; pl. 17, figs. 20, 21.

Stropheodonta profunda Hall—Continued.

Stropheodonta (*Brachyprion*) *profunda* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 13, figs. 1-5 (? 19, 20); pl. 20, figs. 29-31; Pt. II, 1895, pl. 84, fig. 12.

Loc. Lockport, New York; Waldron, Indiana; Bridgeport, Illinois; Racine, Wisconsin; Louisville, Kentucky.

Stropheodonta textilis Hall.

Coralline (Sil.).

Stropheodonta textilis Hall, Pal. New York, II, 1852, p. 327, pl. 74, fig. 6.

Stropheodonta (*Leptostrophia*) *textilis* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288.

Loc. Schoharie, New York.

Stropheodonta tullia (Billings).

Upper Helderberg (Dev.).

Strophomena tullia Billings, Pal. Fossils, II, 1874, p. 29, pl. 2, fig. 6.

Stropheodonta (*Leptostrophia*) *tullia* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288.

Loc. Mount Joli and Split Rock, Percé, Canada.

Stropheodonta variabilis Calvin.

Chemung (Dev.).

Stropheodonta variabilis Calvin, Bull. U. S. Geol. Geogr. Survey Terr., IV, 1878, p. 727.

Stropheodonta variabilis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 289, pl. 15B, figs. 4-6.

Loc. Independence, Iowa; Naples, New York.

Stropheodonta varistriata (Conrad).

Lower Helderberg (Dev.).

Strophomena varistriata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 255, pl. 14, fig. 6.—Billings, Pal. Fossils, II, 1874, p. 26, pl. 2, fig. 3.

Strophomena rectilateris Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 255, pl. 14, fig. 7.

Strophomena impressa Conrad, Ibidem, 1842, p. 255.

Stropheodonta varistriata Hall, Pal. New York, III, 1859, p. 180, pl. 8, figs. 1-16; pl. 16, figs. 1-8;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 44, figs. 6-16 (? figs. 21, 22).

Stropheodonta (*Brachyprion*) *varistriata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 13, figs. 6-16, 21, 22.

Loc. Albany and Schoharie counties, New York; Dalhousie, New Brunswick, and Gaspé, Canada.

Stropheodonta varistriata arata Hall.

Lower Helderberg (Dev.).

Stropheodonta varistriata var. *arata* Hall, Pal. New York, III, 1859, p. 183, pl. 18, fig. 1;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 44, figs. 17, 18.

Stropheodonta varistriata var. *arata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 13, figs. 17, 18.

Loc. Hudson and Albany counties, New York; Arisaig, Nova Scotia (Ami).

Stropheodonta vascularia Hall.

Oriskany (Dev.).

Stropheodonta vasenlaria Hall, Pal. New York, III, 1859, p. 412, pl. 92, fig. 4; pl. 95, fig. 10 (? pl. 93, fig. 2).

Loc. Albany County, New York.

Stropheodonta (?) ventricosa (Shaler).

Anticosti (Sil.).

Brachyprion ventricosa Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 63.

Loc. Southwest Point, Anticosti.

Stropheodonta æquicostata Swallow = *S. callawayensis*.

Stropheodonta altidorsata Swallow = *S. navalis*.

Stropheodonta ampla Hall = *Strophonella ampla*.

- Strophodonta boonensis* Swallow = *S. navalis boonensis*.
Strophodonta caelata Hall = *Strophonella caelata*.
Strophodonta cavumbona Hall = *Strophonella cavumbona*.
Strophodonta cayuta Hall = *Stropheodonta mucronata*.
Strophodonta cymbiformis Swallow = *S. navalis*.
Strophodonta exilis Calvin = *Stropheodonta calvini*.
Strophodonta fragilis Hall = *S. perplana*.
Strophodonta geniculata Hall = *Strophonella geniculata*.
Strophodonta headleyana Hall = *Strophonella headleyana*.
Strophodonta hybrida Hall and Whitfield = *Strophonella reversa*.
Strophodonta imitata A. Winchell = *S. demissa imitata*.
Strophodonta inflexa Swallow = *S. navalis boonensis*.
Strophodonta intermedia Hall = *Hipparionyx proximus*.
Strophodonta leavenworthana Hall = *Strophonella leavenworthana*.
Strophodonta mucronata Hall = *S. interstitialis*.
Strophodonta nacrea Hall = *Pholidostrophia iowaensis*.
Strophodonta punctulifera Hall = *Strophonella punctulifera*.
Strophodonta quadrata Swallow = *S. callawayensis*.
Strophodonta quadrata Calvin (non Swallow) = *S. calvini*.
Strophodonta reversa Hall = *Strophonella reversa*.
Strophodonta striata Hall = *Strophonella striata*.
Strophodonta subcymbiformis Swallow = *S. navalis*.
Strophodonta subdemissa Hall = *S. demissa*.
Strophodonta textilis Hall, 1857 (not 1852) = *S. junia*.

STROPHOMENA (Rafinesque) Blainville. Genotype *S. rugosa* Blainv.

Strophomena Blainville, Manuel de Malacologie et Conchyliologie, I, 1825, p. 513, pl. 53, fig. 2.—DeFrance, Dictionnaire des Sciences Naturelles, LI, 1827, p. 151 and atlas.—King, Mon. Permian Fossils, Pal. Soc., 1850, p. 103.—Meek (partim), Pal. Ohio, I, 1873, p. 73.—Ehlert, Fischer's Manuel de Conchyliologie, 1887, p. 1281.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 245.—Winchell and Schnebert, Minnesota Geol. Survey, III, 1893, p. 384.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 283.

Strophomenes Rafinesque, Desc. Remarkable Objects in the Cabinet of Professor Rafinesque, 1831, p. 4.

Hemipronites Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl. XIV, 172, 1864, p. 24.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 41.

Obs. This genus is characteristic of the Ordovician, and probably does not extend into the Silurian, where *Orthothetes* replaces *Strophomena*. A number of Silurian species are still left under *Strophomena* since their generic characters are unknown.

- Strophomena acanthoptera* Whiteaves = *Stropheodonta acanthoptera*.
Strophomena acutiradiata Hall = *Chonetes acutiradiatus*.
Strophomena alternata Emmons = *Rafinesquina alternata*.
Strophomena alternata fracta Meek = *Rafinesquina alternata fracta*.
Strophomena alternata loxorhytis Meek = *Rafinesquina alternata loxorhytis*.
Strophomena alternistriata Hall = *Rafinesquina alternata alternistriata*.

- Strophomena (?) alterniradiata** Shaler. Anticosti (Sil.).
Strophomena alterniradiata Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 63.
Loc. Southwest Point, Anticosti.
- Strophomena ampla** Hall=*Strophonella ampla*.
- Strophomena anologa** Davidson, 1863=*Leptaena rhomboidalis*.
- Strophomena angulata** Owen=*Rafinesquina alternata*.
- Strophomena anticostiensis** Shaler=*Rafinesquina alternata*.
- Strophomena (?) antiquata** Sowerby. Anticosti (Sil.).
Strophomena antiquata Sowerby, Murchison's Silurian System, 1839.—Billings,
 Pal. Fossils, I, 1862, p. 129, fig. 107.
Loc. Europe; Anticosti; forks of the Chatts River, Gaspé.
Obs. This identification is doubtful.
- Strophomena approximata** (James). Lorraine (Ord.).
Streptorhynchus approximata James, The Paleontologist, 5, 1881, p. 43; 2, 1878,
 p. 15.
Loc. Dearborn County, Indiana.
Obs. Not defined so as to be recognizable.
- Strophomena arctostriata** Hall=*Orthotheses chemungensis arctostriatus*.
- Strophomena (?) arcuata** Shaler. Anticosti (Sil.).
Strophomena arcuata Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 62.
Loc. Ellis Bay, Anticosti.
- Strophomena (?) arethusa** Billings. Lorraine (Ord.).
Strophomena arethusa Billings, Pal. Fossils, I, 1862, p. 132.
Loc. Observation Cape, Anticosti.
- Strophomena atava** Matthew=*Rafinesquina atava*.
- Strophomena aurora** Billings=*Rafinesquina aurora*.
- Strophomena bifurecata** Hall=*Orthotheses chemungensis*.
- Strophomena billingsi** Winchell and Schuchert. Trenton (Ord.).
Strophomena recta Billings (non Conrad), Pal. Fossils, I, 1862, p. 130, fig. 108.
Strophomena billingsi W. and S., Minnesota Geol. Survey, III, 1893, p. 397, fig.
 32.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 170.
Loc. Ottawa, Canada; St. Paul, Cannon Falls, and Fountain, Minnesota; East
 Selkirk, Manitoba.
- Strophomena (?) bipartita** Hall. Coralline (Sil.).
Leptaena bipartita Hall, Pal. New York, II, 1852, p. 326, pl. 74, figs. 4, 5.
Strophomena bipartita Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.
Loc. Schoharie, New York.
- Strophomena blainvillii** Billings=*Stropheodonta blainvillei*.
- Strophomena camerata** Conrad=*Rafinesquina deltoidea*.
- Strophomena cardinalis** (Whitfield). Lorraine (Ord.).
Streptorhynchus cardinale Whitfield, Geol. Wisconsin, IV, 1882, p. 261, pl. 12,
 figs. 9, 10.
Strophomena cardinale Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 252.
Loc. Delafield, Wisconsin.
- Strophomena carinata** Conrad, 1838=*Tropidoleptus carinatus*.
- Strophomena carinata** Conrad, 1842 (non 1838)=*Chonetes coronatus*.
- Strophomena ceres** Billings=*Rafinesquina ceres*.

Strophomena chemungensis Conrad=*Orthothetes chemungensis*.

Strophomena concava Hall=*Stropheodonta concava*.

Strophomena conradi Hall (1859)=*Strophonella conradi*.

***Strophomena conradi* Hall and Clarke. Trenton (Ord.).**

Strophomena conradi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 344,
pl. 9A, fig. 3; pl. 20, figs. 32, 33.

Loc. Jacksonburg, New York.

Strophomena convexa Owen=*S. incurvata*.

Strophomena cornuta Hall=*Chonetes cornutus*.

Strophomena corrugata Conrad=*Stropheodonta corrugata*.

Strophomena crebristriata Conrad=*Stropheodonta crebristriata*.

Strophomena crenistria Hall=*Stropheodonta perplana*.

***Strophomena* (?) *declivis* James. Lorraine (Ord.).**

Strophomena declivis James, Cincinnati Quart. Jour. Sci., I, 1874, p. 240.

Loc. Boyds Station, Kentucky.

Strophomena deflecta Conrad=*Dinorthis deflecta*.

Strophomena delthyris Conrad=*Stropheodonta perplana*.

Strophomena deltoidea Conrad=*Rafinesquina deltoidea* and *R. minnesotaensis*.

Strophomena demissa Conrad=*Stropheodonta demissa*.

Strophomena depressa Vanuxem=*Leptaena rhomboidalis*.

Strophomena depressa ventricosa Hall=*Leptaena rhomboidalis ventricosa*.

***Strophomena* (?) *doneti* Salter. Silurian.**

Strophomena doneti Salter, Jour. of a Voyage in Baffins Bay and Barrow Straits, 1852.

Loc. Wellington Channel.

Strophomena eîgantula Hall=*Plectambonites transversalis*.

***Strophomena* (?) *elliptica* Conrad. Niagara (Sil.).**

Strophomena elliptica Conrad, Third Ann. Rep. Geol. Survey New York, 1839, p. 64.

Loc. Rochester, New York.

***Strophomena* (?) *elongata* Conrad. Lower Helderberg (Dev.).**

Strophomena elongata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842,
p. 259.

Loc. Schoharie, New York.

***Strophomena emaciata* Winchell and Schuchert. Trenton (Ord.).**

Strophomena emaciata W. and S., American Geol., IX, 1892, p. 287;—Minnesota
Geol. Survey, III, 1893, p. 399, pl. 31, figs. 22-24.

Loc. Near Cannon Falls, Minnesota.

Strophomena euglyphya Conrad, and Roemer=*Strophonella punctulifera*.

Strophomena fasciata Hall=*Rafinesquina fasciata*.

Strophomena filitexta Meek, White, and Hall=*S. neglecta* or *S. incurvata*.

***Strophomenes flexilis* Rafinesque. "Limestone of Ohio."**

Same paper as for *S. levigata*, 1831, p. 4.

Obs. Not defined so as to be recognizable.

- Strophomena fluctuosa** Billings. Lorraine (Ord.).
Strophomena fluctuosa Billings, Canadian Nat. Geol., V, 1860, p. 57, fig. 6;—Pal. Fossils, I, 1862, p. 123, fig. 102;—Geol. Canada, 1863, p. 209, fig. 207.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 11A, figs. 4, 5.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 395, pl. 31, figs. 14–17.
Loc. Charletoir Point, Anticosti; Spring Valley, etc., Minnesota.
- Strophomena fontinalis** White=*Dinorthis fontinalis*.
Strophomena fragilis Hall=*Stropheodonta perplana*.
Strophomena galatea Billings=*Stropheodonta galatea*.
Strophomena gibbosa James=*Leptaena rhomboidalis*.
- Strophomena (?) gibbosa** Conrad. Upper Helderberg (Dev.).
Strophomena gibbosa Conrad, Fifth Ann. Rep. Geol. Survey New York, 1841, p. 54.
Loc. Helderberg Mountains, New York.
- Strophomena gilpeni** Dawson=*Stropheodonta gilpeni*.
Strophomena halli Sardeson=*Leptaena charlottæ*.
- Strophomena hallie** Miller. Utica (Ord.).
Streptorhynchus (?) hallie Miller, Cincinnati Quart. Jour. Sci., I, 1874, p. 148, figs. 14–16.
Streptorhynchus hallanum Miller, North American Geol. and Pal., 1889, p. 378.
Strophomena hallie Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 252.
Loc. Cincinnati, Ohio.
- Strophomena hanoverensis** Foerste=*Strophonella striata*.
- Strophomena hecuba** Billings. Lorraine (Ord.).
Strophomena hecuba Billings, Canadian Nat. Geol., V, 1860, p. 60, fig. 7;—Pal. Fossils, I, 1862, p. 126, fig. 104;—Geol. Canada, 1863, p. 209, fig. 206.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 252.
Loc. Anticosti.
- Strophomena hemispherica** Hall=*Stropheodonta hemispherica*.
- Strophomena (?) imbecilis** Billings. ?Calciferosus (Ord.).
Strophomena imbecilis Billings, Pal. Fossils, I, 1865, p. 219.
Loc. Near Portland Creek, Newfoundland.
- Strophomena imbrex** Billings=*Rafinesquina imbrex*.
Strophomena impressa Conrad=*Stropheodonta varistriata*.
Strophomena inaequiradiata Hall=*Stropheodonta inaequiradiata*.
Strophomena incrassata=*Rafinesquina incrassata* and *R. minnesotaensis*.
- Strophomena incurvata** (Shepard). Trenton (Ord.).
Producta incurvata Shepard, American Jour. Sci., XXXIV, 1838, p. 144, figs. 1, 2.
Orthis incurvata Castelnaud, Essai sur le Système Silurien de l'Amérique Septentrionale, 1843, p. 38.
Strophomena convexa Owen, Geol. Expl. Iowa, Wisconsin, and Illinois, 1844, p. 70, pl. XVII, fig. 2.
Leptaena filitexta Hall, Pal. New York, I, 1847, p. 111, pl. 31B, fig. 3.
Strophomena filitexta Billings, Canadian Nat. Geol., I, 1856, p. 203, figs. 1, 2.—Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 70.—Billings, Geol. Canada, 1863, p. 164, fig. 142.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 9, figs. 1–7; pl. 9A, figs. 11–14 (non figs. 10, 15=*S. neglecta*).
Streptorhynchus filitexta Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, figs. 1–7; pl. 42, figs. 11–14 (non figs. 10, 15=*S. neglecta*).

Strophomena incurvata (Shepard)—Continued.

Strophomena incurvata Winchell and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 385, pl. 30, figs. 36-40.—Whiteaves, *Pal. Foss.*, III, Pt. III, 1897, p. 167.
Loc. New York; Kentucky; Tennessee; Missouri; Wisconsin; Iowa; Minnesota; Manitoba; Canada.

Strophomena iniquassa Sardeson = *Rafinesquina minnesotaensis iniquassa*.

Strophomena interstitialis Hall = *Stropheodonta mucronata*.

Strophomena interstitialis Vanuxem, and Hall = *Stropheodonta interstitialis*.

Strophomena irene Billings = *Stropheodonta irene*.

Strophomena ithacensis Vanuxem = *Atrypa reticularis*.

Strophomena (?) julia Billings. Anticosti (Sil.).

Strophomena julia Billings, *Pal. Fossils*, I, 1862, p. 127, fig. 105.

Leptaena julia Shaler, *Bull. Mus. Comp. Zool.*, 4, 1865, p. 65.

Loc. Anticosti.

Strophomena kingi Whitfield = *Rafinesquina kingi*.

Strophomena lævis Emmons. Birdseye (Ord.).

Strophomena laevis Emmons, *Geol. New York*; *Rep. Second Dist.*, 1842, p. 385, fig. 972.

Loc. Great Bend, Jefferson County, New York.

Strophomena lachrymosa Conrad = *Productella lachrymosa*.

Strophomena leda Billings = *Stropheodonta leda*.

Strophomena lepida Hall = *Pholidostrophia iowaensis*.

Strophomenes levigata Rafinesque. "Kentucky limestone."

Enumeration and Account of Some Remarkable Natural Objects in the Cabinet of Professor Rafinesque, 1831, p. 4.

Obs. Not defined so as to be recognizable.

Strophomena lima Conrad = *Productella lachrymosa lima*.

Strophomena lineata Conrad = *Chonetes lineatus*.

Strophomena macra Winchell and Marcy = *Stropheodonta macra*.

Strophomena magna Billings = *Stropheodonta magna*.

Strophomena magniventra Billings = *Stropheodonta magniventer*.

Strophomena membranacea Vanuxem = *Productella hirsuta*.

Strophomena minnesotensis Winchell = *Rafinesquina minnesotaensis*.

Strophomena (?) minor (Walcott). Pogonip (Ord.).

Streptorhynchus minor Walcott, *Mon. U. S. Geol. Survey*, VIII, 1884, p. 75, pl. 11, fig. 9.

Loc. Eureka district, Nevada.

Strophomena (?) modesta Conrad. ? Clinton (Sil.).

Strophomena modesta Conrad, *Third Ann. Rep. N. Y. Geol. Survey*, 1839, p. 64.
Loc. Rochester, New York.

Obs. Compare with *Plectambonites sericea* and *P. elegantula*.

Strophomena mucronata Hall (non Conrad) = *Chonetes mucronatus*.

Strophomena mucronata Conrad (non Hall) = *Stropheodonta mucronata*.

Strophomena nacreata Hall = *Pholidostrophia iowaensis*.

Strophomena (?) nassula Conrad. Carboniferous.

Strophomena nassula Conrad, *Proc. Acad. Nat. Sci. Philadelphia*, III, 1846, p. 23.

Loc. Jersey Shore, Lycoming County, Pennsylvania.

Strophomena nasuta Conrad=*Rafinesquina alternata nasuta*.

Strophomena neglecta (James).

Lorraine (Ord.).

Strophomena filitexta Meek (non Hall), Pal. Ohio, I, 1873, p. 83, pl. 6, fig. 5.

?*Strophomena filitexta* White, U. S. Geol. and Geogr. Survey west 100th Merid., IV, 1875, p. 69, pl. 4, fig. 8.

Hemipronites filitextus Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 43.

Streptorhynchus neglecta James, The Paleontologist, 5, 1881, p. 41.

Streptorhynchus filitextus (partim) Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 42, figs. 10, 15 (non figs. 11-14); pl. 39, figs. 1-7.

Strophomena filitexta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 9A, figs. 10, 15 (non figs. 11-14); pl. 11A, fig. 3.

Strophomena neglecta Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 388.

Loc. Oxford, Clarksville, Waynesville, etc., Ohio; Richmond, Versailles, etc., Indiana; Savanna, Illinois; ? Silver City, New Mexico.

Strophomena neglecta acuta Winchell and Schuchert. Lorraine (Ord.).

Strophomena neglecta var. *acuta* W. and S., Minnesota Geol. Survey, III, 1893, p. 388, pl. 31, figs. 6, 7.

Loc. Spring Valley, Minnesota.

Strophomena ? *nemea* Hall and Whitfield=*Dalmanella pogonipensis*.

Strophomena nervosa Hall=*Stropheodonta perplana nervosa*.

Strophomena niagarensis Winchell and Marcy=*Stropheodonta profunda*.

Strophomena nitens Billings=*Rafinesquina nitens*.

Strophomena nutans Meek.

Lorraine (Ord.).

Strophomena (*Hemipronites*) *nutans* (James) Meek, Pal. Ohio, I, 1873, p. 77, pl. 6, fig. 1.

Hemipronites nutans Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 46.

Streptorhynchus nutans Miller, N. American Geol. Pal., 1889, p. 378.

Strophomena nutans Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 8, fig. 11; pl. 9A, figs. 5-7; pl. 11A, figs. 6, 7.

Loc. Oxford, Clarksville, etc., Ohio; Richmond, Versailles, etc., Indiana.

Strophomena obscura Hall=*Rafinesquina obscura*.

Strophomena (?) orthididea Hall.

Clinton (Sil.).

Leptæna orthididea Hall, Pal. New York, II, 1852, p. 62, pl. 21, fig. 7.

Strophomena orthididea Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.

Loc. Kirkland, Oneida County, New York.

Strophomena patenta Hall=*Strophonella patenta*.

Strophomena patersoni Hall=*Stropheodonta patersoni*.

Strophomena pecten Roemer, and Billings=*Orthothetes subplanus*.

Strophomena pectinacea Hall=*Orthothetes chemungensis*.

Strophomena perplana Conrad=*Stropheodonta perplana*.

Strophomena philomela Billings.

Anticosti (Sil.).

Strophomena philomela Billings, Canadian Nat. Geol., V, 1860, p. 56, figs. 4, 5;—Pal. Fossils, I, 1862, p. 122, figs. 100, 101;—Geol. Canada, 1863, p. 311, fig. 317.

Loc. Anticosti.

Strophomena planiconvexa Hall.

Lorraine (Ord.).

Leptæna planoconvexa Hall, Pal. New York, I, 1847, p. 114, pl. 31B, fig. 7.

Strophomena planiconvexa Hall—Continued.

Strophomena planiconvexa Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 70.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 9, figs. 19, 20.

Strophomena (*Hemipronites*) *planiconvexa* Meek, Pal. Ohio, I, 1873, p. 82, pl. 6, fig. 2.

Hemipronites planiconvexa Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 48.

Streptorhynchus planiconvexus Miller, American Pal. Fossils, 1877, p. 134.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, figs. 19, 20.

Loc. Cincinnati, Ohio.

Strophomena planidorsata Winchell and Schuchert. Lorraine (Ord.).

Strophomena planidorsata W. and S., American Geol., IX, 1892, p. 286;—Minnesota Geol. Survey, III, 1893, p. 393, pl. 31, figs. 8–10.

Loc. Spring Valley, Minnesota; Iron Ridge, Wisconsin; Wilmington, Illinois.

Strophomena planumbona Hall=*S. rugosa*.**Strophomena plicata** Meek=*S. rugosa* subtenta.**Strophomena plicifera** Hall=*Dalmanella plicifera*.**Strophomena pleuristriata** Conrad=*Stropheodonta perplana*.**Strophomena profunda** Hall=*Stropheodonta profunda*.**Strophomena punctulifera** Vanuxem=*Strophonella punctulifera*.**Strophomena pustulosa** Hall (non Phillips)=*Strophalosia truncata*.**Strophomena radiata** Vanuxem=*Strophonella radiata*.**Strophomena recta** Conrad=*Dinorthis deflecta*.**Strophomena recta** Billings=*S. billingsi*.**Strophomena rectilateraria** Meek and Worthen=*Strophonella cavumbona*.**Strophomena rectilateris** Conrad=*Stropheodonta varistriata*.**Strophomena** (?) **reticulata** Shaler. Niagara (Sil.).

Strophomena reticulata Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 62.

Loc. Anticosti.

Strophomena rhomboidalis=*Leptaena rhomboidalis*.**Strophomena rugosa** Hall (non Blainville)=*Leptaena rhomboidalis*.**Strophomena rugosa** (Rafinesque MS.) Blainville. Lorraine (Ord.).

Strophomena rugosa (Rafinesque) Blainville, Malacologie et Conchyliologie, I, 1825, p. 513, pl. 53, figs. 2, 2a.—King, Mon. Permian Fossils, Pal. Soc., 1850, p. 103.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 247, figs. 13, 14.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 390, pl. 31, figs. 4, 5.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 168.

Strophomenes rugosa DeFrance, Dictionnaire des Sciences Naturelles, I, 1827, p. 151 and atlas.

Leptaena planumbona Hall, Pal. New York, I, 1847, p. 112, pl. 31, fig. 4.

Leptaena (n. sp.?) Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 2B, fig. 21. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17876.]

Strophomena planumbona Hall, Geol. Wisconsin, I, 1862, p. 54, fig. 7.—White, Second Ann. Rep. Indiana Bureau Statistics and Geol., 1880, p. 483, pl. 2, figs. 13, 14;—Tenth Rep. Indiana State Geol., 1881, p. 115, pl. 2, figs. 13, 14.—Shaler (partim), Mem. Kentucky Geol. Survey, 1887, p. 13, pls. 4, 5.—Keyes, Geol. Survey Missouri, V, 1895, p. 73.

Strophomena (*Hemipronites*) *planumbona* Meek, Pal. Ohio, I, 1873, p. 79, pl. 6, fig. 3.

Strophomena rugosa (Rafinesque MS.) Blainville—Continued.

Streptorhynchus (*Strophomena*) *elongata* James, *Cincinnati Quart. Jour. Sci.*, I, 1874, p. 240.

Hemipronites planumbona Miller, *Cincinnati Quart. Jour. Sci.*, II, 1875, p. 45.

Streptorhynchus planumbonus Miller, *American Pal. Fossils*, 1877, p. 134.

Streptorhynchus elongata Mickelborough and Wetherby, *Jour. Cincinnati Soc. Nat. Hist.*, I, 1878, p. 76.

Streptorhynchus planumbona Hall, *Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 39, figs. 15-17; pl. 42, figs. 8, 9.

Strophomena planumbona or *rugosa* Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 251, pl. 9, figs. 15-17; pl. 9A, figs. 8, 9.

Loc. Ohio; Indiana; Kentucky; Missouri; Minnesota and Anticosti. Lower Fort Garry, Manitoba. Probably also at Lattners, Iowa, and Ironridge, Wisconsin.

Strophomena rugosa subtenta (Hall). Lorraine (Ord.).

Strophomena subtenta Conrad, *Fifth Ann. Rep. N. Y. Geol. Survey*, 1841, p. 37 (undefined).—Billings, *Pal. Fossils*, I, 1862, p. 132, fig. 109 on p. 130.

Leptæna subtenta Hall, *Pal. New York*, I, 1847, p. 115, pl. 31B, fig. 9.

Strophomena (*Hemipronites*) *plicata* (James) Meek, *Pal. Ohio*, I, 1873, p. 81, pl. 6, fig. 4.

Hemipronites subtenta Miller, *Cincinnati Quart. Jour. Sci.*, II, 1875, p. 46.

Strophomena rugosa var. *subtenta* Winchell and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 393.—Whiteaves, *Pal. Foss.*, III, Pt. III, 1897, p. 169.

Loc. The same as for *S. rugosa*.

Strophomena rugosa ventricosa H.=*Leptæna rhomboidalis ventricosa*.**Strophomena scofieldi** Winchell and Schuchert. Trenton (Ord.).

Strophomena scofieldi W. and S., *American Geol.*, IX, April, 1892, p. 286;—*Minnesota Geol. Survey*, III, 1893, p. 398, pl. 31, figs. 18-21.

Streptorhynchus subsulcatum Sardeson, *Bull. Minnesota Acad. Nat. Sci.*, III, April 9, 1892, p. 335, pl. 4, fig. 39.

Loc. Cannon Falls, Minneapolis, and St. Paul, Minnesota; Beloit, Wisconsin.

Strophomena semifasciata Hall=*Strophonella semifasciata*.**Strophomena semiovalis** Conrad (non Shaler)=*Plectambonites sericeus*.**Strophomena (?) semiovalis** Shaler. Anticosti (Sil.).

Strophomena semiovalis Shaler, *Bull. Mus. Comp. Zool.*, 4, 1865, p. 61.

Loc. Anticosti.

Strophomena septata Winchell and Schuchert. Trenton (Ord.).

Strophomena septata W. and S., *American Geol.*, IX, 1892, p. 285;—*Minnesota Geol. Survey*, III, 1893, p. 390, pl. 30, figs. 1-3.

Loc. St. Paul, Minneapolis, and Rochester, Minnesota.

Strophomena sericea=*Plectambonites sericeus*.**Strophomena setigera** Hall=*Chonetes setigerus*.**Strophomena (?) siluriana** Davidson. Silurian.

Strophomena siluriana Davidson, *British Sil. Braeh.*, *Pal. Soc.*, 1871, p. 303, pl. 47, figs. 1-4.—Etheridge, *Quart. Jour. Geol. Soc. London*, XXXIV, 1878, p. 597.

Loc. England; Cape Leidy, lat. 79° 38'.

Strophomena sinuata Emmons (non Meek)=*S. sulcata*.**Strophomena sinuata** Meek. Lorraine (Ord.).

Strophomena (*Hemipronites*) *sinuata* (James) Meek, *Pal. Ohio*, I, 1873, p. 87, pl. 5, fig. 5 (non *S. sinuata* Emmons, 1855).

Hemipronites sinuata Miller, *Cincinnati Quart. Jour. Sci.*, II, 1875, p. 50.

Strophomena sinuata Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 251.

Loc. Cincinnati, Ohio.

Strophomena squamula James=*Rafinesquina squamula*.

Strophomena striata Hall=*Strophonella striata*.

Strophomena subplana Conrad=*Orthotheses subplanus*.

Strophomena subtenta Conrad=*S. rugosa subtenta*.

***Strophomena sulcata* (Verneuil). Lorraine (Ord.).**

Leptaena sulcata Verneuil, Bull. Geol. Soc. France, 2d ser., V, 1848, p. 350.

Strophomena sinuata Emmons, American Geol., I, 1855, p. 199, fig. 61.

Strophomena (*Hemipronites?*) *sulcata* Meek, Pal. Ohio, I, 1873, p. 85, pl. 5, fig. 4.

Hemipronites sulcata Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 48, fig. 5.

Streptorhynchus sulcatus Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, figs. 8, 9.

Strophomena sulcata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 9, figs. 8, 9; pl. 11A, fig. 8.

Loc. Oxford, Clarksville, etc., Ohio; Richmond, Indiana.

***Strophomena syrtales* Conrad=*Chonetes coronatus*.**

***Strophomena* (?) *talacastrensis* Kayser. Ordovician.**

Strophomena talacastrensis Kayser, Palaeontographica, Suppl., III, 1876, p. 20, pl. 3, fig. 20.

Loc. Talacastra, Cordillera San Juan, Argentine Republic.

***Strophomena tenuilineata* Conrad=*Rafinesquina tenuilineata*.**

***Strophomena tenuistriata*=*Leptaena rhomboidalis*.**

***Strophomena textilis* Hall=*Stropheodonta junia*.**

***Strophomena thalia* Billings. Trenton (Ord.).**

Strophomena thalia Billings, Canadian Nat. Geol., V, 1860, p. 59;—Pal. Fossils, I, 1862, p. 125, fig. 103;—Geol. Canada, 1863, p. 164, fig. 143.—Hall and

Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251.

Loc. Ottawa, Canada.

***Strophomena transversalis* Hall=*Plectambonites transversalis*.**

***Strophomena trentonensis* Winchell and Schuchert. Trenton (Ord.).**

Leptaena subtenta (partim) Hall, Pal. New York, I, 1847, p. 115.

Streptorhynchus subtenta Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, fig. 18.

Strophomena subtenta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 9, fig. 18.

Strophomena trentonensis W. and S., Minnesota Geol. Survey, III, 1893, p. 389, pl. 30, fig. 41.

Loc. Cannon Falls, Minneapolis, and Fountain, Minnesota; Janesville and Beloit, Wisconsin; Frankfort, Kentucky; Nashville, Tennessee; Trenton Falls, New York.

***Strophomena trilobata* (Owen). Trenton (Ord.).**

Leptaena trilobata Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, p. 584, pl. 2, figs. 17, 18. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17875.]

Strophomena trilobata Miller, American Pal. Fossils, 1877, p. 138.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 395, pl. 31, figs. 12, 13.—Whiteaves, Pal. Foss., III, Pt. III, 1897, pp. 169, 241.

Loc. Turkey River, Iowa; Goodhue County, Minnesota; Lake Winnipeg, Manitoba.

***Strophomena tullia* Billings=*Stropheodonta tullia*.**

***Strophomena ulrichi* James=*Rafinesquina ulrichi*.**

***Strophomena unicostata* Meek and Worthen=*Rafinesquina unicostata*.**

Strophomena undulatus Vanuxem=*Leptæna rhomboidalis*.

Strophomena undulosa Conrad=*Leptæna undulosa*.

Strophomena varistriata Conrad=*Stropheodonta varistriata*.

***Strophomena vetusta* James.** Lorraine (Ord.).

Streptorhynchus (*Strophomena*) *vetusta* James, *Cincinnati Quart. Jour. Sci.*, I, 1874, p. 241.

Streptorhynchus vetusta Mickelborough and Wetherby, *Jour. Cincinnati Soc. Nat. Hist.*, I, 1878, p. 76.—James, *The Paleontologist*, 2, 1878, p. 15.

Loc. Upper part of Cincinnati group in Ohio and Indiana.

***Strophomena winchelli* Hall and Clarke.** Trenton (Ord.).

Streptorhynchus (*Strophonella*?) *deltoidea* Hall (non *Leptæna deltoidea* 1847), *Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 39, figs. 10, 12-14 (non fig. 11=*S. nutans*).

Strophomena winchelli Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 344, pl. 9, figs. 10, 12-14; pl. 20, fig. 26.—Winchell and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 394, pl. 31, fig. 11.

Loc. Janesville, Clifton, and Oshkosh, Wisconsin.

***Strophomena wisconsinensis* Whitfield.** Lorraine (Ord.).

Strophomena wisconsinensis Whitfield, *Geol. Wisconsin*, IV, 1882, p. 263, pl. 12, figs. 11-13.

Strophomena wisconsinensis Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 251, pl. 11A, figs. 1, 2.

Loc. Delafield, Wisconsin.

Strophomena woolworthana Hall=*Orthothetes woolworthana*.

STROPHONELLA Hall. Genotype *Strophomena semifasciata* Hall.

Strophonella Hall, *Twenty-eighth Rep. N. Y. State Mus. Nat. Hist.*, 1879, p. 153;—*Eleventh Rep. Indiana State Geologist*, 1882, p. 291.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 290;—*Eleventh Ann. Rep. N. Y. State Geologist*, 1894, p. 282.

***Strophonella ampla* Hall.** Upper Helderberg (Dev.).

Strophomena (*Strophodonta*) *ampla* Hall, *Tenth Rep. N. Y. State Cab. Nat. Hist.*, 1857, p. 111, figs. 1, 2.

Strophomena ampla Billings, *Canadian Jour. Sci. Arts*, VI, 1861, p. 345, figs. 119, 120;—*Geol. Canada*, 1863, p. 367, figs. 376, 378.

Strophodonta ampla Hall, *Pal. New York*, IV, 1867, p. 93, pl. 14, fig. 1.

Strophonella ampla Hall, *Twenty-eighth Rep. N. Y. State Mus. Nat. Hist.*, 1879, p. 154;—*Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 43, figs. 13-15.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 293, pl. 12, figs. 13-15.

Loc. Albany and Schoharie counties, Cherry Valley, Williamsville, etc., New York; Columbus, Ohio; Ontario, Canada.

Obs. Compare with *S. schohariensis* (Castelman).

***Strophonella cælata* Hall.** Chemung (Dev.).

Strophodonta cælata Hall, *Pal. New York*, IV, 1867, p. 112, pl. 19, figs. 6, 7.

Strophonella cælata Hall, *Twenty-eighth Rep. N. Y. State Mus. Nat. Hist.*, 1879, p. 154;—*Second Ann. Rep. N. Y. State Geol.*, 1883, pl. 43, fig. 21.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 293, pl. 12, fig. 21; pl. 15B, fig. 10.

Loc. Near Elmira, New York.

***Strophonella cavumbona* Hall.** Lower Helderberg (Dev.).

Strophodonta cavumbona Hall, *Tenth Rep. N. Y. State Cab. Nat. Hist.*, 1857, p. 51;—*Pal. New York*, III, 1859, p. 187, pl. 21, figs. 1-3.

Strophomena (*Strophodonta*) *cavumbona* Meek and Worthen, *Geol. Surv. Illinois*, III, 1868, p. 374, pl. 7, fig. 10.

Strophonella cavumbona Hall—Continued.

Strophomena rectilateraria Meek and Worthen, *Ibidem*, 1868, p. 375.

Strophonella cavumbona Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 291, 292.

Loc. Schoharie, Hudson, and Catskill, New York; Perry County, Missouri.

Obs. Probably synonymous with *S. punctulifera*.

Strophonella costatula Hall and Clarke.

Niagara (Sil.).

Strophonella costatula Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, p. 359, pl. 81, figs. 15, 16.

Loc. Louisville, Kentucky.

Strophonella (?) conradi Hall.

Lower Helderberg (Dev.).

Strophomena conradi Hall, *Pal. New York*, III, 1859, p. 194, pl. 16, figs. 13, 14.

Strophonella? *conradi* Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 292.

Loc. Schoharie, New York.

Strophonella crassa Rowley.

Hamilton (Dev.).

Strophonella crassa Rowley, *American Geologist*, XIII, 1894, p. 153, figs. 4-6.

Loc. Callaway County, Missouri.

Strophonella geniculata (Hall).

Lower Helderberg (Dev.).

Strophodonta geniculata Hall, *Pal. New York*, III, 1859, p. 483, pl. 23, fig. 6.

Loc. Cumberland, Maryland.

Strophonella headleyana Hall.

Lower Helderberg (Dev.).

Strophomena (Strophodonta) headleyana Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 49, figs. 1, 2.

Strophodonta headleyana Hall, *Pal. New York*, III, 1859, p. 185, pl. 20, figs. 1-3.—Meek, *American Jour. Sci.*, 2d ser., XL, 1865, p. 33.

Strophonella headleyana Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 292.

Loc. Schoharie, Hudson, etc., New York; Kennedy Channel and Cape Frazire, Arctic regions.

Strophonella leavenworthana Hall.

Lower Helderberg (Dev.).

Strophomena (Strophodonta) leavenworthana Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 53.

Strophodonta leavenworthana Hall, *Pal. New York*, III, 1859, p. 189, pl. 21, figs. 5-7; pl. 23, figs. 1-3.

Strophonella leavenworthana Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 154;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 43, figs. 6-9.—

Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 292, pl. 12, figs. 6-9.

Loc. Albany and Schoharie counties, New York.

Strophonella (?) patenta Hall.

Clinton (Sil.).

Leptæna patenta Hall, *Pal. New York*, II, 1852, p. 60, pl. 21, fig. 3.—Rogers, *Geol. Pennsylvania*, II, Pt. II, 1858, p. 823, fig. 631.

Strophomena patenta Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.—Hall and Whitfield, *Pal. Ohio*, II, 1875, p. 115, pl. 5, fig. 10.—Foerste, *Bull. Denison Univ.*, II, 1887, p. 105, pl. 8, figs. 34-37;—*Proc. Boston Soc. Nat. Hist.*, XXIV, 1890, p. 300, pl. 5, fig. 22.

Streptorhynchus patenta Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 42, figs. 16-18.

Strophomena ? (Strophonella?) patenta Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pp. 291, 292, pl. 9A, figs. 16-18.

Strophomena (Strophonella) patenta Foerste, *Geol. Ohio*, VII, 1895, p. 569, pl. 27, figs. 35-37.

Loc. Reynales Basin, Medina, etc., New York; Dayton, Ohio; Hanover, Indiana; Collinsville, Alabama.

- Strophonella punctulifera** (Conrad). Lower Helderberg (Dev.).
Leptaena punctulifera Conrad, Second Rep. N. Y. Geol. Survey, 1838, pp. 112, 117.
Strophomena euglypha Conrad, Fifth Rep. N. Y. Geol. Survey, 1841, p. 36.—
 Roemer, Sil. Fauna d. West. Tennessee, 1860, p. 66, pl. 5, fig. 3.—Etheridge,
 Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 597.
Strophomena punctulifera Vanuxem, Geol. N. Y.; Rep. Third. Dist., 1842, p. 122,
 fig. 5.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 825, fig. 648.—Billings,
 Proc. Portland Soc. Nat. Hist., 1863, p. 108, pl. 3, fig. 2;—Geol. Canada, 1863,
 p. 957, fig. 448;—Pal. Fossils, II, 1874, p. 31, pl. 3, fig. 2.
Strophomena (Strophodonta) *punctulifera* Hall, Tenth Rep. N. Y. State Cab. Nat.
 Hist., 1857, p. 50, fig. 1.
Strophodonta punctulifera Hall, Pal. New York, III, 1859, p. 188, pl. 21, fig. 4; pl.
 23, figs. 4-7.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 121, pl. 13, fig. 10.
Strophonella punctulifera Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist.,
 1879, p. 154;—Second. Ann. Rep. N. Y. State Geol., 1883, pl. 43, figs. 10-12.—Hall
 and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292, pl. 12, figs. 10-12.
Loc. Albany and Schoharie counties, New York; Square Lake, Maine; Pennsyl-
 vania; Decatur County, Tennessee; Dalhousie, New Brunswick, and Gaspé,
 Canada; Eureka district, Nevada; Cape Hilgard and Cape Louis Napoleon,
 Arctic regions.
Obs. See *S. cavumbona* Hall.
- Strophonella (?) radiata** (Vanuxem). Lower Helderberg (Dev.).
Strophomena radiata Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 122, fig.
 6.—Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 50, fig. 1;—Pal.
 New York, III, 1859, p. 193, pl. 21, figs. 8, 9; pl. 18, fig. 3.
Streptorhynchus radiatus Miller, American Pal. Fossils, 1877, p. 134.
Strophonella radiata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292.
Loc. Hudson, Albany, and Schoharie counties, New York.
- Strophonella reversa** Hall. Chemung (Dev.).
Strophodonta reversa Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 494, pl. 3, fig. 4.
Strophodonta hybrida Hall and Whitfield, Twenty-third Rep. N. Y. State Cab.
 Nat. Hist., 1873, p. 239.
Strophonella reversa Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879,
 p. 154.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 293, pl. 12, figs.
 16-20.
Strophonella? (Strophodonta) *reversa* Hall, Second Ann. Rep. N. Y. State Geol.,
 1883, pl. 43, figs. 16-20.
Loc. Rockford, Iowa; Naples, New York.
- Strophonella schohariensis** (Castelnau). ? Upper Helderberg (Dev.).
Orthis schohariensis Castelnau Essai Syst. Sil. l'Amérique Septentrionale, 1843,
 p. 36, pl. 14, fig. 5.
Loc. Schoharie, New York.
Obs. Compare with *S. ampla*.
- Strophonella semifasciata** Hall. Niagara (Sil.).
Strophomena (Strophodonta?) *semifasciata* Hall, Trans. Albany Inst., IV, 1863,
 p. 210.
Strophonella semifasciata Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist.,
 1879, p. 154, pl. 22, figs. 1-3; pl. 23, figs. 7, 8;—Eleventh Rep. Indiana State
 Geol., 1882, p. 292, pl. 22, figs. 1-3; pl. 23, figs. 7, 8;—Second Ann. Rep. N. Y.
 State Geol., 1883, pl. 43, figs. 4, 5.—Hall and Clarke, Pal. New York, VIII, Pt.
 I, 1892, pl. 12, figs. 4, 5.
Loc. Waldron, Indiana; Wisconsin.

Strophonella striata Hall.

Niagara (Sil.).

Strophomena striata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 104, fig. 3;—
Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.

Strophodonta striata Hall, Twenty-eighth Rep., Ibidem, 1879, p. 152, pl. 23, figs. 1-6;—Eleventh Rep. Indiana State Geol., 1882, p. 290, pl. 23, figs. 1-6.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 149.

Leptaena striata Hall, Pal. New York, II, 1852, p. 259, pl. 53, fig. 7.

Strophodonta (*Strophonella*?) *striata* Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 43, figs. 1-3.

Strophonella striata Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 25, pl. 3, figs. 1-8.

Strophomena hanoverensis Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 301, pl. 6, fig. 1.

Strophonella (*Amphistrophia*) *striata* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292, pl. 12, figs. 1-3.

Strophomena (*Orthothetes*) *hanoverensis* Foerste, Geol. Ohio, VII, 1895, p. 567, pl. 27, fig. 34; pl. 31, fig. 1.

Loc. Lockport, New York; Waldron and Hanover, Indiana; Louisville, Kentucky.

Syntrielasma Meek and Worthen = *Enteletes*.

SYNTROPHIA Hall and Clarke. Genotype *Triplexia lateralis* Whitfield.

Syntrophia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270;—Ibidem, Pt. II, 1893, p. 216;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 836.

Syntrophia arachne (Billings).

Upper Cambrian.

Stricklandia? *arachne* Billings, Pal. Fossils, I, 1862, p. 85, fig. 77.

Syntrophia arachne Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 216.

Loc. Point Levis, Canada.

Syntrophia arethusa (Billings).

Upper Cambrian.

Stricklandia? *arethusa* Billings, Pal. Fossils, I, 1862, p. 85, fig. 78.

Syntrophia arethusa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 216.

Loc. Point Levis, Canada.

Syntrophia (?) **armanda** (Billings).

Upper Cambrian.

Orthis? *armanda* Billings, Pal. Fossils, I, 1865, p. 303, fig. 293.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.

Loc. Phillipsburg, Canada.

Obs. This species may prove to be a *Billingsella*. In the interior of the ventral valve "the dental plates seem to form an imperfect triangular chamber" (Billings). If there is present a true spondylium and the foramen is "apparently open" *O. armanda* will prove to be more nearly related to *Syntrophia* than to any other genus. If, however, there is present only an imperfect triangular chamber and the foramen closed by a deltidium, then the species is probably a *Billingsella*.

Syntrophia barabuensis (A. Winchell).

Upper Cambrian.

Orthis barabuensis A. Winchell, American Jour. Sci., 2d ser., XXXVII, 1864, p. 228.

Leptaena barabuensis Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 60;—

Geol. Wisconsin, IV, 1882, pp. 171, 195, pl. I, figs. 6, 7; pl. 3, fig. 6.

Syntrophia barabuensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 216.

Loc. Near Baraboo, Wisconsin.

Syntrophia calcifera (Billings).

Upper Cambrian.

Camarella calcifera Billings, Canadian Nat. Geol., VI, 1861, p. 318, fig. 3;—Geol. Canada, 1863, p. 231, fig. 247;—Pal. Fossils, I, 1865, p. 220.—Meek, Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 464.

Syntrophia calcifera (Billings)—Continued.

Triplesia calcifera Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 75, pl. II, figs. 7, 8.

Triplecia? *calcifera* Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270.

Syntrophia (?) *calcifera* Hall and Clarke, *Ibidem*, VIII, Pt. II, 1893, p. 218, pl. 62, fig. 24.

Loc. Point Levis and Phillipsburg, Canada; Cow Head, Newfoundland; near Malade City, Utah; Eureka district, Nevada; Carter County, Missouri (Keyes).

Syntrophia lateralis (Whitfield).

Calciferous (Ord.).

Triplesia lateralis Whitfield, Bull. American Mus. Nat. Hist., 1886, p. 303, pl. 24, figs. 9-11.

Syntrophia lateralis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270;—*Ibidem*, VIII, Pt. II, 1893, p. 216, pl. 62, figs. 1-10.

Loc. Fort Cassin, Vermont.

Syntrophia primordialis (Whitfield).

Upper Cambrian.

Triplesia primordialis Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 51;—Geol. Wisconsin, IV, 1882, p. 172, pl. 10, figs. 1, 2.

Triplecia primordialis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 271.

Syntrophia primordialis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 218.

Loc. Adams County, Wisconsin.

SYRINGOTHYRIS A. Winchell.Genotype *Spirifer carteri* Hall.

Syringothyris A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 6.—Meek, *Ibidem*, 1865, p. 275;—Pal. Ohio, II, 1875, p. 288.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 90.—Herrick, Bull. Denison Univ., IV, 1888, p. 14.—Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 28.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 47;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 760.

Syringothyris alta Schuchert = *Cyrtia alta*.

Syringothyris angulata Simpson.

Waverly (L. Carb.).

Syringothyris angulata Simpson, Trans. American Phil. Soc., n. ser., XVI, 1889, p. 440, fig. 5.—Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 32.

Loc. Warren, Pennsylvania.

Syringothyris carteri (Hall).

Waverly and Burlington (L. Carb.).

Spirifer carteri Hall, Tenth Rep. N. Y. State Geol., 1857, p. 170.—Meek (partim), Pal. Ohio, II, 1875, p. 285 (not his figures = *S. texta* Hall).

Spirifer (*Crytia*?) *hannibalensis* Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 647.

Syringothyris typa Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 7;—Proc. Am. Phil. Soc., XII, 1870, p. 252.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 8, 48, 50, pl. 26, figs. 6, 7, 10; pl. 27, figs. 1-3.

Spirifer cuspidatus Meek, Proc. Acad. Nat. Sci., Philadelphia, 1865, p. 275;—Am. Jour. Sci., 2d ser., XLIII, 1867, p. 407.

Spirifer cuspidatus? Meek, U. S. Geol. Expl., 40th Parl., IV, 1877, p. 87.

Syringothyris cuspidatus Walcott (non Martin), Mon. U. S. Geol. Survey, VIII, 1884, p. 219, pl. 3, fig. 11.—Herrick (partim), Bull. Denison Univ., III, 1888, p. 41, pl. 1, fig. 7; pl. 2, fig. 17 (non pl. 5, figs. 4-7 = *S. herricki*).

Syringothyris carteri Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 30.—Keyes, Geol. Survey Missouri, V, 1895, p. 87, pl. 40, fig. 10.

Syringothyris typa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 48, fig. 40.

Syringothyris hannibalensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 25, figs. 33-35.

Loc. Licking County and Bedford, Ohio; Burlington, Iowa; Marion and Pike, counties, Missouri; White Pine and Eureka districts, Nevada; near Clendenin, Montana.

Syringothyris cuspidatus Walcott, and Herrick=*S. carteri*.

***Syringothyris extenuata* (Hall).** Waverly (L. Carb.).

Spirifer extenuatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 520, pl. 7, fig. 6.—

White, Wheeler's Expl. and Surv. west 100th Merid., 1875, p. 88, pl. 5, fig. 9.

Syringothyris halli A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 8.

Syringothyris extenuata Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 33.—Keyes, Geol. Survey Missouri, V, 1895, p. 86.

Loc. Burlington, Iowa; Clarksville, Missouri; Battlecreek, Michigan; Mountain Spring, Nevada.

***Syringothyris gigas* (Troost).** Subcarboniferous.

Cyrtia gigas Troost, Sixth Geol. Report Tennessee, 1841, p. 12.

Syringothyris gigas Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 33.

Loc. Harpeth River, Tennessee.

Syringothyris halli Winchell=*S. carteri extenuata*.

***Syringothyris herricki* Schuchert.** Waverly (L. Carb.).

Syringothyris cuspidatus Herrick (partim), Bull. Denison Univ., III, 1888, pl. 5, figs. 4-7 (not pls. 1, 2).

Syringothyris herricki Schuchert, Ninth Ann. Rep. N. Y. State Geologist, 1890, p. 36.—Herrick, Geol. Ohio, VII, 1895, pl. 21, figs. 4-7.

Loc. Granville, Ohio.

***Syringothyris missouri* Hall and Clarke.** Chouteau (L. Carb.).

Syringothyris missouri Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 363, pl. 39, figs. 29-31.

Loc. Chouteau Springs, Missouri.

***Syringothyris* (?) *plena* (Hall).** Burlington (L. Carb.).

Spirifer plena Hall, Geol. Survey Iowa, I, 1858, p. 603, pl. 13, fig. 4.

Syringothyris ? *plena* Schuchert, Ninth Ann. Rep. N. Y. State Geologist, 1890, p. 37.

Spirifer plenus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 31, 39, 48, pl. 37, figs. 32, 33.

Syringothyris plena Keyes, Geol. Survey Missouri, V, 1895, p. 88, pl. 40, fig. 8.

Loc. Burlington, Iowa; Hannibal, Missouri; Quincy, Illinois.

***Syringothyris randalli*, Simpson.** Waverly (L. Carb.).

Syringothyris randalli Simpson, Trans. American Phil. Soc., n. ser., XVI, 1889, p. 441, fig. 6.—Schuchert, Ninth Ann. Rep. N. Y. State Geologist, 1890, p. 36.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 50, pl. 27, figs. 13-16.

Loc. Near Warren and Union City, Pennsylvania.

***Syringothyris texta* (Hall).** Waverly to Keokuk (L. Carb.).

Spirifer cuspidatus Yandell and Shumard, Cont. Geol. Kentucky, 1847, pp. 19, 21.

Spirifer textus Hall, Tenth Rep. N. Y. State Geol. Nat. Hist., 1857, p. 169.—

White, Second Ann. Rep. Indiana Bureau Statistics and Geol., 1880, p. 512, pl. 7, figs. 1, 2;—Tenth Rep. Indiana State Geol., 1881, p. 144, pl. 7, figs. 1, 2.

Spirifer subcuspidatus Hall, Geol. Survey Iowa, I, 1858, p. 646, pl. 20, fig. 5;—Pal. New York, IV, 1867, p. 249.

Spirifer propinquus Hall, Geol. Survey Iowa, I, 1858, p. 647.—Meek and Worthen, Geol. Survey Illinois, 1868, III, p. 530, pl. 19, fig. 8.

Spirifer carteri Meek (partim), Pal. Ohio, II, 1875, pl. 14, fig. 7.

Spirifer cuspidatiformis Miller, North American Geol. Pal., 1889, p. 372.

Syringothyris texta Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 34.—Keyes, Geol. Survey Missouri, V, 1895, p. 88.

Syringothyris subcuspidatus and *texta* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 50, pl. 26, figs. 8, 11 (?9, 12); pl. 27, figs. 4-12, 18.

Loc. New Albany and New Providence, Indiana; near Louisville, Kentucky; Sciotoville, Ohio; Keokuk, Iowa; Warsaw and Nauvoo, Illinois.

Syringothyris *typa* Winchell=*S. carteri*.

TEREBRATELLA d'Orbigny.

Genotype *Terebratula chilensis* Brod.=*Terebratula dorsata* Gmelin.

Terebratella d'Orbigny, Pal. Franc. Ter. Cret., IV, 1847, p. 110.—Dall, American Jour. Conch., VI, 1870, p. 115.—Beecher, Trans. Connecticut Acad., IX, 1893, p. 377.

Terebratella californica Stanton. Upper Cretaceous (Knoxville).

Terebratella californica Stanton, Bull. U. S. Geol. Survey, 133, 1896, p. 33, pl. 1, figs. 12, 13.

Loc. Cottonwood Creek, Tehama County, California.

Terebratella* (?) *dubitanda (Cooper). ? Upper Cretaceous.

Megerlia dubitanda Cooper, Bull. California State Mining Bureau, 4, 1894, p. 50, pl. 3, figs. 48, 49.

Loc. Lajolla and Point Loma, California.

Terebratella* (?) *imbricata (Cooper). ? Upper Cretaceous.

Megerlia imbricata Cooper, Bull. California State Mining Bureau, 4, 1894, p. 51, pl. 3, figs. 50, 51.

Loc. Lajolla, California.

Terebratella obesa Gabb. Cretaceous (Chico).

Terebratella obesa Gabb, Geol. Survey California, Pal., I, 1864, p. 205, pl. 26, fig. 191.

? *Terebratella obesa* Whiteaves, Mesozoic Fossils, Geol. Survey Canada, I, 1884, p. 245.

Loc. Texas Flat, Placer County, California; Queen Charlotte Island.

Terebratella plicata (Say). Cretaceous.

Terebratula plicata Say, American Jour. Sci., II, 1820, p. 43;—Jour. Acad. Nat. Sci. Philadelphia, VI, 1829, p. 73, pl. 3, figs. 5, 6.

Terebratula sayi Morton, Syn. Cret. United States, 1834, p. 71, pl. 3, figs. 3, 4;—American Jour. Sci., XLVIII, 1845, p. 283.

Terebratella plicata d'Orbigny, Prod. Pal., 1849, p. 259.—Gabb, Proc. American Phil. Soc., VIII, 1861, p. 193.—Credner, Zeitsch. d. Deutschen Geol. Gesell., 1870, p. 224.—Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 12, pl. 1, figs. 5-9.

Loc. New Jersey.

Terebratella vanuxemi (Lyell and Forbes). Cretaceous.

Terebratula vanuxemiana Lyell and Forbes, Proc. Geol. Soc. London, 1844, p. 308, with figures.

Terebratula vanuxemi Lyell and Forbes, Quart. Jour. Geol. Soc. London, I, 1845, p. 62, with figures.

Terebratella vanuxemiana d'Orbigny, Prod. Pal., 1849, p. 259.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 19;—Proc. American Phil. Soc., VIII, 1861, p. 194.—Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 14, pl. 1, figs. 1-4.

Terebratella vanuxemi Hollick, Trans. N. Y. Acad. Sci., XI, 1892, p. 98, pl. 1, fig. 6.

Loc. New Jersey; Tottenville, Staten Island.

Terebratella whitneyi Gabb=*Rhynchonella whitneyi*.

TEREBRATULA Llhwyd. Genotype *T. perovalis* Sowerby.

Terebratula Llhwyd, Lithophylacii Britannici Ichnographia, 1696.—Hall, Pal. New York, IV, 1867, p. 386.—Dall, American Jour. Conch., VI, 1870, p. 101.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 153.

Terebratula ænigma d'Orbigny=*Rhynchonella ænigma*.

- Terebratula anigma* Darwin=*Rhynchonella anduin*.
Terebratula acuminatissima Castelnau=*Spirifer acuminatus*.
Terebratula andii d'Orbigny=*Enteletes andii*.
Terebratula antissiensis d'Orbigny=*Rhynchonella antissiensis*.
Terebratula atlantica Morton=*Terebratulina atlantica*.
Terebratula arenata Swallow (non Roemer)=*Dielasma shumardanum*.
Terebratula augusta Hall and Whitfield. Triassic-Jurassic.
Terebratula augusta Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 285, pl. 7, figs. 7-10.—White, BuB. U. S. Geol. Survey Terr., IV, 1880, p. 108;—Twelfth Ann. Rep. U. S. Geol. Survey Terr., 1883, p. 109.
Loc. Shoshone Springs, Nevada; Triassic, southwestern Idaho.
Terebratula bicanaliculata Schlothheim. Jurassic.
Terebratula bicanaliculata Schl., Mém. Soc. Géol. France, 2d ser, IV, 1851, p. 31, pl. 8, figs. 17-19.
Terebratula cornuta Burmeister and Geibel, Abh. Naturf. Gessel. Halle, VI, 1862, p. 127.
Loc. Europe; Dona Ana, Chile.
Terebratula bisacula McChesney. Kaskaskia (L. Carb.).
Terebratula bisacula McChesney, Descriptions New Fossils, 1861, p. 82.
Loc. Chester and Golconda, Illinois.
Terebratula borealis Castelnau=*Clitambonites borealis*.
Terebratula bovidens Morton=*Dielasma bovidens*.
Terebratula brevilobata Swallow. Warsaw (L. Carb.):
Terebratula brevilobata Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 84.
Loc. Ste. Genevieve County, Missouri.
Terebratula burlingtonensis White=*Dielasma burlingtonensis*.
Terebratula camila Morton=*T. harlani*.
Terebratula canipes Ravenel. Jackson (Eocene).
Terebratula canipes Ravenel, Proc. Acad. Nat. Sci. Philadelphia, II, 1844, p. 97.—Courad, American Jour. Conch., I, 1865, p. 15.
Loc. South Carolina.
Terebratula carneoidea Guppy. Eocene.
Terebratula carneoidea Guppy, Quart. Jour. Geol. Soc. London, XXII, 1866, p. 296, pl. 19, fig. 2.
Loc. San Fernando, Trinidad,
Obs. May be the same as living *Terebratula cubensis* Pourtales (Dall)=*Liothyris sphenoides*. (Philippi). The latter also occurs fossil in the Pliocene of Calabria and Sicily (Davidson).
Terebratula chiliensis d'Orbigny. Quarternary.
Terebratula chilensis d'Orbigny, Voyage dans l'Amérique Mérid., Pal., 1842, p. 163.
Loc. Coquimbo, Chile.
Terebratula choctawensis Shumard=*Kingina wacoensis*.
Terebratula concinna Bayle and Coquand=*Rhynchonella anigma*.
Terebratula cooperensis Miller=*Seminula parva*.
Terebratula copiapensis Mörnicke. Jurassic.
Terebratula copiapensis Mörnicke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 63, pl. 2, figs. 5a-5e.
Loc. Quebrada de Marieungu, Chile.

- Terebratula demissirostris** Conrad. Eocene.
Terebratula demissirostra Conrad, Kerr's Geol. North Carolina, App. A, 1875, p. 18, pl. 3, fig. 1.
Loc. Wilmington, North Carolina.
- Terebratula derbyana** Rathbun. Middle Devonian.
Terebratula derbyana (Hartt MS.) Rathbun, Bull. Buffalo Soc. Nat. Hist., I, 1874, p. 236, pl. 10, figs. 15, 17, 22, 24, 25.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 35.
Loc. Erere, Province of Para, Brazil.
- Terebratula domeykana** Bayle and Coquand. Jurassic.
Terebratula domeykana Bayle and Coquand, Mém. Soc. Géol. France, 2d ser., IV, 1851, p. 30, pl. 8, figs. 1-3.—Burmeister and Geibel, Abh. Naturf. Gessel. Halle, VI, 1862, p. 126.—Möriceke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 64.
Loc. Sierra de la Ternera, Dona Ana, and Juntas, Chile.
- Terebratula dorenbergi** Felix. Upper Jurassic.
Terebratula dorenbergi Felix, Palæontographica, XXXVII, 1891, p. 176, pl. 27, figs. 8-8b.
Loc. Cerro de Titania, Oaxaco, Mexico.
- Terebratula elia** Hall. Middle Devonian.
Terebratula elia Hall, Pal. New York, IV, 1867, p. 390, pl. 60, figs. 26-28.
Loc. Waterloo, Iowa.
- Terebratula elongata** of American authors=*Dielasma bovidens*.
- Terebratula emarginata** Sowerby. Jurassic.
Terebratula emarginata (Sowerby) Bayle and Coquand, Mém. Soc. Géol. France, 2d ser., IV, 1851, p. 32, pl. 8, figs. 7-9.
Loc. Europe; Dona Ana, Chile.
- Terebratula ficoides** Bayle and Coquand. Jurassic.
Terebratula ficoides Bayle and Coquand, Mém. Soc. Géol. France, 2d ser., IV, 1851, p. 30, pl. 8, figs. 20-22.
Loc. Dona Ana, Chile.
- Terebratula floridana** Morton=*Terebratulina floridana*.
Terebratula formosa Hall=*Dielasma formosum*.
Terebratula fragilis Morton=*Terebratula harlani*.
Terebratula gaudryi d'Orbigny=*Enteletes gaudryi*.
Terebratula geniculosa McChesney=*Dielasma bovidens*.
Terebratula glossa Conrad=*Terebratulina atlantica*.
Terebratula gorbyi Miller=*Dielasma gorbyi*.
- Terebratula gottschei** Steinman. Jurassic.
Terebratula gottschei Steinman, Neues Jahrb. f. Min., Beilageband, 1881, p. 252, pl. 14, figs. 7, 8.
Loc. Caracoles, Bolivia.
- Terebratula gracilis** Swallow (non Von Buch)=*T. swallowana*.
Terebratula guadalupæ Roemer=*Terebratulina guadalupæ*.
Terebratula halliana Gabb=*Terebratulina atlantica*.
- Terebratula harlani** Morton. Upper Cretaceous.
Terebratula harlani Morton, American Jour. Sci., XVIII, 1829, p. 250, pl. 3, fig. 16;—*Ibidem*, XVII, 1829, p. 283;—*Jour. Acad. Nat. Sci. Philadelphia*, VI, 1829, p. 73, pl. 3, figs. 1-4, 7, 8;—*Syn. Cret. U. S.*, 1834, p. 70, pl. 3, fig. 1; pl. 9,

Terebratula harlani Morton—Continued.

figs. 2, 8, 9.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 18;—Proc. American Phil. Soc., VIII, 1861, p. 196.—Credner, Zeit. d. Deutschen Geol. Gessel, 1870, p. 221.—Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 6, pl. 1, figs. 15-23.

Terebratula fragilis Morton (non Schloth.), Jour. Acad. Nat. Sci. Philadelphia, VI, 1829, p. 75, pl. 3, figs. 3, 4;—American Jour. Sci., XVIII, 1829, p. 250, pl. 3, fig. 17;—Ibidem, XVII, p. 283;—Syn. Cret. U. S., 1834, p. 70, pl. 3, fig. 2.

Terebratula pervalis Morton (non Sowerby), Jour. Acad. Nat. Sci. Philadelphia, VI, 1829, p. 77, pl. 3, figs. 7, 8.

Terebratula camilla Morton, Syn. Cret. U. S., 1834, p. 70, in text.

Terebratula harlani var. *discoidea* Morton, Syn. Cret. U. S., 1833.

Terebratula harlani var. *rectilatera* Morton, Ibidem.

Terebratula subfragilis d'Orbigny, Prod. Pal., II, 1849, p. 258.

Terebratula atlantica (non Morton) Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 18.

Loc. New Jersey; Delaware and South Carolina.

Terebratula harmonia Hall=*Eunella harmonia*.

Terebratula hastata of American authors=*Dielasma bovidens*.

Terebratula helena Whitfield.

Upper Cretaceous.

Terebratula helena Whitfield, Ludlow's Rep. Black Hills Dakota, 1875, p. 103, figs. 5-10.

Loc. North of Belle Fourche, South Dakota.

Terebratula hochstetteri Toulou=*Dielasma hochstetteri*.

Terebratula hohmanni Mörnicke.

Jurassic.

Terebratula hohmanni Mörnicke, Neues Jahr. f. Mineral., Beilageband, IX, 1894, p. 64, pl. 6, figs. 4a, 4b.

Loc. Quebrada de Mariungu, Chile.

Terebratula humboldtensis Gabb.

Triassic.

Terebratula humboldtensis Gabb, Geol. Survey California, Pal., I, 1864, p. 34, pl. 6, fig. 35.—Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 282, pl. 6, figs. 22-24.—Whiteaves, Cont. Canadian Pal., I, 1889, p. 129.

Loc. Star Canyon, Humboldt County, and Dun Glen Pass, Pah-Ute Range, Nevada; Nicola Lake, Canada.

Terebratula ignaciana d'Orbigny.

Jurassic.

Terebratula ignaciana d'Orbigny, Voyage dans l'Amérique Mérid., Pal., 1842, p. 63, pl. 22, figs. 14, 15.—Darwin, Geological Observations on South America, 1846, p. 216.

Loc. Cordillere du Chili, South America.

Terebratula inca Forbes=*T. pervalis*.

Terebratula inconstans Herrick=*Cryptonella inconstans*.

Terebratula inornata McChesney.

"Keokuk to Coal Measures."

Terebratula inornata McChesney, New Pal. Fossils, 1860, p. 48.

Loc. Sangamon County, Illinois.

Terebratula itaitubensis Derby=*Dielasma itaitubense*.

Terebratula jucunda Hall.

Middle Devonian.

Terebratula jucunda Hall, Pal. New York, IV, 1867, p. 390, pl. 60, figs. 29-31.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 154.

Loc. Waterloo, Iowa; Jefferson and Clark counties, Indiana.

Terebratula lachryma Morton=*Terebratulina lachryma*.

- Terebratula lacunosa** Schl. Jurassic.
Terebratula lacunosa (Schl.) Bayle and Coquand, Mém. Soc. Géol. France, ser. ii, IV, 1851, p. 29, pl. 3, figs. 10, 11.
Loc. Europe; Dona Ana, Chile.
- Terebratula lapillus** Morton. Coal Measures.
Terebratula lapillus Morton, American Jour. Sci., XXIX, 1836, p. 153, pl. 26, fig. 36.
Loc. Junior Furnace, Scioto County, Ohio.
Obs. Not determinable.
- Terebratula lecta** Guppy. Eocene.
Terebratula lecta Guppy, Quart. Jour. Geol. Soc. London, XXII, 1866, p. 296, pl. 19, fig. 3.
Loc. San Fernando, Trinidad.
- Terebratula lens** Hall = *Cryptonella lens*.
Terebratula leonensis Conrad = *Kingena leonensis*.
- Terebratula liardensis** Whiteaves. Triassic.
Terebratula liardensis Whiteaves, Cont. Canadian Pal., I, 1889, p. 130, pl. 17, fig. 2. (Abstract of same pub. 1888.)
Loc. Liard River, Canada.
- Terebratula lincklæni** Hall = *Eunella lincklæni*.
Terebratula marcyi Shumard = *Eumetria marcyi*.
- Terebratula meridionalis** Conrad. Oolite or Cretaceous.
Terebratula meridionalis Conrad, U. S. Astronomical Exped. to the Southern Hemisphere, 1855, p. 282, pl. 42, fig. 10.
Loc. Cordillera de Dona Ana, Chile.
- Terebratula mesogona** Castelnau. Formation.?
Terebratula mesogona Castelnau (non Phillips), Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 40, pl. 13, fig. 3.
Loc. Vicinity of Quebec, Canada.
Obs. Undeterminable.
- Terebratula mexicana** Hall. ? Upper Carboniferous.
Terebratula mexicana Hall, Emory's Rep. U. S. and Mexican Bound. Survey, I, 1857, pl. 20, fig. 2.
Loc. Not given.
Obs. Undefined. Compare with *Seminula argentea*.
- Terebratula millipunctata** Hall = *Dielasma bovidens*.
Terebratula mormoni Marcou = *Hustedia mormoni*.
Terebratula navicella Hall = *Centronella navicella*.
- Terebratula nitens** Conrad. Miocene.
Terebratula nitens Dana, Wilkes's U. S. Exped., X, 1849, p. 726, pl. 19, fig. 1. (Conrad's earlier description I have not found.)
Rhynchonella nitans Conrad, American Jour. Couch., 1865, p. 154.
- Terebratula nuciformis** Morton. Coal Measures.
Terebratula nuciformis Morton, American Jour. Sci., XXIX, 1836, p. 150, pl. 2, fig. 5.
Loc. Putnam Hill east of Flint Ridge, Ohio.
Obs. Not defined so as to be recognizable.
- Terebratula nucula** Sowerby = *Rhynchonella nucula*.
Terebratula occidentalis Miller = *Dielasma occidentale*.
Terebratula ovoides Eaton = *Rensselaeria ovoides*.

- Terebratula ontario** Hall. Hamilton (Dev.).
Terebratula ontario Hall, Pal. New York, IV, 1867, p. 418, pl. 60, figs. 45-48.
Loc. Canandaigua Lake, New York.
- Terebratula ornithocephala** Bayle and Coquand=*T. subovoides*.
Terebratula parva Swallow=*Seminula parva*.
- Terebratula patagonica** Sowerby. Tertiary.
Terebratula patagonica Sowerby, Darwin's Geol. Observations on South America, 1846, p. 252, pl. 2, fig. 25.
Loc. St. Josef and St. Julian, Patagonia.
- Terebratula pennata** Atwater=*Spirifer pennatus*.
- Terebratula (Zeilleria) perforata** Piette. Jurassic.
Terebratula (Zeilleria) perforata (Piette) Mörücke, Neues Jahrb. f. Mineral., Beilageband, IX, 1834, p. 65.
Loc. Europe; Sierre de la Ternera, Chile.
- Terebratula perinflata** Shumard. Upper Carboniferous.
Terebratula perinflata Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 392.
Loc. Guadalupe Mountains, Texas.
- Terebratula perovalis** Eaton (non Sowerby)=*Rensseleria ovoides*.
Terebratula perovalis Morton (non Sowerby)=*T. harlani*.
- Terebratula perovalis** Sowerby. Jurassic.
Terebratula inea Forbes, Darwin's Geol. Observations S. America, 1846, p. 268, pl. 5, figs. 19-20.
Terebratula perovalis Bayle and Coquand, Mém. Soc. Géol. France, ser. ii, IV, 1851, p. 22, pl. 8, figs. 15, 16.—Gottsche, Palaeontographica, Suppl., III, 1878, p. 33, pl. 4, fig. 9.—Steinman, Neues Jahrb. f. Min., Beilageband, I, 1881, p. 252.—Mörücke, Ibidem, Beilageband, IX, 1894, p. 65, pl. 3, figs. 6a-6c.
Loc. Europe; Manflas, Tres Cruces, Iquique, and Espinazito, Chile; Caracoles, Bolivia.
- Terebratula peruviana** d'Orbigny=*Seminula argentea*.
Terebratula planirostra Hall=*Cryptonella planirostris*.
Terebratula planosulcata Meek and Worthen=*Cleiothyris roissyi*.
Terebratula plicata Say=*Terebratella plicata*.
- Terebratula poeyana** Lea. ?Jurassic.
Terebratula poeyana Lea, Trans. American Phil. Soc., n. ser., VII, 1841, p. 260, pl. 10, fig. 13.
Loc. Habana, Cuba.
- Terebratula prisca**=*Atrypa reticularis*.
- Terebratula punctata** Sowerby. Liassic.
Terebratula punctata Sowerby, Mineral Coneh., I, 1812, p. 46, tab. 15, fig. 4.—Davidson, British Oolitic and Liassic Brach., Pal. Soc., 1852, p. 45.—Burmeister and Geibel, Abh. Naturf. Gessel. Halle, VI, 1862, p. 127.
Terebratula efr. *punctata* Behrendsen, Zeit. der. Deutschen Geol. Gessel., XLIII, 1891, p. 395.
Terebratula (Waldheimia) punctata (Sowerby) Mörücke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 66.
Loc. Europe; Portezuelo Aneho, Argentine Republic; Manflas, Juntas, Chile.
- Terebratula raimondiana** Gabb. ?Cretaceous.
Terebratula raimondiana Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 298, pl. 42, fig. 9.
Loc. Near Ollon, Peru.

Terebratula reticularis = *Atrypa reticularis*.

Terebratula rectirostra Hall = *Cryptonella rectirostris*.

Terebratula repellini d'Orbigny.

Jurassic.

Terebratula repellini Anguillera, Datos para la Geologia de Mexico, 1893, p. 18.

Loc. Europe; Mexico.

Terebratula robusta Whiteaves.

Jurassic (?Cretaceous).

Terebratula robusta Whiteaves, Cont. Canadian Pal., I, 1889, p. 163, pl. 22, figs.

1, 2.

Loc. Rocky Mountains, near Devils Lake, Canada.

Obs. The horizon of this locality is probably Jurassic (Stanton).

Terebratula rockymontana Marcou = *Pugnax rockymontana*.

Terebratula romingeri Hall = *Cranæna romingeri*.

Terebratula rowleyi Worthen = *Dielasma rowleyi*.

Terebratula royssii d'Orbigny (non L'Éveillé) = *Seminula argentea*.

Terebratula royssii Marcou = *Cleiothyris roissyi*.

Terebratula sacculus Dawson, and Davidson = *Dielasma sacculus*.

Terebratula semisimplex White.

Triassic.

Terebratula semisimplex White, Bull. U. S. Geol. Survey Terr., V, 1879, p. 108.

Loc. Southeastern Idaho.

Terebratula serpentina Owen = *Eumetria macyi*.

Terebratula shumardana Miller = *Dielasma shumardanum*.

Terebratula simulator Hall = *Eunella simulator*.

Terebratula spiriferoides Eaton = *Athyris spiriferoides*.

Terebratula subexcavata Conrad.

Oolite or Cretaceous.

Terebratula subexcavata Conrad, U. S. Astronomical Exped. to the Southern Hemisphere, 1855, p. 282, pl. 41, fig. 4.

Loc. Cordillera de Dona Ana, Chile.

Terebratula subfragilis d'Orbigny = *T. harlani*.

Terebratula subovoides Roemer.

Lias (Jurassic).

Terebratula ornithocephala (non Sowerby) Bayle and Coquand, Mém. Soc. Géol. France, 2d ser, IV, 1851, p. 18, pl. 8, figs. 12-14.

Terebratula subovoides Behrendsen, Zeit. der Deutschen Geol. Gessel., XLIII, 1891, p. 395.—Möricke, Neues Jahrb., f. Mineral., Beilageband, IX, 1894, p. 66.

Loc. Europe; Valle lenas amorillas, Rio Salado, Argentine Republic; Mine Amolanas, Mantlas, and Tres Cruces, Chile.

Terebratula subnumismalis Davidson?

Lias (Jurassic).

Terebratula subnumismalis Davidson, British Oolitic and Liassic Braech., Pal. Soc., 1852, p. 36, pl. 51, fig. 10.

Terebratula cfr. *subnumismalis* Behrendsen, Zeit. der Deutschen Geol. Gessel., XLIII, 1891, p. 396.

Loc. Europe; Rio Salado, Argentine Republic.

Terebratula subretziiforma McChesney.

Kaskaskia (L. Carb.).

Terebratula subretziiforma McChesney, Descrip. New Fossils, 1861, p. 82.

Loc. Fountain Bluff, Illinois.

Terebratula subtetradra Conrad = *Rhynchonella anduin*.

Terebratula subtilita Hall = *Seminula argentea*.

Terebratula sullivanti Hall = *Eunella sullivanti*.

- Terebratula swallovana** Miller. Kaskaskia (L. Carb.).
Terebratula gracilis Swallow (non von Buch), Trans. St. Louis Acad. Sci., II, 1863, p. 83.
Terebratula swallovana Miller, American Pal. Foss., 2d ed., 1883, p. 299.
Loc. St. Marys, Missouri; Chester, Illinois.
- Terebratula tayloriana* Lea=*Rhynchonella tayloriana*.
Terebratula tetradra Sowerby=*Rhynchonella tetradra*.
Terebratula titicacensis Gabb=*Seminula titicacensis*.
- Terebratula traversensis** A. Winchell. Hamilton (Dev.).
Terebratula traversensis A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 95.
Loc. Grand Traverse region, Michigan.
- Terebratula trinitatensis** Guppy. Eocene.
Terebratula trinitatensis Guppy, Quart. Jour. Geol. Soc. London, XXII, 1866, p. 296, pl. 19, fig. 1.
Loc. Sanfernando, Trinidad.
- Terebratula trinucleus* Hall=*Seminula trinucleus*.
Terebratula turgida Hall=*Dielasma turgidum*.
Terebratula turpis Verneuil=*Clitambonites borealis*.
Terebratula utah Marcou (non Hall and Whitfield)=*Pugnax utah*.
- Terebratula (?) utah** Hall and Whitfield. Lower Carboniferous.
Terebratula utah Hall and Whitfield, King's Geol. Expl. 40th Parl., IV, 1877, p. 258, pl. 4, fig. 18.
Loc. Cottonwood Divide, Wasatch Range, Utah.
Obs. Not well established. Based upon a single dorsal valve. May be a *Dielasma*.
- Terebratula valenciennii* Castelnau=*Meristella nasuta*.
Terebratula wacoensis Roemer=*Kingena wacoensis*.
Terebratula wilmingtongensis Lyell and Sowerby=*Rhynchonella wilmingtongensis*.
- Terebratula (?) cfr. zietenii** Loriol. Jurassic.
Terebratula cfr. zietenii Aguilera, Bol. Com. Geológica de Mexico, I, 1895, p. 1, pl. 2, figs. 6, 7.
Loc. Rancho Alamitos, Sierra de Catorce, Mexico.
- TEREBRATULINA** d'Orb. Genotype *Anomia caputserpentis* Linné.
Terebratulina d'Orbigny, Ann. Des. Sci. Nat., VIII, 1848, p. 67.—Hall and Clarke, Thirteenth Ann. Rep. N. Y. State Geol., 1895, p. 872.
- Terebratulina atlantica** (Morton). Upper Cretaceous.
Terebratula atlantica Morton, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 214.
Terebratula halliana Gabb, Proc. Acad. Nat. Sci. Philadelphia, V, 1861, p. 19.
Terebratulina halliana Gabb, Proc. American Phil. Soc., VIII, 1861, p. 200.
Terebratula glossa Conrad, American Jour. Conch., V, 1869, p. 42, pl. 1, fig. 22.
Terebratulina atlantica Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 9, pl. 1, figs. 10-13.—Hollick, Trans. N. Y. Acad. Sci., XI, 1892, p. 98, pl. 1, fig. 8.
Loc. New Jersey; Tottenville, Staten Island.
- Terebratulina filosa** Conrad. ?Cretaceous.
Terebratulina filosa Conrad, American Jour. Conch., II, 1866, pp. 77, 105, pl. 9, figs. 4, 5.
Loc. Uniontown, Alabama.

- Terebratulina floridana** (Morton). Cretaceous.
Terebratula floridana Morton, Syn. Cret. U. S., 1834, p. 72, pl. 16, fig. 17.
Terebratulina floridana d'Orbigny, Prod. Pal., II, 1849, p. 258.—Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 11.
 Loc. Prairie Bluff, Alabama.
- Terebratulina gracilis** (Schlotheim). Eocene.
Terebratula gracilis Schlotheim, Die Petrefactenkunde, 1820, p. 270.
Terebratulina gracilis Conrad, American Jour. Conch., I, 1865, p. 15.
 Loc. Europe; Alabama.
- Terebratulina gaudalupæ** (Roemer). Upper Cretaceous.
Terebratula gaudalupæ Roemer, Texas, 1849, p. 408;—Kreidebildung von Texas, 1852, p. 82, pl. 6, fig. 3.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 19.
 Loc. New Braunfels, Austin, and 200 miles north in Dallas County, Texas (Hill).
- Terebratulina halliana** Gabb=*T. atlantica*.
- Terebratulina lachryma** (Morton). (Cretaceous?) Eocene? .
Terebratula lachryma Morton, Syn. Cret. U. S., 1834, p. 72, pl. 10, fig. 11; pl. 16, fig. 6.
Terebratulina lachryma d'Orbigny, Prod. Pal., 1849, p. 396.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 19;—Proc. American Phil. Soc., VIII, 1861 p. 200.—Conrad, American Jour. Conch., I, 1865, p. 15.—Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 12, pl. 1, fig. 14.
 Loc. New Jersey; Claiborne, Alabama.
- TORYNIFER** Hall and Clarke. Genotype *T. criticus* Hall and Clarke.
Torynifer Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, explanation to pl. 84.
- Torynifer criticus** Hall and Clarke. St. Louis (L. Carb.).
Torynifer criticus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 84, figs. 34, 35.
- TREMATIS** Sharpe.
 Genotype *Orbicula terminalis* Sharpe (non Emmons)=*T. millipunctata* Hall.
Trematis Sharpe, Quart. Jour. Geol. Soc. London, IV, 1847, p. 66.—Dall, Bull. Mus. Comp. Zool., III, 1871, p. 37;—Bull. U. S. Nat. Mus., 8, 1877, p. 73.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 138, 168.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 367.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 258.
- Trematis crassipuncta** Ulrich. Lorraine (Ord.).
Trematis crassipuncta Ulrich, American Geologist, IV, 1889, p. 22; III, p. 378, fig. 7.
 Loc. Cincinnati, Ohio.
- Trematis (?) dyeri** Miller. Lorraine (Ord.).
Trematis dyeri Miller, Cincinnati Quart. Jour. Sci., I, 1874, p. 347, fig. 39.
Trematis (?) dyeri Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 142.
 Loc. Cincinnati, Ohio.
- Trematis filosa** Billings=*Schizocrania filosa*.
- Trematis fragilis** Ulrich. Trenton (Ord.).
Trematis fragilis Ulrich, American Geologist, IV, 1889, p. 21; III, p. 378, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 142, pl. 4G, fig. 14.
 Loc. Near Covington, Kentucky.

- Trematis huronensis** Billings. Black River (Ord.).
Trematis huronensis Billings, Pal. Fossils, I, 1862, p. 53, fig. 59 on p. 52;—Geol. Canada, 1863, p. 159, fig. 130.
Productella minneapolis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 332, pl. 4, figs. 11, 12.
Trematis huronensis? Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 368, fig. 29.
Loc. Pallideau Islands, Lake Huron; Minneapolis, Minnesota.
- Trematis millepunctata** Hall. Utica and Lorraine (Ord.).
Trematis millepunctata Hall, Description n. sp. Crinoidea and other Fossils, 1866, p. 14;—Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 221, pl. 7, figs. 22-25.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 70, pl. 1, figs. 4-7.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 16.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 139, pl. 4G, figs. 4-10.
Loc. Cincinnati, Ohio.
Obs. See *T. quincuncialis* and *T. reticularis*.
- Trematis montrealensis** Billings. Trenton (Ord.).
Trematis montrealensis Billings, Pal. Fossils, I, 1862, p. 52, fig. 57;—Geol. Canada, 1863, p. 159, fig. 128.
Loc. Montreal, Canada.
- Trematis oblata** Ulrich. Utica and Lorraine (Ord.).
Trematis punctostriata Hall and Whitfield (non Hall, 1873), Pal. Ohio, II, 1875, p. 70, pl. 1, figs. 8, 9.
Trematis oblata Ulrich, American Geologist, IV, 1889, p. 23; III, p. 378, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 142, pl. 4G, fig. 20.
Loc. Cincinnati, Ohio.
- Trematis ottawaensis** Billings. Trenton and Lorraine (Ord.).
Trematis ottawaensis Billings, Pal. Fossils, I, 1862, p. 53, fig. 58 on p. 52;—Geol. Canada, 1863, p. 159, fig. 129;—Cat. Sil. Fossils Anticosti, 1866, p. 11.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 139, pl. 4G, figs. 15-17.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 369, fig. 30.
Loc. Ottawa, Canada; Anticosti; Trenton Falls, New York; Frankfort, Kentucky; St. Paul, Minnesota.
- Trematis?** *pannulus* White=*Iphidea pannulus*.
Trematis punctostriata Hall and Whitfield=*T. oblata*.
- Trematis punctistriata** Hall. Lorraine (Ord.).
Trematis punctostriata Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 243, pl. 13, figs. 17, 18.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 142, pl. 4G, figs. 11-13 (?).
Loc. Clifton, Tennessee.
- Trematis (?) pustulosa** Hall. Lorraine (Ord.).
Trematis? *pustulosa* Hall, Descrip. n. sp. Crinoidea and other Fossils, 1866, p. 15;—Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 222.
Loc. Near Horicon, Wisconsin.
- Trematis quincuncialis** Miller and Dyer. Lorraine (Ord.).
Trematis quincuncialis Miller and Dyer, Cont. to Pal., II, 1878, p. 8, pl. 3, fig. 9.
Loc. Lebanon, Ohio.
Obs. Seems to be only a variety of *T. millepunctata* occurring at a higher horizon.

- Trematis reticularis** (Miller). Lorraine (Ord.).
Crania reticularis Miller, *Cincinnati Quart. Jour. Sci.*, II, 1875, p. 280, fig. 1.
Loc. Brookville, Indiana.
Obs. The type specimens have been examined and appear to be young *T. millepunctata*.
- Trematis rudis** Hall=Schizocrania rudis.
- Trematis terminalis** Emmons. Trenton (Ord.).
Orbicula terminalis Emmons, *Geol. New York; Rep. Second Dist.*, 1842, p. 395, fig. 4.—Hall, *Pal. New York*, I, 1847, p. 100, pl. 30, fig. 11.
Trematis terminalis Emmons, *American Geologist*, Pt. II, 1855, p. 201, fig. 63.—Billings, *Geol. Canada*, 1863, p. 159, fig. 127.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 139, pl. 4G, figs. 1, 2.
 ?*Trematis terminalis* Miller, *Cincinnati Quart. Jour. Sci.*, II, 1875, p. 14.
Loc. Middleville, Trenton Falls, Watertown, and elsewhere in New York.
- Trematis truncata** Hall=Schizobolus concentricus.
- Trematis umbonata** Ulrich. Lorraine (Ord.).
Trematis umbonata Ulrich, *American Geologist*, IV, 1889, p. 23; III, 1889, fig. 8 on p. 378.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 139, pl. 4G, figs. 18, 19.
Loc. Covington, Kentucky; Cincinnati, Ohio.
- TREMATOBOLUS** Matthew. Genotype *T. insignis* Matthew.
Trematobolus Matthew, *Canadian Rec. Science*, 1893, p. 276.—Hall and Clarke, *Eleventh Ann. Rep. N. Y. State Geol.*, 1894, p. 252.
- Trematobolus insignis** Matthew. Middle Cambrian.
Trematobolus insignis Matthew, *Canadian Record Science*, 1893, p. 276, fig. 1;—*Trans. Royal Soc. Canada*, Vol. XI, 1894, p. 88, pl. 16, fig. 4a-d;—*Trans. N. Y. Acad. Sci.*, XIV, 1895, p. 122, pl. 4, fig. 2.
Loc. St. Martins, New Brunswick.
- TREMATOSPIRA** Hall. Genotype *Spirifer*? *perforatus* Hall.
Trematospira Hall, *Pal. New York*, III, 1859, p. 207;—*Twelfth Rep. N. Y. State Cab. Nat. Hist.*, 1859, p. 27;—*Pal. New York*, IV, 1867, p. 271.—Nettelroth, *Kentucky Fossil Shells*, *Mem. Kentucky Geol. Survey*, 1889, p. 135.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 124;—*Thirteenth Ann. Rep. N. Y. State Geologist*, 1895, p. 798.
 ?*Trematospira* Hall, *Sixteenth Rep. N. Y. State Cab. Nat. Hist.*, 1863, p. 54.
- Trematospira acadie** Hall and Clarke=*Rhynchospira acadie*.
- Trematospira camura** Hall. Niagara (Sil.).
Atrypa camura Hall, *Pal. New York*, II, 1852, p. 273, pl. 56, fig. 3.
Trematospira camura Hall, *Pal. New York*, III, 1859, p. 212, pl. 28A, fig. 1.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 126, pl. 49, figs. 2-4.
Rhynchonella camura Billings, *Geol. Canada*, 1863, p. 315, fig. 322.
Loc. Lockport, New York.
- Trematospira costata** Hall. Lower Helderberg (Dev.).
Trematospira costata Hall, *Pal. New York*, III, 1859, p. 210, pl. 28A, 1859, fig. 4;—*Ibidem*, IV, 1867, p. 276, figs. 5, 6.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, pl. 49, figs. 19, 20.
Loc. Albany and Schoharie counties, New York.
- Trematospira deweyi** Hall=*Parazyga deweyi*.
- Trematospira disparilis** Hall=*Atrypina disparilis*.

- Trematospira dubia** (Billings). Lower Helderberg (Dev.).
Retzia dubia Billings, Proc. Portland Soc. Nat. Hist., I, 1863, p. 113, pl. 3, fig. 10.
Trematospira dubia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 126,
 pl. 49, figs. 15, 16.
Loc. Square Lake, Maine.
- Trematospira equistriata** Hall and Clarke. Lower Helderberg (Dev.).
Trematospira equistriata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895,
 pl. 49, fig. 47.
Loc. Cumberland, Maryland.
- Trematospira gibbosa** Hall. Hamilton (Dev.).
Trematospira gibbosa Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860,
 p. 82;—Pal. New York, IV, 1867, p. 272, pl. 45, figs. 7-15.—Hall and Clarke,
 Pal. New York, VIII, Pt. II, 1895, pl. 49, figs. 23-27.
Loc. Bellona, York, and Darien, New York.
- Trematospira helena** Nettelroth = *Rhynchospira helena*.
- Trematospira hippolyte** (Billings). Lower Helderberg (Dev.).
Retzia hippolyte Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 112, pl. 13, fig. 9.
Trematospira hippolyte Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p.
 126, pl. 49, figs. 7, 8.
Loc. Square Lake, Maine.
- Trematospira hirsuta** Hall = *Parazyga hirsuta*.
- Trematospira imbricata** Hall = *Atrypina imbricata*.
- Trematospira** (?) *liniuscula* A. Winchell. Hamilton (Dev.).
Trematospira ? *liniuscula* A. Winchell, Rep. Lower Peninsula Michigan, 1866,
 p. 94.
Loc. Grand Traverse region, Michigan.
- Trematospira matthewsoni** McChesney = *Atrypa marginalis*.
- Trematospira maria** (Billings). Lower Helderberg (Dev.).
Retzia maria Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 112, pl. 3, fig. 8.
Trematospira maria Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 126,
 pl. 49, fig. 21.
Loc. Square Lake, Maine.
- Trematospira multistriata** Hall. Lower Helderberg (Dev.).
Spirifer multistriata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 59,
 figs. 1-6.
Trematospira multistriata Hall, Pal. New York, III, 1859, p. 209, pl. 24, fig. 3;
 pl. 28A, fig. 5;—*Ibidem*, IV, 1867, p. 276, figs. 1-3.—Hall and Clarke, Pal.
 New York, VIII, Pt. II, 1893, p. 126, fig. 110, pl. 49, figs. 9-14.
Retzia multistriata Billings, Geol. Canada, 1863, p. 958, fig. 458.
Loc. Schoharie, New York.
- Trematospira nobilis** Hall = *Cyclorhina nobilis*.
- Trematospira perforata** Hall. Lower Helderberg (Dev.).
Spirifer ? *perforata* Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 60.
Trematospira perforata Hall, Pal. New York, III, 1859, p. 208, pl. 28A, fig. 3;—
Ibidem, IV, 1867, p. 276.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895,
 pl. 49, figs. 5, 6.
Loc. Albany and Schoharie counties and Hudson, New York.
- Trematospira simplex** Hall. Lower Helderberg (Dev.).
Trematospira simplex Hall, Pal. New York, III, 1859, p. 211, pl. 28A, fig. 2.—Hall
 and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 49, figs. 17, 18.
Loc. Decatur County, Tennessee.

Trematospira quadruplicata Miller = *Rhynchotrema inaequivalve*.

***Trematospira tennesseensis* Hall and Clarke.** Lower Helderberg (Dev.).

Trematospira tennesseensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 83, figs. 21-23.

Loc. Perry County, Tennessee.

TRIGERIA (Bayle partim) Hall and Clarke.

Genotype *Terebratula guerangeri* de Verneuil.

Trigeria Bayle (partim), Explic. Carte Géol. de France, Atlas, 1875, pl. 13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 272, 273, fig. 189;—Thirteenth Rep. N. Y. State Geologist, 1895, p. 856.

***Trigeria gaudryi* (Ehlerl).**

Oriskany (Dev.).

Centronella gaudryi Ehlerl, Bull. Soc. Geol. France, 3d ser., V, 1877, p. 593, pl. 10, fig. 8;—Bull. de la Soc. d'Etudes Scientif. d'Angers, separate 1883, p. 2, pl. —, figs. 10-17.

Trigeria gaudryi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 273, fig. 189, pl. 76, figs. 6, 7.

Loc. France; Cumberland, Maryland.

***Trigeria* (?) *lepada* Hall.**

Hamilton (Dev.).

Rhynchospira lepada Hall, Thirteenth Rep. N. Y. State Geol. Nat. Hist., 1860, p. 83;—Pal. New York, IV, 1867, p. 276, pl. 45, figs. 1-6.

Retzia lepada Miller, N. American Geol. Pal., 1889, p. 366.

Trigeria ? *lepada* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 274, pl. 50, figs. 36-40.

Loc. Canandaigua Lake and Bellona, New York.

***Trigeria* (?) *margarida* (Derby).**

Middle Devonian.

Centronella (?) *margarida* Derby, Archivos do Museu Nacional Rio de Janeiro, IX, 1890, p. 84, with figures in text.

Trigeria ? *margarida* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 274.

Loc. Head of Paraguay; Matto Grosso, Brazil.

***Trigeria* (?) *portlandica* (Billings).**

Lower Helderberg (Dev.).

Rensselaeria portlandica Billings, Proc. Portland Soc. Nat. Hist., I, 1863, p. 115, pl. 3, fig. 12.

Trigeria ? *portlandica* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 273, pl. 76, figs. 4, 5.

Loc. Square Lake, Maine.

***Trigeria* (?) *wardiana* (Rathbun).**

Middle Devonian.

Retzia wardiana (Hartt) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 245, pl. 10, figs. 2-5, 8, 9, 11, 12, 14, 16.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 31.

Retzia ? *wardiana* Derby, Archivos do Museu Nacional do Rio de Janeiro, IX, 1890, p. 78.

Trigeria ? *wardiana* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 274.

Loc. Province of Para, Brazil.

TRIMERELLA Billings.

Genotype *T. grandis* Billings.

Trimerella Billings, Pal. Fossils, I, 1862, p. 166.—Dall, American Jour. Conch., VI, 1870, p. 160;—*Ibidem*, VII, 1871, p. 79.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 143.—Dall, Bull. U. S. National Mus., 8, 1877, p. 74.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 33, 46, 163;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 236.

Gotlandia Dall, American Jour. Conch., VI, 1870, p. 160.

- Trimerella acuminata** Billings. Guelph (Sil.).
Trimerella acuminata Billings, Pal. Fossils, I, 1862, pp. 167, 168, fig. 152;—*American Jour. Sci.*, 3d ser., I, 1871, p. 471;—*Ann. Mag. Nat. Hist.*, 4th ser., VIII, 1871, p. 140.—Dall, *American Jour. Conch.*, VII, 1871, p. 82.—Davidson and King, *Quart. Jour. Geol. Soc. London*, XXX, 1874, p. 146, pl. 15, figs. 4-7; pl. 16, figs. 1, 2.—Nicholson, *Pal. Prov. Ontario*, 1875, p. 68, fig. 3.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pl. 4B, fig. 6.
Loc. Galt, New Hope, and Hespelar, Ontario; near Hillsboro, Ohio; Port Byron, Illinois; Gotland and Farö.
- Trimerella billingsi** Dall. Guelph (Sil.).
Trimerella billingsi Dall, *American Jour. Conch.*, VII, 1871, p. 82, pl. 11, figs. 1-3.—Davidson and King, *Quart. Jour. Geol. Soc. London*, XXX, 1874, p. 150, pl. 16, figs. 8, 9.
Loc. New Hope, Ontario, Canada.
- Trimerella dalli** Davidson and King. Guelph (Sil.).
Trimerella dalli Davidson and King, *Quart. Jour. Geol. Soc. London*, XXX, 1874, p. 154, pl. 15, figs. 1-3.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pl. 4A, fig. 10.
Loc. Hespelar, Elora, and New Hope, Ontario, Canada.
- Trimerella galtensis** Hall=*Rhinobolus galtensis*.
- Trimerella grandis** Billings. Guelph (Sil.).
Trimerella grandis Billings, *Pal. Fossils*, I, 1862, pp. 166, 167, fig. 151.—Dall, *American Jour. Conch.*, II, 1870, p. 160;—*Ibidem*, VII, 1871, p. 82.—Hall, *Twenty-third Rep. N. Y. State Cab. Nat. Hist.*, 1873, pl. 13, figs. 11-16.—Davidson and King, *Quart. Jour. Geol. Soc. London*, XXX, 1874, pl. 13, figs. 2, 3.—Nicholson, *Pal. Prov. Ontario*, 1875, p. 67, fig. 37.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pl. 4A, figs. 1, 2; pl. 4B, figs. 2-5.
Loc. Galt, New Hope, and Elora, Hespelar, Ontario, Canada; near Hillsboro, Ohio; Wisconsin.
- Trimerella minor** Dall=*Rhinobolus galtensis*.
- Trimerella ohioensis** Meek. Niagara (Sil.).
Trimerella ohioensis Meek, *American Jour. Sci.*, 3d ser., I, 1871, p. 305.—Dall, *American Jour. Conch.*, VII, 1871, p. 83.—Davidson and King, *Geol. Mag.*, IX, 1872.—Meek, *Pal. Ohio*, I, 1873, p. 183, pl. 16, fig. 1.—Davidson and King, *Quart. Jour. Geol. Soc. London*, XXX, 1874, p. 153, pl. 16, figs. 3-7; pl. 19, figs. 1-2.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, pl. 4A, figs. 3-9.
Loc. Genoa, Ottawa County, Ohio; Port Byron, Illinois; Ontario, Canada.
- TRIPLECIA** Hall. Genotype *Atrypa extans* Emmons.
Tripllesia Hall, *Pal. New York*, III, 1859, p. 522;—*Twelfth Rep. N. Y. State Cab. Nat. Hist.*, 1859, p. 41.—Waagen, *Palaontologica Indica*, Ser. XIII, I, 1884, p. 576.
Tripllesia Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 269.—Winchell and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 408.—Hall and Clarke, *Eleventh Ann. Rep. N. Y. State Geologist*, 1894, p. 289.
Dicraniscus Meek, *American Jour. Sci.*, 3d ser., IV, 1872, p. 279.—*Pal. Ohio*, I, 1873, p. 576.
- Tripllesia cuspidata** Hall. Trenton (Ord.).
Atrypa cuspidata Hall, *Pal. New York*, I, 1847, p. 133, pl. 33*, fig. 1, and p. 318.
Tripllesia cuspidata Hall, *Pal. New York*, III, 1859, p. 522.—Hall and Clarke, *Pal. New York*, VIII, Pt. I, 1892, p. 270.
Loc. Lowville, Lewis County, New York.

- Triplecia extans** (Emmons). Trenton (Ord.).
Atrypa extans Emmons, Geol. N. Y.; Rep. Second Dist., 1842, p. 395, fig. 6.—
 Hall, Pal. New York, I, 1847, p. 137, pl. 33, fig. 1.
Triplesia extans, Hall, *Ibidem*, III, 1859, p. 523, figs. 1-3.
Triplecia extans Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270,
 pl. 11C, figs. 1-7.
Loc. Watertown, Lowville, and Boonville, New York.
- Triplecia niagaraensis** Hall and Clarke. Niagara (Sil.).
Triplecia niagaraensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 83,
 figs. 16-20.
Loc. Near Milwaukee, Wisconsin.
- Triplecia nucleus** Hall. Trenton (Ord.).
Atrypa nucleus Hall, Pal. New York, I, 1847, p. 138, pl. 33, fig. 2.
Triplesia nucleus Hall, *Ibidem*, III, 1859, p. 522.
Triplecia nucleus, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270,
 pl. 11C, figs. 8, 9.
Loc. Middleville, New York.
- Triplecia ortonii** Meek. Clinton (Sil.).
Dicraniscus ortonii Meek, American Jour. Sci., 3d ser., IV, 1872, p. 280.
Triplesia ortonii Meek, Pal. Ohio, I, 1873, p. 178, pl. 15, fig. 1.
Triplecia ortonii, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270;
 pl. 11C, figs. 12-20.—Foerste, Geol. Ohio, VII, 1895, p. 585.
Loc. Dayton, Ohio; Newson, Tennessee.
- Triplecia (?) radiata** Whitfield. Calciferous (Ord.).
Triplesia radiata Whitfield, Bull. American Mus. Nat. Hist., II, 1889, p. 43, pl. 7,
 figs. 5-8.
Triplecia radiata, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 271.
Loc. Beckmantown, New York.
- Triplecia ulrichi** Winchell and Schuchert. Lorraine (Ord.).
Triplecia ulrichi W. and S., Minnesota Geol. Survey, III, 1893, p. 409, fig. 34.
Loc. Wykoff and Spring Valley, Minnesota.
- Triplesia ambigua* Hall = *Camarella aubigua*.
Triplesia calcifera Walcott = *Syntrophia calcifera*.
Triplesia congesta Hall = *Hyattella congesta*.
Triplesia lateralis Whitfield = *Syntrophia lateralis*.
Triplesia primordialis Whitfield = *Syntrophia primordialis*.
Triplesia putillus Hall = *Mimulus waldronensis*.
Triplesia quadricostata Hall = *Hyattella congesta*.
- TROPIDOLEPTUS** Hall. Genotype *Strophomena carinata* Conrad.
Tropidoleptus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 152 (unde-
 fined);—Twelfth Rep. *Ibidem*, 1859, p. 31 (undefined); Twentieth Rep.—
Ibidem, 1867, pp. 165, 279;—Pal. New York, IV, 1867, p. 404.—Nettelroth,
 Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 46.—Hall
 and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 302;—Thirteenth Ann. Rep.
 N. Y. State Geologist, 1895, p. 870.
- Tropidoleptus carinatus** (Conrad). Marcellus and Hamilton (Dev.).
Strophomena carinata Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 64.
Leptæna laticosta (Hall) de Verneuil, Bull. Soc. Geol. France, 2d ser., IV, 1847,
 p. 703.
Tropidoleptus carinatus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p.
 151, figs. 1, 2;—Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 31, figs.

Tropidoleptus carinatus (Conrad)—Continued.

1-4.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 828, fig. 672.—Hall, Pal. New York, IV, 1867, p. 407, pl. 62, figs. 2, 3.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 427, pl. 13, fig. 2.—Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 254, pl. 9, figs. 1, 9, 10, 26.—Derby, Bull. Mus. Comp. Zool., III, 1876, p. 282.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 35.—Nettelbladt, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 146, pl. 17, figs. 14, 15.—A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 73, pl. 4, figs. 32-34.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 304, figs. 227, 228, pl. 82, figs. 26-36.

Loc. New York; Falls of Ohio; Columbus, Ohio; Pennsylvania; Jackson County, Illinois; Erere, Province of Para, Brazil; Island of Coati, Lake Titicaca (Agassiz), and Rio Sicassica (Ulrich), Bolivia, South America; South Africa (Ulrich); France; Germany and England.

Tropidoleptus occidentens Hall.

Hamilton (Dev.).

Tropidoleptus occidentens Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 91;—Pal. New York, IV, 1867, p. 408, pl. 61A, figs. 50-52.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 82, figs. 37, 38.

Loc. Iowa City, Iowa.

UNCINULUS Bayle. Genotype *Rhynchonella subwilsoni* d'Orbigny.

Uncinulus Bayle, Explic. de la Carte Géolog. France, IV, Atlas, 1878, pl. 11, figs. 17-20.—Waagen, Palaeontologica Indica, Ser. XIII, I, 1883, p. 424.—Ehbert, Fischer's Manuel de Conchyliologie, 1887, p. 1306.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 195;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 828.

Uncinulus abruptus Hall.

Lower Helderberg (Dev.).

Rhynchonella abrupta Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 68, fig. 1;—Pal. New York, III, 1859, p. 228, pl. 31, fig. 3.

Uncinulus abruptus Hall and Clarke, VIII, Pt. II, 1893, p. 199, pl. 58, figs. 15-21.

Loc. Albany and Schoharie counties, New York.

Uncinulus campbellanus (Hall).

Lower Helderberg (Dev.).

Rhynchonella campbellana Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 79;—Pal. New York, III, 1859, p. 239, pl. 43, fig. 2.

Loc. Albany County, New York.

Uncinulus mutabilis Hall.

Lower Helderberg (Dev.).

Rhynchonella mutabilis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 66, figs. 1-7;—Pal. New York, III, 1859, p. 225, pl. 29, fig. 4; pl. 30, figs. 1, 2.

Uncinulus mutabilis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 199, pl. 58, figs. 22-25.

Loc. Schoharie and Carlisle, New York.

Uncinulus nobilis Hall.

Lower Helderberg (Dev.).

Rhynchonella nobilis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 80, figs. 1-3.—Rogers, Geol. Pennsylvania, II, 1858, p. 825, fig. 645.—Hall, Pal. New York, III, 1859, p. 240, pl. 43, fig. 3.

Uncinulus nobilis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 58, fig. 26.

Loc. Albany and Schoharie counties, New York; Pennsylvania.

Uncinulus nucleolatus Hall.

Lower Helderberg (Dev.).

Rhynchonella nucleolata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 68;—Pal. New York, III, 1859, p. 227, pl. 31, figs. 1f, 2.—Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 110, pl. 3, fig. 5.

Uncinulus nucleolatus Hall—Continued.

Uncinulus nucleolata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 199.
Loc. Schoharie and Carlisle, New York; Square Lake, Maine; St. Blandine, New Brunswick, Canada.

Uncinulus pyramidatus Hall.

Lower Helderberg (Dev.).

Rhynchonella pyramidata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 70;—Pal. New York, III, 1859, p. 229, pl. 32, figs. 1, 2.

Uncinulus pyramidatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 58, figs. 27, 28.

Loc. Albany County, New York.

Uncinulus stricklandi (Sowerby).

Niagara (Sil.).

Terebratula stricklandi Sowerby, Murchison's Sil. System, 1839, pl. 13, fig. 19.

Rhynchonella tennesseensis Hall (non Roemer), Trans. Albany Institute, IV, 1860, p. 228;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., Doc. ed., 1876, pl. 26, figs. 34-40.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 496, pl. 3, figs. 2-4;—Tenth Rep. State Geol. Indiana, 1881, p. 128, pl. 3, figs. 2-4.

Rhynchonella stricklandi Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., Doc. ed., 1879, p. 165, pl. 26, figs. 34-40;—Eleventh Rep. State Geol. Indiana, 1882, p. 308, pl. 26, figs. 34-40.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 81, pl. 27, figs. 9-11; pl. 29, figs. 3-6.

Uncinulus (Uncinulina) stricklandi Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 58, figs. 38-40.

Loc. Europe; Waldron, Indiana; Louisville, Kentucky.

Uncinulus vellicatus Hall.

Lower Helderberg (Dev.).

Rhynchonella vellicata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, pp. 69, 71, figs. 2, 3;—Pal. New York, III, 1859, p. 230, pl. 33, fig. 1.

Uncinulus vellicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 199.

Loc. Albany and Schoharie counties, New York; Dalhousie, New Brunswick, Canada.

VITULINA Hall.Genotype *V. pustulosa* Hall.

Vitulina Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 72, figs. 1, 2;—Pal. New York, IV, 1867, p. 410.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 138;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 804.

Vitulina pustulosa Hall.

Hamilton (Dev.).

Vitulina pustulosa Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 82;—Pal. New York, IV, 1867, p. 410, pl. 62, fig. 1.—Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 255, pl. 9, figs. 2, 6-8, 11-13, 15, 20, 21, 27, 32.—Derby, Bull. Mus. Comp. Zool., III, 1876, p. 282.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 36.—A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1891, p. 273;—*Ibidem*, Beilageband, VIII, 1892, p. 71, pl. 4, figs. 26-29.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 139, 317, pl. 82, figs. 18-25.

Loc. Near Tully and Tinkers Falls, New York; Monroe County, Pennsylvania; Erere, Province of Para, and provinces Parana and Matto Grosso, Brazil; island of Coati, Lake Titicaca, Tarabuco and Rio Sicacica, Bolivia; South Africa.

WALDHEIMIA King.Genotype *W. flavescens* Lamarck.

Waldheimia King, Mon. Permian Fossils, Pal. Soc., 1850, p. 81.—Dall, American Jour. Conch., VI, 1870, p. 107.

Waldheimia (?) catorcensis Aguilera.

Jurassic.

Waldheimia catorcensis Aguilera, Bol. Com. Geologica de Mexico, I, 1895, p. 1, pl. 2, fig. 8.

Loc. Rancho Alamitos, San Luis, Potosi, Mexico.

Waldheimia compacta White and St. John = *Cryptacanthia compacta*.

Waldheimia coutinhoana Derby = *Harttina coutinhoana*.

Waldheimia deweyi Hall = *Parazyga deweyi*.

Waldheimia formosa Hall = *Rhynchospira formosa*.

Waldheimia globosa Hall = *Rhynchospira globosa*.

Waldheimia imbricata Cooper = *Terebratella?* *imbricata*.

***Waldheimia kennedyi* Dall.**

Miocene.

Waldheimia kennedyi Dall, Proc. California Acad. Sci., 1874 (extract, p. 4).

Loc. Cerros Island, Lower California.

Waldheimia rectirostra Hall = *Rhynchospira rectirostris*.

Whitfieldia Davidson = *Meristina*.

WHITFIELDDELLA Hall and Clarke. Genotype *Atrypa nitida* Hall.

Whitfieldella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 58;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 766.

Whitfieldella* (?) *billingsana (Meek and Worthen). Niagara (Sil.).

Centronella billingsiana Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 352, figs. a, b, c; pl. 6, fig. 5.

Loc. Alexander County, Illinois.

Whitfieldella* (?) *bisulcata (Vanuxem). Lower Helderberg (Dev.).

Atrypa bisulcata Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 112.

Merista bisulcata Hall, Pal. New York, III, 1859, p. 253.

Loc. Litchfield, New York.

***Whitfieldella cylindrica* Hall.**

Clinton-Niagara (Sil.).

Atrypa cylindrica Hall, Pal. New York, II, 1852, p. 76, pl. 24, fig. 2.

Atrypa crassirostra Hall, Pal. New York, 1852, p. 269, pl. 55, fig. 4.

Merista cylindrica Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.

Athyris cylindrica Billings, Geol. Canada, 1863, p. 317, fig. 333;—Geol. Canada, 1863, p. 317, fig. 332.

Meristella (? *Meristina*) *cylindrica* Meek, Pal. Ohio, I, 1873, p. 180, pl. 15, fig. 2.

Whitfieldella cylindrica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60, pl. 40, figs. 16-22.

Loc. Lockport, New York; Hillsboro, Ohio; Hamilton, Ontario; Anticosti.

Whitfieldella* (?) *harpalyce (Billings).

Lower Helderberg (Dev.).

Athyris harpalyce Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 116, pl. 3, fig. 14.

Whitfieldella (?) *harpalyce* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60.

Loc. Square Lake, Maine.

Whitfieldella hyale (Billings).

Guelph (Sil.).

Charionella? *hyale*, Billings, Pal. Fossils, I, 1862, p. 166, fig. 150.

Whitfieldella hyale Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60.

Charionella hyale Hall and Clarke, *Ibidem*, pl. 42, figs. 20, 21.

Loc. Galt and Elora, Ontario; Wisconsin (Whitfield).

***Whitfieldella intermedia* Hall.**

Clinton-Niagara (Sil.).

Atrypa intermedia Hall, Pal. New York, II, 1852, p. 77, pl. 24, figs. 3, 4, ?6.—Rogers, Geol. Pennsylvania, II, 1858, Pt. II, p. 823, fig. 634.

Merista intermedia Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.

Athyris intermedia Nicholson and Hinde, Canadian Jour. Sci., XIV, 1874, p. 157.—Nicholson, Pal. Prov. Ontario, 1875, p. 61, fig. 32A.

Whitfieldella intermedia Hall—Continued.

Whitfieldella intermedia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60, pl. 40, figs. 1, 2.

Loc. Lockport, New York; Thorold, Ontario; Pennsylvania.

Whitfieldella (?) julia (Billings).

Anticosti (Sil.).

Athyris julia Billings, Pal. Fossils, I, 1862, p. 146, fig. 124.

Meristella julia Miller, N. American Geol. Pal., 1889, p. 354.

Loc. Anticosti.

Whitfieldella (?) naviformis Hall.

Clinton-Niagara (Sil.).

Atrypa naviformis Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 71, fig. 3;—Pal. New York, II, 1852, p. 76, pl. 24, fig. 1.—Nicholson and Hinde, Canadian Jour. Sci., n. ser., XVI, 1874, pp. 144, 157.

Meristella naviformis Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Athyris naviformis Billings, Geol. Canada, 1863, p. 317, fig. 320.—Nicholson, Pal. Prov. Ontario, 1875, p. 62, fig. 32E.

Whitfieldella naviformis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60, pl. 40, fig. 3.

Loc. Rochester, Sodus, etc., New York; Dundas, Ontario; Anticosti.

Whitfieldella nitida Hall.

Niagara (Sil.).

Atrypa nitida Hall, Geol. New York; Rep. Fourth Dist., Tables of Organic Remains, 13, 1843, fig. 5;—Pal. New York, II, 1852, p. 268, pl. 55, fig. 1.—Billings, Canadian Nat. Geol., I, 1856, p. 137, pl. 2, fig. 9.

Merista nitida Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Athyris nitida Hall, Geol. Canada, 1863, p. 317, fig. 334.

Meristella nitida Hall, Trans. Albany Institute, IV, 1863, p. 226.

Meristina nitida Hall, Pal. New York, IV, 1867, p. 299;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 169, pl. 25, figs. 1-7;—Eleventh Rep. State Geol. Indiana, 1882, p. 300, pl. 25, figs. 1-7.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 102, pl. 33, figs. 10, 11.—Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 70, pl. 7, figs. 6-10.

Whitfieldella nitida Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 59, figs. 43, 44; pl. 40, figs. 4-13.

Loc. Lockport, etc., New York; Hamilton, Ontario; Waldron, Indiana; Louisville, Kentucky; Anticosti.

Whitfieldella nitida oblata Hall.

Niagara (Sil.).

Atrypa nitida var. *oblata* Hall, Pal. New York, II, 1852, p. 269, pl. 55, fig. 2.

Merista nitida var. *oblata* Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Loc. Lockport, etc., New York.

Whitfieldella (?) nucleolata (Hall.)

Coralline (Sil.).

Atrypa nucleolata Hall, Pal. New York, II, 1852, p. 328, pl. 74, fig. 10.

Merista nucleolata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Meristella nucleolata Whitfield, Geol. Wisconsin, IV, 1882, p. 321, pl. 25, fig. 5.

Loc. Schoharie, New York; near Milwaukee, Wisconsin.

Whitfieldella oblata Hall.

Medina (Sil.).

Atrypa oblata Hall, Pal. New York, II, 1852, p. 9, pl. 4, figs. 4, 5.

Merista oblata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Whitfieldella (?) oblata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60.

Loc. Lockport, New York.

Whitfieldella sulcata (Vanuxem).

Waterlime (Sil.).

Atrypa sulcata Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 112, fig. 5.—Hall, *Ibidem*, Rep. Fourth Dist., 1843, p. 142, fig. 5.

Merista sulcata Miller, American Pal. Fossils, 1877, p. 115.

Loc. Near Vienna village, New York.

WILSONIA Kayser.Genotype *Terebratula wilsoni* Sowerby.

Wilsonia Kayser, Zeitschr. d. deutsch. geolog. Gesselsch., XXIII, 1871, p. 502.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 195;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 827.

Ucinulina Bayle, Explic. de la Carte Géolog. France, IV, 1878, Atlas, pl. 13, figs. 13-16.

Obs. A subgenus of *Camarotoëchia*.

Wilsonia kokomoensis (Miller).

Waterline (Sil.).

Rhynchonella kokomoensis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 312, pl. 9, figs. 22-24.

Loc. Kokomo, Indiana.

Wilsonia saffordi Hall. Niagara and Lower Helderberg (Sil. and Dev.).

Rhynchonella saffordi Hall, Canadian Nat. Geol., V, 1860, p. 146.—Hall and Whitfield, Twenty-seventh Rep. N. Y. State Cab. Nat. Hist., 1875, pl. 9, figs. 27-29.—Dawson, Acadian Geol., 3d ed., 1878, p. 598.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 79, pl. 27, figs. 22-24; pl. 33, figs. 4-6.

Wilsonia saffordi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 198, pl. 58, figs. 5-14.

Loc. In the Arisaig group of Nova Scotia; Perry County, Tennessee; Louisville, Kentucky.

Wilsonia saffordi depressa (Nettelroth).

Niagara (Sil.).

Rhynchonella saffordi var. *depressa* Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 80, pl. 33, fig. 1-3.

Loc. Louisville, Kentucky.

Wilsonia wilsoni (Sowerby).

Niagara (Sil.).

Terebratula wilsoni Sowerby, Mineral Conchology, 1818, p. 118, fig. 3.

Rhynchonella wilsoni Roemer, Sil. Fauna d. West. Tennessee, 1860, p. 71, pl. 5, fig. 13.

Wilsonia wilsoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 198.

Loc. Europe; Decatur County, Tennessee; Louisville, Kentucky; Lake Temiscouata, New Brunswick.

YORKIA Walcott.Genotype *Y. wanneri* Walcott.

Yorkia Walcott, Proc. U. S. Nat. Mus., XIX, 1897, p. 714.

Yorkia wanneri Walcott.

Lower Cambrian.

Yorkia wanneri Walcott, Proc. U. S. Nat. Mus., XIX, 1897, p. 715, pl. 60, figs. 1-1c.

Loc. Emigsville, Pennsylvania.

Yorkia (?) washingtonensis Walcott.

Lower Cambrian.

Yorkia (?) *washingtonensis* Walcott, Proc. U. S. Nat. Mus., XIX, 1897, p. 715, pl. 60, fig. 3.

Loc. Salem, Washington County, New York.

ZYGOSPIRA Hall.Genotype *Atrypa modesta* Hall.

Stenocisma Hall (non Conrad), Pal. New York, I, 1847, p. 142.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 1864, p. 16.

Zygospira Hall, Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, p. 154, figs. 1, 2.—Billings, Canadian Nat. Geol., VII, 1862, p. 393.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 267.—Meek, Geol. Survey, Illinois, III, 1868, p. 377.—Davidson, Suppl. British Silurian Brachiopoda, Pal. Soc., 1882, p. 122.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 465.—Beecher and Schuchert, Biol. Soc. Washington, VIII, 1893, pp. 71-82.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 154.

Anazyga Davidson, Suppl. British Silurian Brachiopoda, Pal. Soc., 1882, p. 128.

ZYGOSPIRA Hall—Continued.

Hallina Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 471.

Protozyga Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 151.

Protozyga, Hallina and Zygospira Hall and Clarke, Thirteenth Ann. Rep. N. Y. State Geologist, 1895, pp. 809, 810, 812.

Zygospira æquila Sardeson = *Z. nicoletti*.

Zygospira anticostiensis Davidson = *Catazyga erratica*.

Zygospira cincinnatiensis Meek.

Lorraine (Ord.).

Zygospira cincinnatiensis (James) Meek, Pal. Ohio, I, 1873, p. 126, pl. 11, fig. 5.—

Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 59.—Hall and Clarke, Pal.

New York, VIII, Pt. II, 1895, pl. 54, figs. 13, 14.

Loc. Cincinnati, Ohio.

Zygospira concentrica Ulrich.

Lorraine (Ord.).

Zygospira concentrica Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, 1879, p. 14,

pl. 7, fig. 10.

Loc. Cincinnati, Ohio.

Zygospira deflecta Hall.

Trenton (Ord.).

Atrypa deflecta Hall, Pal. New York, I, 1847, p. 140, pl. 33, fig. 4.

Zygospira deflecta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 157.

Loc. Lewis County, New York; Ottawa, Canada.

Zygospira exigua (Hall).

Trenton (Ord.).

Atrypa exigua Hall, Pal. New York, I, 1847, p. 141, pl. 33, fig. 6.

Genus? *exigua* Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.

Protozyga *exigua* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 149, figs. 137, 138, pl. 54, figs. 47, 48.

Loc. Lowville, Watertown, and Martinsburg, New York.

Zygospira erratica Davidson = *Catazyga erratica*.

Zygospira headi Hall = *Catazyga headi*.

Zygospira kentuckiensis James.

Lorraine (Ord.).

Zygospira modesta var. *kentuckiensis* James, The Paleontologist, 1878, p. 7.

Zygospira kentuckiensis Nettelroth, Kentucky Fossil Shells, Mem. Kentucky

Geol. Survey, 1889, p. 138, pl. 34, figs. 21-25.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 54, figs. 11, 15, 16.

Loc. Oldham and Jefferson counties, Kentucky.

Zygospira (?) *mica* (Billings).

Anticosti (Sil.).

Rhynchonella mica Billings, Cat. Sil. Foss. Anticosti, 1866, p. 44.

Zygospira ? *mica* Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 157.

Loc. Division 4 of the Anticosti group, Anticosti.

Zygospira (?) *minima* Hall.

Niagara (Sil.).

Zygospira minima Hall, Descrip. n. sp. Foss. Waldron, Indiana, 1879, p. 14;—

Eleventh Rep. Indiana State Geologist, 1882, p. 305, pl. 27, fig. 7;—Trans. Albany Institute, X, 1883, p. 70.

Loc. Waldron, Indiana.

Zygospira modesta Hall.

Utica and Lorraine (Ord.).

Atrypa modesta (Say) Hall, Pal. New York, I, 1847, p. 141, pl. 15, fig. 15;—Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 69.

Zygospira modesta Hall, Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, p. 154;—Twentieth Rep. Ibidem, 1867, p. 267, figs. 1, 2.—Meek, Pal. Ohio, I, 1873,

p. 125, pl. 11, fig. 4.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 58.—

Davidson, Suppl. British Sil. Brachiopoda, Pal. Soc., 1882, p. 122.—Winchell

Zygospira modesta Hall—Continued.

and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 467, pl. 34, figs. 42-44.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 155, figs. 146-149, pl. 54, figs. 7-10, 12.—Keyes, *Geol. Survey Missouri*, V, 1895, p. 98.

Rhynchonella? *modesta* Billings, *Geol. Canada*, 1863, p. 211, fig. 211.

Loc. Cincinnati, Ohio; Turin, etc., New York; Lattners, Iowa; Spring Valley, Minnesota; Wisconsin; St. Louis County, Missouri; Ottawa, Canada (Ami).

Zygospira nicoletti Winchell and Schuchert. Trenton (Ord.).

Harrina nicoletti W. and S., *American Geol.*, IX, April 1, 1892, p. 293;—*Minnesota Geol. Survey*, III, 1893, p. 474, pl. 34, figs. 59-62.

Zygospira aquila Sardeson, *Bull. Minnesota Geol. Survey*, III, April 9, 1892, p. 335, pl. 4, figs. 15-18.

Zygospira nicoletti Beecher and Schuchert, *Biol. Soc. Washington*, VIII, Pt. II, 1893, p. 71, pl. 10, fig. 23; pl. 11, figs. 11, 12.

Loc. Minneapolis, Rochester, and Fountain, Minnesota; Decorah, Iowa; Beloit, Wisconsin; Auburn, Missouri.

Zygospira paupera Billings. Anticosti (Sil.).

Zygospira paupera Billings, *Cat. Sil. Fossils Anticosti*, 1866, p. 46.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 157.

Loc. Division 3 of Anticosti group, Anticosti.

Zygospira putilla Hall and Clarke. ? Lorraine (Ord.).

Zygospira putilla Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1893, p. 157, fig. 150, p. 365, pl. 54, figs. 35-37; pl. 83, figs. 29, 30.

Loc. Pike County, Missouri.

Zygospira recurvirostris (Hall). Trenton (Ord.).

Atrypa recurvirostris Hall, *Pal. New York*, I, 1847, p. 140, pl. 33, fig. 5.

Rhynchonella recurvirostris Billings, *Geol. Canada*, 1863, p. 168, fig. 152.

Anazyga recurvirostra Davidson, *Suppl. British Sil. Brachiopoda*, *Pal. Soc.*, 1892, p. 129.

Zygospira recurvirostra Winchell and Schuchert, *Minnesota Geol. Survey*, III, 1893, p. 466, pl. 34, figs. 38-41.—Beecher and Schuchert, *Biol. Soc. Washington*, VIII, 1893, p. 71, pl. 10, figs. 7-21; pl. 11, figs. 1-10.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, pl. 54, figs. 1-6.—Whiteaves, *Pal. Foss.*, III, Pt. III, 1897, p. 180.

Loc. New York; Kentucky; Iowa; Minnesota; Wisconsin; Ottawa, Canada; Lake Winnipeg, Manitoba. According to Billings it occurs also in the Lorraine group of Anticosti.

Zygospira saffordi Winchell and Schuchert. Trenton (Ord.).

Harrina saffordi W. and S., *American Geol.*, IX, 1892, p. 292;—*Minnesota Geol. Survey*, III, 1893, p. 473, pl. 34, figs. 55-58.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, pl. 83, figs. 36-38.

Zygospira saffordi Beecher and Schuchert, *Biol. Soc. Washington*, VIII, 1893, p. 71, pl. 10, fig. 22; pl. 11, figs. 13, 13a.—Hall and Clarke, *Pal. New York*, VIII, Pt. II, 1895, p. 151, figs. 139-141.

Loc. Lebanon, Tennessee; Highbridge, Kentucky.

Zygospira (?) subconcava Meek and Worthen. Lower Helderberg (Dev.).

Zygospira subconcava Meek and Worthen, *Geol. Survey Illinois*, III, 1868, p. 380, pl. 7, fig. 1.

Loc. Perry County, Missouri.

Zygospira uphami W. and S. = *Catazyga uphami*.

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