

made, though numerous species may be found in the lower coal measures.

All the specimens obtained were forwarded to Mr. Meek, for identification. The list is given hereafter, together with descriptions of five new species. Mr. Meek expresses his conclusions in the following letter :

WASHINGTON, D. C., *November 8, 1870.*

Prof. STEVENSON :

DEAR SIR :—I have examined the carboniferous fossils, sent by you from West Virginia, with as much care as other engagements would permit. Of those from the lower carboniferous limestone of Monongalia county, there are about seventeen species. Most of these, however, I have not been able to identify with known forms, owing mainly to the imperfect condition of the specimens. A few of them, however, may be found to be new species, when better specimens can be examined. Six or seven of the species are forms found in the great upper division of the lower carboniferous limestone series of the Western States—the Chester Group of the Illinois Reports. Some of the others will probably also prove to be Chester species ; while one (*Hemipronites crassus*) has not before, I believe, been found below the coal measures, through the whole of which it ranges farther westward. It is likewise worthy of note that another form (a short, rapidly expanding *Cyrtoceras*,) is most nearly like a western coal measure species, while there is also among the specimens an imperfect example of a *Bellerophon*, marked very like *B. carbonarius* of Cox, from the coal measures.

From all the evidence yet obtained, I can arrive at no other conclusion than that this [portion of the] Monongalia limestone belongs to the horizon of the Chester Group. Six or seven of the species are, as already indicated, certainly Chester forms, while several others are either identical with Chester species, or most nearly related to forms of that age. The fact that one of the species is also known to range through the whole of the coal measures, and one or two others are nearly related to forms of that age, rather confirms the conclusion that this rock belongs to the horizon of the Chester Group than otherwise, especially when the species are viewed in connection with their associates ; for it is now well known that some of the coal measure types of the West have, as might be expected, closely allied representatives in the Chester Group, while several Brachiopods are known to range from below the Chester Group into the coal measures.

So far as I am informed, this is the farthest point to the eastward at which the Chester Group, or indeed any other particular division of the lower carboniferous limestone series of the West, has been yet recognized.

The specimens sent from the lower coal measures are nearly all forms common in the coal series of Indiana, Illinois, Missouri, Kansas, Nebraska, etc., though few of them have before been found so far eastward. In some of the States mentioned, nearly all of these species range through the whole of the coal measures. Some of them, however, are locally more restricted. This great range of the species of invertebrate remains in the coal measures of the Western States has long since satisfied me that these fossils cannot generally be relied upon as a means of identifying particular beds or horizons in our coal measures throughout wide areas ; though particular groupings of species may sometimes serve as guides in this respect, within limited areas. The coal measure forms, however, enable us at once to distinguish beds of that age from any of the lower carboniferous or older rocks.

The great length of time through which most of these fossils must have continued to live, will be better understood when it is stated that nearly *all* of the species enumerated in this list from the lower coal measures of West Virginia, also occur even in the upper coal measure beds in Nebraska, referred by Professors Marcon and Geinitz to the *Permian* or so-called *Dyas*.* Indeed, the collections from these two widely separated localities and horizons, contain so many of the same species, that if shown to almost any geologist unacquainted with the range of species in our coal measures, he would scarcely hesitate to adopt the conclusion that they came from *exactly* the same horizon in the series. Yet from what is known of the geology of your region, and of that of the States farther west, it is probable that the beds from which your collections were obtained, hold a position from 1,000 to 1,500 feet or more below those alluded to in Nebraska.

From such facts as this, it would seem that although there were many elevations and depressions, as well as other consequent changes, the climatic and other physical conditions affecting animal life, must have remained remarkably uniform throughout the whole of the long-continued coal period.

Very truly yours,

F. B. MEEK.

*I have marked with an asterisk in the list, each of the species known to occur, with numerous other carboniferous species, in the so-called *Dyas* of Nebraska.

LISTS OF CARBONIFEROUS FOSSILS FROM WEST VIRGINIA,

MADE OUT BY F. B. MEEK.

A. LOWER CARBONIFEROUS (CHESTER GROUP) SPECIES.

1. *Monticulipora*.—[All the lower carboniferous species were obtained on Cheat river, about two miles above Ice's ferry.—J. J. S.]

2. *Crinoidal Columns*.

3. *Hemipronites Crassus*. Meek and Hayden.—The specimens seem to agree in all respects with this coal measure form, which I had been led to suspect might be *H. crenistria*, Phillip's sp. Mr. Davidson, however, to whom I sent specimens of it, says: he has never seen in the species "*crenistria*" the peculiar mesial septum seen in the ventral valve of *H. crassus*. The same septum is seen in the specimens here under consideration.

* 4. *Productus Fasciculatus*. McChesney.—This may be only a variety of *P. elegans*. Norwood and Pratten.

* 5. *Productus Pileiformis*. McChesney.

* Specimens marked with an asterisk in list A are identical with forms occurring in the Chester group in the Western States.

* 6. *Athyris Subquadrata*. Hall.—The title of this to rank as a distinct species from *A. subtilita* may be questionable.

7. *Spirifer Keokuk* var. Hall. (?)—Seems also to be near *S. opimus*, Hall, from the coal measures.

* 8. *Pinna*. Undt. sp.—Fragments of a longitudinally-ribbed species that is very like *P. Missouriensis*. Swallow. It occurs in the Chester group in Illinois, Missouri, etc.

9. *Modiola*, or *Myalina*.—Probably new.

* 10. *Allorisma Clavata*. McChesney.—(*A. antiqua*. Swallow.)—This is a very variable species, and is often so distorted by accidental pressure as to present widely different forms.

11. *Allorisma*. Undt. sp.—Along with *A. clavata* are numerous specimens which differ so widely from it, and from each other, that I am inclined to think there are among them two or three other variable species. But I have not had time to study the series with sufficient care to be able to decide on this point.

12. *Macrocheilus*. Undt. sp.

13. *Naticopsis*. Undt. sp.

14. *Bellerophon*. Undt. sp.—Probably two or more species, one of which is most nearly like *B. carbonarius* of the western coal measures.

15. *Pleurotomaria*. Undt. sp.

* 16. *Straparollus Planidorsatus*. Meek and Worthen.

(—*Euomphalus Perspectivus*. Swallow.)

17. *Cyrtoceras*. Undt. sp.—Seems to be closely related to *C. curtum*. Meek and Worthen, from the coal measures.

†18. *Phillipsia Stevensoni*. Meek.

B. LOWER COAL MEASURES SPECIES.

* 1. Crinoidal Fragments.—Some pentagonal, star-shaped discs of columns. [Stratum No. 29.]

2. Crinoidal Columns.—[Strata Nos. 20 and 29.]

3. *Erisocrinus*. Undt. sp.—[Stratum No. 20.]

4. *Hemipronites Crassus*. Meek & Hayden.—[Generally distributed.]

5. *Chonetes Smithii*. Norwood & Pratten.—[Stratum No. 29.]

6. *Chonetes*.—Seems to differ from *C. granulifera*, Owen, only in being smaller. [Stratum No. 28.]

* 7. *Productus Nebrascensus*. Owen.—[Generally distributed.]

* 8. *Productus Prattenanus*. Norwood.—[Generally distributed.]

* 9. *Productus Semireticulatus*. Martin sp.—[Stratum No. 29. Seems to be rare in our beds.]

10. *Productus*. Undt. sp.—Very small, concentrically wrinkled. [Stratum No. —.]

* 11. *Athyris Subtilita*. Hall.—Very abundant and presenting all the usual varieties. [Of general distribution.]

† Species marked with a dagger are new species, of which descriptions are at the end of the lists.

- * 12. *Spirifer (Martinia) Planoconvexus*. Shumard.
- * 13. *Spirifer Cameratus*. Morton.
- * 14. *Discina Nitida*.?—[Stratum 28.]
- *? 15. *Pseudomonotis*—(Monotis of some authors, but not of Brown.)—
A fragment, but showing exactly the irregular radiating costæ and striæ,
with vaulted scales on the ribs, seen in that genus. [29.]
- * 16. *Aviculopecten Carbonarius*. Stevens, sp—*Pecten Broadheadii*,
Swallow & P. Hawni, Geinitz. [20 and 29.]
- 17. *Aviculopecten*. Undt. sp.—Probably *A occidentalis*. Shumard.
- * 18. *Myalina Subquadrata*. Shumard, var. *ampla*.—[Stratum 29.]
- 19. *Myalina*. Undt. sp.—Very small, probably a young shell. [Stratum 28.]
- 20. *Allorisma*. Undt. sp.—[Stratum 29.]
- 21. *Allorisma*. Undt. sp.—[Stratum 20.]
- * 22. *Nucula Ventricosa*. Hall.—[Strata 20 and 28.]
- * 23. *Nucula Parva*. McChesney.—[Stratum 28.]
- † 24. *Nucula Anodontoides*. Meek.—[Strata 20 and 28.]
- * 25. *Nuculana Bellistriata*. Stevens sp.—A very small attenuated variety. Common in the so-called upper Dyas, Nebraska City, Nebraska. [Strata 20 and 28.]
- † 26. *Yoldia Carbonaria*. Meek.—[Stratum 20.]
- † 27. *Yoldia Stevensoni*. Meek.—[Stratum 20.]
- * 28. *Schizodus*. Undt sp.—[Stratum 20.]
- * 29. *Edmondia Aspenwalensis*. Meek.—[Stratum 20.]
- 30. *Astartella*. Undt sp.—[Strata 20 and 28.]
- † 31. *Macrodon obsoletus*. Meek.—[Stratum 28.]
- 32. *Macrocheilus Primigenius*. Conrad.—[Strata 20 and 28.]
- * 33. *Macrocheilus Ventricosus*. Hall.—[Strata 20 and 28.]
- 34. *Macrocheilus*. Undt. sp.—[Strata 20 and 28.]
- 35. *Polyphemopsis*. Peracutus. Meek & Worthen.—[Stratum 20.]
- * 36. *Euomphalus rugosus*. Hall, not Sowerby.—[Stratum 20.]
- * 37. *Bellerophon Montfortianus*. Norwood & Pratten.—[Strata 20 and 28.]
- * 38. *Bellerophon Percarinatus*. Conrad—[Strata 20 and 28.]
- * 39. *Bellerophon Carbonarius*. Cox.—[Strata 20 and 28.]
- 40. *Bellerophon Meekianus*. Swallow.—[Strata 20 and 28.]
- * 41. *Pleurotomaria Grayvilliensis*. Norwood & Pratten.—[Strata 20 and 28.]
- 42. *Pleutomaria*. Undt sp.—A very small, depressed species. [Stratum 28.]
- * 43. *Orthoceras Cribrosum*. Geinitz.—[Strata 20 and 28.]

* The species marked with an asterisk in list B, are known to range through the whole of the coal measures in the West, even into the upper beds at Nebraska City, Nebraska, referred by Profs. Marcon and Geinitz to the Permian, or so-called Dyas.

† New species. The descriptions will be found at the end of the lists.

- * 44. *Nautilus Occidentalis*. Swallow.—[Strata 20 and 28.]
 45. *Nautilus*. Undt sp.—[Stratum 28.]
 * 46. *Phillipsia Sangamonensis*. Meek & Worthen.—[Stratum 20.]

UPPER COAL MEASURE SPECIES.

1. *Solenomya*. Undt sp.

DESCRIPTIONS OF NEW SPECIES.

BY F. B. MEEK.

December, 1870.

MACRODON OBSOLETUS—*Meek*.

This species agrees very nearly with *M. (Arca) carabonaria* of Cox, (Kentucky Report, Atlas pl. VIII, fig. 5,) excepting that it seems not to attain quite so large a size, and has radiating costæ only on the posterior dorsal region; all the other parts of the valves being marked merely by concentric lines, and sometimes rather strong, irregular ridges and furrows of growth. These concentric striæ cross the radiating lines of the posterior dorsal region, so as to form a subcancelled marking on that part of the valves.

Length, 1 inch; height 0.45 inch; convexity, about 0.26 inch.

Locality and position—lower coal measures of Monongalia county, W. Va.

NUCULA (?) ANODONTOIDES.—*Meek*.

Shell ovate, ventricose, the greatest convexity being in the umbonal region; posterior side short, faintly sub-truncate vertically at the immediate extremity; basal margin semi-elliptical in outline; cardinal margin nearly straight externally, equaling about half the length of the valves, carinate at the extremities; anterior side rather long, very narrowly rounded in the middle of the extremity, to which point the basal margin rounds up rather gradually, and the anterior dorsal edge slopes obliquely from the end of the hinge; beaks moderately prominent, convex, incurved without very distinct obliquity, and located about half-way between the middle and the posterior side; umbonal slopes, both before and behind, sub-angular, in consequence of the presence of a lunule and escutcheon-like impression, of which that on the anterior or longer side is larger, being usually continued nearly or quite to the extremity of that side. Surface smooth, or only showing under a magnifier very obscure lines of growth.

Length of the largest specimen, 0.57 inch; height, 0.40 inch; convexity, 0.30 inch. Some of the other specimens are proportionally more convex.

I have described the shorter side as the posterior of this shell, which, of course, would probably be incorrect, if it is not a true *Nucula*. Although I only know from some of the imperfect specimens, that it has a rather coarsely crenate hinge, there can be little doubt that it has an internal ligament, and thus differs from *Tellinomya* and other palaeozoic types that have been separated under other names, since the dorsal margin of the valves can be seen to fit closely all the way along, so as to show no traces of an external ligament. It has not the physiognomy of the typical modern *Nuculas*, but looks externally like a miniature *anodon*. It seems to be closely allied to *N. Beyrichi*, V. Schaur, from the Permian of Germany; but it is larger, more robust, more nearly smooth, and differs in the lunule-like impressions before and behind the beaks.

Locality and position.—Just below the Mahoning sandstone, Monongalia county, W. Va. Coal measures.

YOLDIA STEVENSONI.—*Meek.*

Shell much compressed, very thin, longitudinally elliptic-subovate, being about twice as long as high, with the widest part a little before the middle; anterior side narrowly rounded; posterior more contracted and compressed, with the extremity faintly truncated above the middle; basal outline broadly semi-ovate, being a little more prominent anteriorly; cardinal border sharply carinate, and provided with a marginal furrow on each valve, both before and behind the beaks, slightly convex before and concave behind the beaks, in outline; umbonal slopes not angular; beaks nearly central and depressed. Surface ornamented by fine, regular, concentric, linear furrows, separated by spaces two or three times their own breadth.

Length, 0.78 inch; height, 0.38 inch; convexity, 0.16 inch.

A very neat, remarkably compressed species, having exactly the form and external appearance of a true *Yoldia*, but its hinge and interior are unknown. Named in honor of Prof. J. J. Stevenson, of West Virginia University.

Locality and position.—Dark shale just below the Mahoning sandstone, Monongalia county, W. Va. Coal measures.

YOLDIA CARBONARIA.—*Meek.*

This species is much more convex than *Y. Stevensoni*, as well as proportionally longer, particularly behind the beaks, while its anterior end is shorter and more narrowly rounded, and its posterior dorsal slope is straighter and more declining to the narrowly rounded extremity. Its dorsal border also wants the carinate and the marginally sulcate character of that species, and its surface the regularly sulcate ornamentation, being marked merely with very obscure irregular lines of growth. Its beaks are more convex and proportionally farther forward than in *Y. Stevensoni*.

Locality and Position.—Dark shale just under the Mahoning sandstone of the coal measures. Monongalia county, W. Va.

PHILLIPSIA STEVENSONI.—*Meek.*

The only specimens of this species obtained consist of a part of the glabella and the pygidium. The latter is very similar to the corresponding part of *P. Portlockii*, M. & W. (hoc. Acad. N. S., Philad., Dec., 1865, p. 268) from the Keokuk beds, excepting that it is proportionally longer, more convex, and more narrowly rounded behind; its length and breadth being very nearly or quite equal, and its height half the breadth. Its lateral lobes also slope more abruptly to the margins, which are not flattened, but very slightly thickened, obscurely striated, and abruptly sloping. It likewise shows no traces of either the furrows or granules seen on the anterior segments of the lateral lobes of *P. Portlockii*, the surface of these lobes being entirely smooth, excepting minute pitting or punctures. Its prominent mesial lobe is flattened or slightly furrowed on each side, and shows fourteen segments, ornamented each by a row of small granules; while each lateral lobe has ten less strongly defined, and more depressed segments, separated merely by slight linear furrows.

The fragment of a glabella, found associated with the pygidium, above described, shows it to be rather depressed, oval-oblong, widest between the eyes, with a comparatively large sub-trigonal posterior lateral lobe on each side, extending forward to about the middle of the inner margin of each of the small palpebral lobes; and just before each of these larger lateral lobes there is another faintly defined, very small, oblique one, not extending quite so far forward as the palpebral lobes. The neck segment is comparatively wide antero-posteriorly, arched upward nearly or quite as high as the central part of the glabella, and, like the latter, ornamented by small granules.

Length of pygidium, 0.32 inch; breadth, 0.33 inch; height, 0.16 inch.

Named in honor of Prof. J. J. Stevenson, of West Virginia University.

Locality and Position.—Monongalia county, W. Va. Chester group of the Lower Carboniferous.

[I am under obligations to Col. W. A. Hanway, H. W. Brock, M. D., Messrs. D. H. Chadwick and E. Chisler, of Morgantown, and to Mr. John W. Guseman, on Decker's Creek, for assistance in collecting fossils and making measurements. I am also indebted to Mr. Moses D. Wells, of Morgantown, for information upon some points of our local geology, which I have already acknowledged in the body of the report.—J. J. S.]