ART. LII.—*Notice of a new Lower Oriskany Fauna in Columbia County, New York*; by C. E. BEECHER. *With an annotated list of fossils*; by J. M. CLARKE.

I.

IN 1890, while making collections and geological sections in the Becraft's Mountain region of Columbia County, New York, a fauna was discovered by the writer, which in many respects is new to the State. Its affinities are with the Oriskany, but its geological position is below the true Oriskany sandstone. It appears to include a part, at least, of what has been considered as the Upper Pentamerus limestone, and has been referred to the Lower Helderberg group on account of its lithological characters and upon insufficient paleontological grounds. The fauna of the Upper Pentamerus in its original locality (Schoharie, N. Y.) has previously been recognized to contain several species quite distinct from the Scutella, Shaly, and Lower Pentamerus limestones, which represent the typical Lower Helderberg group. Moreover, as the complete fauna has remained unknown and the series has been confused with the underlying Scutella limestone, no exact correlations have been made.

From the fossils now known from Becraft's Mountain and several other localities, it is evident that the relations of the fauna contained in the upper beds of the series above the Scutella limestone and just below the Oriskany sandstone are with the latter, and not with the Lower Helderberg group. This is shown by the presence in these beds of such typical Oriskany species as *Edriocrinus sacculus*, *Pholidops terminalis*, *Leptostrophia magnifica*, *Hipparionyx proximus*, *Leptocaelia flabellites*, *Spirifer arrectus*, *Spirifer arenosus*, *Cyrtina rostrata*, *Rhynchonella oblata*, and *Rensselaeria ovoides*. This list has been revised by Mr. C. Schuchert, who has made a careful study of the Oriskany brachiopods.

At Becraft's Mountain the rock is a hard, cherty, arenaceous limestone, weathering into a rotten fine-grained sandstone, preserving the moulds of the fossils or their silicified replacements. On Catskill Creek, near Leeds, as shown by specimens received from Mr. W. W. Dodge, the rock contains less sand, and does not weather into a softer condition. At Port Jervis, N. Y., it is in general still more calcareous, although there are some cherty layers, and many of the fossils are silicified. Here, too, the series is continuous from the Oriskany sandstone down through the trilobite beds of Mather, Horton and Barrett. The arenaceous character of the beds gradually

decreases downwards, carrying the typical Oriskany species into the *Dalmanites dentatus* layers and below, and making the whole series of this group at Port Jervis probably over two hundred feet in thickness, of which one hundred or more belong to the Lower Oriskany. The relations of these beds to the Oriskany was appreciated by Barrett,* who was led, however, to refer them to the Lower Helderberg on account of the occurrence of some doubtful Lower Helderberg species and their stratigraphical position.

In the paper on Becraft's Mountain by W. M. Davis,† the Upper Pentamerus, including the Scutella limestone, is stated to have a thickness of from forty to fifty feet, followed directly by the Cauda-galli shales. At Rondout, he recognized a recurrence of the Shaly limestone above the Scutella beds. The same conditions obtain at Becraft's Mountain, and at the top occur the few feet of cherty and arenaceous beds containing the Lower Oriskany fossils.

The paleontological aspect of this fauna is of much interest, especially on account of the large number of genera and species new to the Oriskany group and species new to science. Even the forms which are characteristic of the Oriskany sandstone above offer slight variations in size and features which enable them to be recognized as from a somewhat older horizon. As a whole, the fauna is transitional. A few of the Lower Helderberg types lingered; others were changed into species intermediate between Lower Helderberg and true Oriskany and Corniferous forms; and new types also appeared, which in the higher rocks reached a greater development. Among some of the new types of structure may be mentioned the coarsely plicate Leptocoelia, the Spirifers with plications in the sinus and the Corycephalus group of Dalmanites, having the outer margin of the cephalon denticulate. C. E. B.

II.

A preliminary List of the Species constituting the Oriskany fauna of Becraft's Mt., N. Y.

(Names in roman are of species present in the normal Oriskany or *Hipparionyx* fauna of Central New York and the Schoharie Section; for convenience of reference the letters H and D are placed before names of species belonging respectively to Lower Helderberg and upper-Lower, or Middle Devonian types.)

FISHES. 1. Spine of undetermined species.

ANNELIDS. 2. *Spirorbis* sp.

(D) 3. *Autodetus* sp. n. This genus is also represented in the Hamilton shales, but by a much larger species.

* Ann. Lyceum Nat. Hist. N. Y., vol. xi. p. 297, 1876.

† This Journal, III, vol. xxvi, pp. 381-389, Nov., 1883.

TRILOBITES. (H) 4. *Dalmanites* sp. n. A. A large *Odontochile* with a series of marginal crenulations about the cephalon, of the character of those in *D. pleuroptyx* of the Shaly limestone and *D. anchiops*, of the Schoharie grit, but more extensive than either. The lateral glabellar lobes are more confluent than in the earlier (Niagara and Lower Helderberg) species. The genal angles end obtusely or in small spines. The pygidium is broad and unusually short, ending in a sharp, angular termination, but not in a spine. Annulations simple and very distinct; about 10 on the axis and 9 on the pleurae. This is the largest and most abundant of the species. Some of the cephalons measure $3\frac{1}{4}$ inches in diameter.

(H) 5. *Dalmanites* sp. n. A. var. This is represented by a series of pygidia similar in annulation to the foregoing but persistently different in much smaller size, more slender form and tapering outline. It is closely similar to *D. micrurus*, of the Lower Helderberg, but less abundantly annulated.

6. *Dalmanites* sp. n. B. Long, slender pygidia with acute but not extended terminal spine. Annulations of axis about 15; of pleurae, 12. On the axis is a double median row of conspicuous tubercles and there are irregularly scattered tubercles on the pleural ribs. This may be compared in form and ornament with *D. dentatus*, of the Port Jervis series, but it is more abundantly annulated and without the strong caudal spine of that species.

7. *Dalmanites* sp. n. C. A single pygidium, quite distinct from the rest, has a tapering outline, high convexity, broad, acute caudal extremity and strong simple annulations. There are 7-8 annulations on the axis, 8-9 on the pleura, all terminating at a considerable distance from the extremity of the shield. The expression of this pygidium is well defined and suggests in some respects, that of a small, sharply annulated *Homalonotus*.

(H) 8. *Dalmanites* sp.? D. There is evidence of another species of this genus with a pygidium somewhat similar to that of *D. pleuroptyx*.

(D) 9. *Dalmanites phacoptyx*, Hall. This species has heretofore been known only in the Upper Helderberg limestone of the Province of Ontario.

(H, D) 10. *Phacops* sp. n. Heads and pygidia are not uncommon. The form of the glabella is somewhat appressed laterally and is suggestive of *P. cephalotes* Barr. The genal extremities bear a single spinule or tubercle as in *P. Logani*, of the Shaly limestone, and *P. pipa*, of the Upper Helderberg, but the glabella does not show the lateral furrows distinctive of the earlier species of this genus. The segments of the thorax bear nodes at the axial furrows, such as characterize *P. Logani*, though the annulations of the pygidium do not appear to be duplicate as in the Lower and Upper Helderberg species. Some small examples do not have the thoracic nodes and these may represent a distinct specific form.

(D) 11. *Phacops* (*Acaste*) cf. *anceps*, Clarke. This species has heretofore been found only in the Upper Helderberg of the Province of Ontario.

(D) 12. *Homalonotus* sp. Occasional fragments indicate a species of small size, differing from the gigantic *H. major*, occurring in the Oriskany sandstone of Ulster Co.

(H) 13. *Cordania** sp. n. Allied to *C. cyclurus*, Hall, of the Shaly limestone but differing in details of ornamentation.

(H, D) 14. *Cyphaspis* sp. n. Of the type of *C. caelebs* (Lower Helderberg) and *C. minuscula* (Upper Helderberg) but with proportionately much larger cephalon.

(D) 15. *Proetus* sp. n.? A. A small form of the *P. angustifrons-clarus*-Rowi type.

(D) 16. *Proetus* sp. n. B. A much larger form with highly convex glabella and multianulate pygidium; of the type of *P. crassimarginatus* of the Upper Helderberg.

(H) 17. *Acidaspis tuberculatus*, Conrad. A characteristic species of the Shaly limestone.

OSTRACODES. 18. *Leperditia* sp. 19. *Primitia* sp.

CIRRIPEDS. 20. *Turritepas* sp.

(CEPHALOPODS. No representative of these fossils has been observed.)

GASTROPODS. 21. *Platyceras tortuosum*, Hall. 22. *P. nodosum*, Conrad.

23. *Strophostylus expansus*, Conrad. 24. *Diaphorostoma ventricosum*, Conrad.

*The writer has introduced this name in a paper now in press, for certain American species which have been referred to the genus *Phaethonides*, Angelin.

(D) 25. *Diaphorostoma* sp. n. In external ornament similar to *D. lineatum* of the Hamilton shales.

26. *Cyrtolites expansus*? (D) 27. *Pleurotomaria* sp. n. 28. *Bellerophon* sp. n.? PTEROPODS. 29. *Conularia* sp.? 30. *Coleolus* sp.?

(H) 31. *Tentaculites* cf. *elongatus*, Hall. A very large species differing, if at all, from the Lower Helderberg form, in its coarser annulations.

32. *Tentaculites* sp. n. A very slender form, covered with minute, equal and closely crowded annulations.

PELECYPODS. (H) 33. *Actinopteria* cf. *textilis*, Hall. This shell is nearer to the typical lower Helderberg species than to the var. *arenaria* occurring in the *Hipparionyx*-fauna.

(H) 34. *Aviculopecten* of the type .1. *Schoharie*, Hall, of the Shaly limestone, but covered with radial ribs in addition to the very fine concentric lines.

35. *Megambonia bellistriata*, Hall. 36. *M. lamellosa*, Hall(?) 37. *Goniophora* sp. n. (H) 38. *Cypricardinia* cf. *lamellosa*, Hall, of the Shaly limestone. 39. *Conocardium* sp.

BRACHIOPODS. 40. *Lingula* sp. 41. *Orbiculoidea* sp.

42. *Crania* sp. n. A large shell with fine, rapidly bifurcating surface striae. This is of the type of *C. agarcina* of the Shaly limestone, but larger and more finely striate. Not uncommon. 43. *Crania* sp. n. A smooth species.

44. *Pholidops terminalis*, Hall. This, and *P. arenaria* both of the Oriskany, are probably but the exterior and the internal cast of the same species.

45. *Pholidops* sp. n. A small species of the type of *P. squamiformis*.

(H) 46. *Orthis perelegans*, Hall, of the Shaly limestone.

(H) 47. *O. cf. oblata*, Hall of the Shaly limestone. A small form of this type. 48. *O. sp?* A small, subcircular species.

(H) 49. *Orthothetes* cf. *Woolworthana*, Hall, of the Shaly limestone.

50. *O. sp. n.* A small, very abundant shell, in size and expression suggestive of *O. lens*, of the Choteau limestone, but more variable in form and contour.

51. *Hipparionyx proximus*, Vanuxem. A single specimen of a very large and typical brachial valve.

52. *Leptena rhomboidalis*, Wilckens. The Lower and Upper Helderberg form, rather than the Oriskany var. *ventricosa*.

53. *Stropheodonta Linckleri*, Hall. (H) 54. *S. cf. radiata*, Vanuxem. In some of these shells the radial striae are sharp and strongly fasciculate, producing an expression similar to that of *S. demissa* of the Middle Devonian.

55. *S. sp. n. A.* A large, strongly arcuate form with fine fasciculate striae, as in *Rafinesquina alternata*.

(D) 56. *S. sp. n. B.* A small convex form of the type of *S. alveata* of the Schoharie grit.

57. *Leptostrophia magnifica*, Hall. A small variety.

(H) 58 *L. cf. Becki*, Hall. A perplane species with low, irregular, concentric rugae extending to the anterior margin. The prevailing size of the shell is much smaller than in the Lower Helderberg form. Very abundant.

(D) 59. *L. perplana*, Conrad. Persistently more convex than the middle Devonian form; the difference however is no more than varietal. Everywhere abundant.

(H D) 60. *Strophonella* cf. *Headleyana*, Hall, of the Shaly limestone.

61. *Vitulina?* If this identification, founded on a single internal cast, be correct, this genus appears for the first time on this continent in its normal association with a lower Devonian fauna, as in South America and Africa.

(D) 62. *Chonetes* sp. n. A small shell of the type of *C. coronata*, Conrad.

63. *Chonostrophia* sp. n. Differs from *C. complanta* of the Oriskany in smaller size, greater reversed convexity and distinct fasciculation of striae. 64. *Anoplia nucleata*, Hall.

65. *Spirifer arrectus*, Hall. This abundant species varies considerably in size and plication and frequently suggests the Lower Helderberg *S. cyclopterus*. 66. *S. arenosus*, Conrad. 67. *S. pyxidatus*, Hall. (H) 68. *S. modestus*, Hall, of the Shaly limestone. 69. *S. cf. fimbriatus*, Conrad. A sparsely ribbed, coarsely fimbriated shell. Specific relations can not be more closely determined with the material at hand.

70. *Cyrtina rostrata*, Hall. 71. *C. cf. Dalmani*, Hall, of the Shaly limestone. 72. *Meristella* sp. n. This shell has many points of similarity with *M. oblata* of the Oriskany. It is, however, a smaller, much more strongly trihedral shell, with the aspect of a gigantic *M. lenta*. 73. *Meristella cf. laevis* of the Lower Helderberg. 74. *Meristella* sp. n? A large non-sinuate species.

(H) 75. *Trematospira multistriata*, Hall, of the Shaly limestone.

(D) 76. *Celospira* sp. n. In size this shell resembles *C. Camilla*, of the Corniferous limestone, while it bears the external ornament of *C. concava* of the Shaly limestone, though the plications are rather more numerous.

(H) 77. *Celospira* sp. of the small size of *C. concava* but more regularly plicate.

78. *Leptocoelia fiabellites*, Hall. (D) 79. *L. acutiplicata*, Hall, of the Corniferous limestone.

(H) 80. *Anastrophia* sp. n. A very finely plicate species.

81. *Rensselæria ovoides*, Eaton. 82. *R. Suessiana*, Hall? 83. *R. ovalis*, Hall?

84. *Rhynchonella oblata*, Hall. 85. *R. Barrandii*, Hall. 86. *R. cf. speciosa*, Hall. 87. *R. sp.?*

(H) 88. *Eatonia medialis*, Hall, of the Shaly limestone. 89. *E. peculiaris*, Conrad.

(D) 90. *Centronella*, sp. n. of the type of *C. glans-fagea*, but of great size.

(H) 91. *Cryptonella* sp. n. Similar to an undescribed species in the Shaly limestone.

BRYOZOANS. (D) 92. *Fenestella celsipora*, Hall, of the Corniferous limestone.

93. *F. sp.?*

(D) 94. *Hemitrypa cf. columellata*, Hall, of the Corniferous limestone.

95. *Polypora* sp? 96. *Reptaria* sp. 97. *Hederella* sp. 98. *Clonopora* sp. 99. *Fistulipora* sp.

CORALS. (H) 100. *Zaphrentis cf. Ræmeri* of the Shaly limestone. 101. *Z. sp.?* 102. *Romingeria* sp. 103. *Monticulipora*, a branching species. 104. *Trachypora*, sp.

CRINOIDS. 105. *Edriocrinus sacculus*, Hall.

SPONGES. 106. *Hindia* sp.

This remarkable association of species furnishes the missing link in the evolution of the Lower Helderberg into the typical Lower Devonian fauna. While the presence of so many positive Oriskany types determines the faunal quantivalence, the perdurance of species and modifications of specific expressions characteristic of the Shaly limestone fauna, and the inception of upper Lower Devonian specific forms, render this combination altogether unusual and of prime significance in the correlation of our earlier Devonian. The southwestern extension of the Oriskany (*Hipparionyx*) fauna, as in Maryland, is complicated with the Lower Helderberg, but to a less degree than here; while in the representative of the same fauna in the Province of Ontario there is a great predominance of Upper Helderberg species. With the 46 species which have been identified in the *Hipparionyx* fauna of New York (see list published by Mr. Charles Schuchert, in Eighth Annual Report of the New York State Geologist, p. 50, 1889), the 106 or more species of the Becraft's Mt. fauna are in striking contrast, and no element so strongly enforces this contrast or is so unique in itself as the *crustacean*. The association is indubitably of early Oriskany age and is eminently the *Trilobite* or *Dalmanites* facies of the Oriskany fauna. J. M. C.