Papers under the following titles were presented for publication :—

"New Species of Fresh-water Mollusks from South America," by Henry A. Pilsbry.

"Geology of the Mussel-bearing Clays of Fish House, N. J.," by Henry A. Pilsbry.

The death of Baron Ferdinand Von Mueller, a Correspondent, October 9, 1896, was announced.

The following were elected members :—

Henry A. Laessle, George C. Harlan, M. D., William M. Singerly and Henry Beates, Jr., M. D.

Prof. W. C. Roentgen of Würzburg, was elected a Correspondent.

The following were ordered to be printed :—

CONTRIBUTIONS TO THE ZOOLOGY OF TENNESSEE. No. 4, MOLLUSKS.

BY HENRY A. PILSBRY AND SAMUEL N. RHOADS.[1]

The following paper concludes the annotated lists of the animals of Tennessee, collected and observed by Mr. Rhoads, which have appeared in the Proceedings of the Academy of Natural Sciences of Philadelphia, beginning with page 376, in the volume for 1895. The reader is referred to this article for an itinerary of the journey through Tennessee, during which the collection of mollusks here enumerated was secured.

The list is restricted exclusively to the collection made by Mr. Rhoads in May and June, 1895, no attempt being made, as in previous papers of this series, to complete the list.

The literature of Tennessee mollusks is extensive, nearly all general works on the North American land and fresh water forms containing descriptions of or references to species from the state. There are, however, but few special papers on shells of this area. Dr. James Lewis published in the American Journal of Conchology, VI, 1870, p. 188–191, "Notes on the Land Shells of East Tennessee," based on specimens collected by Miss Annie E. Law. Pages 216–226 contain an article "On the Shells of the Holston River," by the same author, likewise from Miss Law's collection. Tryon, in Amer. Jour. Conch., VII, p. 86, reviews Dr. Lewis' notes on Holston River *Strepomatidæ*. A third paper by Lewis, "Shells of Tennessee (No. 2)," collected by Miss Law, appears in Proceedings of the Academy of Natural Sciences of Philadelphia for 1872, pp. 108–115. A number of other papers by Dr. Lewis, in the same Proceedings, and by Prof. A. G. Wetherby, in the Journal of the Cincinnati Society of Natural History, deal mainly with Tennessee mollusks.

In species of *Unionidæ*, Tennessee is wonderfully rich. The western part of the state, represented in the collection here recorded

[1] Prof. H. A. Pilsbry, of the Academy of Natural Sciences of Philadelphia, and his assistant, Mr. E. G. Vanatta, identified the entire collection. Chas. T. Simpson, of the National Museum, has kindly examined and reported on a number of ambiguous and difficult *Unionidæ*. All annotations are made by Mr. Pilsbry.

by the forms taken at Reelfoot Lake, has the typical northern Mississippi fauna, with a few southwestern species. The special character of the Tennessee River system is well known to conchologists; but among the species herein catalogued from middle and east Tennessee will be found a number of forms described from Alabama, Louisiana and other localities to the south and west, such as *Unio propinquus, U. pybasii, U. turgidus, U. tumescens, U. caliginosus,* etc.

PULMONATA.

AGNATHA.

Family CIRCINARIIDÆ Pilsbry.

Selenitidæ Fischer = *Macrocyclis* and *Selenites* Auct.

1. **Circinaria**[2] **concava** (Say).

Bellevue (68677)[3]; Banks of Emory Riv., Harriman (68676); Johnson City (68679); Road to Cloudland, Roan Mt., 5000 ft. (68675).

AULACOPODA.

Family ZONITIDÆ.

2. **Vitrea arborea** (Say).

Samburg, Reelfoot Lake (68689); Raleigh (69104); Sawyer's Springs (69105); Banks Emory Riv., Harriman (68688, 68692); Allardt (68691); 5 m. S. W. Greeneville (68693); Greeneville (68694); road to Cloudland, Roan Mt., 3500 to 5000 ft. (68690).

3. **Vitrea indentata** (Say).

Bellevue (68696, 68697).

4. **Omphalina kopnodes** (W. G. Binn.).

Samburg, Obion Co. (69106); Bellevue (69107).

5. **Omphalina fuliginosa** (Griff.).

Banks of Emory Riv., Harriman (68635).

6. **Omphalina laevigata** (Pfr.).

Raleigh (68639); bank Richland Creek ("Belle Mead"), Davidson Co. (68642); Bellevue (68637); Sawyer's Springs, Walden's Ridge (68638); bank Emory Riv., near Harriman (68641); Johnson City (68643).

[2] *Circinaria* Beck, 1837 = *Macrocyclis* Binney = *Selenites* Fischer, 1878, not *Selenites* Hope, 1840.

[3] Braketed numbers refer to the catalogue entries of the Academy of Natural Sciences of Philadelphia.

7. **Omphalina rugeli** (W. G. Binn.).

Roan Mt., Carter Co., 4000 to 6000 ft. (69108, 69109, 69110).

8. **Vitrinizonites latissimus** (Lewis).

Rock Creek, Roan Mt., 3500 to 5000 ft. (68698).

9. **Gastrodonta acerra** (Lewis).

Roan Mt., Carter Co., 5000 ft. (69084).

10. **Gastrodonta intertexta** (Binn.).

Chattanooga (68670).

11. **Gastrodonta ligera** (Say).

Samburg, Reelfoot Lake (68673).

12. **Gastrodonta demissa** (Binn.).

Bellevue (69086).

13. **Gastrodonta capsella** (Gld.).

Belle Mead Farm, near Nashville (69089); Emory Riv., near Harriman (69090); Roan Mt., Rock Creek (69091).

14. **Gastrodonta gularis** (Say).

Sawyer's Springs (69092); Emory Riv., near Harriman (69093); Nolachucky Riv., near Greeneville (68094); Roan Mt., Carter Co., 4000 to 6000 ft. (69095, 69096).

15. **Gastrodonta collisella** Pils.

Emory Riv., near Harriman (69097); Johnson City (69098).

16. **Gastrodonta interna** (Say).

Bellevue (68666); Chattanooga (68667); Sawyer's Springs, Walden Ridge (68668); bank Emory Riv., Harriman (68669).

Family LIMACIDÆ.

17. **Limax campestris** Binn.

Reelfoot Lake (69056); Bellevue (69055); Holston Riv., near French Broad Junction (69054).

Family PHILOMYCIDÆ.

18. **Philomycus carolinensis** (Bosc.).

Reelfoot Lake (69057); Raleigh (69078); Sawyer's Springs (69059); Harriman (69058).

Family ENDODONTIDÆ.

19. **Pyramidula perspectiva** (Say).

Samburg, Reelfoot Lake (68650); "Belle Mead" farm, near Nashville (68649); Bellevue (68646); Chattanooga (68645); Saw-

yer's Springs, Walden Ridge (68653); bank Emory Riv., Harriman (68644); Knoxville (68651); Johnson City (68647); Roan Mt., 5000 ft. (68652).

20. Pyramidula alternata (Say).

Samburg, Reelfoot Lake (68661); Belle Mead Farm, near Nashville (69079); Bellevue (68663); Williams Isl., near Chattanooga (68664); Chattanooga (69080); Sawyer's Springs (69081); Knoxville (68662); Greeneville (68657); Johnson City (69082); Rock Creek, Roan Mt. (68655); Doe Riv., Roan Mt., 4000 ft. (68656).

21. Pyramidula alternata carinata (Auct.).

Emory Riv., near Harriman (69083).

Most Tennessee specimens of this species are more coarsely and strongly ribbed than northern and western examples, and there is often a more or less pronounced peripheral keel. The culmination of this type of shell is *P. alternata mordax*, of which, however, no specimens were taken at localities recorded above. The form called var. *carinata* contrasts with these, being very fine-ribbed and distinctly carinated, and not at all of the *mordax* type. Peculiarly depressed, but not keeled, specimens occurred at Sawyer's Springs.

22. Helicodiscus lineatus (Say).

Belle Mead farm, near Nashville (68681); bank Emory Riv., Harriman (68682).

HOLOPODA.

Family HELICIDÆ.

23. Polygyra plicata Say.

Emory Riv., near Harriman (69060).

24. Polygyra troostiana Lea.

Belle Mead Farm, near Nashville (69061).

25. Polygyra inflecta (Say).

Raleigh (68579, 69062); Belle Mead Farm, near Nashville (68581); Bellevue (68577); Williams Isl., near Chattanooga (68574); Chattanooga (68584, 68572); bank Holston Riv., above junction of French Broad Riv. (68573); Knoxville (68575); Greenville (68576); Johnson City (69583).

26. Polygyra rugeli (Shutt.).

Sawyer's Springs, Walden Ridge (68571); bank Emory Riv., near Harriman (68570).

27. Polygyra fraudulenta Pils.

Samburg, Reelfoot Lake (68565); Belle Mead Farm, near Nashville (68566); Williams Isl., near Chattanooga (68569); bank Emory Riv., Harriman (68567); bank Doe Riv., 4000 ft., Roan Mt. (68564).

28. Polygyra tridentata (Say).

Sawyer's Springs, Walden Ridge (68557); Greeneville (68561); 5 m. S. W. Greeneville, bank Nolachucky Riv. (68558); Allardt (68562); near junction Holston and French Broad Rivs. (68559); Johnson City (68560); banks Doe Riv., Roan Mt., 4000 ft. (68563).

29. Polygyra palliata (Say).

Samburg, Reelfoot Lake (68555); Johnson City (68556).

30. Polygyra obstricta (Say).

Bellevue (68553); bank Emory Riv., Harriman (68552).

31. Polygyra appressa perigrapta Pils.

Samburg (68547); Raleigh (68544); Belle Mead Farm, near Nashville (68557); Chattanooga (68542); Sawyer's Springs, Walden Ridge (68549); bank Emory Riv., Harriman (68548); Knoxville (68541).

32. Polygyra subpalliata Pils.

Roan Mt., 3000 to 6000 ft. (69064, 69065, 69066).

This is the "*Mesodon wetherbyi*" of most collections. It is a far more common species in museums than that, occurring abundantly at Roan Mt.

33. Polygyra wetherbyi (Bld.).

Emory Riv., near Harriman, Roane Co. (69067).

The specimens of this excessively rare species agree with one of the original lot collected by Prof. A. G. Wetherby. It has been found before in Whitley (and Campbell?) counties.

34. Polygyra wheatleyi (Bld.).

Roan Mt., 3000 to 6000 ft. (69068, 69069, 69070).

35. Polygyra ——— sp.?

Allardt (69071).

A single specimen, defective in the umbilical region, of an apparently new species.

36. Polygyra elevata (Say.).

Samburg, Reelfoot Lake (68606); Belle Mead Farm, near Nashville (68604); Bellevue (68619); Chattanooga (68607), faintly, broadly chestnut-banded at the periphery; bank of Emory Riv., Harriman (68605); junction French Broad and Holston Rivers (68608, 68618).

37. Polygyra exoleta (Binn.).

Samburg, Reelfoot Lake (68614); Bellevue (68613); bank Emory Riv., Harriman (68616).

38. Polygyra andrewsæ (Binn.).

Ten miles east of Allardt (68624); Roan Mt., Doe Riv. valley, 3000 ft. (68625, 66305); top of Roan Mt. (68629): road to Cloudland, 3500 to 5000 ft. (68626, 68628).

Mr. E. G. Vanatta, who dissected specimens, found that the small thin-shelled typical form agrees with the very large, solid shells in soft anatomy, confirming Binney's observations.

39. Polygyra albolabris (Say).

Belle Mead Farm, near Nashville (68621); Chattanooga (68620).

40. Polygyra albolabris major (Binn.).

Vaughan's Cave, near Bellevue (68623); Johnson City (68629).

Very large specimens. Dissections of them by Mr. E. G. Vanatta fully confirm the anatomical distinctions indicated by Mr. Binney between this species or variety and the large form of *P. andrewsæ*.

41. Polygyra thyroides (Say).

Samburg, Reelfoot Lake (68611); Raleigh (68601); Belle Mead Farm, near Nashville (68598); Bellevue (68610); Chattanooga (68603); Knoxville (68602); 2 m. E. Watauga Sta., Washington Co. (68599); Johnson City (68609).

42. Polygyra clausa (Say).

Williams Isl., near Chattanooga (68631); Johnson City (68630).

43. Polygyra downieana (Bld.).

Sawyer's Springs (69072); Belle Mead Farm, near Nashville (69073).

44. Polygyra monodon fraterna (Say).

Raleigh (69074).

45. Polygyra leai (Ward).

Belle Mead Farm, near Nashville (68596).

46. Polygyra hirsuta altispira Pils.

Road to Cloudland, Roan Mt., Doe Riv., 4000 ft. (68586); top Roan Mt., 6000 ft. (68585).

47. Polygyra stenotrema (Fér.).

Chattanooga (68588); Sawyer's Springs, Walden Ridge (68592); bank Emory Riv., Harriman (68587); Allardt (68593).

48. Polygyra stenotrema depilata Pils.

Belle Mead Farm, near Nashville (68594); Bellevue (68590); Johnson City (68595).

Family BULIMULIDÆ.

49. Bulimulus dealbatus (Say).

Belle Mead Farm, near Nashville (68632).

ELASMOGNATHA.

Family SUCCINEIDÆ.

50. Succinea obliqua Say.

Samburg, Reelfoot Lake (68686).

51. Succinea ovalis Gld.

Samburg, Reelfoot Lake (68683); Mouth of Wolf Riv., Memphis (68684); Richland Creek, Belle Mead Farm, near Nashville (69282).

52. Succinea avara Say.

Samburg, Reelfoot Lake (68687); Chattanooga (69281).

LIMNOPHILA.

Family LIMNÆIDÆ.

53. Limnæa desidiosa Say.

Samburg (69297); Bellevue (69295); Johnson City (69298); Knoxville (69075).

54. Limnæa columella Say.

Knoxville (69076).

55. Limnæa humilis Say.

Johnson City (69299).

56. Planorbis trivolvis Say.

Samburg (69250, 69301).

57. Planorbis bicarinatus Say.

Emory River, near Harriman (69302).

58. Planorbis dilatatus Gld.

Knoxville, in a spring (69303).

59. Ancylus diaphanus Hald.

Knoxville (69334).

Family PHYSIDÆ.

60. Physa gyrina Say.

S. Harpeth River, 6 m. from Bellevue (69266); Knoxville (69077).

61. Physa heterostropha Say.

Belle Mead Farm, near Nashville (69267); Nolachucky River, near Greeneville (69269); Watauga River, near Watauga (69270); Johnson City (69268).

62. Physa integra Hald.

Samburg (69271); Johnson City (69272).

63. Physa microstoma Hald.

Belle Mead Farm, near Nashville (69275). Also taken in Kentucky, at Mammoth Cave (69276); west bluff of Kentucky River, opposite Frankfort (69277); Shelbyville, Clear Creek (68278).

This seems to be a distinct and well characterized species, readily distinguishable at first sight from all other American forms of this genus, in which specific lines are so difficult to define. Judging from the rare occurrence of this name in the literature, the species must be comparatively rare and local.

PROSOBRANCHIATA.

RHIPIDOGLOSSA.

Family HELICINIDÆ.

64. Helicina orbiculata (Say).

Chattanooga (68633).

65. Helicina occulta (Say).

Bank Emory Riv., near Harriman (68634).

This species was first found living in the West by Messrs. Pilsbry and Shimek, but has subsequently occurred to conchologists in many localities in Iowa, Minnesota and Wisconsin. In the East it occurs living in "Western Pennsylvania" (Green), near Pittsburg (Stupakoff), in Virginia, western North Carolina and eastern Tennessee. Its range is apparently interrupted by the Ohio Valley, and

the special localities east and west are more or less isolated. Its distribution is, on the whole, more markedly discontinuous than that of any American land snail known to me. It probably lives in higher latitude than any other member of the *Helicinidæ*. *H. occulta* is an omnipresent, and therefore characteristic, fossil of the Mississippi Valley loess; and during the formation of that deposit was extensively diffused and excessively numerous over a large area where it is now extinct.

TÆNIOGLOSSA.

Family AMNICOLIDÆ Tryon.

66. Somatogyrus aureus Tryon.

Nolachucky River, near Greeneville (69284).

67. Pomatiopsis lapidaria (Say).

Banks of Emory River, near Harriman (69283).

Family VIVIPARIDÆ Gill.

68. Vivipara intertexta (Say).

Samburg, Reelfoot Lake (69249).

69. Campeloma ponderosum (Say).

Tennessee River, near Chattanooga (69232, 69236, 69237); Holston River, 1 mile above French Broad (69259, 69260); Tennessee River, near Knoxville (69258); Clinch River, below Patton's Ferry (69261); Indian shell heap, Williams Island (69231).

70. Campeloma subsolidum (Anth.).

Samburg, Reelfoot Lake (69233, 69234, 69235); Big Harpeth River, near Bellevue (69263).

71. Campeloma geniculum (Conr.).

Emory River, near Harriman (69262).

72. Lioplax subcarinata (Say).

Big Harpeth River, near Bellevue (69238).

Family PLEUROCERIDÆ Fischer.

This has long been recognized as one of the most difficult families of American mollusks. Tryon made a good beginning in the intricate study of its species in his monograph published by the Smithsonian Institution in 1872. His conclusions were based upon a study of material from all the principal collections of that time; and his extensive synonymy has proved in nearly every case which

has since been tested to be singularly well judged. It was a splendid piece of work, considering the time and material available. But Tryon himself, in his later years, saw as clearly as anyone that a vastly greater reduction of species must be made. He told me, in 1888, that, as he now saw these shells, there were not more than a tenth as many good species as names. Whether the particular ratio mentioned was deliberately said or not, I do not know: but I incline to the belief that it will prove near the truth.

These shells must be collected and studied by river-systems; and it then appears that often the same species occurs in some localities sculptured throughout, in others only on the upper portion, while in still other places only the earlier whorls may show the characteristic sculpture. Some of the species described from one or two decollate examples will be recognized with great difficulty, if at all, in cases where the type locality is not known.

A cursory glance at the generic scheme in current use reveals some inaccuracies which call for correction. The genera are unequally related, and, as Tryon has shown, fall into three main groups. They are as follows:

Io Lea, 1831, type *Fusus fluvialis* Say. *Melafusus* Swainson, 1840, is a synonym.

LITHASIA Hald., 1840, type *Anculosa* (*Lithasia*) *geniculata* Hald.

A section of *Lithasia* is *Angitrema* Hald., 1841, type *Melania armigera* Say; *Glotella* Gray, 1847, same type, being a synonym of *Angitrema*.

It will be observed that this reverses Tryon's usage, as he places *geniculata* in *Angitrema*, and restricts *Lithasia* to smooth species.

Angitrema is a connecting link between *Io* and *Lithasia*, and seems conchologically about intermediate between the two groups.

PLEUROCERA Rafinesque, 1818, type?

Synonyms: *Ceriphasia* Swains., 1840, type, *C. sulcata* Swains. (=*P. canaliculatum* Say); *Trypanostoma* Lea, 1862, type *M. canaliculata* Say, *Telescopella* Gray, 1837, type *Melania undulata* Say.

Strephobasis Lea, 1861, types *S. spillmani, cornea* and *clarkii* Lea (all =*plena* Anth.), is a section of *Pleurocera*.

ELIMIA H. & A. Adams, 1854, type *M. acutocarinata* Lea.

Synonyms: *Melasma* H. & A. Adams, *Juga* H. & A. Adams, *Megara* H. & A. Adams, and *Goniobasis* Lea, 1862.

The group of Adams brothers, *Elimia*, contains incongruous elements, although most of the species named are *Goniobases*. *E. elevata* "Lea," *filum* Lea, *spinalis* Lea and *torta* Lea belong to the the prior genus *Pleurocera* Raf., and, therefore, are to be eliminated from *Elimia*. *Holstonia* Lea belongs to the prior genus *Lithasia* Hald. *Apis* Lea is a *Pachychilus*. The other species are true *Goniobases*.

GYROTOMA Shuttlew., 1845.

Synonyms *Schizostoma* and *Schizocheilus* Lea (preoc.). *Apella* Mighels, MS., 1860.

ANCULOSA Say.

73. Io spinosa Lea.

Holston River, 3 miles from Knoxville (69253); Tennessee River, near Knoxville (69252); Nolachucky River., 5 miles south of Greeneville (69251); in the Indian shell heaps, Williams Island, Tennessee River (69255); Indian mound, junction Holston and French Broad (69254); Indian mound, Patton's Ferry, Nolachucky River (69265).

74. Lithasia geniculata Hald.

Indian shell heaps, Williams Island, Tennessee River (69240); Emory River, near Harriman (69242); Tennessee River, near Knoxville (69241); Clinch River, below Patton's Ferry (69239).

75. Lithasia verrucosa (Raf.).

Tennessee River, near Chattanooga (69332); Tennessee River, near Knoxville (69247); Aboriginal shell heaps, Williams Island (69248); shell heap, junction Holston and French Broad Rivers (69264).

76. Lithasia venusta Lea.

Big Harpeth River, near Bellevue (69293, 69294).

77. Lithasia stygia (Say).

Big Harpeth River, near Bellevue (69333).

These shells, while worthy of the Styx when unwashed and black with iron deposit, are of a beautiful green with darker bands when this incrustation is removed.

78. Pleurocera undulatum (Say).

Clinch River, above Patton's Ferry (69313); Holston River, 1 mile above French Broad (69312, 69314).

Pleurocera undulatum is here understood to cover the following nominal species, all of which seem to be connected by inappreciable degrees when a large series is examined: *Melania excurata* Con.,

M. rorata Rve., *Trypanostoma spillmani* Lea, *T. moniliferum*, *Io nodosa*, *Io variabilis*, *Io nobilis* and *Io robusta* Lea. There are still other forms which will doubtless fall under *undulatum* as varieties or synonyms.

79. Pleurocera undulatum nobile (Lea).

Tennessee River, near Chattanooga (69317); Emory River, near Harriman (69316).

80. Pleurocera undulatum moniliferum (Lea).

Aboriginal shell heaps, Williams Island, Tennessee River (69315).

81. Pleurocera canaliculatum (Say).

Clinch River, below Patton's Ferry (69368); Tennessee River, near Knoxville (69264).

82. Pleurocera gradatum (Anth.).

Tennessee River, near Knoxville (69310); Holston River, 1 mile above junction with French Broad (69309).

83. Pleurocera filum (Lea).

Tennessee River, near Chattanooga (69306); Emory River, near Harriman (69308); Tennessee River, near Knoxville (69305).

84. Pleurocera filum var?

South Harpeth River, 6 miles from Bellevue (69307).

85. Pleurocera —— sp.?

Patton's Ferry, Clinch River (69324).

A peculiar species, not corresponding with any described form, but it may be described in a much worn or truncated condition.

86. Pleurocera cylindraceum (Lea).

Emory River, near Harriman (69304.)

It was described from Roane County. *Trypanostoma roanense* Lea is a synonym of *cylindraceum*.

87. Pleurocera hastatum (Anth.).

Watauga River, below Watauga Station (69318).

88. Pleurocera alveare (Con.).

Clinch River, above Patton's Ferry (69311).

89. Pleurocera unicale (Hald.).

Nolachucky, four and a half miles south of Greeneville (69319).

90. Strephobasis lyonii Lea.

Tennessee River, near Knoxville (69335); Holston River, 1 mile above French Broad (69336).

91. Strephobasis plena (Anth.).

Tennessee River, Chattanooga (69337); Clinch River, above Patton's Ferry (69338).

S. plena includes as synonyms *S. spillmani*, *clarkii* and *cornea* of Lea, all from the same region and in the same river system.

Strephobasis is a mere section of *Pleurocera*, and is reducible to some two or three species.

92. Goniobasis[8] proxima (Say).

Watauga River, Watauga Station (69290).

93. Goniobasis proxima symmetrica (Hald.).

Doe River, Roan Mountain, 2800 to 4000 ft. (69292); Rock Creek, Roan Mountain 3500 ft. (69291).

The same form occurs plentifully around Cranberry, Mitchell Co. N. C. (Dr. H. Skinner).

94. Goniobasis laqueata (Say).

Richland Creek, Belle Mead, near Nashville (69289); South Harpeth River, 6 miles from Bellevue (69348, 69286, 69347); Big Harpeth River, near Bellevue (69287, 69288).

The specimens are not typical, being more like the synonym or variety *G. deshayesiana* Lea; but there are at least ten other names, probably referable to the same species, leading terms being *plicatula* Lea, *costulata* Lea, *cinerella* Lea, *sparus* Lea, *cerea* Lea, *rugosa* Lea, *corrugata* Lea, *circinata* Lea, *athleta* Anth., *glauca* Anth., *lyonii* Lea, etc.

95. Anculosa subglobosa Say.

Nolachucky River, 6 miles southwest of Greeneville (69342); Watauga River, below Watauga Station (69343); Doe River, 2800 4000 ft. (69344).

96. Anculosa harpethensis Pils. *Sp. nov.*

Mr. Pilsbry's description is herewith given:—Shell globose, with very short spire and rounded periphery; olivaceous brown or yellowish, the surface with slight growth lines. Whorls 5, the body whorl very convex, impressed in the umbilical region. Aperture livid purplish within the outer lip but slightly sinuous, parietal wall and columella heavily calloused, purple; face of columella concave, a projecting angle at union of columellar and basal lips. Alt.

[8] The familiar generic name is used here for convenience, but it must be replaced eventually by *Elimia* H. & A. Adams.

9½, diam. 19 mm.: alt. 12, diam. 11mm. The globular form and angulation at base of columella separate this form from *A. subglobosa*.

Big Harpeth River, near Bellevue (69357).

97. Anculosa prærosa Say.

Holston River, 1 mile above French Broad (69244); Tennessee River, near Chattanooga (29246); Tennessee River, near Knoxville (69245). Indian mound, Williams Island (69248).

98. Anculosa ornata Anth.

Tennessee River, near Knoxville (69340); Holston River, 1 mile above French Broad (69339).

PELECYPODA.

Family CYRENIDÆ Fischer.

99. Sphærium striatinum (Lam.).

Big Harpeth River, near Bellevue (69325); Johnson City (69326).

100. Sphærium fabale Prime

Belle Mead Farm, near Nashville (69328).

101. Sphærium transversum (Say).

Samburg, Obion Co. (69327).

102. Sphærium partumeium (Say).

Samburg, Reelfoot Lake, Obion Co. (69330).

103. Pisidium abditum Hald.

Knoxville (69331).

Family UNIONIDÆ.

104. Unio acuens Lea.

Tennessee River, Williams Island (67371); Tennessee River, near Knoxville (69372); Holston River, 1 mile above French Broad (69373).

105. Unio alatus Say.

Tennessee River, above Knoxville (68341).

106. Unio anodontoides Lea.

Big Harpeth River, near Bellevue, Davidson Co. (68327). Wolf River, below Shelby Co. (68701).

107 Unio arcæformis Lea.

Holston River, 1 mile above junction with Tennessee River (68317).

108. Unio asperrimus Lea.

Reelfoot Lake, Obion Co. (68340).

109. Unio biangulatus Lea.

Tennessee River, above Knoxville (68361); Watauga River, below Watauga Station (69370).

Described from Caney Fork.

110. Unio caliginosus Conr.

Clinch River, above Patton's Ferry (69203).

Described from the Red River at Alexandria, La.

111. Unio capsæformis Lea.

Big Harpeth River, near Bellevue, Davidson Co. (68369).

112 Unio circulus Lea.

Big Harpeth River, near Bellevue (68381); Tennessee River, near Knoxville (68362).

An Ohio drainage species.

113. Unio conradianus Lea. (*Conradicus* Lea).

Emory River, Harriman (69222); Watauga River, near Johnson City (69226).

The specimens are, for the greater part, only very slightly plicate on the posterior slope, far less so than Lea's types.

114. Unio cooperianus Lea.

Tennessee River, near Williams Island, below Chattanooga (68375); 2 miles above Knoxville (69211); Clinch River, above Patton's Ferry (68363).

115. Unio cornutus Barnes.

Clinch River, above Patton's Ferry, Roane Co. (68330).

116. Unio crassidens Lam.

Holston River, 1 mile above junction with Tennessee River (68365); Tennessee River, near Knoxville (68327); Tennessee River, near Williams Island, Chattanooga (68347); Clinch River, above Patton's Ferry (68337).

117. Unio cuneolus Lea.

Emory River, Harriman (69201).

Described from the Holston.

118 Unio cylindricus Say.

Holston River, 1 mile above junction with Tennessee River (68342).

119. Unio dromas Lea.

Holston River, 1 mile above junction with Tennessee River (68313); Tennessee River, near Williams Island, Chattanooga (68323); Tennessee River, near Knoxville (68326).

120. Unio edgarianus Lea.

Clinch River, above Patton's Ferry (69206).

One of the specimens collected has the lateral teeth reversed.

121. Unio elegans Lea.

Reelfoot Lake (68376).

The specimens have numerous greenish rays in place of the usual V-like maculation.

122. Unio fascinans Lea (*fassinans*).

Watauga River, below Watauga Station (68387).

123. Unio gibbosus Barnes.

Tennessee River, near Williams Island, Chattanooga (68315); Tennessee River, above Knoxville (68324); Holston River, 1 mile above junction with Tennessee River (68370); Clinch River, above Patton's Ferry, Roane Co. (68314); Emory River, near Harriman, Roane Co. (68339); Watauga River, near Johnson City, Washington Co. (68325).

Shells smaller than those of the northern Mississippi Valley, and often light salmon inside, especially in the Holston River specimens.

124. Unio glans Lea.

Emory River, near Harriman (69377).

Two specimens of somewhat doubtful specific identity.

125. Unio gracilis Barnes.

Wolf River, below Raleigh, Shelby Co. (68700); Holston River, 1 mile above junction with French Broad (69200).

126. Unio haysianus Lea.

Tennessee River, 2 miles above Knoxville (69199).

Described from the Cumberland River.

127. Unio irroratus Lea.

Holston River, 1 mile above Junction with Tennessee River (68354).

128. Unio kirtlandianus Lea.

Watauga River, near Johnson City (69204).

129. Unio lawi Lea.

Emory River, Harriman (69223).

Described from the Tennessee River, Tuscumbia, Ala., and the Holston.

130. Unio ligamentinus Lam,

Holston River, 1 mile above junction with Tennessee River (68335); Tennessee River, near Williams Island, Chattanooga, (68348); Tennessee River, above Knoxville (68368); Clinch River, above Patton's Ferry, Roane Co. (68360); Harpeth River, 6 miles south of Bellevue (68699).

The shells are constantly smaller and rounder than in specimens of Illinois and Iowa.

131. Unio muhlfeldtianus Lea.

Watauga River, near Johnson City (69225).

Described from the Cumberland River.

132. Unio multiradiatus Lea.

Emory River, near Harriman, Roane Co. (68318); Clinch River, above Patton's Ferry, Roane Co. (68338); Watauga River, near Johnson City, Washington Co. (68336).

133. Unio obliquus Lam.

Holston River, 1 mile above junction with French Broad (69217); Tennessee River, near Chattanooga (69214).

134. Unio ovatus Say.

Tennessee River, 2 miles above Knoxville (69279); Holston River, 1 mile above junction with French Broad (69218).

135. Unio parvus Say.

Reelfoot Lake, Obion Co. (68359).

136. Unio phaseolus Hild.

Tennessee River, near Chattanooga (69202); Emory River, near Harriman (69369).

137. Unio pictus Lea.

South Harpeth River, 6 miles from Bellevue (68385).

This was described from Harpeth River specimens.

138. Unio pilaris Lea.

Tennessee River, 2 miles above Knoxville (69213); Holston River, 1 mile above junction of French Broad (69219); Clinch River above Patton's Ferry.

139. Unio plicatus Lesueur.

Reelfoot Lake, Samburg, Obion Co. (68377).

140. Unio propinquus Lea.

Tennessee River 2 miles above Knoxville (69212); Holston River, 1 mile above junction with French Broad (69220); Clinch River, above Patton's Ferry (68353).

This species was described from Florence and Tuscumbia, Alabama, localities far to the southwest of the above.

141. Unio purpuratus Lam.

Wolf River, near Raleigh (68702).

Characteristic specimens of this southwestern form.

142. Unio pustulosus Lea.

Reelfoot Lake, Obion Co. (68366); Holston River, 1 mile above junction with Tennessee River (68367); Clinch River, above Patton's Ferry (68363).

143. Unio pybasii Lea.

Emory River, Harriman (69196); South Harpeth River, 6 miles from Bellevue (69195); Watauga River, near Johnson City (69193).

Lea's specimens were from Tuscumbia, Ala.

144. Unio pyramidatus Lea.

Holston River, 1 mile above junction with French Broad (68364); Tennessee River, 2 miles above Knoxville (69205); Clinch River, above Patton's Ferry (69207).

145. Unio rectus Lam.

Holston River, 1 mile above junction with Tennessee River (68372).

146. Unio rubiginosus Lea.

Big Harpeth River, near Bellevue (68358); South Harpeth River, 6 miles south of Bellevue (68316).

147. Unio securis Lea.

Clinch River, above Patton's Ferry (68331).

148. Unio sphæricus Lea (?).

Tennessee River, near Williams Island, Chattanooga (68373).

149. Unio subrostratus Say.

Reelfoot Lake, Samburg, Obion Co. (69194).

150. Unio subtentus Say.

South Harpeth River, 6 miles from Bellevue (68704); Tennessee River, above Knoxville (68371).

151. Unio texasensis Lea.

Reelfoot Lake, Samburg (69215).

Much larger than the typical form from central Texas, length 56, breadth, 30 mm.

152. Unio trapezoides Lea.

Reelfoot Lake, Samburg (69216).

Two young specimens. The species has not before been reported from so far north, east of the Mississippi, so far as I know.

153. Unio triangularis Barnes.

Tennessee River, above Knoxville (68378).

154. Unio tuberculatus Barnes.

Big Harpeth River, near Bellevue, Davidson Co. (68345); Wolf River, below Raleigh, Shelby Co. (68703).

The specimens from the Big Harpeth belong to the large, densely pustulose, white nacred, northern race.

155. Unio tumescens Lea.

Tennessee River, near Knoxville (69374); Emory River, Harriman (69375); Clinch River, above Patton's Ferry (69376).

Described by Lea from Alexandria, La.

156. Unio turgidus Lea.

Wolf River, near Raleigh (68384).

Described from New Orleans.

157. Unio undulatus Barnes.

Clinch River, above Patton's Ferry (69209); Big Harpeth River, near Bellevue (68344).

On account of the prior *Unio undulatus* Say (now *Alasmodonta undulata*), the name of this well-known species must be changed.

158. Unio ventricosus Barnes.

Big Harpeth River, near Bellevue, Davidson Co. (68328).

159. Unio verrucosus Barnes.

Big Harpeth River, near Bellevue, (68343); Tennessee River, above Knoxville (68349); Holston River, 1 mile above junction with Tennessee River (68350).

160. Alasmodonta complanata Barnes.[5]

[5] The diverse origin of various elements of the so-called genus *Margaritana* has been demonstrated by Mr. C. T. Simpson. It is practically certain that the group of *M. complanata, rugosa,* etc., arose from a different stock of *Unio*

Big Harpeth River, near Bellevue (68346).

161. Alasmodonta confragosa Say.

Reelfoot Lake, Obion Co. (68356).

162. Alasmodonta edentula Say.

Big Harpeth River, near Bellevue (68380); Watauga River, near Johnson City (68379).

Very large specimens, length 12.7 cm., from the Big Harpeth. Probably not specifically distinct from *A. pennsylvanica* Lam. of the Middle States.

163. Alasmodonta marginata Say.

Clinch River, above Patton's Ferry (68332); Watauga River, near Johnson City (68321).

164. Alasmodonta minor (Lea).

South Harpeth River River, 6 miles from Bellevue (69228).

165. Alasmodonta rugosa Bar.

Tennessee River, 2 miles above Knoxville (69229); Big Harpeth River, near Bellevue (68333); Watauga River, near Johnson City (68320).

166. Anodonta grandis Say.

Reelfoot Lake, Obion Co. (68382).

167. Anodonta harpethensis Lea.

Harpeth River, near Bellevue (69230).

168. Anodonta suborbiculata Say.

Reelfoot Lake, Obion Co. (68351).

169. Anodonta imbecilis Say.

Reelfoot Lake, Obion Co. (68322).

SUMMARY: *Pelecypoda*, 71 species; aquatic *Gastropoda*, 41 species; terrestrial *Gastropoda*, 54 species.

from the *M. margaritifera* and *monodonta;* and Simpson finds numbers of other incongruous elements.

We are hardly prepared, however, to merge the various groups of "*Margaritana*" in *Unio*. Among other disadvantages, a great many specific names would require change, such as the first one of this list; and then, there is a real difference (in the hinge teeth) which would be without recognition in nomenclature. It seems to us that although there are a few forms, such as *Unio pressus*, in which this distinction is obscure, still in the great majority it holds. The subject is a complex one, which should not be decided hastily, and we can well afford to postpone wholesale changes in specific nomenclature until Simpson, von Ihering and other specialists who are now working upon the *Unionidæ* with such gratifying results, shall have arrived at a thoroughly mature classification.

FOSSIL BONES OF BIRDS AND MAMMALS FROM GROTTO PIETRO TAMPONI AND GRIVE-ST. ALBAN.

BY R. W. SHUFELDT, M. D.

For some time past the writer has had in his possession a small collection of fossil bones that were kindly submitted to him by Mr. Jno. Eyerman, of Easton, Pennsylvania, to whose cabinet they belong.

These fossil bones are from birds and mammals, and were obtained from two very different localities, the smaller lot of the two having been collected at the Grotto Pietro Tamponi, and the remainder of them at Grive-St. Alban, in France. In his letter of transmittal, Mr. Eyerman invites my attention to the fact that the celebrated locality, Grive-St. Alban, "is situated in the department of Isère, France, the deposits belonging to the upper division of the Middle Miocene. European geologists have arranged the Middle Miocene into two divisions, of which the upper is distributed principally in isolated patches throughout France, although these deposits are also found in Germany and in the Vienna Basin."

"Grive-St. Alban is justly famous for the large number and great variety of mammalian remains found in its beds, of which we have *Listriodon, Hyotherium, Palæomeryx, Micromeryx, Dicroceros* of the Artiodactyla, as well as the earliest antelope, *Protragoceros*. Of the Perissodactyla there are the hornless rhinoceros, *Aceratherium, Chalicotherium*. Of the Proboscidea there is the *Mastodon augustidens*. The Rodentia is represented by *Lagomys, Myoxus, Sciurus, Chalicomys* and the large Dormouse, *Cricetodon*. The Carnivora by *Viverra, Lutra, Dinocyon;* the sabre-tooth tiger, *Machaerodus;* the mongoose, *Herpestes*, and the disputed genus *Haplogale* of Sclosser. The Insectivores by *Plesiosorex, Erinaceus* and *Talpa*, and, finally, the fossil Gibbon, *Hylobates*."

In the second locality, or that of Tavolara, we find the "Grotto Pietro Tamponi, consisting of several chambers, and situated on the small Island of Tavolara, in the Gulf of Terranova, a few miles off the northeast coast of Sardinia. The upper chamber of this grotto contains numerous remains of the rodent *Lagomys sardus* (Giebel's variety *corsicanus*). The lower chamber has produced the avian remains."