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THE LAND SNAILS OF KENTUCKY

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The publication by Bickel (1967) of a checklist of the Recent and Pleistocene *McIlusca* of Kentucky pointed up how poorly the land snails of that State are known, and prompted the preparation of this list. This list contains only records from my own collections. It does not contain any records of fossils, which were published elsewhere (Hubricht 1964). Only the counties where specimens were collected are given under each species rather than exact localities, as it is believed that this is accurate enough for plotting of distributions of most species.

OTALA LACTEA Müller. Jefferson

POLYGYRA PUSTULOIDES (Bland). Edmonson, Hart, Webster

POLYGYRA LEPORINA (Gould). Edmonson, Livingston.

POLYGYRA PLICATA Say. Barren, Cumberland, Edmonson, Hardin, Hart, Jessamine, Logan, Meade, Mercer, Metcalfe, Pulaski, Wayne.

POLYGYRA FATIGIATA Say. Livingston.

STENOTREMA EDWARDSI (Bland). Bell, Har-

lan, Jackson, Laurel, McCreary, Menefee, Pulaski, Wayne, Whitley.

STENOTREMA BARBATUM (Clapp). Edmonson, Jefferson, Meade.

STENOTREMA ANGELLUM Hubricht. Adair, Anderson, Cumberland, Edmonson, Garrard, Green, Harrison, Hart, Jefferson, Jessamine, Logan, Meade, Mercer, Pulaski, Russell, Trimble, Warren, Woodford.

STENOTREMA STENOTREMA STENOTREMA (Pfeiffer). Anderson, Barren, Bell, Carroll, Clinton, Cumberland, Edmonson, Franklin, Garrard, Hardin, Harlan, Hart, Jackson, Jefferson, Jessamine, Laurel, McCreary, Mercer, Metcalfe, Monroe, Pike, Trimble, Wayne, Whitley.

STENOTREMA HIRSUTUM (Say). Barren, Bell, Breckenridge, Carter, Clinton, Cumberland, Edmonson, Green, Hardin, Harlan, Hart, Laurel, McCreary, Metcalfe, Nicholas, Pulaski, Taylor, Wayne.

STENOTREMA LEAI ALICIAE (Pilsbry). Christian, Grayson, Hardin, Hart, Hopkins, Logan, Webster.

STENOTREMA FRATERNUM FRATERNUM (Say).

Boyle, Edmonson, Gallatin, Green, Hardin, Harlan, Jefferson, Jessamine, Laurel, Pulaski, Shelby, Trimble, Warren.

MESODON THYROIDUS (Say). Allen, Anderson, Barren, Bell, Christian, Edmonson, Franklin, Garrard, Harlan, Hopkins, Jefferson, Jessamine, Knox, Laurel, Livingston, Logan, Mercer, Metcalfe, Pulaski, Webster, Whitley.

MESODON CLAUSUS CLAUSUS (Say) Adair, Allen, Bell, Cumberland, Edmonson, Henry, Todd, Wayne.

MESODON NORMALIS (Pilsbry). Harlan, McCreary

I MESODON DOWNIEANUS (Bland) I. Pilsbry's (1940) record from Warren County for this species was based on a specimen of *Mesodon clausus clausus*

MESODON KALMIANUS Hubricht. Laurel.

MESODON ZALETUS (Binney). Allen, Anderson, Boyle, Clinton, Cumberland, Edmonson, Franklin, Green, Harlan, Jefferson, Jessamine, Knott, Lincoln, Livingston, Meade, Mercer, Trimble, Warren.

MESODON ELEVATUS (Say). Edmonson, Green, Hardin, Jefferson, Meade.

MESODON LAEVIOR Pilsbry. Allen, Anderson, Edmonson, Franklin, Hardin, Hart, Jefferson, Jessamine, Meade, Mercer, Pulaski, Todd, Trimble, Warren.

MESODON APPRESSUS (Say). Bell, Carter, Floyd, Harlan, Knox, McCreary, Perry, Pike, Powell, Pulaski, Whitley.

MESODON WETHERBYI (Bland). Whitley.

MESODON SAYANUS (Pilsbry). Bell, Harlan, Mercer, Pulaski, Whitley.

MESODON CHILHOWEENSIS (Lewis). McCreary.

MESODON RUGELI (Shuttleworth). Adair,

Boyle, Clinton, Cumberland, Edmonson, Floyd, Green, Jackson, Jessamine, Knott, Laurel, McCreary, Mercer, Metcalfe, Monroe, Powell, Pulaski, Russell, Taylor, Wayne.

MESODON INFLECTUS (Say). Allen, Barren, Bell, Christian, Edmonson, Franklin, Garrard, Grayson, Hardin, Harlan, Harrison, Hart, Hopkins, Jefferson, Jessamine, Livingston, Logan, Meade, Mercer, Metcalfe, Monroe, Nicholas, Perry, Pulaski, Shelby, Todd, Trimble, Warren, Webster, Whitley, Woodford.

MESODON RUGELI (Shuttleworth) X MESODON INFLECTUS (Say). The range of *M. rugeli* is wholly within that of *M. inflectus*. Although these two species are frequently found in adjacent localities it is very unusual to find them living together. I have found them living together at about eight places in all. At some of these localities where there was a distinct difference in size between the species there was no hybridization. But where they were of about the same size they hybridized readily, producing a series of intermediates. There apparently has been some introgression, as *M. inflectus* is inclined to look a little more like *M. rugeli* within the range of that species.

TRIODOPSIS TRIDENTATA TRIDENTATA (Say). Adair, Barren, Bell, Boyle, Carroll, Carter, Cumberland, Edmonson, Harlan, Hart, Knott, Lincoln, Logan, McCreary, Meade, Menifee, Metcalfe, Monroe, Nicholas, Perry, Pike, Taylor, Trimble, Warren, Whitley.

TRIODOPSIS COMPLANATA (Pilsbry). Cumberland, Green, Jackson, Laurel, Lincoln, Marion, Mercer, Pulaski, Russell, Wayne, Whitley.

TRIODOPSIS VULGATA Pilsbry. Bell, Edmonson, Green, Harlan, Jefferson, Jessamine, Meade, Mercer, Metcalfe, Simpson

TRIODOPSIS DISCOIDEA Pilsbry. Harlan, Meade.

TRIODOPSIS OBSTRUCTA (Say). Edmonson, Hart, Warren.

TRIODOPSIS DENOTATA (Férussac). Bell, Edmonson, Green, McCreary, Harlan, Menifee, Whitley.

TRIODOPSIS OBSTRUCTA (Say) X TRIODOPSIS DENOTATA (Férussac). Edmonson.

TRIODOPSIS FOSTERI FOSTERI (F.C. Baker). Carroll, Livingston.

TRIODOPSIS ALBOLABRIS (Say). Bell, Edmonson, Harlan, Hart, Jackson, Jessamine, Logan, McCreary, Perry, Whitley.

ALLOGONA PROFUNDA (Say). Bell, Edmonson, Harlan, Meade, Mercer, Pulaski.

BULIMULUS DEALBATUS DEALBATUS (Say). Logan, Warren

HAPLOTREMA CONCAVUM (Say). Anderson, Barren, Bell, Edmonson, Green, Hardin, Harlan, Hart, Henry, Jefferson, Knott, Laurel, McCreary, Meade, Menifee, Mercer, Metcalfe, Monroe, Pike, Taylor, Trimble, Wayne, Whitley.

EUCONULUS CHERSINUS CHERSINUS (Say). Anderson, Butler, Cumberland, Edmonson, Franklin, Green, Hopkins, Jefferson, Logan, Meade, Trimble, Wayne.

EUCONULUS DENTATUS (Sterki). Butler, Hardin.

GUPPYA STERKII (Dall). Breckenridge, Edmonson, Hardin, Jefferson, Mercer, Trimble.

GLYPHYALINIA BURRINGTONI (Pilsbry). Cumberland, McCreary.

GLYPHYALINIA WHEATLEYI (Bland). Breckenridge, Butler, Cumberland, Edmonson, Green, Hardin, Harlan, Knott, McCreary, Perry, Wwrrren.

GLYPHYALINIA LEWISIANA (Clapp). Edmonson.

GLYPHYALINIA SPECUS Hubricht. Barren, Edmonson, Logan, Warren.

GLYPHYALINIA INDENTATA (Say). Adair, Anderson, Barren, Bell, Butler, Carroll, Christian, Clinton, Cumberland, Edmonson, Floyd, Franklin, Green, Hardin, Harlan, Harrison, Hart, Hopkins, Jefferson, Jessamine, Knott, Laurel, Livingston, Logan, McCreary, Meade, Mercer, Metcalfe, Monroe, Pike, Todd, Trimble, Wayne

GLYPHYALINIA CAROLINIENSIS (Cockerell). Bell, Harlan, Knott, Pulaski.

GLYPHYALINIA CRYPTOMPHALA (Clapp). Anderson, Mercer, Warren.

GLYPHYALINIA SOLI (H. B. Baker). Bell, Boyle, Edmonson, Franklin, Harlan, Hart, Meade, Trimble.

GLYPHYALINIA PRAECOX (H. B. Baker). Adair, Cumberland, Edmonson, Whitley.

GLYPHYALINIA SCULPTILIS (Bland). Adair, McCreary, Whitley.

MESOMPHIX INORNATUS (Say). Bell, Harlan, Menifee, Mercer, Nicholas, Perry, Pike, Whitley.

MESOMPHIX VULGATUS H. B. Baker. Anderson, Clinton, Cumberland, Edmonson, Green, Hardin, Hart, Jefferson, Jessamine, Lincoln, Meade, Mercer, Metcalfe, Simpson, Warren.

MESOMPHIX ANURUS Hubricht. Warren.

MESOMPHIX DEROCHETUS Hubricht. Edmonson, Mercer.

MESOMPHIX PERLAEVIS (Pilsbry). Bell, Harlan, Jackson, McCreary, Menifee, Perry, Pike, Whitley.

MESOMPHIX RUIDUS Hubricht. Breckenridge, Edmonson, Hart, Meade, Webster.

MESOMPHIX FRIABILIS (W.G. Binney). Edmonson, Jessamine.

MESOMPHIX CUPREUS (Rafinesque). Bell, Cumberland, Franklin, Harlan, Hart, Mercer, Pike.

PARAVITREA MULTIDENTATA (Binney). Barren, Harlan, Jackson, Meade, Whitley.

PARAVITREA ANDREWSAE (W. G. Binney). Perry.

PARAVITREA REECEI Morrison. Pike.

PARAVITREA PLACENTULA (Shuttleworth). Bell, Harlan.

I can find no significant difference between these specimens and those from southeastern Tennessee. Unless anatomical studies show differences, *P. placentula lithodora* (Pilsbry) will have to be placed in the synonymy of typical *P. placentula*. Anatomical studies were not made on any of these specimens because of the small series collected. Such studies would have necessitated destroying the shell.

PARAVITREA CAPSELLA (Gould) Anderson, Barren, Bell, Clinton, Cumberland, Edmonson, Green, Harlan, Hart, Jessamine, Mercer, Metcalfe, Perry, Pike, Pulaski, Simpson, Warren, Wayne, Whitley.

PARAVITREA BLARINA Hubricht. Bell.

PARAVITREA TANTILLA Hubricht. Lincoln.

PARAVITREA LAPILLA Hubricht. Edmonson.

HAWAIIA MINUSCULA MINUSCULA (Binney). Allen, Barren, Christian, Edmonson, Floyd, Hart, Jefferson, Mercer, Metcalfe.

GASTRODONTA INTERNA (Say). Adair, Bell, Cumberland, Franklin, Harlan, Jackson, Laurel, McCreary, Meade, Menifee, Metcalfe, Perry, Powell, Pulaski, Wayne, Whitley.

VENTRIDENS GULARIS (Say). Barren, Edmonson, Hart, Metcalfe.

VENTRIDENS COLLISELLA (Pilsbry). Pike.

VENTRIDENS PILSBRYI Hubricht. Adair, Bell, Harlan, Laurel, Lincoln, McCreary, Pulaski.

VENTRIDENS THELOIDES (Walker & Pilsbry). Bell, Clinton, Cumberland, Harlan, Knott, Knox, Laurel, Perry, Pike, Whitley.

VENTRIDENS LAWAE (W. G. Binney). Cumberland. Knott.

VENTRIDENS LASMODON (Phillips). Bell, McCreary.

VENTRIDENS DEMISSUS (Binney). Barren, Bell, Cumberland, Harlan, Livingston, Metcalfe, Shelby, Whitley.

VENTRIDENS PERCALLOSUS Pilsbry. Todd.

VENTRIDENS ACERRA (Lewis). Harlan.

VENTRIDENS LIGERUS (Say). Allen, Edmonson, Floyd, Franklin, Gallatin, Hardin, Harrison, Henry, Jefferson, Jessamine, Livingston, Meade, Mercer, Metcalfe, Trimble.

VENTRIDENS INTERTEXTUS (Binney). Bell, Cumberland, Edmonson, Hart.

VENTRIDENS ELLIOTTI (Redfield). Harlan, Laurel, Pike.

ZONITOIDES ARBOREUS (Say). Barren, Bell, Edmonson, Floyd, Franklin, Hart, Henry, Hopkins, Jefferson, Livingston, Logan, McCreary, Metcalfe, Pulaski, Todd, Trimble.

ZONITOIDES LIMATULUS (Binney). Barren, Edmonson, Hart, Meade, Trimble.

ZONITOIDES LATEUMBILICATUS (Pilsbry). Barren, Edmonson, Franklin, Jessamine, Lincoln, Menifee, Mercer.

STRIATURA MERIDIONALIS (Pilsbry & Ferriss). Anderson, Breckenridge, Butler, Edmonson, Floyd, Franklin, Green, Hardin, Hart, Jefferson, Logan, Meade, Mercer, Metcalfe, Pike, Trimble.

- DEROCERAS LAEVE* (Müller). Edmonson.
- ANGUISPIRA ALTERNATA* (Say). Adair, Boyle, Cumberland, Edmonson, Franklin, Harrison, Henry, Jefferson, Meade, Mercer, Metcalfe, Pulaski, Shelby, Simpson, Todd, Trimble, Warren.
- ANGUISPIRA STRONGYLODES* (Pfeiffer). Bell, Harlan.
- ANGUISPIRA MORDAX* (Shuttleworth). Bell, Harlan, Jackson, Wayne, Whitley.
- ANGUISPIRA RUGODERMA* Hubricht. Bell, Harlan.
- Recent collecting of more material of this species shows that it is not *A. knoxensis* (Pilsbry), in the synonymy of which it was placed by Pilsbry (1948). It differs in shape, sculpture, and in its larger size. It is the largest species of the *alternata* group of *Anguispira*. It is apparently endemic to Pine Mountain.
- ANGUISPIRA KOCHI KOCHI* (Pfeiffer). Franklin, Fulton, Green, Hardin, Meade, Mercer.
- DISCUS CRONKHITTEI* (Newcomb). Jefferson.
- DISCUS PATULUS PATULUS* (Deshayes). Allen, Adair, Anderson, Barren, Bell, Boyle, Breckenridge, Clinton, Cumberland, Edmonson, Franklin, Green, Hardin, Harlan, Knott, Laurel, McCreary, Meade, Mercer, Metcalfe, Monroe, Nicholas, Pike, Powell, Pulaski, Warren.
- DISCUS NIGRIMONTANUS* (Pilsbry). Harlan.
- HELICODISCUS NOTIUS NOTIUS* Hubricht. Barren, Christian, Edmonson, Hart, Jackson, Jessamine, Livingston, Pike, Warren, Webster.
- HELICODISCUS NOTIUS SPECUS* Hubricht. Barren.
- HELICODISCUS PARALLELUS* (Say). Bell, Edmonson, Floyd, Hart, Jefferson, Meade.
- HELICODISCUS PUNCTATELLUS* Morrison. Edmonson.
- HELICODISCUS HADENOECUS* Hubricht. Barren.
- HELICODISCUS INERMIS* H. B. Baker. Floyd.
- PUNCTUM MINUTISSIMUM* Lea. Breckenridge, Edmonson, Hardin, Hart, Jefferson, Meade, Mercer, Trimble.
- PUNCTUM BLANDIANUM* Pilsbry. Cumberland.
- PUNCTUM VITREUM* H. B. Baker. Anderson, Edmonson.
- PUNCTUM SMITHI* Morrison. Bell, Breckenridge, Butler, Edmonson, Hardin, Jefferson, Meade.
- PUNCTUM LAMELLATUM* Hubricht. Hardin.
- PHILOMYCUS CAROLINIANUS* (Bosc). Bell, Edmonson, Franklin, Hardin, Hart, Jefferson, Laurel, Logan, McCreary, Meade, Mercer, Metcalfe, Trimble, Webster, Whitley.
- PHILOMYCUS TOGATUS* (Gould). Bell, Harlan, Jessamine, Pike.
- PHILOMYCUS VENUSTUS* Hubricht. Bell, Harlan.
- PALLIFERA MUTABILIS* Hubricht. Barren, Christian, Cumberland, Franklin, Laurel, Metcalfe.
- PALLIFERA WETHERBYI* W. G. Binney. Whitley.
- PALLIFERA MARMOREA* Pilsbry. Edmonson, Hardin, Hart, Logan, Warren, Woodford.
- PALLIFERA SECRETA* (Cockerell). Bell, Edmonson, Franklin, Hardin, Knox, Lincoln, Meade, Menifee, Mercer, Trimble, Whitley.
- PALLIFERA FOSTERI* F. C. Baker. Edmonson.

SUCCINEA OVALIS OVALIS Say. Edmonson, Hardin Henderon Jefferson.

SUCCINEA WITTERI Shimek. Crittenden.

CATINELLA VERMETA (Say). Allen, Carroll, Edmonson Gallatin, Hardin, Henderon, Henry Jefferson, Livingston, Logan, Mercer Todd, Trimble.

CATINELLA OKLAHOMARUM (Webb). Cumberland, Jefferson, Metcalfe, Pike.

STROBILOPS LABYRINTHICA (Say). Anderson, Barren, Breckenridge, Butler, Edmonson Hardin, Hart Hopkins Jefferson, Logan Meade.

STROBILOPS AENEA Pilsbry. Bell, Christian, Edmonson, Hart, Jefferson, Meade, Metcalfe, Trimble.

GASTROCOPTA ARMIFERA (Say) Allen, Cumberland, Edmonson, Floyd, Hardin, Hart, Henry, Hopkins, Jefferson, Jessamine, Livingston, Logan Meade, Mercer Metcalfe, Trimble.

GASTROCOPTA CLAPPI Sterki Edmonson, Hart.

GASTROCOPTA CONTRACTA (Say). Anderson, Bell, Christian, Cumberland, Edmonson, Floyd, Hardin Harrison, Hopkins, Jefferson Logan Meade, Metcalfe, Monroe, Trimble.

GASTROCOPTA PENTODON (Say). Anderson, Breckenridge, Christian, Cumberland, Edmonson Floyd, Hart, Hopkins, Jefferson, Trimble.

Occasionally a specimen of *G. pentodon* will become mature and develop the teeth one whorl short of the usual number. Such specimens were named *Gastrocopta carnegiei* by Sterki. *Gastrocopta tappaniana* produces similar aberrations.

GASTROCOPTA TAPPANIANA (C. B. Adams). Edmonson, Jefferson, Meade, Metcalfe.

GASTROCOPTA CORTICARIA (Say). Edmonson, Jefferson, Trimble.

GASTROCOPTA PROCERA PROCERA (Gould). Cumberland, Edmonson, Floyd, Hardin, Hart, Jefferson.

PUPOIDES ALBILABRIS (C. B. Adams). Edmonson, Hardin, Hart, Henry, Jefferson, Livingston, Logan, Trimble.

VERTIGO OSCARIANA Sterki. Cumberland.

VERTIGO OVATA OVATA (Say). Edmonson.

VERTIGO TRIDENTATA Wolf. Floyd, Jefferson, Mercer, Trimble.

COLUMELLA EDENTULA (Draparnaud). Anderson, Edmonson, Hardin, Metcalfe.

VALLONIA PULCHELLA (Müller). Hardin.

VALLONIA EXCENTRICA Sterki. Hardin, Henry.

VALLONIA COSTATA (Müller). Hardin, Henry.

CIONELLA MORSEANA Doherty. Bell, Edmonson, Green, Hardin, Meade, Mercer, Perry, Trimble, Whitley.

CARYCHIUM CLAPPI Hubricht. Bell, Breckenridge, Edmonson, Hardin, Jessamine, Mercer, Metcalfe, Perry.

CARYCHIUM EXILE EXILE H.C. Lea. Anderson, Barren, Bell, Butler, Carroll, Edmonson Franklin, Hardin, Hart, Jefferson, Lincoln Meade, Monroe, Trimble, Whitley.

CARYCHIUM EXIGUUM (Say). Meade.

CARYCHIUM STYGIUM Call. Barren, Edmonson, Hart, Simpson, Warren.

CARYCHIUM NANNODES Clapp. Bell, Butler, Edmonson, Green, Hardin, Meade, Mercer, Metcalfe, Perry, Pike, Trimble.

HENDERSONIA OCCULTA (Say). Bell, Harlan.

HELICINA ORBICULATA ORBICULATA (Say). Cumberland, Edmonson, Pulaski.

POMATIOPSIS CININNATIENSIS (Lea). Edmonson, Jefferson, Livingston.

POMATIOPSIS LAPIDARIA (Say). Anderson, Barren, Carroll, Cumberland, Edmonson, Green, Harlan, Jefferson, Livingston, Meade, Mercer, Metcalfe, Perry, Pike, Warren, Wayne.

LITERATURE CITED

BICKEL, David. (1967) Preliminary checklist of Recent and Pleistocene Mollusca of Kentucky. -- STERKIANA 28: 7-20.

HUBRICHT, LESLIE (1964) Pleistocene land snails from the talus of Kentucky and Tennessee. -- STERKIANA 16: 3-4.

PILSBRY, Henry A. (1939-1948) Land Mollusca of North America (north of Mexico). -- Acad. Nat. Sci. Philadelphia, Monogr. 3, v. 1, 2, 2215 p.

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LAND SNAILS FROM PINE AND BIG
BLACK MOUNTAINS, KENTUCKY

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In 1900, Pilsbry marshalled molluscan evidence to demonstrate the relatively distinctive nature of the fauna in the Cumberland Plateau as contrasted with that of the eastern mountains (Roan Mountain to the Great Smokies). He considered the broad valley of East Tennessee to be a partial barrier to intermingling of the two faunas. Collections in 1967 by the present authors tend to ameliorate the barrier concept, or at least extend the Smoky Mountain fauna into Kentucky

Most of Eastern Kentucky is included in the Cumberland Plateau, a region of dendritic drainages, irregularly winding, narrow ridges, and deep, narrow valleys. In much of the literature, for example Lutz's paper on the land mollusks of Claiborne County, Tennessee, which lies adjacent to Kentucky in the region of Cumberland Gap, it has been common practice to term Cumberland and Pine Mountains a part of the Cumberland Plateau. However, Pine Mountain actually marks the change in the southeast from the horizontal strata of the plateau country to the folded-and-thrust faulted linear ridges of the Appalachians (McFarlan, 1950). Both Pine and Cumberland Mountains are rather steep ridges carved from the Lee Formation, and are

separated from the plateau by the geosynclinal Middlesboro Basin.

Both of the last-named mountains are linear ridges of the Ridge-and-Valley Province. Pine Mountain ranges from 2100 to 2300 feet elevation at the southern end, and from 2600 to 3000 feet at the north. Cumberland Mountain has been produced in westward-dipping Lee conglomerate, and lies on the eastern flank of the Middlesboro syncline. Its altitude approximates 3000 feet over much of its length, and it attains 3451 feet in Harlan County, Kentucky. The region is drained by the headwaters of the Cumberland River, which crosses Pine Mountain via a narrow water gap at 1000 feet, a course established prior to the formation of the mountain.

Cumberland Gap is a notch in Cumberland Mountain at the point where Tennessee, Kentucky, and Virginia come together. The bottom of the gap is at 1,650 feet mean sea level, and thus is from 400 to 650 feet above the Powell (Tennessee) and Cumberland Rivers (Kentucky), and some 500 feet above the Middlesboro lowlands. The Cumberland River apparently pirated an east-flowing tributary (now called Yellow Creek) from the Powell River. It was this stream

from the Powell River. It was this stream which originally eroded Cumberland Gap. During late Tertiary times, a northward tilting of the Harrisburg Plain completed the separation (McFarlan, *loc. cit.*).

Within the Middlesboro Basin several dendritic patterned mountains attain rather high altitudes. Big Black Mountain, in Harlan County, carved from Harlan Sandstone, is the highest point in Kentucky, 4,150 feet.

Armed with the information concerning stream capture and tectonic adjustments in the Cumberland Gap vicinity, the authors conducted a moderately intensive collecting tour on the southern end of Pine Mountain in Bell County, Kentucky. Some material was secured from Big Black Mountain for comparative purposes. In addition to other interesting material, several species heretofore unknown in Kentucky were secured.

PREVIOUS WORK IN THE AREA

With four exceptions (see below), all of the information concerning the Mollusca of Pine Mountain were presented in Pilsbry's (1940, 1946, 1948) Monograph. All of Pilsbry's material came from a single locality in Harlan County. These data are here summarized: *Stenotrema edwardsi* (Bland), *S. hirsutum* (Say), *S. fraternum* (Say), *Mesodon zaletus* (Binney), *M. sayanus* (Pilsbry), *Triodopsis tridentata* (Say), *T. denotata* (Férussac), *Allogona profunda* (Say), *Anguispira alternata jessica* Kutchka *Discus patulus* (Deshayes), *D. bryanti nigri-montanus* (Pilsbry) (elevated by Hubricht, 1963, to full species), *Punctum minutissimum* (Lea), *Philomycus carolinianus* (Bosc), *P. flexuolaris* Rafinesque, *Guppya sterkii* (Dall), *Mesomphix inornatus* (Say), *M. perlaevis* (Pilsbry), *M. cupreus* (Rafinesque), *Paravitrea placentula lithodora* Pilsbry, *Gastrodonta interna* (Say), *Ventridens accerra* (Lewis), *V. elliotti* (Redfield), and *Striatura ferrea* Morse. Hubricht (1938) described *Anguispira alternata rugoderma*

from the lower side of Pine Mountain in Bell County, a form submerged in *alternata* by MacMillan (1940). Branson (1968) listed paratypes of his *Philomycus batchi* from this general region.

Bell County, Kentucky was included in the mapped ranges of *Ventridens pilsbryi* Hubricht (see text), *V. theloides* (Walker and Pilsbry), *V. lawae* (W. G. Binney) and *V. gularis* (Say) (Hubricht, 1964), and Hubricht (1961) described *Stenotrema calvescens* from the Tennessee side (Marion County) of Cumberland Mountain (not collected by us). Burch (1951) secured specimens of *Mesodon andrewsae normalis* (Pilsbry) from Big Black Mountain in Virginia near the Kentucky border.

COLLECTING SITES

In the discussion which follows, each species is referred to the locality where it was collected by the station numbers below. The figure following the station number in parentheses is the number collected.

STATION 1. Near the base of Pine Mountain, in a heavily shadowed valley, under decaying hardwood leaves and wood, Pine Mountain State Park, Bell County, Kentucky. May 5, 1967.

STATION 2. Big Black Mountain, slopes along Fugate Creek, State Highway 38, 'Slope Hollow,' near Louellan, Harlan County, Kentucky. May 7, 1967.

STATION 3. Near top of Pine Mountain, 2,300 - 2,400 feet mean sea level, Pine Mountain State Park, Bell County, Kentucky. May 6, 1967.

STATION 4. Pine Mountain State Park Lodge, approximately 1,500 feet mean sea level, Bell County, Kentucky. October 17, 1967.

ANNOTATED LIST

Careful analysis of the collections secured at the above stations disclosed representatives of six families, 18 genera,

and 47 species. Included in these were nine species heretofore unknown from Kentucky; one of these species was tentatively diagnosed as *Philomycus venustus* Hurbrecht. The remaining eight new records are: *Pallifera ragsdalei* Webb, *Mesodon perigraptus* (Pilsbry), *Mesomphix capnodes* (Binney), *Retinella carolinensis* (Cockerell), *Retinella virginica* Morrison, *Ventridens suppressus virginicus* (Vanatta), *V. coelaxis* (Pilsbry), and *V. lasmodon* (Phillips).

Family Endodontidae

ANGUISPIRA ALTERNATA MORDAX (Shuttleworth).

Collecting Sites: 3 (46).

As indicated by MacMillan (1940), this beautiful species was found associated with tuliptree logs, on the south side of the mountain. No other form of *alternata* was present. In the small to medium-sized specimens, the periphery is acutely angular, very similar to *A. cumberlandiana* (Lea) in general appearance, the height being considerably less than one-half the diameter. Furthermore, the spire is depressed in the larger ones, and the periphery continues strongly angular. The growth sculpture is very heavy, above and below, raised and sharp (see table below). The aperture is quite oblique. The measurable details are (mm):

DIAM.	HEIGHT	UMBI-LICUS	RIBS PER 3 mm	WHORLS
7.5	3.0	2.0	5	3 5/6
10.0	5.0	2.0	-	4 1/3
11.0	4.9	2.5	-	4 1/2
12.0	5.5	3.0	3	4 1/2
14.5	6.6	3.0	-	-
16.0	7.4	3.9	2	5
18.0	8.5	4.5	-	5 1/6
21.0	11.0	5.2	4	6

These specimens, five of which were deposited in the Museum of Comparative Zoology at Harvard, are indistinguishable from some secured on Rich Mountain, Oklahoma. The only other records for the form in Kentucky are from Monticello, Wayne

County (Pilsbry, 1948) and Bowling Green (Price, 1900).

ANGUISPIRA ALTERNATA ANGULATA Pilsbry
Collecting Sites: 1(1), 2(2).

These shells, all of which were collected at the bases of the mountains, possess a distinctively angular periphery, and the sculpturing is rather coarse, there being about four ribs per 2mm on the last one-half of the body whorl. Below the periphery there is a single row of blotches and a few scattered flammules above it. One of the shells measures 10.5 mm in diameter, 5.1 in height, 2.8 in umbilicus, and it possessed 4 1/3 whorls. We refer the form *A. alternata jessica* Kutchka to this race. It is the common form of *alternata* over much of the Cumberland Plateau.

DISCUS NIGRIMONTANUS (Pilsbry).

Collecting Site: 1(2).

The periphery is angular above and below, giving the outer peristome an angular appearance. Except for the first 1 1/2 whorls, which are finely spirally striate, the pale brown shell is coarsely rib-striate, the ribs increasing in height as they pass over the periphery.

HEIGHT	DIAMETER	UMBILICUS	WHORLS
1.5	3.0	1.5	3 1/4
1.2	3.0	1.3	3 1/2

This collection verifies Pilsbry's (1948) records. Miss Price's records for *Discus bryanti* (Harper) at Torrent, East Kentucky Mountain, were probably based upon this species.

DISCUS PATULUS (Deshayes)

Collecting Sites: 1(2), 2(1), 3(75).

The growth sculpture is coarse in all specimens. The internal parietal nodule becomes progressively smaller as the diameter increases, disappearing in shells of 8.0 mm or larger. One of the most common snails in hardwood forests throughout the state.

DIAM.	HEIGHT	UMBILICUS	WHORLS
6.8	3.5	2.8	5½
7.5	4.3	3.0	5½
8.0	4.5	3.5	6
8.5	3.8	3.5	6

Family Haplotrematidae

HAPLOTREMA CONCAVUM (Say)

Collecting Sites: 1(7), 2(4), 3(3), 4(1).

The specimens from Pine Mountain have very fine, close-set radial sculpture which becomes coarser on the lower side and behind the aperture. The foot was blue in specimens with shells under 16.0 mm in diameter, but tended to yellowish gray in the larger ones and in the specimens from Black Mountain. In the measurable details which follow, the first four specimens are from Pine Mountain; the last four are from Black Mountain.

DIAM.	HEIGHT	UMBILICUS	WHORLS
10.3	5.0	3.5	4 +
14.3	6.5	4.5	4 7/8
16.7	7.5	5.6	5
18.5	6.8	9.0	5 +
19.5	9.0	6.2	5 1/3
20.2	8.9	6.5	5 1/2
21.0	10.0	7.5	5 1/2
21.5	9.6	7.0	5 1/2

The shells of the Pine Mountain specimens are quite similar to those used by Webb (1951) from the Great Smokies to describe the subspecies *H. concavum kendeighi*. Later, Hubricht (1956) found some specimens in North Carolina in which specimens with shells 16.4 mm and smaller had enlarged cloacae and a blue foot; specimens 19.5 mm and larger had a yellowish-gray foot. He concluded that the large-shelled form was *H. concavum* and the smaller ones were *H. kendeighi*. Both the cloacal character and the blue foot are neanic features which merge into the typical adult form, and hence cannot be used to differentiate species. *H. kendeighi* is a simple synonym of *H. concavum*, and should be submerged.

Family Limacidae

DEROCERAS RETICULATUM (Müller)

Collecting Sites: 1(1); 14.0 mm in total length.

Family Philomycidae

PHILOMYCUS VENUSTUS Hubricht

Collecting Site: 2(2)

Hubricht's (1953) holotype was collected in Wythe County, Virginia, but he secured paratypes from the summit of Black Mountain, also in Virginia, and from the Great Smoky Mountains. Our specimens are very similar to some secured from the Smokies, and from ones taken near the eastern end of Black Mountain in Virginia (Branson, 1968). The species probably ranges throughout southern and eastern Kentucky. Our specimens measured:

CONTRACTED LENGTH	WIDTH OF SOLE
16.5 mm	2.5 mm
47.0	6.5

PALLIFERA RAGSDALEI (Webb)

This large, grayish-brown slug is of widespread occurrence in the eastern United States, and westward to the Ozarks (Branson, 1962) where it was long confused with *Philomycus carolinianus* (Bosc). Our single specimen measured 41.0 mm in contracted length, and the sole was 8.0 mm wide.

Family Polygyridae

ALLOGONA PROFUNDA (Say)

Collecting Sites: 1(1), 3(5).

Only two of the six specimens possess a broad, revolving chestnut band above the periphery. The growth striae are thread-like. Two of the shells measured:

DIAMETER	HEIGHT	UMBILICUS	WHORLS
29.0	15.3	5.5	5 1/3
30.5	12.3	7.5	5 1/2

MESODON APPRESSUS (Say)

Collecting Sites: 1(9), 2(5), 3(18), 4(2).

In the Pine Mountain material, the periphery is more angular than in that from Black Mountain, and that from northern Kentucky. The growth striae and characteristic beaded spiral striae (about as heavy above as below) is coarse, much like specimens from Knoxville, Tennessee. Ecologically, the species seems to have a preference for decaying wood, often climbing six or seven feet in dead trees. A series from station 1 measure:

DIAMETER	HEIGHT	WHORLS
15.5	8.0	5 1/6
17.0	8.6	5 +
19.0	9.0	5 +
19.5	9.5	5 1/2

MESODON PERIGRAPTUS Pilsbry

Collecting Sites: 1(4), 3(6).

The chamois-colored shell is sub-glossy, depressed, with rather fine growth striae cut across by incised spirals. The imperforate base is concave, and the short, curving parietal tooth is well separated from the axis. Some of our shells measured:

DIAMETER	HEIGHT	WHORLS
19.5	9.0	5
20.7	9.7	5 1/5
21.0	9.1	5
22.0	9.5	5 -

MESODON SAYANUS (Pilsbry)

Collecting Sites: 2(8), 3(2), 4(1).

This northern and eastern species is very common in shaded valleys of the Cumberland Plateau, but it begins to peter out toward the Valley and Ridge Province, there being very few records in Tennessee. The shell, in southeastern Kentucky, averages larger than elsewhere in the range, our largest specimen being two mm larger than the largest listed by Pilsbry (1940). Four shells measured:

DIAMETER	HEIGHT	UMBILICUS	WHORLS
20.0	12.3	3.0	5 7/8
22.5	13.5	3.0	6
24.0	14.2	4.0	6 1/5
29.0	15.9	6.0	6

MESODON ZALETUS (Binney)

Collecting Sites: 1(3), 2(4), 3(4).

Four specimens from station 2 measure:

DIAMETER	HEIGHT	WHORLS
29.9	20.4	5 3/4
30.0	20.2	5 1/2
31.3	21.5	5 1/2
31.5	21.5	5 2/3

MESODON INFLECTUS (Say)

Collecting Site: 1(3).

These three specimens were secured from beneath a pile of decaying leaves. In the uplands, *inflectus* is replaced by the next species.

MESODON RUGELI (Shuttleworth)

Collecting Sites: 2(1), 3(2).

Mesodon rugeli is less abundant on Pine and Black Mountains than in the Cumberland Plateau area, and tends to be slightly smaller. Our specimens measure:

DIAMETER	HEIGHT	WHORLS
9.5	5.5	5
10.0	5.5	4 5/6
10.5	5.5	4 3/4

STENOTREMA EDWARDSI (Bland)

Collecting Sites: 1(7), 2(4), 3(6).

The minute ridges which support the radially arranged periostracal processes are very dark brown, and the processes are very well developed. The aperture is quite narrow, its basal notch nearly obsolete. Four shells measure:

DIAMETER	HEIGHT	WHORLS
7.5	4.8	5
8.2	5.3	5 1/4
8.5	5.5	5 1/5
9.5	5.8	5 +

STENOTREMA HIRSUTUM (Say)

Collecting Sites: 1(8), 3(1), 4(4).

With the exception of one specimen from station 1 (the largest below), all of the specimens are more or less typical *hirsutum*. The 10.5 mm specimen has some characteristics of *S. barbatus* (Clapp), including a rather wide basal notch, short,

stiff periostracal processes, and wide aperture. Four specimens were measured:

DIAMETER	HEIGHT	WHORLS
7.0	4.8	5
7.2	4.5	5 1/3
7.9	5.0	5 1/4
10.5	7.3	5 1/2

STENOTREMA STENOTREMA (Pfeiffer)

Collecting Sites: 1(4). 2(2) 3(7).

All of these specimens possess only moderately depressed shells, and in all of them the periostracal processes have spirally arranged bases, thus eliminating the possibility of confusion with the nominate form *S. angellum* (Hubricht, 1958).

Three specimens measure:

DIAMETER	HEIGHT	WHORLS
10.0	7.0	5½
10.3	7.0	5½
10.5	6.8	5½

TRIODOPSIS ALBOLABRIS (Say)

Collecting Sites: 1(1). 2(8) 3(7).

HEIGHT	DIAMETER	WIDTH OF LIP	WHORLS
32.0	22.0	3.3	5 1/2
34.0	20.5	3.5	5 1/2
35.5	22.8	3.6	5 2/3
36.5	24.0	3.3	5 2/3

TRIODOPSIS DENOTATA (Deshayes)

Collecting Site: 2(1).

A decidedly lowland form, our specimen was removed from a decaying log on the banks of Fugate Creek. It measured 25.0 mm in diameter, 13.0 mm in height, and had nearly six whorls.

TRIODOPSIS FOSTERI (F. C. Baker)

Collecting Site: 3(3).

The radial sculpture is relatively coarse, the parietal tooth is short and separated from the columellar axis, and a small upper palatal is present.

DIAMETER	HEIGHT	WHORLS
14.5	7.5	5
14.6	7.0	4½
15.5	8.8	5+

TRIODOPSIS FRAUDULENTA (Pilsbry)

Collecting Sites: 2(5), 3(3).

DIAMETER	HEIGHT	WHORLS
14.5	7.5	5 1/3
16.0	8.0	5 1/2
19.0	9.0	5 4/5

TRIODOPSIS MULTILINEATA (Say)

Collecting Site: 3(1).

Although Browne and Bruder (1963) reported fossil shells of this species from Western Kentucky, we believe ours is the only record of a living specimen. In our specimen, there are five revolving bands on the base, one at the periphery, and three above the periphery. The measurements are: 26.5 mm in diameter, 15.4 mm in height, and there are 4 7/8 whorls.

TRIODOPSIS TRIDENTATA (Say)

Collecting Sites: 1(8) 2(8). 3(24).

These specimens are quite like Pilsbry's *T. tridentata juxtidentis*, since in several of them the parietal tooth slants towards the upper palatal. A series of five measure:

DIAMETER	HEIGHT	UMBILICUS	WHORLS
14.5	7.0	3.0	4 2/3
15.5	8.0	3.5	5 1/3
16.8	8.0	3.1	5 1/2
19.0	10.0	2.9	5 2/3
19.5	9.7	3.5	5 1/2

Family Zonitidae

GASTRODONTA INTERNA (Say)

Collecting Sites: 2(2) 3(6). 4(3).

Although there are few published records for this species in Kentucky—Bickel (1967) overlooked Pilsbry's (1946) record from Pine Mountain Harlan County—it actually is generally distributed throughout the Cumberland Plateau region. Four specimens measure:

DIAMETER	HEIGHT	WHORLS
5.5	3.5	7 1/2
6.9	4.2	8
7.0	4.5	8 1/5
7.4	4.5	8

GUPPYA STERKII (Dall)

Collecting Site: 3(1).

HAWAIIA MINUSCULA (Binney)

Collecting Site: 3(1).

MESOMPHIX CAPNODES (Binney)

Collecting Site: 3(5).

The spiral papillae are present, but rather weakly developed, and a moderate umbilicus is produced. The measurable details are:

DIAM.	HEIGHT	AP. HEIGHT	AP. WIDTH	UMBI-LICUS	WHORLS
14.5	8.5	7.8	7.8	1.9	3 1/2
18.3	11.5	-	-	1.8	4
19.0	11.0	9.3	9.3	2.5	4
19.5	11.5	10.3	10.3	2.2	4
22.0	13.5	11.1	11.1	0.8	4 1/3

MESOMPHIX CUPREUS (Rafinesque)

Collecting Sites: 1(2), 2(2), 3(3).

Of the greenish form of this species, these shells lack spiral sculpture, and the apex is only moderately eroded. Three shells measure:

DIAM.	HEIGHT	AP. HEIGHT	AP. WIDTH	UMBI-LICUS	WHORLS
21.1	12.6	11.1	10.7	3.0	4 1/4
22.5	13.5	11.3	11.9	3.2	4 1/4
28.5	17.0	13.0	14.0	4.3	4 5/6

MESOMPHIX INORNATUS (Say)

Collecting Sites: 1(8), 2(18), 3(9).

One of the most common snails in the mountains of eastern Kentucky, the species seems to be more depressed in this region than elsewhere. A series of six shells from station 2 measure:

DIAM.	HEIGHT	AP. HEIGHT	AP. WIDTH	SPIRE WIDTH	WHORLS
19.6	11.0	9.0	11.0	9.5	4 2/3
20.3	11.0	9.3	11.0	9.0	4 1/2
20.5	11.5	9.8	11.5	9.8	4 1/2
20.5	11.0	9.5	11.6	10.0	4 1/2
21.1	12.0	10.2	11.7	11.0	5 +

In the largest specimen, the umbilicus measures about 1.0 mm.

MESOMPHIX PERLAEVIS (Pilsbry)

Collecting Sites: 2(22), 3(11), 4(1).

DIAM.	HEIGHT	AP. H.	AP. W.	WHORLS
15.0	8.0	7.3	8.5	4 +
16.0	9.5	8.5	8.8	4 1/3
17.5	10.5	8.0	8.8	4 1/3

18.5	11.0	8.8	10.0	4 2/3
19.5	11.0	9.1	10.5	4 3/4
22.0	11.8	10.0	12.2	5

The umbilicus of the largest specimen measures 1.5 mm. In addition to the above, the width of the last spire in relation to spire width was determined in four specimens, as follows:

SHELL DIAMETER	SPIRE WIDTH	WIDTH LAST WHORL
21.0	11.0	8.5
19.5	9.5	7.5
17.3	8.5	7.4
16.0	8.0	6.6

MESOMPHIX VULGATUS H. B. Baker

Collecting Site: 1(9).

DIAM	HEIGHT	AP. H.	AP. W.	WHORLS
15.0	9.0	8.0	8.0	4 1/2
19.5	11.0	10.8	9.0	5
21.0	13.5	11.5	10.0	4 2/3
23.0	13.0	12.5	11.0	5

PARAVITREA PLACENTULA (Shuttleworth)

Collecting Sites: 1(1), 2(1), 3(4).

The shell is depressed, only slightly convex. Its base is smooth, all of the whorls being visible in the well-like umbilicus which is contained about seven times in the diameter. The sutures are rather shallow, re-bordered. Following the first one and one-half smooth whorls, the remaining whorls bear incised, uneven radial striae, between which are finer growth striae. None of the shells bore teeth.

DIAM.	HEIGHT	UMBILICUS	WHORLS
3.5	1.5	0.5	5 3/4
6.0	3.0	1.2	7
7.0	4.0	1.5	8

The type locality, of Pilsbry's (1946) *P. placentula lithodora* is Pine Mountain, Harlan County. He stated (*loc. cit.*) that 'If it were not so far out of its range the Pine Mountain snail might be thought to be a form of *placentula*, and it is provisionally placed with that species.' In view of our other findings, we are of the opinion that *lithodora* is not 'out of range.' The form is relatively common in the Cumberland Plateau. It is probably a sibling species of *placentula* rather than

race of that species. We herewith elevate it to full-species rank.

RETINELLA CAROLINENSIS (Cockerell)

Collecting Sites: 1(3), 2(1), 3(4).

The umbilicus is approximately one-half open (hemiomphalic), and the whorls are marked by minute but distinct, close-set spiral sculpture. This species is common around Gatlinburg, Sevier County, Tennessee (Pilsbry, 1946).

DIAMETER	WHORLS
2.6	3 1/3
4.5	4 1/2
6.0	4 7/8

RETINELLA CRYPTOPHALA (Clapp)

Collecting Site: 1(1).

A common species throughout Kentucky.

RETINELLA INDENTATA (Say)

Collecting Site: 1(1).

RETINELLA VIRGINICA Morrison

Collecting Site: 1(2).

The greenish-yellow, hyaline shell has a waxy appearance. Its major growth wrinkles are close-set and irregularly spaced, crossed by faint spiral striae, the latter also being present on the base. The aperture is rather transverse, wider than high, and the upper peristome contacts the penultimate whorl well above the periphery. Height, 2.4 mm; diameter, 4.5 mm; diameter of umbilicus, 0.9 mm; height of aperture, 1.5 mm; width of aperture 2.0 mm; whorls 4 $\frac{1}{2}$.

RETINELLA WHEATLEYI (Bland)

Collecting Site: 1(1).

This specimen, which measures 3.5 mm in diameter and has an oval umbilicus 0.7 mm in diameter, has 11 major growth wrinkles per 2.0 mm on the last one-half of the body whorl, and 3 $\frac{1}{2}$ whorls.

VENTRIDENS ELLIOTTI (Redfield)

Collecting Sites: 1(1), 2(1), 3(3), 4(2)

Greenish-yellow and glistening above, the whorls increase slowly the last being somewhat depressed near the aperture. The

base is much smoother than the upper surface. Four specimens measure:

DIAM.	HEIGHT	UMBILICUS	WHORLS
6.0	3.0	1.2	aperture chipped
7.0	4.0	1.5	5 1/5
7.6	4.0	1.4	5 1/2
9.0	4.5	2.0	5 1/4

VENTRIDENS GULARIS NODUS Pilsbry

Collecting Sites: 2(1), 3(32).

The base is distinctly concave around the minute umbilicus, the shell being broadly dome-shaped. The growth striae are very low, rounded, and spiral sculpture is lacking. In young stages, to 6.5 mm in diameter, there are two lamellae; one situated on the thickened columellar axis, its free edge directed outward; the other lamella is produced near the outer edge of the floor of the body whorl, and it is strongly curved, its edge directed slightly inward and upward. The animal was yellowish-gray, thus distinguishing our specimens from Hubricht's (1964) *V. pilsbryi*. Five specimens measure:

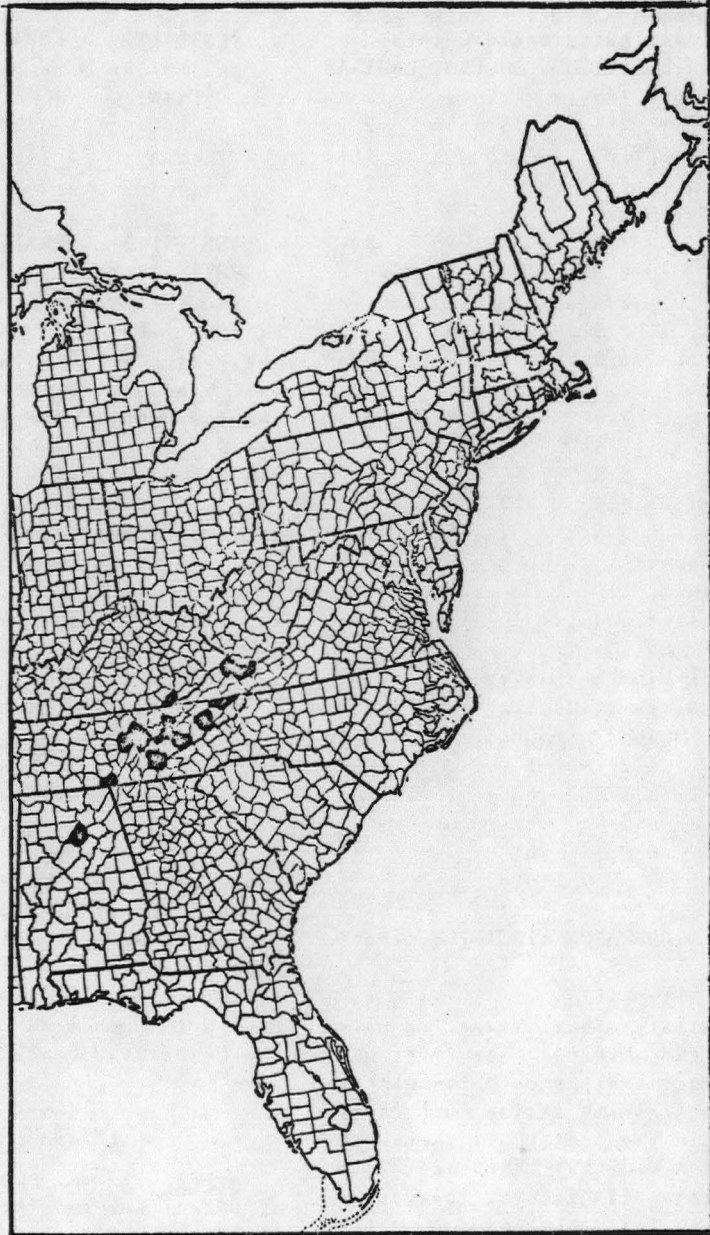
DIAMETER	HEIGHT	WHORLS
6.0	3.0	6 1/2
7.5	4.5	7 1/3
8.5	5.5	7 7/8
9.0	5.2	8 +
9.3	6.9	9 +

VENTRIDENS LASMODON (Phillips)

Collecting Sites: 1(19), 3(1).

Since there is such a wide hiatus (Map 1) separating this population from its counterparts in Tennessee (Smokies), we have included a rather detailed characterization of this species.

The shell coloration is amber, and the growth sculpturing is rather coarse, much weaker on the nearly smooth base, which has some distinct, wavy spirals. The profile is low, broadly dome-like, although the periphery is angular in small shells; the base is convex. The sutures are distinct, and the aperture is moderately lunate, oblique. All whorls are visible in the large umbilicus. Up to about 6.5 mm in diameter, the shells possess the following arrangement of two blade-like la-



MAP 1. Distribution of *Ventridens lasmodon* in Virginia, Kentucky (Bell County), Tennessee, and Alabama.

mellae: one around the last one-third whorls near the axis, and a second, slightly longer one on the middle outer wall of the last whorl. Shells larger than this retain only a thick pad near the axis. The animal is white. The series from Station 1 have the following measurements:

DIAM.	HEIGHT	UMBILICUS	WHORLS	LAMINAE
4.5	2.0	1.5	5	2
4.5	2.0	1.5	5 1/5	2
4.8	2.0	1.7	5 1/4	1(1)
5.1	2.3	1.6	5	2
5.2	2.1	2.0	5 1/2	2
6.0	2.5	2.0	6 1/2	2
6.5	3.0	2.3	Note 2	Note 3
6.9	3.2	2.4	7	Note 3
7.0	3.2	2.5	6 3/4	Note 3
7.0	3.5	2.5	7	0
7.0	3.5	2.3	Note 2	0
7.1	3.5	2.5	7 1/5	0
7.3	3.5	2.5	7	Note 3
7.5	3.4	2.5	7	0
7.5	3.5	2.5	7 1/4	0
7.5	3.5	2.5	7 1/5	0

Note 1: basal gone

Note 2: almost 7

Note 3: columellar nodule

VENTRIDENS DEMISSUS (Binney)

Collecting Sites: 1(4) 2(5) 3(1).

DIAM.	HEIGHT	WHORLS
8.8	5.2	6 --
9.5	6.1	6 1/2
9.8	6.5	6 1/2
10.2	6.0	6 1/2
10.5	6.5	6 1/2

VENTRIDENS SUPPRESSUS VIRGINICUS (Vantatta)

Collecting Site: 1(1).

The shell, a late neanic stage, is pale horn in color and shining. The first one and one-half whorls are smooth, the others bear indistinct growth striae and faint spirals. Within the last whorl there are four lamellae: a somewhat thickened bifid one near the columella leaning toward the basal one, which is thickened near the middle and thinner distally, and which leans toward the columella. Above the latter, two very low, spiral lamellae are placed near the suture. The umbilicus is

round, well-like, and the periphery is slightly angular near the periphery. The shell measures 4.5 mm in diameter, 2.5 mm in height, 0.5 mm in umbilical diameter, and it has 5 1/2 whorls.

VENTRIDENS ACERRA (Lewis)

Collecting Site: 4(3).

DIAM.	HEIGHT	WHORLS
8.0	5.0	6
9.5	5.7	6 1/5
9.7	5.9	6 1/2

VENTRIDENS COELAXIS (Pilsbry)

Collecting Site: 2(1).

The shell is impressed around the umbilicus, and the periphery is angular. There are two long lamellae, one near the axis, and another nearly on the floor of the body whorl. The measurements are: diameter 6.8 mm; height 3.9 mm; umbilicus 0.9 mm; 7 whorls. This may actually be a separate race, because of the smaller umbilicus (about 7.5 times in diameter), but the lack of specimens precluded such a conclusion. For the present, it seems best to include the form with *coelaxis*.

ZONITOIDES ARBOREUS (Say)

Collecting Site: 4(1).

CONCLUSIONS

Although more work is needed in the Pine Mountain region, especially on adjacent Cumberland Mountain, the evidence presented above clearly indicates a closer faunal relationship between the area and the Great Smokies and Valley-and-Ridge Province than between Pine Mountain and the Cumberland Plateau.

LITERATURE CITED

- BICKEL, D. (1967) Preliminary checklist of Recent and Pleistocene Mollusca of Kentucky. -- *Sterkiana* 28: 7-20.
- BRANSON, B. A. (1962) The slugs (Gastropoda: Pulmonata) of Oklahoma and Kansas with new records. -- *Trans. Kansas Acad. Sci.* 65: 110-119.

- (1968) Two new slugs (Pulmonata: Philomycidae: *Philomycus*) from Kentucky and Virginia. -- *Nautilus* 81: 127-133.
- BROWNE, R. G. and BRUDER, P. (1963) Pleistocene Mollusca from the loesses of Kentucky. -- *Sterkiana* 11: 53-56, 57.
- BURCH, P. R. (1951) *Mesodon andrewsae normelii* (Pils.) in Virginia (Pulmonata, Polygyridae). -- *Virginia J. Sci.* 2: 60-61.
- HUBRICHT, L. (1938) A new *Anguispira* from Kentucky. -- *Nautilus* 51: 131.
- (1953) Three new species of Philomycidae. -- *Nautilus* 66: 78-80.
- (1956) *Haplotrema kendeighi* Webb. -- *Nautilus* 69: 126-128.
- (1958) New species of landsnails from the eastern United States. -- *Trans. Kentucky Acad. Sci.* 19: 70-76.
- (1961) Eight new species of land snails from the southern United States. -- *Nautilus* 75: 26-63.
- (1963) Notes on the genus *Discus*. -- *Nautilus* 77: 62-63.
- (1964) The bidentate species of *Ventridens* (Stylommatophora: Zonitidae). -- *Malacologia* 1: 417-426.
- LUTZ, L. (1950) A list of the land Mollusca of Claiborne County, Tennessee, with description of a new subspecies of *Triodopsis*. -- *Nautilus* 63: 99-105, 121-123.
- MacMILLAN, G. K. (1940) A monographic study of the snails of the genera *Anguispira* and *Discus* of North America, exclusive of Mexico. -- *Ann. Carnegie Mus.* 27: 371-427.
- MacFARLAN, A.C. (1950) Geology of Kentucky. -- Univ. Kentucky, Lexington, p. i-xxviii; 1-531.
- PILSBRY, H.A. (1900) Mollusca of the Great Smoky Mountains. -- *Proc. Acad. Nat. Sci. Phila.* 52: 110-150.
- (1940) Land Mollusca of North America (north of Mexico). -- *Acad. Nat. Sci. Phila. Monogr.* 3 I(2): i-viii; 575-999; i-ix.
- (1946) *Ibid.*, 3 II (1): i-viii; 1-520.
- (1948) *Ibid.*, 3 II (2): i-xlvi; 521-1113.
- PRICE, S. F. (1900) Mollusca of southern Kentucky. -- *Nautilus* 14: 75-79.
- WEBB, G. R. (1951) A new land snail, *Haplotrema concavum kendeighi* (Mollusca, Pulmonata). -- *Trans. Kansas Acad. Sci.* 54: 78-82.

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ABSTRACT

Collections at four sites on Pine and Big Black Mountains, Bell and Harlan counties respectively, disclosed a closer relationship of the fauna of Pine Mountain and the Great Smoky Mountains and the Valley-and-Ridge Province than between the Kentucky sites and the Cumberland Plateau. Nine terrestrial mollusks, previously unrecorded from Kentucky, are reported: *Pal-*

lifera ragsdalei, *Philomycus venustus*, *Mesodon perigraptus*, *Mesomphix capnodes*, *Retinella carolinensis*, *R. virginica*, *Ventridens suppressus virginicus*, *V. coelaxis*, and *V. lasmodon*. Most of these represent rather wide range extensions. *Paravitrea placentula lithodora* Pilsbry is elevated to full species rank.

Author's Summary

THE LAND MOLLUSCA OF ST. CROIX, VIRGIN ISLANDS

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INTRODUCTION

St. Croix, the largest of the Virgin Islands, lies about 95 miles southeast of San Juan, Puerto Rico and 1,000 miles southeast of Key West, Florida. It is roughly wedge shaped with the narrower portion at the eastern end. It is about 21 miles long, 6 miles wide at the center and has an area of 84 square miles.

Its relatively simple topography is characterized by a mountainous northern region and a southern area of rolling plains. A lowland area also borders the sea on the west near Fredriksted.

The highest mountains are found in the northwest (Mt. Eagle 1,165 ft., Blue Mt. 1,090 ft.). Portions of this area are well wooded. The lower mountains in the center, where they have not been subjected to cultivation and along the eastern peninsula, have a cover of low bushes, cacti, and grasses.

Cederstrom (1950) gives a brief description of the geology of the island. The mountains in the northwest and along the eastern peninsula are made up of the Mt. Eagle formation which is of volcanic origin and contains some interbedded limestone. In the center of the island, from

Concordia and reaching southward to near Constitution Hill, there is a belt of lower limestone hills cut by narrow valleys. The southern plain, which does not extend along the narrow eastern peninsula except as discontinuous embayments, consists largely of clayey and sandy alluvium overlying the Mt. Eagle formation. This alluvium is interspersed with beds of Kings-hill marl containing white limestone and limy rocks of coral reef origin. Most molluscan faunal records come from the southern plain and the low limestone hills.

There is no need here to repeat the geologic history of the island as given by Cederstrom except to note that during the late Miocene uplift earlier Miocene and older Cenozoic deposits were raised above sea level. In some of these layers marine fossils have been found. Cederstrom writes (1950: 15), 'About this time land connections permitting migration of land animals from Anguilla to Puerto Rico, Haiti, and Cuba probably existed. St. Croix seems to have been connected with Anguilla, St. Martin, and St. Bartholomew.' Hence his explanation for the predominantly Puerto Rican influence on the island fauna.

The first compilation of the land shells

of St. Croix seems to have been made by Pfeiffer (1855) when he undertook a review of the shells known at that time from the West Indies. His report was based on material provided by Alfred H. Riise who made the earliest thorough collection of land mollusks of the island. In 1861 Thomas Bland, in his remarks on the geographical distribution of the land shells of the West Indies, listed 15 species from St. Croix.

The present compilation has various sources. These include the personal collections of the author together with those made by Gordon Usticke and George A. Seaman, inhabitants of St. Croix. The largest single source is the collection of St. Croix material in the MCZ, from which most locality records were taken. This rich collection contains, besides much material supplied by Mr. Seaman, also numerous lots sent by Harry A. Beatty who collected on St. Croix from 1938 to 1945. In addition, use was made of the valuable articles by Fritz Haas (1960, 1962) who listed the Vertiginidae, Subulinidae, and Oleacinidae collected in the West Indies by P. Wagenaar Hummelinck. Finally a few references are made to other reliable records in the Manual of Conchology (1889, 1906, 1016) and elsewhere.

The land snail fauna of St. Croix is not very rich. Neither species nor specimens, except for some omnipresent 'tramps' like *Bulimulus guadelupensis* and *Subulina octona*, appear in large numbers. As in most West Indian islands, the fauna is composed of an endemic group with a strong adventitious influence, mainly the result of accidental introduction. In St. Croix part of the relatively small number of Antillean groups, some endemic and some identical with species from Puerto Rico, are extinct and appear only as fossils.

Several West Indian families have Cruzan representatives: Urocoptidae, Cerionidae (extinct), Chondropomidae, as well as such genera as *Plagioptycha*, *Hyalosagda*, *Caracolus* (extinct), and *Granodomus* (ex-

tinct). However, there are no helicidids, cyclophorids, or oleacinids. Cooke (1895: 352) regards St. Croix as lying within the area where the typical Antillean fauna of the larger islands, especially Puerto Rico, is depauperate and is giving way to South American forms found on the Lesser Antilles below Antigua. Hence the absence of these three important Antillean elements may be regarded as a sign of the progressive zoogeographic depauperization of the region.

Riise (1857: 205) speculated that the extinct species became so only after the island was inhabited and cultivated. He went on to explain that the 'snails are found at the foot or near the edge of hills, one or two feet underground or in some isolated areas spread over rather large areas of the surface, after it has been prepared for cane cultivation. In cases where heavy rains have formed gutters or streams from the high hills through the lowlands, they are found in thin layers over a quarter of a mile in length, two feet or more under the earth's surface. The layer which usually covers them is a fine layer of clay and sand, sometimes mixed with lime.' (Translated).

There may be another cause for the present scarcity of land snails. A persistent tradition states that the island was completely burned over at one time. Harman (1961: 64) writes, 'The previous French settlers [1664-1696] found the thick forests of St. Croix breeders of disease, insects, and humidity and set fire to the entire island, taking refuge on boats in the harbor while the giant trees burned.' Such an event, if proved to be true, must have been enormously destructive of molluscan life. However, I am not aware that other evidence of so vast a conflagration has been found. Mr. Seaman writes me in this connection: 'Your account of the 'conflagration' which supposedly destroyed St. Croix is in keeping with general sound opinion. That a part of the island was burned is no doubt true, but it would be impossible to devastate an entire island

by fire, particularly the St. Croix of that time. My opinion is that severe changes in land usage — in which burning to clear forest lands for sugar cane planting was the method employed — accounted for the extirpation of many snail forms.' (June 4, 1968).

The present fauna is both quantitatively and qualitatively poorer than in pre-Columbian times. Many writers have commented on the fact that the fossil forms of still extant species on St. Croix are larger, frequently considerably so, than living representatives. It is clear that local conditions at that time were more favorable for the flourishing of a land snail fauna, and that these conditions consisted primarily in untilled and unburned terrain.

Of the 29 species recorded for Saint Croix, 7 are endemic, of which 4 are living and 3 extinct. Of the remaining 22 species, 20 are of West Indian and New World distribution and 2 have been introduced from the Oriental Region.

The synonymy of the present compilation has been limited to original references and a few later ones, preferably those presenting a good figure or a new generic placement. More complete synonymies can generally be found, where not otherwise indicated, in the corresponding volumes of the Manual of Conchology, especially those prepared by Pilsbry.

Most of the material cited here was personally examined. Where this was not possible, it is so indicated. Several of the specimens reported by Mr. Seaman were examined by him and compared with specimens in his collection determined by Dr. William J. Clench of the MCZ.

The shells collected by Jacobson and Usticke in 1958 have been deposited in the AMNH. Many of Seaman's shells are in the MCZ. Those collected by Hummelinck are either in the Rijksmuseum van Natuurlijke Historie, in Leiden, or the Zoologisch Museum in Amsterdam.

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ABBREVIATIONS

MCZ - Museum of Comparative Zoology, Cambridge, Massachusetts.
AMNH - American Museum of Natural History

FAMILY CHONDROPOMIDAE

Chondropoma santacruzense (Pfeiffer)

Chondropoma santacruzense Pfeiffer 1855, Malakozologische Blätter, 2: 101 (Spring Gut prope Christiansted insulae St. Croix).

Chondropoma basicarinatum Pfeiffer 1855, *ibid.*, 2: 101, pl. 4, figs. 2, 3 (La Grange prope Fredriksted).

Chondropoma chordiferum Pfeiffer 1855, *ibid.*, 2: 102, pl. 4, fig. 1 (subfossile in Bilows Minde insulae St. Croix).

Cyclostoma kazika Weinland 1876, *ibid.*, 23: 173, pl. 2, figs. 17, 18; Jahrbücher der deutschen malakozologischen Gesellschaft, 7: 349 [not *Chondropoma kazikum* Bartsch 1942].

REMARKS. This is the commonest chondropomid on the island. *C. basicarinatum*

and *chordiferum* are fossil or subfossil forms which differ from the recent shells only in being much larger.

SPECIMENS EXAMINED. Fredensborg; Rattan; East Point (all Jacobson and Usticke) on tree trunks, under leaves on ground; Mt. Eagle; Bellevue (Belleview); Rust-op-Twist; Estate Thomas; Bethlehem; Anguilla; Concordia; Spanish Town; Castle Coakley (all Seaman); Sweet Bottom; La Grange; Sandy Point; Estate New Works; East Point; Slob (all MCZ).

Chondropoma rufilabrum ('Beck' Potiez and Michaud

Cyclostoma rufilabrum 'Beck' Potiez and Michaud 1838, Galerie des Mollusques ... du Muséum de Douai, Paris, 1: 241, pl. 24, figs. 20, 21 (Les Indes? les Antilles).

Cyclostoma bilabre Menke 1843 Molluscorum Novae Hollandiae, Hannover, p. 8 (in ora orientalis [Australia]).

Cyclostoma rufilabrum 'Beck' Sowerby 1847, Thesaurus Conchyliorum, London, 1: 106, pl. 24, fig. 61 (From St. Croix).

Cistula rufilabris 'Beck' Pfeiffer 1855, Malakozologische Blätter, 2: 101 (Cane Bay, Rust op Twist); Pfeiffer 1858, Monographia Pneumonopomorum Viventium, Cassel, Suppl. 1. p. 133 (in arboribus Hippomnaes mancinellae in insula Saint-Croix Indiae Occidentalis).

REMARKS. This species is frequently credited to Pfeiffer, but Potiez and Michaud have priority. Seaman writes (personal communication): 'Found subfossil and living, the subfossil considerably larger than the living form. This is a much rarer shell than *santacruzense* and is apparently confined to a strip of coast between Fredriksted and Judith's Fancy. It is presently [1958] common at Rust - op - Twist, though not as some of the early collectors described, confined to manchineel trees. I have found it on many different trees at Rust-op-Twist and Davis Bay.'

SPECIMENS EXAMINED. Rust-op-Twist; La

Grange (both MCZ); Judith's Fancy (Jacobson and Usticke, alive under old coral boulders near beach).

FAMILY PUPILLIDAE

Gastrocopta rupicola marginalba (Pfeiffer)

Pupa marginalba Pfeiffer 1840 Wiegmann, Archiv Naturgeschichte, 6th year, 1: 253 (Cuba).

Gastrocopta rupicola marginalba (Pfeiffer, Pilsbry 1916, Manual Conchology (2) 24: 60, pl. 11, figs. 10-13, pl. 10, figs. 6, 8, 9; Haas 1960, Studies Fauna Curaçao and other Caribbean Islands, no. 41, p. 12, pl. 2, fig. K, pl. 5, figs. A-D.

PUBLISHED RECORD. Upper Bethlehem (Haas).

Gastrocopta pellucida hordeacella
Pilsbry

Pupa hordeacella Pilsbry 1890, Proc. Acad. Nat. Sci. Philadelphia, p. 44, pl. 1, figs. g-k (New Braunfels, Texas).

Gastrocopta pellucida hordeacella Pilsbry 1916, Manual Conchology (2), 24: 78, pl. 15, figs. 4, 9; Haas 1960, Studies Fauna Curaçao and other Caribbean Islands, no. 41, p. 10, pl. 3, fig. A.

PUBLISHED RECORD. Fair Plain (Haas).

Gastrocopta servilis riisei (Pfeiffer)

Pupa riisei Pfeiffer 1852, Zeitschrift für Malakozologie, 9: 151 (St. Thomas).

Gastrocopta servilis riisei (Pfeiffer), Pilsbry 1916, Manual of Conchology (2), 24: 74, pl. 14, figs. 8-9; Haas 1960, Studies Fauna Curaçao and other Caribbean Islands, no. 41, p. 11, pl. 4, figs. I-M.

PUBLISHED RECORD. Upper Bethlehem (Haas).

Pupoides albilabris nitidulus (Pfeiffer)

Hill; Fredensborg Hill; Canaan Valley; Sandy Point; Estate Mon Bijou; Bülow's

Bulinulus nitidulus (Pfeiffer 1839, Wiegmann, Archiv für Naturgeschichte, 5th year, 1: 352 (Cuba).

Minde; Estate New Works; Salt River (all MCZ); La Grande Princess (Jacobson and Usticke); 'common over most of the island' (Seaman).

Pupoides marginatus nitidulus (Pfr.) Pilsbry 1921, Manual of Conchology (2), 26: 113, pl. 12, figs. 9, 16.

REMARKS. *Cyclostoma marginata* Say 1821 is preoccupied by Gotthelf Fischer de Waldheim 1807.

PUBLISHED RECORD. 'St. Croix' (fide Pilsbry).

Leptinaria lamellata (Potiez and Michaud)

Achatina lamellata Potiez and Michaud 1838, Galerie des Mollusques ... du Muséum de Douai, 1: 128 pl. 11, fig. 6.

Achatina unilamellata d'Orbigny 1842, Voyage dans l'Amérique Meridionale, Paris, p. 257.

Leptinaria lamellata (Pot. & Mich.), Pilsbry 1906, Manual of Conchology (2), 18: 208, pl. 42, figs. 39, 40; Aguayo 1944, Revista Sociedad Malacologica 'Carlos de la Torre,' 2: 52, text figure.

REMARKS. See Aguayo 1944 for extensive synonymy.

Family SUCCINEIDAE

Succinea approximans Shuttleworth

Succinea approximans Shuttleworth 1854, Diagnosen neuer Mollusken, 6: 55 (copied from Berner Mittheilungen) (Puerto Rico); van der Schalie 1944, Misc. Publ. Mus. Zool., U. Michigan, Ann Arbor, no. 70, p. 42, pl. 4, fig. 1.

SPECIMENS EXAMINED. Collins; La Grange (both MCZ); Canaan (Seaman).

SPECIMENS EXAMINED. Slob; La Grange; Rust-op-Twist; Bethlehem; Cane Garden; Concordia; Williams, Constitution Hill; Salt Marsh Purslane near Krause Lagoon; Estate New Works; Bülow's Minde (all MCZ); Fredensborg (Jacobson and Usticke); Little La Grange; Orange Grove; Bellevue (all Seaman).

Lamellaxis (Allopeas) micrus (d'Orbigny)

Helix micra d'Orbigny 1835, Synopsis Terrestrialium et Fluviatilium Molluscorum, Magasin de Zoologie, 5: Class V, no. 61, p. 9 (no locality).

Lamellaxis (Leptoebas?) micra (d'Orbigny), H. B. Baker 1945, Nautilus 58: 90.

Lamellaxis (Allopeas) micra (Orbigny), Pilsbry 1946, Land Mollusca of North America, Phila., 2: 178, fig. 85, a, b, c.

Lamellaxis (Allopeas) micron (Orbigny), Haas 1962, Studies Fauna Curaçao and other Caribbean Islands, no. 58, p. 57, pl. 7, figs. A-E.

FAMILY SUBULINIDAE

Subulina octona (Bruguière)

Bulinus octonus Bruguière 1792, Encyclopédie Méthodique Paris, 1: 325 (Antilles, Santo Domingo, Guadeloupe).

Subulina octona Bruguière, Beck 1837, Index Molluscorum, Hafniae Hafnia (Copenhagen), p. 77; Haas 1962, Studies Fauna Curaçao and other Caribbean Islands, no. 58, p. 49, pl. 8, figs. A-F.

SPECIMENS EXAMINED. La Valley; Bethlehem; Nicholas (all MCZ); Upper Bethlehem; Fredensborg; Canaan (all Haas, not seen); La Grande Princess (Jacobson and Usticke).

SPECIMENS EXAMINED. Upper Bethlehem

Lamellaxis (Allopeas) gracilis (Hutton)

Bulimus gracilis Hutton 1834, Jour. Asiatic Soc. Bengal, 3: 86 [description] 3: 93 [name] (Mirzapoor [India]).

Achatina subula Pfeiffer 1839, Wiegmann, Archiv für Naturgeschichte, 5th year, 1: 352 (Matanzas, Havana, Cuba).

Lamellaxis (Allopeas) gracilis (Hutton), Haas 1962, Studies Fauna Curaçao and other Caribbean Islands, no. 58, p. 56, pl. 10, figs. E-H.

SPECIMENS EXAMINED. Sandy Point, Concordia; Bethlehem; La Grange; Williams; Slob (all MCZ); La Grande Princess (Jacobson and Usticke).

Opeas octogyrum plicatellum (Guppy)

Stenogyra plicatella Guppy 1868, Ann. & Mag. Nat. Hist., (4), 1: 438 (Trinidad).

Opeas octogyrum var. *plicatellum* (Guppy), Pilsbry 1906, Manual of Conchology (2), 18: 207, pl. 29, fig. 75.

Opeas octogyrum plicatellum (Guppy), Haas 1962, Studies Fauna Curaçao and other Caribbean Islands, no. 58, p. 55, pl. 11, figs. B, C.

PUBLISHED RECORDS. Fredensborg; N of airport; Canaan (all Haas).

Beckianum beckianum (Pfeiffer)

Bulimus beckianus Pfeiffer 1846, Symbolae ad historiam Heliceorum, Cassel, sect. 3, p. 82 (in insula Opara?).

Synopeas beckianum (Pfeiffer), H. B. Baker 1945, Nautilus, 58: 91.

Beckianum beckianum (Pfeiffer), H. B. Baker 1961, Nautilus 75: 84.

Diaopeas beckianum (Pfeiffer), Haas 1962, Studies Fauna Curaçao and other Caribbean Islands, no. 58, p. 55, pl. 10, figs. A-D.

REMARKS. Haas (1962) proposed *Diaopeas* to replace *Synopeas* Jousseaume 1889, not Forster 1856 (Hymenoptera). However, Baker had proposed *Beckianum* in 1961.

SPECIMENS EXAMINED. Salt River (MCZ); La Grande Princess (Jacobson and Usticke); Mary's Fancy; St. John; Canaan; Morning Star; La Grange (all Seaman).

Obeliscus swiftianus (Pfeiffer)

Bulimus swiftianus Pfeiffer 1852, Zeitschrift für Malakozoologie, 9: 150 (in insula St. Thomas).

Obeliscus swiftianus (Pfeiffer), Pilsbry 1906, Manual of Conchology (2), 18: 268, pl. 30, figs. 1-4.

SPECIMENS EXAMINED. La Grande Princess (Jacobson and Usticke); Mury's Fancy; Mon Bijou; Canaan (all Seaman).

FAMILY BULIMULIDAE

Bulimulus guadalupensis (Bruguière)

Helix exilis Gmelin 1791, Systema Naturae, ed. 13, p. 3668 [not H. F. Müller 1774; nor Gmelin 1789, Systema Naturae, p. 3616].

Bulimus guadalupensis Bruguière 1792, Encyclopédie Méthodique, 1: 313 (Guadeloupe).

Bulimulus exilis (Gmelin), Pilsbry 1897, Manual of Conchology, (2), 11: 37, pl. 9, figs. 61-67 (contains complete synonymy).

Bulimulus guadalupensis (Brug.), Pilsbry 1901, *ibid.*, 14: 143.

REMARKS. This species is widely spread over the entire island, especially in gardens and wooded tracts. It is probably the most common larger land shell on the island.

Bulimulus guadalupensis eyriesii (Drouet)

Bulimus eyriesii Drouet 1859, Essai sur les Mollusques Terrestres et Fluviatiles de la Guyane Française, Paris, p. 63, pl. 1, figs. 12, 13.

Bulimulus exilis var. *eyriesii* (Drouet),

Pilsbry 1897, Manual of Conchology, (2), 11: 39, pl. 12, figs. 52-60.

REMARKS. 'Under the above varietal name I place a very large series of shells before me, which agree in essential characters with the thinner and unicolorated forms of *B. exilis* [= *guadalupensis*], and in fact offer every possible gradation with that species. Typically, var. *eyriesii* is a little more conoidal and wider below; it is never banded . . . it is thinner than typical *B. exilis* but varies in this respect.' (Pilsbry, l. c., p. 40). We recognize this taxon provisionally. Further collecting should show if the form justifies itself geographically as well as morphologically. See Pilsbry (l. c., 38-39) for a discussion of the varietal names that have been given to forms of *guadalupensis*.

SPECIMENS EXAMINED. Mt. Eagle; Concordia; Nicholas (all MCZ).

Bulimulus diaphanus (Pfeiffer)

Bulimus diaphanus Pfeiffer 1854, Proc. Zool. Soc. London, p. 125 (St. Thomas, West Indies).

Bulimulus diaphanus (Pfeiffer), Pilsbry 1897, Manual of Conchology (2), 11: 47, pl. 9, fig. 44.

REMARKS. This species has been confused with *B. barbadensis* (Pfeiffer) in some museum collections. The shells differ in the nature of the umbilical chink, which is smaller in *barbadensis*, and in the protoconch, which is sculptured with wavy axial striae in *barbadensis* and pit reticulated in *diaphanus*.

SPECIMENS EXAMINED. Salt River; Sandy Point; Mt. Eagle (all MCZ).

Bulimulus riisei (Pfeiffer)

Bulimus riisei Pfeiffer 1856, Malakozoologische Blätter, 2: 103, pl. 4, figs. 7,

8 (subfossile in plantatione 'La Grange' prope Fredriksted insulae St. Croix).

Bulimulus riisei (Pfeiffer). Pilsbry 1897, Manual of Conchology (2), 11: 41, pl. 14, figs. 1, 2, pl. 9, figs. 38, 39.

REMARKS. This species with a shell characterized by a large umbilicus, greatly developed columellar lip, and rather slender spire, is found only as a fossil on St. Croix. It is the only known endemic bulimulid on the island. Seaman writes: 'Enjoys a fairly wide distribution throughout the limestone (marl) area.'

SPECIMENS EXAMINED. Concordia; Fair Plain at Bridge (both MCZ); Kerr Farm 0.5 mi E of Great Pond; between Fredensborg and Fredensfeld (both Jacobson and Ustick).

Drymaeus elongatus (Röding)

Helix elongata Röding 1798, Museum Boltenianum, p. 107, no. 1371.

Helix virgulata Férussac 1822, Tableaux Systématiques, Paris, p. 54, no. 396 (Le Brésil?, les Antilles, Porto-Rico, l'île Saint-Barthelemy, Saint-Domingue).

Bulimus extinctus Pfeiffer 1855, Malakozoologische Blätter, 2: 103, pl. 4, figs. 9, 10 (subfossile in parte occidentali insulae St. Croix).

Drymaeus elongatus (Bolten), Pilsbry, 1899, Manual of Conchology (2), 12: 23, pl. 11, figs. 1-26 (contains full synonymy).

REMARKS. This is a polymorphic species that varies strongly in color. 'Wide distribution, common. Many color phases, from pure white to chocolate, depending on locality.' (Seaman, personal communication).

SPECIMENS EXAMINED. Cane Garden; Constitution Hill; Fair Plain at bridge; East Point; Parasol; Estate New Works; Tague Bay; Mt. Eagle (all MCZ); Kern Farm, Great Pond [forma *extincta*]; East End, (on tree trunks, cactus; W of Grape Tree Bay [for-

ma *apiculata* Gray I on shrubs and bushes (all Jacobson and Usticke).

FAMILY CERIONIDAE

Cerion rude (Pfeiffer)

Pupa rudis Pfeiffer 1855, Malakozoologische Blätter, 2: 102, pl. 5, figs. 1, 2 (subfossilis in Plantationibus 'Diamond' et 'Paradise' insulae St. Croix).

Pupa latilabris Pfeiffer 1855, *ibid.*, 2: 103, pl. 5, fig. 3 (subfossilis in plantatione 'Blessing' insulae St. Croix).

Cerion rude (Pfeiffer), Pilsbry 1902, Manual of Conchology (2), 14: 194, pl. 33, figs. 54-57.

REMARKS. This species, which is found only as a fossil on St. Croix, stands close to *striatellum* (Guérin) from Puerto Rico, differing in having a less obtuse apex. *P. rudis* and *P. latilabris* were published on the same date. Pilsbry (l. c.) exercised the right of the first reviewer and selected *rudis*. According to Seaman, the shells are abundant as fossils in the limestone (marl) area.

SPECIMENS EXAMINED. Rust-op-Twist; Slob; Hogensborg; Fair Plain (all MCZ); La Grande Princess (Jacobson and Usticke).

FAMILY UROCOPTIDAE

Brachypodella chordata (Pfeiffer)

Cylindrella chordata Pfeiffer 1855, Proc. Zool. Soc. London, p. 117; Malakozoologische Blätter, 1855, 2: 102, pl. 5, figs. 10, 11 (Bülows Minde prope Christiansted insulae St. Croix).

Brachypodella chordata (Pfeiffer), Pilsbry (1904. Manual of Conchology (2), 16: 85, pl. 7, figs. 25-27.

SPECIMENS EXAMINED. Bülow's Minde; Bethlehem (both MCZ); Kingshell; Clifton Hill; Fredensborg; Bellevue (all Seaman).

FAMILY STREPTAXIDAE

Streptaxis (Streptartemon) glaber Pfeiffer

Streptaxis glabra Pfeiffer 1850, Proc. Zool. Soc. London, p. 126 (Demarara).

Streptaxis glaber Pfeiffer, Tryon 1885, Manual of Conchology (2), 1: 74 pl. 15, figs. 24-26.

Streptaxis (Streptartemon) glaber Pfeiffer, Clench 1958, Nautilus 72: 19; Venmans 1963, Studies Fauna Curaçao and other Caribbean Islands, no. 61, p. 53, text figs. 12-19 (biometrical tables), pl. 2, figs. 1-12 (contains extensive synonymy).

REMARKS. Seaman thinks that this recent immigrant from South America has a much wider distribution on the island than is indicated by the records. Since *Streptaxis* is masculine gender, *glabra* had to take the masculine form *glaber*.

SPECIMENS EXAMINED. Fredriksted (MCZ); St. George; Bellevue; La Grange; Hogensborg (all Seaman).

Gulella (Huttonella) bicolor (Hutton)

Pupa bicolor Hutton 1834 Jour. Asiatic Soc. Bengal, 3: 86 [description], 3: 93 [name] (Mirzapoor) [India].

Ennea bicolor Hutton, Tryon 1885, Manual of Conchology (2), 1: 104, pl. 19, figs. 14, 17, 18, pl. 20, fig. 24.

Gulella (Huttonella) bicolor (Hutton), Venmans 1963, Studies Fauna Curaçao and other Caribbean Islands, no. 61, p. 44, text figs. 7-11 (contains extensive synonymy).

SPECIMENS EXAMINED. Bethlehem; Rust-op-Twist; Concordia; Bülow's Minde; Salt River (all MCZ); La Grande Princess; between Fredensborg and Fredensfeld (both Jacobson and Usticke); Bellevue; Kingshell (both Seaman).

FAMILY SAGDIDAE

Lacteoluna selenina (Gould)

Helix vortex Pfeiffer 1839, Wiegmann, Archiv für Naturgeschichte, 5th year 1: 351 (Cuba) [not Linnaeus 1758].

Helix selenina Gould 1848, Proc. Boston Soc. Nat. Hist., 3: 38 (Georgia and Florida).

Lacteoluna selenina (Gould), Pilsbry 1940 Land Mollusca of North America, Philadelphia, 1: 981 fig. 569.

SPECIMENS EXAMINED. Constitution Hill; Bülow's Minde; Bethlehem (all MCZ); Fredensborg; La Grande Princess (both Jacobson and Usticke); Kinghill; Bellevue; La Grange (all Seaman).

Hyalosagda (Microsagda) subaquila (Shuttleworth)

Helix subaquila Shuttleworth 1854, Diagnosen neuer Mollusken, p. 129 [copied from Berner Mittheilungen, p. 37], (Ceiba, Fajardo, San Juan [Puerto Rico]); Shuttleworth, Tryon 1887, Manual of Conchology (2), 3: 98, pl. 19 fig. 31.

Hyalosagda (Microsagda) subaquila (Shuttleworth), H. B. Baker 1940, Nautilus, 54: 60, pl. 5, fig. 13 (anatomy).

REMARKS. The following record is based upon MCZ 110275, a series of fossil shells.

SPECIMENS EXAMINED. La Grange (MCZ).

FAMILY CAMAENIDAE

Granodomus incertus (Férussac)

Helix incerta Férussac 1823, Histoire Naturelle Générale et particulière des Mollusques terrestres et fluviatiles, Paris, 1: 221, pl. 105, fig. 2 (St. Thomas).

Thelidomus incertus (Férussac), Pilsbry 1889, Manual of Conchology (2), 5: 57, pl. 4, figs. 36, 37, pl. 1, figs. 1, 2.

REMARKS. This species appears as a fos-

sil on St. Thomas and on St. Croix, where it is exceedingly rare. Seaman reports that he has never found it. The two records below, however, definitely establish it as a St. Croix species. Pilsbry writes: 'Most or all of the Virgin Islands ... are inhabited by this species.' (l.c., p. 58). The dating of *incerta* Férussac follows A. S. Kennard 1942, Proc. Malacological Soc. London, 25: 14.

SPECIMENS EXAMINED. St. Croix; La Grange (both MCZ).

Caracolus carocolla (Linnaeus)

Helix carocolla Linnaeus 1758, Systema Naturae, 10 ed., p. 769 (no locality).

Caracolus carocolla Linnaeus, Pilsbry 1889, Manual of Conchology (2), 5: 120, pl. 21, figs. 1, 2, 5, 6, 7, pl. 24, fig. 89; Wurtz 1955, Proc. Acad. Nat. Sci. Philadelphia 107: 118, pl. 1, figs. 31, 34-36 (anatomy).

Pleurodonte debooyi Bartsch 1918, Proc. U. S. Nat. Museum, 54: 605 pl. 93 (Salt River, St. Croix).

REMARKS. This common Puerto Rican species is found only as a fossil on St. Croix. Bartsch suspected that his new species might turn out to be identical with *C. carocolla* (l. c., p. 606).

SPECIMENS EXAMINED. Concordia; Bethlehem; Fair Plain (all MCZ); Little La Grange; Little Fountain; Salt River (all Seaman).

Plagioptycha santacruzensis (Pfeiffer)

Helix santacruzensis Pfeiffer 1855, Malakozoologische Blätter, 2: 104, pl. 4, figs. 3-5 [not 4-6] (La Grange prope Fredriksted insulae St. Croix).

Plagioptycha santacruzensis (Pfr.), Pilsbry 1889, Manual of Conchology (2), 5: 23, pl. 11, figs. 18-20, pl. 19, figs. 53-54.

REMARK. This endemic species is found only as a fossil.

SPECIMENS EXAMINED. Fredensborg; ½ mi E of Great Pond (both Jacobson and Usticke); Bethlehem; Kingshill; Golden Grove; St. Johns; Golden Rock (all Seaman).

Plagiptycha euclasta beatty: Clench

Plagiptycha euclasta beatty: Clench 1940, *Memorias Sociedad Cubana Historia Natural*, 14: 244, pl. 42, fig. 3 (Mt. Eagle, St. Croix).

SPECIMENS EXAMINED. Mt. Eagle; Concordia; La Grange; Slob; Estate Suttan Valley (all MCZ).

SPECIES OF DOUBTFUL OCCURRENCE ON ST CROIX

CHONDROPOMA FALLAX (Pfeiffer) 1854. Reported doubtfully from St. Croix by Bland (1861). This species has not been found there again.

SUCCINEA RIISEI Pfeiffer 1853. This species, reported by Bland (1861), has never been reported since from St. Croix. Van der Schalie (1944: 43) calls it 'by far the rarest *Succinea* in Puerto Rico.'

BULIMULUS BARBADENSIS (Pfeiffer) 1852. The shells determined thus in some museums are actually *B. diaphanus* Pfeiffer.

BULIMULUS FRATERCULUS 'Férussac' Potiez and Michaud 1837. Of this taxon, which probably is some form of *B. guadalupensis*, Pilsbry writes (1897: 46): 'I have been unable to identify this species with any of the shells before me. The *B. fraterculus* of American collections, reported from Puerto Rico, St. Kitts, St. Croix, Antigua, St. John, St. Thomas, Trinidad and Barbados, is not this species.'

HEMITROCHUS GALLOPAGONIS 'Valenciennes' Pfeiffer 1842. This species was described

in error from St. Croix and doubtfully reported from there by Pilsbry in 1889. See Clench (1950: 275). It does not seem that any *Hemitrochus* live in the Virgin Islands.

CAROCOLUS MARGINELLA (Gmelin) 1789. Reported by Bland (1861) from St. Croix. The single specimen in the MCZ is obviously vectitious. Unlike *C. carocolla* (L.), this species does not even appear as a fossil.

HELIX VARIEGATA Férussac 1821. This species was described and figured by Chemnitz (1796, *Conchylien-Cabinet*, 9: 152, pl. 133, fig. 207) who reported that he had it from St. Croix. He also referred to a figure by Gualtieri 1742 (pl. 3, fig. Q). Férussac changed the Chemnitzian locality to Otaïti. Pilsbry wrote of it (1889: 38): 'This is a spurious species, which need not encumber our catalogues any longer.' From the published figures it appears rather to be some form of European *Helicella* which may have found its way onto an Antilles-bound ship. *Helix nivea* Gmelin 1789 is another name for it.

LITERATURE CITED

- AGUAYO, Carlos Guillermo (1944) *Leptinaria lamellata* y otros Moluscos introducidos en Cuba. -- *Revista Soc. Malac.* 'Carlos de la Torre.' 2: 51-59, fig. 1.
- BLAND, Thomas (1861) *Annals of the Lyceum Nat. Hist. New York*, 7: 335-361.
- CLENCH, William J. (1950) *Jour. Conchyl.*, 90: 269-276, 1 pl.
- CEDERSTROM, D. J. (1950) *Geology and Ground-Water Resources of St. Croix, Virgin Islands.* -- *Geol. Survey Water-Supply Paper No. 1067*, Washington, D.C., 6 + 117 pp., 6 pls., 1 map.
- COOKE, Rev. A. H. (1895) *Mollusca.* -- *IN: Cambridge Natural History*, 3: 14 + 459 pp., 311 text figs., 4 maps.

HAAS, Fritz (1960) Studies Fauna of Curaçao and other Caribbean Islands, no. 41, Caribbean Land Molluscs, Vertiginidae, 1-51 pp., 2 text figs., 5 pls.

(1962) Ibid. no. 58. Subulinidae and Oleacinidae, pp. 49-60, pls. 7-11, 1 map.

HARMAN, Jeanne Perkins (1961) The Virgins: Magic Island, New York, Appleton-Century-Crofts, 9 + 269 pp., 14 pls.

PFEIFFER, Louis (1855) Beiträge zur

Molluskenfauna Westindiens. Malakozologische Blätter, 2: 98-106.

PILSBRY, Henry A. (1889) Manual of Conchology (2) 5: 216 pp., 64 pls.

RIISE, Alfred & (1857) Om nogle Uddøde Landsnegle fra St. Croix.--Skandinaviske Naturforskermode, 7: 205-206.

van der SCHALIE, Henry (1948) The Land and Fresh-Water Mollusks of Puerto Rico. Misc. Publ. Mus. Zool. Univ. Michigan, no. 70, 134 pp., 14 pls., frontisp.

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NOTICE OF ANNUAL MEETING

WESTERN SOCIETY OF MALACOLOGISTS

The second annual meeting of the Western Society of Malacologists will be held at the conference grounds at Asilomar State Park, Pacific Grove, California June 18 to 21, 1969. Scientific papers, symposia on related problems, and exhibits will be presented in various fields related to the study of malacology and invertebrate zoology.

Officers for the coming year who were elected at the 1968 conference are as follows:

PRESIDENT: Dr. William K. Emerson, American Museum of Natural History

FIRST VICE PRESIDENT: Dr. A. Myra Keen, Stanford University

SECOND VICE PRESIDENT: Mr. Eugene Coan, Stanford University

SECRETARY, Mrs. Paul O. Hughes, Los Alamitos

TREASURER, Mrs. Leroy Poorman, Pasadena

MEMBERS-AT-LARGE: Dr. Judith Terry, Palo Alto, California and Miss Betsy Harrison, Honolulu, Hawaii

All persons interested in malacology and conchology are cordially invited to attend and participate in the coming conference. Excellent accommodations in varying price ranges (American Plan) will be available for those making their reservations early.

For information on the conference or membership in the Society, please address the Secretary, Mrs. Paul O. Hughes, 12871 Foster Road, Los Alamitos, California 90720.

Habitat.—Coosa River, Alabama; E. R. Showalter, M.D.
Diameter, .35; length, .63 of an inch.

Observations.—This species is very nearly allied to *Melania* (*Goniobasis*) *Vanuzemiana* (nobis), having coarse striae over the whole of the whorls. But it is smaller, rather more elliptical, and has more striae, the number being about ten. These striae are rounded, with an intervening groove, and cover the whole of the whorls. The bands are obscure on the outside of both the specimens before me, but are well defined inside. It has some resemblance to *Melania* (*Goniobasis*) *Coosaensis* (nobis), but is a much smaller species, and is more constricted in the whorls and in the aperture. The aperture is nearly half the length of the shell.—*Lea*.



253. *G. impressa*, LEA.

Melania impressa, LEA, Philos. Proc., ii, p. 83, Oct., 1841. Philos. Trans., ix, p. 19. Obs., iv, p. 19. WHEATLEY, Cat. Shells U. S., p. 25. JAY, Cat. Shells, p. 274. BINNEY, Check List, No. 143. BROU, List, p. 32. REEVE, Monog. *Melania*, sp. 316, 349. HANLEY, Conch. Miscel. *Melania*, t. 8, f. 69.
Megara impressa, LEA, CHENU, Manuel, i, f. 2023. ADAMS, Genera, i, p. 306.
Melania crebristriata, LEA, Philos. Proc., iv, p. 166. Philos. Trans., x, p. 65, t. 9, f. 47. Obs., iv, p. 65. BINNEY, Check List, No. 75. CATLOW, Conch. Nomencl., p. 186. BROU, List, p. 32.
Megara crebristriata, LEA, ADAMS, Genera, i, p. 306.

Description.—Shell transversely and thickly sulcate, fusiform, thick, reddish-brown; spire obtuse; sutures impressed; whorls six; flattened; aperture elliptical, rather large, angular at the base, within white.

Fig. 646.



Habitat.—Coosa River, Alabama.

Diameter, .48; length, .81 of an inch.

Observations.—Dr. Griffith received a single specimen only of this singularly marked species, and this is not entirely perfect at the spire or aperture. The whole surface of this specimen is covered with very minute, impressed, revolving lines, the body-whorl having twenty-four. They are nearly equidistant and very regular. Its aperture is nearly one-half the length of the shell. On the superior part of the columella, there is quite a large callus.* In form and size, it closely resembles the *M. robusta* herein described.—*Lea*.

My two figures represent an adult and immature specimen.

*Other specimens, subsequently received, confirm nearly all the other characters.

It is a beautiful species and occurs not infrequently in the Coosa River.

Melania crebristriata.—Shell transversely and very closely striate, nearly fusiform, thick, yellowish horn-color; spire obtuse; sutures impressed; whorls somewhat convex; aperture small, rather ovate, angular at the base, within whitish; columella inflected and thickened above.

Habitat.—Tuscaloosa, Alabama.

Diameter, .40; length, .76 of an inch.

Observations.—This species is nearly allied to *M. impressa* (nobis), but may be distinguished by its color being yellowish, and by its coarser striae. Its aperture also is smaller. The three specimens before me are very differently banded, one having nine, another three, and the last a rather broad one near the upper part of the whorl. These are only seen on the inside. The apex of each being eroded, the number of the whorls could not be accurately counted



Perhaps there are six. The striae are so strong that they cause the edge of the outer lip to be crenate. The aperture is about two-fifths the length of the shell. On the superior whorls there are broad, slightly elevated, somewhat oblique ribs. The number of striae on the three specimens before me are, respectively, sixteen, eighteen and twenty.—*Lea*.

254. *G. pergrata*, LEA.

Melania pergrata, LEA, Proc. Acad. Nat. Sci., p. 123, 1861.
Goniobasis pergrata, LEA, Jour. Acad. Nat. Sci., v, pt. 3, p. 243, March, 1853. Obs., ix, p. 65.

Description.—Shell striate, subcylindrical, obtusely conical, somewhat thick, greenish horn-color; spire very obtuse; sutures very much impressed; whorls six, shouldered above, covered with transverse striae, the last very large and cylindrical; aperture large, elongately ovate, whitish within; outer lip acute; columella arcuate, slightly callous above, somewhat rounded at the base.

Operculum ovate, spiral, dark brown, with the polar point on the edge near to the base.

Habitat.—Coosa River, Alabama; E. R. Showalter, M.D.

Diameter, .44; length, .90 of an inch.

Observations.—This species reminds one of *M. crebristriata*, *M. cap-*

ularis and *M. impressa* (nobis), (all *Goniobases*) by its numerous transverse striæ; but these striæ are neither so numerous, so regular, nor the intervals so deeply impressed, nor do these striæ exist on the upper whorls, as in those species. The color of the epidermis is also much lighter and brighter. In outline it is near to *impressa*, but the spire is not so elevated, nor has it the bands which are visible on that species. It is to be regretted that a single specimen only was received, as others may be found with different character. This one has an obscure band on the upper whorls, but none whatever on the lower one. The striæ on the outside are represented inside by whitish lines. The aperture is fully half the length of the shell.—*Lea*.

Fig. 648.



This may be merely a variety of *impressa*, in which the striæ are not so well developed.

255. *G. capillaris*, LEA.

Melania capillaris, LEA, Proc. Acad. Nat. Sci., p. 122, 1861.

Goniobasis capillaris, LEA, Jour. Acad. Nat. Sci., v, pt. 3, p. 236, t. 34, f. 34, March, 1863. Obs., ix, p. 58.

Description.—Shell thickly striate, subfusiform, somewhat thick, yellowish-brown, covered with close, transverse striæ; spire very obtuse; sutures irregularly impressed; whorls somewhat compressed, the last large; aperture large, widely elliptical, capillary striæ within; outer lip crenulate; columella whitish, thickened, incurved, obtusely angular at the base.



Fig. 649.

Operculum ovate, spiral, dark brown, with the polar point near the inner side and near to the base.

Habitat.—Coosa River, Alabama; E. R. Showalter, M.D. and Wm. Spillman, M.D.

Diameter, .38; length, .88 of an inch.

Observations.—This species belongs to the group of which *Melania* (*Goniobasis*) *impressa* (nobis) may be considered the type. It is covered with hair-like raised lines, like *impressa* and *Melania* (*Goniobasis*) *crebristriata* from the same river. It may be distinguished from the former by being more cylindrical, being of a slightly lighter brown, and in having more striæ. From the latter by having a less exerted spire, by having finer striæ and being of a darker brown. All three of these species have usually more or less fine brown bands in the

interior, but occasionally a specimen may be seen without bands. Among the specimens before me, the *crebristriata* has about fifteen striæ, the *capillaris* about twenty-six, and the *impressa* about twenty-eight. These raised, rounded striæ cause, in all the three species, a beautiful crenated outer lip. The aperture is about half the length of the shell, and the apex is usually decollate. The brown lines of the interior do not reach the edge of the outer lip. In some specimens the columella is so much thickened that it reminds one of the genus *Lithasia*.—*Lea*.

DOUBTFUL AND SPURIOUS SPECIES.

Melania fuscata, DESHAYES,* Anim. sans. Vert., viii, p. 435.

Melania ligata, Conrad, BROT, List, p. 33. (Ubi?) Alabama.

Melania ochracea, Cristofori and Jan., BROT, List, p. 59. (In museo deest.)

Melania Buschiana, REEVE,† Monog. *Melania*, sp. 50. California.

Melania ligata, Cristofori and Jan., BROT, List, p. 58.

Melania oreliana, Lea, WHEATLEY, Cat. Shells, U. S. p. 26. Alabama.

Melania multistriata, Lea, WHEATLEY, Cat. Shells, U. S., p. 26. Alabama.

Melania mutilata, Say,‡ JAY, Cat. Shells. CATLOW, Conch. Nomencl., p. 197. South Carolina.

Melania exigua, CONRAD, = *Amnicolida*.

Melania sulculosa, MENKE, Syn. Meth., 2d edit., p. 136. BROT, List, p. 59.

Paludina sulculosa, MENKE, Syn. Meth., 1st edit., p. 80.

Melania costata,§ RAVENEL, Cat., p. 11, 1834. BINNEY, Check List, No. 71. BROT, List, p. 58. Dan River, Virginia.

Melania Wahlamatensis,|| Lea, BINNEY, Check List. BROT, List, p. 59.

Pleurocera acuta, RAFINESQUE, Enumeration and Account, p. 3, Nov., 1831.

Pleurocera gibbosa, Rafinesque, BINNEY, Check List, No. 122.

Pleurocera gonula, RAFINESQUE, Enumeration and Account, p. 2, Nov., 1831.

Melania marginata, Rafinesque, BINNEY, Check List, No. 163.

Melania (*Amblopus*) *rugosa*, RAFINESQUE, Enumeration and Account, p. 3, Nov., 1831.

Melania viridis, RAFINESQUE, Enumeration and Account, p. 3, Nov., 1831.

Melania vittata, RAFINESQUE, Enumeration and Account, p. 3. BINNEY, Check List, No. 295.

Melania zonalis, Rafinesque, BINNEY, Check List, No. 238. BROT, List, p. 59.

* This old species, figured by Born and described in full in Deshayes' edition of Lamarck, is certainly not an American shell, although attributed to Virginia. Its characters are entirely of the East Indian type.

† This shell is evidently of East Indian type.

‡ = *Bulimus decollatus*, L. (*mutilatus*, Say).

§ = *Anculosa dissimilis*?

|| Mr. Lea has not used this name for any of the *Strepomatidæ*, but he has used it for an *Anodonta*.

Genus EURYCÆLON, LEA.

Eurycalon, LEA, Proc. Acad. Nat. Sci., p. 3, Jan., 1864.

Description.—See Preliminary Observations, p. xxx.

Geographical Distribution.—The species of *Eurycælon* are not numerous, and appear to be confined to the waters of East Tennessee and North Alabama.*

1. *E. Midas*, LEA.

Melania Midas, LEA, Proc. Acad. Nat. Sci., p. 119, 1861.

Goniobasis Midas, LEA, Jour. Acad. Nat. Sci., v, pt. 3, p. 233, t. 34, f. 28, March, 1863. Obs., ix, p. 55.

Description.—Shell smooth, cylindraceo-elliptical, somewhat thick, greenish, obscurely banded; spire very obtuse; sutures irregularly impressed; whorls somewhat compressed, the last very large, obscurely striate below; aperture large, ear-shaped, bluish-white within; outer lip acute; columella bluish-white, thickened and inflected, obtusely angular at the base.

Operculum subelliptical, spiral, dark brown, with polar point near the inner edge and one-fifth from the base.

Habitat.—Coosa and Alabama Rivers, near Wetumpka; Dr. E. R. Showalter.

Diameter, .48; length, .98 of an inch.

Observations.—This is a well marked species. There are several specimens before me, differing but little. Two of them have a brown band in the interior of the upper part of the aperture, another has none, but exhibits an obscure row of spots on the upper whorls, which others have also. Two of the specimens have irregular, tuberculous swellings on the upper part of the whorls, which obscure the bands, and thus cause them to take on a maculate character. The increment of growth usually commences below the previous termination, leaving angles on the sutures. In this character one is reminded of *Melania (Goniobasis) oppugnata* (nobis). In these

Fig. 650.



specimens there is a difference in the form of the base of the aperture, one of them being more rounded; but this may arise from difference of age. In outline this species is allied to *Hartmanii* (nobis), but it cannot be confounded with that shell, which is much larger, more robust, more elevated in the apex, and has more and better developed bands. It is on the other side near to *Melania (Goniobasis) basalis* (nobis). The aperture is about two-thirds the length of the shell.—Lea.

Very closely allied to *G. ambusta*.

2. *E. Leai*, TRYON.

Eurycalon Leai, TRYON, American Journal of Conchology, vol. 2, No. 1, p. 5, t. 2, f. 3, 1866.

Description.—Shell conical, thick, shining; spire conical, obtusely elevated; suture moderately impressed; whorls about six, slightly convex, everywhere covered with very fine, close, revolving striæ, somewhat shouldered beneath the suture and crimped; body-whorl large, slopingly convex; aperture large, ovate, broad below; wax-yellow or somewhat olivaceous, lighter beneath the suture, white within.



Habitat.—Etowah River, Cartersville, Georgia.

Diameter, 13 mill.; length (eroded), 19 mill.

Observations.—This species is somewhat like *G. luteola*, Lea, in color, striæ and texture, but differs in having tubercles and in the form of the aperture. In *G. pergrata*, Lea, the striæ are coarser and the tuberculations are wanting. It is a very neat species, beautifully marked by the narrowly compressed numerous tubercles under the suture, and its close, waved, revolving striæ.—Tryon.

3. *E. gratiosa*, LEA.

Melania gratiosa, LEA, Proc. Acad. Nat. Sci. p. 122, May, 1861.

Goniobasis gratiosa, LEA, Jour. Acad. Nat. Sci. v, pt. 3, p. 211, t. 35, f. 43, March, 1863. Obs., ix, p. 63.

Description.—Shell tuberculate, sometimes striate, obtusely fusiform, somewhat thick, yellowish-green, banded or without bands; spire very obtuse; sutures impressed; whorls six, flattened above, the last large; aperture rather large, subrhomboidal, whitish within; outer lip acute, slightly sinuous; columella inflected, thickened, subangular at the base.

* I am now inclined to consider these shells to be distorted *Goniobasis* and *Anculosa*, and in none of them can I find generic characters. They might with advantage to science be relegated to those genera. April, 1873.

Operculum ovate, spiral, dark brown, with the polar point near to the base.

Habitat.—Coosa River, Alabama; E. R. Showalter, M.D.

My cabinet and cabinet of Dr. Showalter.

Diameter, .39; length, .78 of an inch.

Observations.—This is a very remarkable and beautiful little species. There are three specimens before me, all of them having four somewhat distant, low, obtuse, rather large nodes. I have never seen any other species with this kind of nodes. The texture of the shell is delicate, the epidermis smooth and shining. Two of the specimens have four well defined, brown bands, which are strongly marked inside and out. The third specimen is without bands, but it is covered with very remarkable transverse striæ, which traverse the nodes as well as the other parts of the surface. The aperture is more than half the length of the shell.—*Lea*.

Fig. 632.



See remarks on next species (*M. lachryma*, Anthony) with which it is identical.

3a. *E. lachryma*, ANTHONY.

Melania lachryma, Anthony, REEVE, Monog. *Melania*, sp. 473, May, 1861. BROU, List, p. 32.

Description.—Shell conically ovate, thick, fulvous-olive, encircled with numerous black lines; whorls five, slopingly convex round the upper part, then gibbous, and obtusely tubercled, longitudinally, plicately striated throughout; aperture narrowly ovate, rather small, sinuately effused at the base.



Habitat.—United States. (Alabama—label attached to type, G. W. Tryon, Jr.)

Observations.—A prettily painted species of a rude, obtusely tubercled form.—*Reeve*.

The figure is a copy of Mr. Anthony's type. This shell and *gratiosa* are identical, but I am unable to ascertain which has priority. A very beautiful specimen in Mr. Lea's collection is closely and sharply sculptured with transverse striæ.

4. *E. lepida*, LEA.

Melania propria, LEA, Proc. Acad. Nat. Sci., 1861, p. 123.

Goniobasis lepida, LEA, Jour. Acad. Nat. Sci., v, pt. 3, p. 227, t. 34, f. 17, March, 1863. Obs., ix, p. 49.

Description.—Shell smooth, subfusiform, rather thin, yellowish horn-color, obscurely banded, shining; spire raised; sutures very much impressed; whorls about six, slightly convex above, inflated below; aperture rather large, ovate, yellowish-white within; outer lip acute; columella inflected, thickened above and rounded at the base.

Habitat.—Yellowleaf Creek, Shelby County, Alabama; Dr. E. R. Showalter.

Diameter, .42; length, .98 of an inch.

Observations.—A single specimen was sent to me by Dr. Lewis, Mohawk, N. Y., who received it from Dr. Showalter. It is allied to *straminea* herein described, and to *Melania proteus* (nobis).

Fig. 634.



It was more elongate than the former, and larger and darker horn-color. It differs from the latter in not being so solid and in being more oval. The specimen before me is eroded at the apex, and therefore the apical whorls cannot be described, nor the number correctly ascertained. There is a slight swelling below the suture, and irregular flattenings on the bulge of the whorls. A single obscure band is visible on the upper part of the whorls, and some obscure striæ on the lower part.—*Lea*.

The shouldered whorls, and irregular flattenings will place this species in the genus *Eurycelon*, instead of *Goniobasis*, where it is put by Mr. Lea. This species was first published under the name of *propria*, but that name being preoccupied by Mr. Lea himself, it was subsequently changed to *lepida*.

5. *E. proteus*, LEA.

Melania proteus, LEA, Philos. Proc., iv, p. 166, 1845. Philos. Trans., x, p. 57, t. 9, f. 28. Obs., iv, p. 57. BINNEY, Check List, No. 219. BROU, List, p. 33.

Juga proteus, LEA, Adams, Genera, i, p. 304.

Description.—Shell smooth, subcylindrical, thick, pupæform, yellowish horn-color; spire elevated; sutures impressed; aperture small, rhomboidal, angular at the base, within whitish.

Habitat.—Tuscaloosa, Alabama.

♂ Diameter, .5 of an inch; length, 1 inch.

Observations.—There were six specimens submitted to me by Dr. Budd, which I refer to the one species, although they present considerable difference. Five of the specimens are dead and bleached shells, and are of a light yellow or buff color. The sixth is a fresh and perfect specimen, with four small, purple bands and a tuberculous shoulder, the tubercles being prolonged nearly into folds. Two others are indistinctly banded. Another has a tuberculous shoulder, and is disposed to be granulate. From these varieties arises the name given to it. The aperture is rather contracted, and about two-fifths the length of the shell.—*Lea*.

Fig. 655.



6. *E. gibberosa*, LEA.

Goniobasis gibberosa, LEA, Proc. Acad. Nat. Sci., p. 266, 1862. Jour. Acad. Nat. Sci., v, pt. 3, p. 312, t. 37, f. 155, March, 1863. Obs., ix, p. 134, t. 37, f. 155.

Description.—Shell smooth, subfusiform, thick; spire obtuse; sutures irregularly impressed; whorls hump-backed, slightly convex above, the last one very large; aperture very large rhomboidal, white within; outer lip acute, sinuous; columella bent in, thickened above and below.



Operculum ovate, dark brown, with the polar point near to the base, on the inner edge.

Habitat.—Alabama River; E. R. Showalter, M.D.

Diameter, .48 of an inch; length, 1.03 inches.

Observations.—Four specimens of this remarkable species are before me. They were sent by Dr. Showalter to Dr. Hartman, who called my attention to them and sent them for examination. The species is singular for the four to six hump-like elevations which exist on the upper half of each of the whorls and which leave flattish spaces between, on one of which spaces the shell will always rest when the specimen is moved on a flat surface. One of the specimens has four distinct bands, one has these obsolete, the two remaining ones are without bands. The only species to which this has close affinities is *Melania (Goniobasis) basalis* (nobis), it having somewhat like irregular elevations, but it is a smaller and thinner species with a greenish epidermis and thick close bands. None of the four speci-

mens before me have more than three perfect whorls remaining, the upper ones (perhaps six originally) are worn off. The length of the aperture is about one-half that of the shell.—*Lea*.

7. *E. nubila*, LEA.

Melania nubila, LEA, Proc. Acad. Nat. Sci., p. 118, 1861.

Goniobasis nubila, LEA, Jour. Acad. Nat. Sci., v, pt. 3, p. 235, March, 1863. Obs., ix, p. 57.

Description.—Shell striate, somewhat elliptical, subfusiform, dark green, obscurely spotted, rather thick; spire obtusely elevated; sutures irregularly impressed; whorls six, rather inflated, the last large; aperture rather large, rhomboido-elliptical, four-banded within; outer lip acute; columella arcuate, obtusely angular at the base.

Habitat.—Coosa River, Wetumpka, Alabama; Dr. E. R. Showalter.

Diameter, .45 of an inch; length, 1.1 inches.

Observations.—Several specimens of different ages are before me. The oldest one is about an inch long, the youngest about half an inch. They all bear the same dark nebulous character, but



the largest only has the four bands so wide as to combine and give the fauces a dark purple hue, which extends to the callus of the columella. The others have the columella whitish and the bands are distinct within. The oldest has a few coarse striae on the upper and lower parts of the whorls, but the younger ones in my possession have not these striae. There is a disposition in all these specimens to have obscure coarse folds, which are yellowish, leaving between them darkish spots. The aperture is nearly one-half the length of the shell.—*Lea*.

8. *E. umbonatum*, LEA.

Eurycalon umbonatum, LEA, Proc. Acad. Nat. Sci., p. 3, 1864. Obs., xi, 106, t. 23, f. 64.

Description.—Shell nodulous, subfusiform, rather thick, obscurely banded, dark olive; spire very obtuse; sutures very much impressed; whorls with irregular bosses, swollen below the sutures, the last one very large; aperture very large, subelliptical; outer lip acute, slightly sinuous; columella thickened above and somewhat sinuous below.

Habitat.—Smith's Shoals, Cumberland River, East Tennessee; Major S. S. Lyon (U. S. E.).

Diameter, .48; length, .80? of an inch.

Observations.—I only received two specimens of this interesting species, and neither being perfect at the apex, the number of whorls cannot be ascertained; probably there are not more than five. Both these specimens have two small, obscure bands on the inside of the upper part of the outer lip. One has dark brown marks inside and is brown at the bottom of the columella. One is much darker on the outside than the other. The large, irregular nodes or bosses are three on the body-whorl of one specimen and five on the other, they are placed on the shoulder of the whorls. The aperture is nearly two-thirds the length of the shell.—*Lea*.

Fig. 658.



9. *E. Anthonyi*, BUDD.

Anculosa Anthonyi, Budd, REDFIELD, Ann. Lyc. Nat. Hist., vi, p. 130, t. 1, f. 6, April, 1854.

Leptoxis Anthonyi, Budd, Redfield, BROT, List, p. 23. BINNEY, Check List, No. 341.

Anculotus Anthonyi, Budd, Redfield, REEVE, Monog. Anc., t. 2, f. 17.

Description.—Shell rhomboidally ovate, covered with an olivaceous-yellowish epidermis, beneath which usually appear two purplish bands encircling the body-whorl; spire short; whorls about four, the upper ones much eroded, the upper portion of the last whorl is shouldered by a series of large, obtuse and irregular tubercles, about four or five in number, there is also a slight tendency towards thickening in the ventral portion of the whorl; aperture ovate, effuse above and below; right lip thin; columella lip usually stained with purple above and

Fig. 659.



below, reflected so as partially to cover a deep, umbilical depression, which, however, is continued towards the base, forming a channel much resembling that of the umbilical region in *Natica*.

Habitat.—Holstein River, near Knoxville, Tennessee, where it was collected by our associate, O. W. Morris, and also by Mr. Anthony.

Diameter, .63 (16 millim.); length, .83 of an inch (21 millim.). Length of aperture, .61 (16 millim.); breadth of aperture, .31 of an inch (8 millim.).

Observations.—Allied to *A. salebrosa*, but has the tubercles of its last whorl larger, more obtuse and irregular and fewer in number. In adopting the above name for this species, proposed by Dr. Budd,

I pay a deserved compliment to one of the most industrious and ardent naturalists in our Western States; though in so doing, I reluctantly depart from a wholesome recommendation formally promulgated, first by the Scientific Congress of Great Britain, and afterwards by that of America. It is to be regretted that this recommendation has been so little heeded, but where the recognized *laus* of nomenclature' hardly restrain, mere suggestions will be of little avail.—*Redfield*.

This very distinct species attains a large size, ranking in this respect with *E. crassa*. In the collection of Gould are specimens collected in west Georgia.

10. *E. crassa*, HALDEMAN.

Anculosa crassa, HALDEMAN, Monog. Limniades, No^o 4, p. 3 of Cover, Oct. 5, 1841. *Anculotus crassus*, HALDEMAN, JAY, Cat., 4th edit., p. 276. REEVE, Monog. Anculotus, t. 2, f. 14.

Leptoxis crassa, HALDEMAN, Monog. Lept., p. 2, t. 1, f. 19-23. BINNEY, Check List, No. 350. BROT, List, p. 24. HALDEMAN, ADAMS, Genera, i, p. 307.

Leptoxis pisum, HALDEMAN, Monog. Lept., p. 4, t. 3, f. 82. BINNEY, Check List, No. 378. BROT, List, p. 25. HALDEMAN, ADAMS, Genera, i, p. 307.

Anculosa turbinata, LEA, Proc. Acad. Nat. Sci., 54, 1861. Jour. Acad. Nat. Sci., v, pt. 3, p. 254, March, 1863. Obs., ix, p. 76.

Description.—Shell conical or globose, ponderous; whorls five, flat or slightly convex; spire exserted; aperture ovate, with a well marked columellar notch; labium thick; color brown.

Fig. 661.



Fig. 660.



Habitat.—Clinch? River, Tennessee.

Length, $\frac{1}{2}$ of an inch.

Observations.—Differs from *A. prærosa* by the better developed spire and notch.

Haldeman

In his "Monog. of Leptoxis," Professor Haldeman informs us that this species lives in tranquil waters near their margins, and not in rapid currents, like the other species of the genus. This is certainly an unexpected habit in a species so ponderous and it may be doubted whether the species habitually *seeks* such stations. The species appears to be rather common in North Alabama, whence beautiful specimens have been received.

The following is a synonyme:—

Leptoxis pisum.—Shell globular, shining, having the lines of growth effaced; spire very short, decorticated and rounded; mouth widely oval, contracted by the columella in front; columella slightly flattened with an anterior flexure; color shining brown, within white or violet.

Fig. 662.



Habitat.—Tennessee.

Observations.—A species of medium size, remarkable for its exterior and its well developed columellar flexure.—Haldeman.

The following is also a synonyme:—

Eurycalon turbinata.—Shell smooth, subrotund, thick, heavy, dark horn color, three-banded; spire obtuse, scarcely exerted; sutures very much impressed; whorls four, the last very large; aperture large, ovate, within white and three-banded, recurved at the base;

Fig. 663. Fig. 664.



columella incurved, impressed; outer lip acute, expanded and sinuous.

Habitat.—North Alabama; Prof. M. Tuomey and Dr. Lewis: Tuscaloosa; Dr. Budd.

Diameter, .56; length, .70 of an inch.

Observations.—I have seen only three specimens of this species. One, that which is figured, I have had for some years. It is not easily confounded with any species I know, being more turbinata than any which has come

under my notice. It is broad above and pointed below, and has an abrupt curvature near the base of the columella made by the impressed callus over the umbilical region. The best specimen has three well defined, brown bands, more distinct within, the other two have them indistinct. These bands do not reach the edge, and the upper one is much the larger. There is a disposition on the callus above and below to be tinted with brown.—Lea.



I find that this is only a very much inflated and not fully grown shell of *E. crassa*. I figure a very young specimen (fig. 665), which exhibits a great difference from the adult. In fig. 664a the sharp carina of the young shell is disappearing; this is succeeded by the form described by Mr. Lea as *turbinata*, and then follows the mature form.

Genus MESESCHIZA, LEA.

Meseschiza, LEA, Proc. Acad. Nat. Sci., p. 2, Jan., 1864.

Description.—Shell fusiform, imperforate: aperture rhomboidal, below canaliculate; lip expanded, slit in the middle; columella smooth, incurved.

Operculum corneous, spiral.—Lea.*

1. *M. Grosvenorii*, LEA.

Meseschiza Grosvenorii, LEA, Proc. Acad. Nat. Sci., p. 2, Jan., 1864. Obs., xi, 108, t. 23, f. 67.

Description.—Shell smooth, fusiform, thin, obtusely conical, purple or banded; spire obtusely conical; sutures slightly impressed; whorls about seven, scarcely convex; aperture large, rhomboidal, generally banded within; outer lip acute, slightly notched in the middle; columella slightly thickened and twisted.



Operculum ovate, light brown, rather thin, having several volutions, and with the polar point well removed from the left margin.

Habitat.—Wabash River, Indiana; H. C. Grosvenor.

Diameter, .27; length, .43 of an inch.

Observations.—I have thirteen specimens of this remarkable shell. Eight of them have a well defined, though delicate notch, on the edge, at or near to the periphery of the last whorl. In some this notch is a little above the periphery, and in others a little below. Five of the specimens have no notch, which probably arises in four of them from not being fully grown, and in one from having the thin, delicate edge broken off. The specimens vary in color, some being light horn-color with few or many bands, others more or less purple and with or without bands; others again have obscure, longitudinal thickenings, which being whitish give the specimens the appearance of being folded. In all the specimens there is a light line under the sutures, and some have six or seven brown bands, which are distinctly seen on the inside. The channel at the base is small, but well defined. In outline this species reminds one of *Goniobasis Vauxiana* (nobis) and

*Only a single species of this genus has been described, and all the specimens are young shells and from a single locality. I have examined them carefully and I have discovered in every one of those exhibited to me by Mr. Lea, the evidence of diseased growth; under these circumstances I think the genus may fairly be considered a doubtful one. April, 1873.

Melania (Goniobasis) germana, Anthony. It is a thinner shell than either, and the notch in the lip removes it from that genus. The aperture is about one-half the length of the shell. I have great pleasure in naming this species after Mr. Grosvenor, to whom I am greatly indebted for many of our western mollusca.—*Lea*.

Genus SCHIZOSTOMA, LEA.

Schizostoma, LEA, Philos. Proc., ii, p. 242, Dec., 1842; iv, p. 167, Aug., 1845. Pallos. Trans., x, p. 67, 1847. Obs., iv, p. 41, 1847. Proc. Acad. Nat. Sci., May, 1860. Jour. Acad. Nat. Sci., v, pt. 3, p. 245, March, 1863. Obs., ix, p. 67.

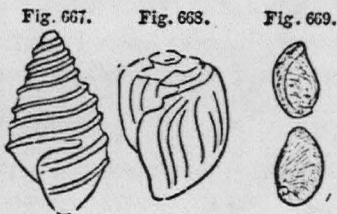
Schizocheilus, LEA, Philos. Trans., x, p. 295, 1853. Obs., v, p. 51, 1823. *Gyrotoma*, SHUTTLEWORTH, Mittheil. Naturforsch. Bern., p. 83, July 22, 1845. ADAMS, Genera, i, p. 305, Feb., 1854. GRAY, Guide to Mollusca, i, p. 103, 1857. CHENU, Man. de Conchyl., i, p. 293, 1859. ANTHONY, Proc. Acad. Nat. Sci., p. 63, Feb., 1860. BINNEY, Check List, June, 1860. BROU, List, p. 27, 1862.

Melatoma, Anthony, GRAY, Zool. Proc., p. 153, 1847. WOODWARD, Manual, p. 131, 1851. REEVE, Couch. Icon., March, 1860. *Apella*, MIGHELS, MSS.

Description.—Shell conical or fusiform; lip fissured above; aperture ovate; columella smooth, incurved.

Geographical Distribution.—The genus appears to be restricted to the waters of the Coosa River, Alabama.

Observations.—The genus *Schizostoma* seems to be capable of being divided into two natural groups in the form of the *fissura*, the cut in the lip. In one group this fissura is deep and direct, that is, parallel with the suture or upper edge of the whorl (fig. 667); in the other it is not deep and is oblique to the suture (fig. 668). Fig. 669 represents the operculum of *S. ovoideum*, Shutt.



SYNOPTICAL TABLE OF SPECIES.*

FISSURE DIRECT, NARROW AND DEEP. FISSURE OBLIQUE, SHORT AND WIDE.

1. Shell striate or ridged.

A. Shell conical, spire lengthened, sharply carinate.

- | | |
|-------------------------------------|------------------------------------|
| 1. <i>S. CARINIFERUM</i> , Anthony. | 15. <i>S. PAGODUM</i> , Lea. |
| <i>S. Showalterii</i> , Lea. | 16. <i>S. PYRAMIDATUM</i> , Shutt. |
| 2. <i>S. CASTANEUM</i> , Lea. | 17. <i>S. WETUMPKAENSE</i> , Lea. |
| | <i>S. ornata</i> , Anthony. |
| | <i>S. pagoda</i> , Lea, of Reeve. |

B. Shell conic-cylindrical; spire obtuse, not carinate.

- | | |
|---------------------------------------|----------------------------------|
| 3. <i>S. OVOIDEUM</i> , Shuttleworth. | 18. <i>S. ALABAMENSE</i> , Lea. |
| | 19. <i>S. ANTHONYI</i> , Lea. |
| 4. <i>S. EXCISUM</i> , Lea. | 20. <i>S. BABYLONICUM</i> , Lea. |
| | <i>Spillmanii</i> , Lea. |

C. Shell globosely-ovate, spire moderate.

- | | |
|-------------------------------------|------------------------------------|
| 5. <i>S. PUMILUM</i> , Lea. | 21. <i>S. BUDDII</i> , Lea. |
| <i>Globosum</i> , Lea. | <i>S. funiculatum</i> , Lea. |
| <i>Alabamense</i> , Lea, of Reeve. | <i>S. pagodum</i> , Lea, of Reeve. |
| <i>Showalterii</i> , Lea, of Reeve. | |

2. Shell smooth.

D. Shell elliptic.

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|------------------------------------|
| 6. <i>S. ELLIPTICUM</i> , Anthony. |
| 7. <i>S. LACINIATUM</i> , Lea. |

E. Shell quadrately cylindrical.

- | | |
|---------------------------------------|-------------------------------------|
| 8. <i>S. AMPLUM</i> , Anthony. | 22. <i>S. DEMISSUM</i> , Anthony. |
| 9. <i>S. NUCCULUM</i> , Anthony. | <i>S. Hartmanii</i> , Lea. |
| | 23. <i>S. CONSTRICTUM</i> , Lea. |
| | <i>S. rectum</i> , Anthony. |
| | 23a. <i>S. SHOWALTERIANA</i> , Lea. |
| 10. <i>S. CYLINDRACEUM</i> , Mighels. | 24. <i>S. SALEBROSUM</i> , Anthony. |
| | <i>S. robustum</i> , Anthony. |
| | <i>S. rectum</i> , Anth., of Reeve. |

* In the above table the opposite species in the two groups are generally exactly similar except in the character of the slit.

F. Shell ovate, whorls obliquely flattened, spire obtuse.

- | | |
|-----------------------------------|--------------------------------|
| 11. <i>S. BULBOSUM</i> , Anthony. | 25. <i>S. GLANDULUM</i> , Lea. |
| <i>S. ovalis</i> , Anthony. | 26. <i>S. INCISUM</i> , Lea. |
| 12. <i>S. CURTUM</i> , Mighels. | <i>S. virens</i> , Lea. |
| | <i>S. quadratum</i> , Anthony. |
| | <i>S. obliquum</i> , Anthony. |
| 13. <i>S. GLANS</i> , Lea. | |

G. Shell globose.

14. *S. SPHERICUM*, Anthony.

SPECIES.

1. *S. cariniferum*, ANTHONY.

Gyrotoma carinifera, ANTHONY, Proc. Acad. Nat. Sci., p. 66, Feb., 1860. BINNEY, Check List, No. 310. BROU, List, p. 27.

Melatoma cariniferum, ANTHONY, REEVE, Monog. Melatoma, t. 2, f. 13.

Schizostoma Showalterii, LEA, Proc. Acad. Nat. Sci., p. 93, March, 1860. Jour. Acad. Nat. Sci., t. 35, f. 49, March, 1863. Obs., ix, p. 68.

Gyrotoma Showalterii, Lea, BINNEY, Check List, No. 334. BROU, List, p. 28.

Description.—Shell conic, thick, dark brown; spire obtusely elevated, truncate, though not abruptly so, six whorls remaining, one or two having apparently been lost by truncation; carinations elevated, subacute and found on all the whorls, two on each of the spiral ones and three to four on the body-whorl; fissure direct, broad, and moderately deep, extending about one-fifth around the shell; sutures irregular, much modified by the carinæ, and often concealed in part by them; aperture ovate and banded within; columella much rounded, callous at the lower part only; outer lip irregularly waved, its outline modified by the carinæ on the body-whorl; no sinus.

Fig. 670.



Habitat.—Coosa River, Alabama.

Length of shell, $\frac{1}{2}$; breadth of shell, $\frac{1}{2}$ of an inch. Length of aperture, $5\frac{1}{2}$ -16 of an inch; breadth of aperture, $\frac{1}{4}$ of an inch.

Observations.—This species cannot well be confounded with any other yet described. In general form and in its armature, one is very forcibly reminded of *Melania annulifera*, Con., from which it differs, however, not only generally, but by its more ovate base. The carinæ are lighter in color than the general body of the shell, and are slightly irregular or subnodulous in outline; it is a stout, heavy species, and

has a smaller aperture, proportionally, than is common in the genus; the bands within the aperture are five in number, very dark, and the three central ones are disposed to be confluent; a dark, broad band revolves around the base of the shell. Compared with *Schizostoma pagoda*, Lea, it differs in color, in its more elongate form, and by the character of its carinæ, which are more uniform, the main variation being that they are more diffused on the whorl, whereas, in Mr. Lea's species they are particularly conspicuous near the apex.—Anthony.

I give below Mr. Lea's description of *Schizostoma Showalterii*, from the Journal of the Academy of Natural Sciences.

Schizostoma Showalterii.—Shell transversely ribbed, subcylindrical, thick, chestnut-color, minutely striate; spire elevated; sutures impressed; whorls flattened; fissure rather large and deep; aperture rather small, elliptical, banded within; columella thick; outer lip slightly crenulate.

Fig. 671.



Operculum ovate, with the polar point near the inner lower edge.

Habitat.—Coosa River, at Uniontown, Alabama; E. R. Showalter, M.D.

Diameter, .46; length, .93 of an inch.

Observations.—It is somewhat like *pagoda* (nobis), but is much larger, more robust and subcylindrical. It also has more and larger ribs, which are very prominent. The specimens before me have on the last whorl seven ribs, the three lower ones being small, the three middle ones large, looking like cords wrapped round the shell. These are of a lighter brown. Two ribs only are visible on the upper whorls. The fissure in the lip is three-tenths of an inch long. The apex being eroded, I am unable to describe that part, nor can I give, consequently, the number of whorls, but they are likely to be seven or eight.—Lea.

S. pagoda, Lea, is distinguished from this species, besides the above characters, by its short and oblique slit. Mr. Reeve figures, in species 23, *Melatoma Showalterii*, which certainly does not apply to this species, but rather to Mr. Lea's *S. pumilum*.

2. *S. castaneum*, LEA.

Schizostoma castaneum, LEA, Proc. Acad. Nat. Sci., p. 186, May, 1860. Jour. Acad. Nat. Sci., v, pt. 3, t. 35, f. 50. Obs., ix, p. 69.

Gyrotoma castanea, LEA, BINNEY, Check List, No. 311. BROU, List, p. 27.

Description.—Shell carinate, conical, rather thick, dark brown, imperforate; spire exerted; sutures very much impressed; whorls six, flattened, with a single carina and four bands; lip-cut straight, narrow and deep; aperture rather small, elliptical, banded within, rounded at the base; columella white and thickened; outer lip acute, slightly sinuous.

Operculum nearly round, light brown, with the polar point below the middle on the inner side.

Habitat.—Coosa River, Alabama; E. R. Showalter, M.D.

Diameter, .32; length, .64 of an inch.

Observations.—Several specimens are before me of nearly the same size. A single, rather obscure carina follows round the middle of the lower whorls, and is exhibited on the upper whorls just above Fig. 672. the suture with more force. The four bands are obscure on the outside, but well defined on the inside. One specimen has but three bands, and another has very pale bands. The impression made by the lip-cut is well defined and forms a narrow, hem-like line below the suture. The aperture is rather small, not being quite half the length of the shell, and is rounded at the base. It is nearest in outline to *pagoda* (nobis), but may at once be distinguished by the color being usually darker, by being less carinate, in having a deeper lip-cut, and in being rounded at the base, instead of being angular there, as that species is. The aperture is rather more than one-third the length of the shell.—*Lea*.



This shell is also closely allied to *Wetumpkaense*, LEA, which, however, has a short, wide fissure. I have endeavored in the Synoptical Table of this genus to indicate the close connection of certain species belonging to the opposite groups, namely, those with the short, oblique, and those with the narrow, direct fissure. It is curious that almost every species in the one section has its analogue in the other, with which, perhaps, it has more affinity than with the nearest of its own section.

3. *S. ovoideum*, SHUTTLEWORTH.

Gyrotoma ovoideum, Shuttleworth, MITCHELL, Bern. Nat. Gesell., No. 50, p. 83, July 22, 1843. H. & A. ADAMS, Genera, iii, t. 32, f. 4.

Description.—Shell conoidal, thick, olivaceous, concentrically striate-costate, brown-banded, apex eroded; whorls about five, thickened at the suture; fissure very narrow, elongate; columella thickened above.

Fig. 673.



Length, about .7; breadth, .4-.4½ of an inch. Length of aperture, .3 of an inch. Length of fissure, .2 of an inch.

Observations.—Closely approaching *Melanía olivula*, Conrad, in form; varied by confluent bands.—*Shuttleworth*.

Figured from H. and A. Adams, "Genera." It appears to be a more cylindrical and narrower species than the following.

4. *S. excisum*, LEA.

Melanía excisa, LEA, Philos. Proc., p. 242, Dec., 1842. Philos. Trans., ix, 1846. JAY, Cat., 4th edit., p. 273.

Schizostoma excisa, LEA, WHEATLEY, Cat. Shells U. S., p. 23.

Gyrotoma excisa, LEA, BINNEY, Check List, No. 317. BROU, List, p. 27. LEA, ADAMS, Genera, i, p. 305.

Melanía excisum, LEA, REEVE, Monog., sp. 2.

Description.—Shell striate, subfusiform, rather thick, yellowish; spire ovately conical; sutures impressed; whorls flattened; aperture cut out above, small, elliptical, white.

Habitat.—Alabama.

Diameter, .40; length, .64 of an inch.

Observations.—This shell is very remarkable for the cut in the superior part of the outer lip, very similar to some species of *Pleurotoma*. This cut extends nearly one-fifth round the whorl, leaving immediately below the suture an elevated ridge. There are nearly three whorls of this specimen perfect, and the cicatrix shows the cut to have extended in due proportion thus far. The aperture is rather small, and rather more than one-third the length of the shell. On the spire there is a slight disposition to plication. The apex being eroded, the number of whorls is not certain, perhaps six. This specimen has three revolving, purple bands.—*Lea*.



Mr. Reeve, and Dr. Brot following him, place *ovoideum*, Shuttleworth, in the synonymy of this species. As I have no means of comparing specimens of the latter with Mr. Lea's species, I have preferred to separate them in this work.

S. Babylonicum is a larger, wider, more robust species than the one now under consideration.

5. *S. pumilum*, LEA.

- Schizostoma pumilum*, LEA, Proc. Acad. Nat. Sci., p. 187, May, 1860. Jour. Acad. Nat. Sci., v, pt. 3, t. 35, f. 57, March, 1863. Obs., ix, p. 74.
Gyrotoma pumila, Lea, BINNEY, Check List, No. 328. BROT, List, p. 27.
Schizostoma globosum, LEA, Proc. Acad. Nat. Sci., p. 187, May, 1860. Jour. Acad. Nat. Sci., v, pt. 3, t. 35, f. 58, March, 1863. Obs., ix, p. 74.
Gyrotoma globosa, Lea, BINNEY, Check List, No. 321. BROT, List, p. 27.
Melatoma globosum, Lea, REEVE, Monog. t. 3, f. 18.
Melatoma Alabamense, Lea, of REEVE, Monog. sp. 20.
Melatoma Showalterii, Lea, of REEVE, Monog. sp. 23?

Description.—Shell striate, top-shaped; rather thin, pale horn-color, imperforate; spire very obtuse; sutures much impressed; whorls six, ventricose, the last very large; fissure straight and rather short; aperture rather small, ovate, white within, angular at the base and somewhat canaliculate; columella white, twisted and thickened below; outer lip acute and sinuous.

Habitat.—Alabama; B. W. Budd, M.D.

Diameter, .40; length, .63 of an inch.

Observations.—This is a rather small, dwarfish looking species, nearly as wide as it is long, which

I have had for a long time from Dr. Budd. One of the specimens has a few obscure bands. It is nearly allied to *glandula* (nobis), but the spire is higher, and it is striate, while the other is not. It is not likely to be confounded with *glans* (nobis), as that is a large species with a higher spire. The hem-like line left by the lip-cut is large and well defined round the whorls. The aperture is about half the length of the shell. One of the specimens before me has three indistinct bands. The other two have none.—*Lea*.



Fig. 678. Fig. 679.



Fig. 676. Fig. 677.

Having before me a number of specimens of Mr. Lea's *S. pumilum* and of his *S. globosum*, I am convinced that the latter is an immature form of the former species. The accompanying figures, the largest of which agrees well with Mr.

Lea's figure of *S. pumilum*, and the smallest with *S. globosum*, with the aid of the intermediate figure (Fig. 678), will exhibit their connection and the mode of growth of the shell. It will be seen that *S. globosum* has attained to four whorls, that the intermediate figure would exhibit (if the loss by erosion were supplied) five, and that the adult has six whorls.

The following is the description of

Schizostoma globosum.—Shell transversely striate, globose, rather thin, yellowish, imperforate; spire short, obtusely conical; sutures impressed; whorls four, three-banded, the last large; lip-cut straight, narrow and short; aperture rather large, elliptical, banded within and angular at the base; columella white, incurved; outer lip sharp and expanded.

Operculum ovate, rather light brown, with the polar point near the inner lower edge.

Habitat.—Alabama; E. R. Showalter, M.D.

Diameter, .32; length, .48 of an inch.

Observations.—This is a very small, globose species, more rounded and inflated than any other which has come under my notice, and it is Fig. 680. the smallest which I have seen. The description being made from two specimens only, it may be found to vary when others are observed. In this specimen the three bands are broad and of a dark brown, the two upper ones having on the outside raised striæ running parallel to the edges. The aperture is large, and is rather more than half the length of the shell. The impression made by the lip-cut is well defined and forms a narrow, hem-like line below the suture. This species is not likely to be confounded with any of the species known, being smaller than all but *laciniatum* (nobis), which is more conical. The aperture is nearly two-thirds the length of the shell.—*Lea*.

The analogue of *S. pumilum* among the obliquely fissured species is *S. Buddii*, Lea, to which it perhaps more nearly approximates than to either *S. glans* or *glandula*, with which Mr. Lea compares it. Although many of the shells in Reeve's Monograph are well figured, their value for the identification of species is seriously impaired by the application to them in several instances of wrong names, and by the insufficiency of the descriptions. This is greatly to be regretted and illus-

trates the truth of Mr. Brot's remark, that the genus is but little known in Europe.

6. *S. ellipticum*, ANTHONY.

Melotoma ellipticum, ANTHONY, MSS., REEVE, Monog., t. 3, f. 21, April, 1861.
Gyrotoma elliptica, ANTHONY, BROT, List, p. 27.

Description.—Shell oblong-ovate, yellowish-olive, encircled with three broad, greenish-black bands; spire rather produced, obtuse; whorls flatly convex, smooth, faintly, rudely plicated towards the apex; aperture narrowly ovate; fissure deep.

Habitat.—Coosa River.

Observations.—A well defined species, though partaking of the typical characters of some others.—*Reeve*.

This shell somewhat resembles *S. bulbosum*, Anthony, but is distinguished by its more lengthened form and by the regularly convex outline of the body-whorl and spire.

Fig. 680a.



7. *S. laciniatum*, LEA.

Schizostoma laciniatum, LEA, Philos. Proc., iv, p. 167, August, 1845. Philos. Trans. x, p. 60, t. 9, f. 57, 1853.
Gyrotoma laciniata, LEA, BINNEY, Check List, No. 321. BROT, List, p. 27. ADAMS, Genera, i, p. 305.

Description.—Shell smooth, obtusely conical, rather thick, banded, yellowish horn-color; spire obtuse; sutures excavated; whorls convex; fissure deep; aperture elliptical, whitish within; columella smooth, thickened above.

Habitat.—Tuscaloosa, Alabama.

Diameter, .25; length, .45 of an inch.

Observations.—This is the smallest species I have seen. The mouth and fissure of this specimen are perfect, but the apex is much eroded, and the number of whorls cannot therefore be ascertained. There are four bands very distinctly marked on the inside. The aperture appears to be about one-half the length of the shell. The fissure is very narrow and remarkably deep, extending nearly one-fourth round the whorl. The cicatrix along the suture is of a lighter color. The marks of growth are distinct, and give a lacinate appearance.—*Lea*.

Fig. 680b.



A very neat species which Mr. Reeve seems to have overlooked. The locality given in the above description is probably incorrect. Mr. Lea has recently stated his opinion that this and other species, to which he originally assigned Tuscaloosa as the habitat, were not really found there. Indeed the present state of our knowledge of the species of this genus leads us to believe that they are entirely confined to the waters of the Coosa River. It is wonderful that this group occupies such a restricted space, while others, such as *Lithasia*, *Pleurocera*, etc., extend over nearly the whole of the country between the Mississippi River and the Alleghany Mountains.

8. *S. amplum*, ANTHONY.

Gyrotoma ampla, ANTHONY, Proc. Acad. Nat. Sci., p. 66, Feb., 1860. BINNEY, Check List, No. 306. BROT, List, p. 27.
Melotoma amplum, ANTHONY, REEVE, Monog., t. 3, sp. 16.

Description.—Shell smooth, ovate, rather thick, olivaceous; spire not elevated, but acute; whorls 6-7, subconvex; sutures well defined; fissure broad, rather deep and wavy; aperture moderate, elliptical, flesh-colored and banded within; columella smooth, or slightly thick-

Fig. 681.

Fig. 682.



ened only at the fissure; body-whorl striate and banded; whorls of the spire not banded, but having a thickened, cord-like line near the suture.

Habitat.—Coosa River, Alabama.

Length, eleven-sixteenths; breadth, seven-sixteenths of an inch. Length of aperture, seven-sixteenths; breadth of aperture, four-sixteenths of an inch.

Observations.—A fine, symmetrical species of this interesting genus, which hitherto has not been very productive in species. Compared with *Schizostoma funiculatum*, Lea, which it most nearly resembles, it is smoother, thinner, more acute and has not the double cord-like lines of that species. Most, if not all the species of *Gyrotoma*, have the fissure gradually filled up behind as it is pushed forward in the process of growth, by a cord-like line more or less prominent, often so much so as to produce quite a shoulder at the suture, and this species is so marked, but it has no cord-like line in the middle of the body-whorl, as described in *funiculatum*.—*Anthony*.

A beautiful species, which may be readily distinguished from

all the other deeply fissured *Schizostomæ* by its quadrate form, caused by the flattening of the body-whorl. In its form it approaches closely to *S. salebrosa*, Anthony, which is, however, much larger and belongs, moreover, to the other section of the genus.

9. *S. nuculum*, ANTHONY.

Melatoma nucula, ANTHONY, MSS., REEVE, Monog. t. 3, f. 19, April, 1861.
Gyrotoma nucula, ANTHONY, BROU, List, p. 27.

Description.—Shell obtusely conical, fulvous-olive; whorls convex, smooth; aperture narrowly ovate, a little effused at the base; fissure deep.

Habitat.—Coosa River, Alabama.

Observations.—Chiefly distinguished by the simplicity of its characters, the shell being neither sculptured nor banded.—Reeve.

I have not seen this species. Judging from the figure it appears to me to be the same as *amplum*.

Fig. 683



10. *S. cylindraceum*, MIGHELS.

Schizostoma cylindracea, MIGHELS, Bost Proc., i, p. 189, Oct., 1844.
Gyrotoma cylindracea, MÜLL., BINNEY, Check List, No. 315. Gould, BROU, List, p. 27. ADAMS, Genera, i, p. 305.

Description.—Shell nearly smooth, cylindrical, thick, with slight, revolving undulations; epidermis olivaceous; spire ovate-conic, eroded; whorls three or four, flattened, shouldered; suture distinct; aperture oval; fissure deep and wide.

Habitat.—Warrior River, Alabama.—Mighels.

I can only reprint the original description of this species, the shell being unknown to me.

11. *S. bulbosum*, ANTHONY.

Gyrotoma bulbosa, ANTHONY, Proc. Acad. Nat. Sci., p. 65, Feb., 1850. BINNEY, Check List, No. 309. BROU, List, p. 27.
Melatoma bulbosum, ANTHONY, REEVE, Monog., sp. 22.
Gyrotoma ovalis, ANTHONY, Proc. Acad. Nat. Sci., p. 65, Feb., 1850. BINNEY, Check List, No. 325. BROU, List, p. 27.

Description.—Shell striate, ovate, moderately thick, dark olive; spire obtusely elevated, subtruncate, four whorls only remaining; whorls of the spire subconvex; sutures very distinct, rendered more

so by the shouldering of the whorls; body-whorl inflated, subangulated a little below the suture, from which angle it shelves towards it, and having two or three dark, broad bands revolving round it; lines of growth curved and very distinct, almost like crowded ribs; fissure perfectly straight, very narrow and not deep; aperture rather

Fig. 684.



Fig. 685.



long, of a dusky color within and ornamented by three broad and distinct bands there; columella smooth, except at the lower part, where it is slightly thickened.

Habitat.—Coosa River, Alabama.

Length of shell, nine-sixteenths; breadth of shell, three-eighths of an inch. Length of aperture, five-sixteenths; breadth of aperture, three-sixteenths of an inch.

Observations.—A short, ovate species resembling in some respects *G. ovalis* (nobis) herein described; it is less elevated than that species, more ventricose, and its surface is rougher; indeed, there seem to be some indications of obscure folds on the body-whorl of this species near the suture, which in very old specimens may be more fully expressed; and thus bring it into close affinity with *M. salebrosa* (nobis).—Anthony.

Having compared Mr. Anthony's types of his *S. bulbosum* and *S. ovalis*, together with other specimens, I am convinced that they are the extreme forms of one species. With regard to the striae of the former being rougher than those of the latter species, some of the specimens of *ovalis* before me have exactly the same striation, disposed somewhat to rise into folds near the suture which distinguishes the typical *bulbosum*. *S. salebrosus* is a larger and more cylindrical species, and *S. bulbosum* is more closely allied to *S. incisum*, Lea.

The description of *S. ovalis* follows, and figures of both that and *bulbosum* are given from Mr. Anthony's types.

Schizostoma ovalis.—Shell smooth, oval, olivaceous, moderately thick; spire obtusely elevated, composed of about 5-6 convex whorls, of which two are generally lost by truncation; sutures deeply impressed; aperture broadly elliptical, banded within; fissure direct, exceedingly narrow and very deep, extending nearly one-half around the shell; columella slightly curved by a callus.

Habitat.—Coosa River, Alabama.

Length of shell, ten-sixteenths; breadth of shell seven-sixteenths

of an inch. Length of aperture, seven-sixteenths; breadth of aperture, four-sixteenths of an inch.

Observations.—A fine, symmetrical species remarkable for its regularly oval form and unusually deep, linear fissure; the whorls are somewhat shouldered, though not so much so as in many of the species; the spiral whorls are furnished with two broad bands, one near the top of each and the other widely separate and near the preceding whorl, being often half concealed by it; there are three bands on the body-whorl equidistant from each other; compared with *G. bulbosa* (nobis), which it most nearly resembles, it is longer, more linear, and has not the rapidly attenuating spire of that species nor its roughly striate surface.—*Anthony*.



12. *S. curtum*, MIGHELS.

Schizostoma curta, MIGHELS, Bost. Proc., 1, p. 189, Oct., 1844.

Gyrotoma curta, Mighels, BINNEY, Check List, No. 314. Gould, Brot, List, p. 27. ADAMS, Genera, 1, p. 305.

Description.—Shell short, subglobose, smooth, thick and solid; epidermis dark green, with two or three revolving bands of a darker color; spire short, obtuse, eroded; whorls three or four, flattened in the middle; suture superficial; aperture pear-shaped; fissure distinct.

Habitat.—Warrior River, Alabama.—*Mighels*.

This species is unknown to me except through the description. The locality probably should read Coosa River, instead of Warrior River.

13. *S. glans*, LEA.

Schizostoma glans, LEA, Proc. Acad. Nat. Sci., p. 186, May, 1860. Jour. Acad. Nat. Sci., v, pt. 3, t. 35, f. 52, March, 1863. Obs., ix, p. 70.

Gyrotoma glans, Lea, BINNEY, Check List, No. 320. Brot, List, p. 27.

Description.—Shell smooth, ovately conical, inflated, rather thick, yellowish horn-color or chestnut-brown, striate, imperforate; spire obtusely elevated; sutures regularly impressed; whorls six, obsoletely banded, the last rather large; lip-cut straight, narrow and deep; aperture rather small, elliptical, white within, obtusely angular at the base; columella white, thickened above; outer lip sharp and somewhat sinuous.

Operculum ovate, dark brown, with the polar point near to the inner lower edge.

Habitat.—Coosa River, Alabama; E. R. Showalter, M.D.

Diameter, .44; length, .78 of an inch.

Observations.—This is rather a robust species, and judging from the specimens before me, I should presume that there would be much regularity in the species. On one of the specimens there are two obscure, hair-like bands, one on the middle of the body-whorl and another near the base. Other specimens have only a very obscure, thin band near the base. Very probably specimens may be found with a third band near to the suture, and others with better defined bands. Some were chestnut-brown. The upper whorls were rather flattened, and the lines of growth few and obscure. The impression made by the lip-cut is well defined, and forms a strong, narrow, hem-like line below the suture. The outer lip stands close to the body-whorl. The aperture is one-half the length of the shell, and the base is obtusely angular. This species, in general facies, is near to *glandula* herein described, but differs in the form of the lip-cut, which is narrow, deep and straight. It is also a much larger species, and is without the well marked shoulder of *glandula*.—*Lea*.



This pretty species appears to be allied to *S. bulbosum*, *Anthony*, but offers the following points of distinction:—it is more inflated and heavier, the color is much lighter, the bands are very narrow and the striation is not so strongly marked. In a very fine individual before me, the body-whorl is disposed to tuberculation below the suture.

14. *S. sphaericum*, ANTHONY.

Melatoma sphaericum, ANTHONY, MSS., REEVE, Monog., sp. 8, April, 1861.

Description.—Shell subglobose, yellowish-olive, encircled with interrupted fillets of greenish-black; spire small, somewhat immersed; whorls convex, smooth, rather inflated; sutural fissure slightly channelled; columella callous.

Habitat.—Coosa River, Alabama.

Observations.—A small, globose shell, with its little spire distinctly immersed, characterized by a copious banding throughout of interrupted fillets of greenish-black, fuscous in the interior.—

Reeve.



This elegant little species is widely separated in form and ornamentation from any other of the genus. In both these respects it reminds one strongly of Mr. Lea's *Anculosa formosa*.

15. *S. pagoda*, LEA.

Schizostoma pagoda, LEA, Philos. Proc., iv, p. 167, Aug., 1845. Philos. Trans., x, p. 67, t. 9, f. 52, 1853.

Gyrotoma pagoda, Lea, CHENU, Manuel, i, f. 2,020. BINNEY, Check List, No. 327. BROU, List, p. 27. ADAMS, Genera, i, p. 303.

Description.—Shell carinate, conical, rather thick, dark horn-color; spire rather short; sutures very much impressed; whorls six; fissure small; aperture elliptical, within whitish; columella smooth.

Habitat.—Tuscaloosa, Alabama.

Diameter, .35; length, .75 of an inch.

Observations.—Three of this interesting species are before me. They are very distinct, and may easily be known by the carina being very acute on the superior whorls, presenting the appearance of a Chinese pagoda. The lower whorl is slightly and irregularly striate. The fissure is not deep, but rather wide, being about one-fifth the length of the whorl. The columella at the base is rather angular. The aperture is rather more than one-third the length of the shell.—*Lea*.

Fig. 659.



This excellent species in form belongs to that group of which *S. carinifera*, Anthony (*Showalterii*, Lea) may be considered the type. It is not so large a shell as that species, nor is it so strongly carinate. It is also allied to *S. Wetumpkaense*, Lea, but is a more elongated shell. The locality given is extremely doubtful. Mr. Reeve figures two distinct species for *S. pagoda*:—his fig. 1a is *S. Wetumpkaense*, Lea, and fig. 1b is *S. Buddii*, Lea. It is doubtful whether Mr. Brot has recognized this species, as he refers to Mr. Reeve's figures.

16. *S. pyramidatum*, SHUTTLEWORTH.

Gyrotoma pyramidatum, SHUTTLEWORTH, Mitt. Bern. Nat. Gesell., No. 50, p. 83, July 22, 1845. BINNEY, Check List, No. 329. BROU, List, p. 27. ADAMS, Genera, i, p. 305.

Description.—Shell pyramidal, thickened, olivaceous or blackish,

concentrically, sulcately costate, frequently nodosely geniculate; banded with brown; apex eroded; whorls five or six; fissure wide, short; columella tuberculately thickened above.

Length, .9; breadth of the ultimate whorl, $\frac{1}{2}$ – $\frac{5}{8}$ of an inch. Length of aperture, $\frac{3}{4}$. Length of fissure, .1 of an inch.—*Shuttleworth*.

This species is entirely unknown to me, but is evidently closely allied both to the preceding and following.

17. *S. Wetumpkaense*, LEA.

Schizostoma Wetumpkaense, LEA, Proc. Acad. Nat. Sci., p. 187, May, 1860. Jour.

Acad. Nat. Sci., v, pt. 3, t. 33, f. 56, March, 1863. Obs., ix, p. 73.

Gyrotoma Wetumpkaensis, Lea, BINNEY, Check List, No. 336. BROU, List, p. 28.

Melatoma Wetumpkaense, Lea, REEVE, Monog., t. 3, f. 17.

Melatoma ornata, ANTHONY, MSS., REEVE, Monog., fig. 11.

Melatoma pagoda, Lea, REEVE, Monog., fig. 1a. (not 1b).

Description.—Shell striate, ovately cylindrical, thick, light brown, umbilicate; spire obtuse, conoidal; sutures very much impressed;

whorls six, banded, flattened, the last large; fissure oblique and short; aperture large, ovate, banded within, at the base obtusely angular; columella white, thickened above; outer lip sharp and sinuous.

Operculum spiral, large and long, the polar point being near to the lower left edge.

Habitat.—Coosa River, at Wetumpka, Ala.; E. R. Showalter, M.D.

Diameter, .41; length, .70 of an inch.

Observations.—Among the specimens from Dr. Showalter were a number of adults and young of this species. Some were eroded so much as to exhibit little more than the body-whorl. The more perfect ones, still slightly eroded at the apex, exhibited six whorls. The half-grown have five whorls, with a cord-like carina on the middle of each, and this carina is raised much above the surface. The quite young have a sharp apex, and carry the carina to near the apex. The suite, which I owe to the kindness of Dr. S., consists of some eighteen specimens, varying from one-fourth to nearly a whole inch in size. In general outline this species approaches *S. Buddii* (nobis), but it is more cylindrical when full grown, and generally has bands. Besides it is umbilicate, while *Buddii* is not. Usually *Wetumpkaense* is striate and banded, but it is not universally the case. The aperture is less than half the length of the shell. The hem is yellowish and not well marked.—*Lea*.



S. ornata, Anthony, is evidently the young of this species. I give the original description, and also a figure from the type specimen.

Melatoma ornatum.—Shell ovate, somewhat pyramiddally turreted, yellowish-olive, neatly, spirally corded with dark green; whorls 5-6, concavely sloping round the upper part, keeled at the sutures; aperture small; fissure broad, moderately deep; columella thinly inflected, pinkish-white.

Habitat.—North Carolina, United States.

Observations.—A charming little species, banded in a most characteristic manner, with raised, dark green, cord-like ridges upon a clear, yellowish-olive ground.—Reeve.



Mr. Anthony's label is marked "Proc. A. N. S. Phil.," but he never published the species. Mr. Reeve, misled by this reference, has quoted *Anculosa ornata*, Anthony, as being the description referred to, and consequently assigns North Carolina as the habitat. It is scarcely necessary to repeat that no species of *Schizostoma* has ever been positively ascertained to exist in any other waters than those of the Coosa. I think it very probable that *pagoda*, *pyramidatum* and *Wetumpkaense* are identical, but I have not sufficient data to ascertain the fact positively.

18. *S. Alabamense*, LEA.

Schizostoma Alabamense, LEA, Proc. Acad. Nat. Sci., p. 187, May, 1860. Jour. Acad. Nat. Sci., v, pt. 3, t. 35, f. 51. Obs., ix, p. 72.
Gyrotoma Alabamensis, Lea, BINNEY, Check List, No. 305. BROU, List, No. 27.

Description.—Shell striate, elliptical, stout, yellowish-olive, imperforate; spire obtusely conical; sutures very much impressed; whorls six, banded, rather inflated, the last very large; fissure oblique and rather short; aperture rather large, ovate, banded within and obtusely angular at the base; columella white, somewhat thickened above and below; outer lip sharp and sinuate.



Habitat.—Alabama; B. W. Budd, M.D. and Dr. E. R. Showalter.

Diameter, .50; length, .90 of an inch.

Observations.—The specimen from Dr. Budd has been a long time in my possession, and was considered to be an inflated variety of

excisa, but specimens recently received from Dr. Showalter satisfy me that it is distinct. It is among the largest of the genus, being nearly an inch long, and may be distinguished by its robust form and its regular, elliptical outline. The specimens before me have three broad, dark purple bands within, which give an indistinct dark green hue to the outside, and stop short of the edge. The lip-cut stands well out, and the hem-like margin is distinct and yellowish. The base of the columella is yellowish. The aperture is half the length of the shell. The hem is yellow, broad and well marked.—Lea.

Mr. Reeve's fig. 20 intended to represent this species, I refer to *S. pumilum*, Lea. *S. Alabamense* is allied to *Babylonicum*, Lea, but is, as it appears to me, well distinguished by the regularity of the striae, which cover the whole surface.

19. *S. Anthonyi*, REEVE.

Melatoma Anthonyi, REEVE, Monog., sp. 12, April, 1861.
Gyrotoma Anthonyi, Reeve, BROU, List, p. 27.

Description.—Shell conically ovate, rather solid, fulvous-brown; spire produced; whorls sloping round the upper part, concavely impressed round the middle, last whorl encircled by a single, dark ridge; aperture rather narrow, attenuately effused at the base; columella arcuately twisted.

Fig. 693.



Fig. 694.



Habitat.—Alabama.

Observations.—This shell, received from Mr. Anthony without a name, appears to me to be distinct, and I am glad to avail myself of the opportunity of dedicating it to a gentleman to whom we are so largely indebted beyond all others for his researches after the *Melaniadae* of the southern United States of America.—Reeve.

Mr. Reeve does not mention the character of the fissure, but I judge from the figure that it is short and wide. The accompanying woodcuts are copied from Mr. Reeve's.

20. *S. Babylonicum*, LEA.

Schizostoma Babylonicum, LEA, Philos. Proc., iv, p. 167, Aug., 1845. Philos. Trans., x, p. 68, t. 9, f. 51.

Gyrotoma Babylonicum, LEA, BINNEY, Check List, No. 307. CHENU, Manuel de Conchyl., i, f. 2021. BROU, List, p. 27. LEA, ADAMS, Genera, i, p. 305.

Melatoma Babylonicum, LEA, REEVE, Monog., sp. 6.

Schizostoma Spillmanii, LEA, Proc. Acad. Nat. Sci., p. 54, Feb., 1861. Jour. Acad. Nat. Sci., v, pt. 3, t. 35, f. 55. Obs., ix, p. 72.

Gyrotoma funiculata, LEA, ADAMS, Genera, i, p. 305.

Description.—Shell striate, somewhat fusiform, rather thick, chestnut-color; spire obtusely conical; sutures impressed; whorls flattened; fissure small; aperture large, elliptical, somewhat flesh-colored within; columella smooth, angular at the base, thickened above.

Habitat.—Tuscaloosa, Alabama.

Diameter, .48 of an inch; length, 1 inch.

Observations.—A single specimen only of this species was submitted to me. It differs from the other described species in being angular at the superior portion of the whorl along the lower margin of the fissure, making quite a shoulder, and giving it the *Babylonic* appearance. The fissure is wide, but not deep. The apex being much eroded, the number of whorls could not be ascertained. The aperture is nearly half the length of the shell. The deposit on the columella in this individual does not cover the perforation. In others this may differ. The outer lip is quite patulous.—*Lea*.

Fig. 695.



S. Babylonicum was described from a single specimen, several years ago, when but few species of the genus were known. As the description of *S. Spillmanii* appears to be much more accurate and to apply well to the shell first named, I have adopted it in this connection. There can be but little doubt that the two species described by Mr. Lea are identical. I have before me a splendid suite of this species numbering about thirty individuals from which the figures of the adult and young *Spillmanii* are drawn. These were obligingly presented to the Smithsonian Institution by Dr. James Lewis of Mohawk, N. Y., who received them from Dr. Showalter. Mr. Reeve's figure 6 intended to represent this shell is too large and ponderous and must be received with doubt.

The description and figure of *S. Spillmanii* are given below.

Schizostoma Spillmanii.—Shell striate, subcylindrical, rather thick, yellowish-brown, imperforate; spire obtuse, conoidal; sutures impressed; whorls six, very much banded, flattened, the last large; fissure oblique and rather short; aperture large, ovate and banded within, obtusely angular at the base; columella white, thickened above; outer lip sharp and sinuous.

Fig. 696.



Operculum ovate, spiral, rather large, dark brown with the polar points near to the left edge, about one-fifth above the basal margin.

Habitat.—Coosa River, Alabama; Dr. E. R. Showalter.

Diameter, .48; length, .92 of an inch.

Observations.—I have a number of specimens, chiefly young, from Dr. Spillman, and a fine suite of different ages from Dr. Showalter. There is much difference among them, some being subcylindrical, while others are disposed to be oval.



This species is nearly allied to *Wetumpkaense* (nobis) and closely resembles it in the adult state, but in the young state the two species differ very much. The young of *Wetumpkaense* is remarkably carinate on the middle of the whorl, and this is more marked on the superior whorls, the epidermis being of a light yellowish horn-color, with a distinct brown band on the upper portion of the whorl, and generally two below, sometimes three. The *Spillmanii* has a very obtuse

Fig. 697.



angle along the middle of the whorl, which does not show in the upper whorls, which are dark brown, and the band is interrupted, making the spire somewhat maculate. The aperture is not quite half of the length of the shell. The hem is not well defined. I name this after my friend Dr. Spillman, who sent me a number of fine specimens, old and young.—*Lea*.

Fig. 698.

21. *S. Buddii*, LEA.

Schizostoma Buddii, LEA, Philos. Proc., iv, p. 167, Aug., 1845. Philos. Trans., x, p. 68, t. 9, f. 53.

Gyrotoma Buddii, LEA, BINNEY, Check List, No. 308. BROU, List, p. 27.

Schizostoma funiculatum, LEA, Philos. Proc., iv, p. 167, Aug., 1845. Philos. Trans., x, p. 69, t. 9, f. 55.

Gyrotoma funiculata, LEA, BINNEY, Check List, No. 313. BROU, List, p. 27.

Melatoma funiculatum, LEA, of REEVE, Monog., sp. 5.

Melatoma pagoda, LEA, of REEVE, Monog., sp. 16.

Description.—Shell striate, subsfusiform, thick, dark horn-colored; spire obtusely conical; sutures irregularly impressed; whorls six,

rather inflated; fissure small, oblique; aperture large, rhomboidal, whitish within; columella thickened above.

Habitat.—Tuscaloosa, Alabama.

Diameter, .47; length, .83 of an inch.

Observations.—This is a robust shell, being thicker and heavier than any other species of this genus which I have observed. The aperture is nearly one-half the length of the shell. Two specimens were sent together by Dr. Budd, presuming they were the same. One, however, which is not quite a mature shell, has little or no fissure. The other, from which the description is made, has a wide but short fissure, and the margin of it opens obliquely.—*Lea.*

Fig. 700.



The following is the description of

Schizostoma funiculatum.—Shell striate, elliptical, rather thick, chestnut-colored; spire obtuse; sutures much impressed; whorls convex; fissure rather large, oblique; aperture large, elliptical; columella thickened above.

Fig. 701.



Habitat.—Tuscaloosa, Alabama.

Diameter, .4; length, .66 of an inch.

Observations.—A single specimen only was obtained by Dr. Budd of this species. It is short, stout, and almost subrotund. It has two elevated, cord-like lines, revolving on the whorls. One immediately under the suture, the other below that again. The aperture is more than half the length of the shell. The apex is so much eroded as to prevent the number of whorls being ascertained. There are about six.—*Lea.*

Having examined Mr. Lea's original specimens of the above descriptions (both of which are figured) as well as other shells of intermediate forms, I believe that the two should be united. Mr. Reeve's figure 3 of this species is a *Goniobasis leta*, Jay. Mr. Reeve's figure of *funiculatum* quoted above does not so well represent that variety as his figure 1b, which he introduced to illustrate Mr. Lea's *S. constrictum* (considered by Mr. Reeve to be a synonyme of *pagoda*). This species is very closely allied to the long-fissured *S. pumilum* of Lea.

22. *S. demissum*, ANTHONY.

Gyrotoma demissa, ANTHONY, Proc. Acad. Nat. Sci., p. 64, Feb., 1860. BINNEY, Check List, No. 316. BROU, List, p. 27.

Melatoma demissum, ANTHONY, REEVE, Monog., sp. 9.

Schizostoma Hartmanii, LEA, Proc. Acad. Nat. Sci., p. 187, May, 1860. Jour. Acad. Nat. Sci., v, pt. 3, t. 33, f. 51. Obs., ix, p. 69.

Gyrotoma Hartmanii, LEA, BINNEY, Check List, No. 322. BROU, List, p. 27.

Description.—Shell short, robust, thick, truncate, of a dark horn-color; spire flat by truncation, exhibiting traces of about four whorls; body-whorl cylindrical; fissure broad, waved and rather deep; aperture elliptical, within whitish; columella thickened along its whole extent, but most so at the fissure.

My cabinet.

Length of shell, ten-sixteenths; breadth of shell, seven-sixteenths of an inch. Length of aperture, seven-sixteenths; breadth of aperture, four-sixteenths.

Observations.—A fine, cylindrical species, whose chief character-

Fig. 702.



istics are its very smooth, polished surface, plain russet color and flat, truncate spire; the lines of growth are unusually strong in this species, and the darker lines indicating the terminus of previous mouths are very distinct and numerous, evidencing frequent and many pauses in its growth; the columella is much bent near its base, and a narrow, but distinct sinus is formed at about the middle space between the outer lip and columella. A single specimen only is before me, but seems so very distinct from all others that I have no hesitation in considering it new.—*Anthony.*

Mr. Lea considers that this species = his *S. constrictum*. They are nearly allied, but *constrictum* is a more elongated, narrower shell, and a comparison of Mr. Anthony's types, kindly placed in my hands by that gentleman, has induced me to believe that *constrictum* should rather be united to *S. rectum*, Anthony.

The following is Mr. Lea's description of

Schizostoma Hartmanii.—Shell smooth, subcylindrical, thick, yellowish horn-color, imperforate; spire raised; sutures very much impressed; whorls flattened, the last rather large; fissure straight and rather short; aperture rather small, ovate, white within, obtusely

angular at the base; columella white, incurved, somewhat thickened below; outer lip sharp and sinuous.

Habitat.—Coosa River, Alabama; W. D. Hartman, M.D.

Diameter, .46; length, .96 of an inch.

Observations.—This specimen, which I owe to the kindness of Dr. Hartman of Westchester, Penn., was no doubt sent to him by Dr. Showalter. It is distinct from any species I have before seen, and is more nearly allied in outline to *Babylonicum* (nobis) than any other species I know. It differs in not being umbilicate, in not having a square shoulder, and in being yellowish horn-color. It is impressed below the hem-like margin of the suture, while the other is not. It is also near to *recta*, Anthony, but is stouter, is of a light color, and has a more twisted columella. The specimen in my possession is nearly an inch in length. With a perfect spire it would exceed an inch. All is imperfect above the second whorl, but there are indications of there being at least six. One specimen has no bands, the other has three obscure ones. The aperture is about half the length of the shell. The hem is rather narrow and is well defined. I have great pleasure in naming this species after my friend Dr. Hartman, who has done so much to promote natural science.—*Lea.*

23. *S. constrictum*, LEA.

Schizostoma constrictum, LEA, Philos. Proc., iv, p. 167, Aug., 1815. Philos. Trans., x, p. 68, t. 9, f. 55.

Gyrotoma constricta, Lea, BINNEY, Check List, No. 302. BROTH, List, p. 27. ADAMS, Genera, i, p. 305.

Gyrotoma recta, ANTHONY, Proc. Acad. Nat. Sci., p. 64, Feb., 1860. BINNEY, Check List, No. 331. BROTH, List, p. 27.

Melatoma rectum, ANTHONY, REEVE, Monog., sp. 10, not sp. 7a.

Description.—Shell smooth, cylindrical, yellowish, thick; short,

Fig. 704.



originally furnished with about five low whorls, of which three are nearly lost by truncation; fissure moderately broad, not quite direct and not remarkably deep; sutures lightly impressed; aperture narrow ovate, occupying about three-fifths of the length of the shell; within dusky and obscurely banded; columella callous, thickened abruptly at the fissure.

Habitat.—Coosa River, Alabama.

Length of shell, eleven-sixteenths; breadth of shell, three-eighths

Fig. 703.



of an inch. Length of aperture, seven-sixteenths; breadth of aperture, three-sixteenths of an inch.

Observations.—This is the most cylindrical species I have ever seen in this genus. In its general form and coloring it most nearly resembles *G. demissa* (nobis), but is longer, more elevated, smoother and is ornamented with bands, which on that species are entirely wanting; these bands on the body-whorl are three in number, of which the middle one is the narrowest and least distinct; they are widely distant from each other; the cord-like cincture is very prominent in this species and the fissure is farther removed from the suture than is usual. It is altogether a beautiful and graceful species.—*Anthony.*

Mr. Lea's description, being founded on a single abnormal specimen, is by no means so good as that of Mr. Anthony; I have, therefore, adopted the latter. The types of both are figured. I have seen other specimens besides Mr. Lea's, which have the constriction of the centre of the whorls, which has given rise to the specific name, but I cannot at present consider this to be a normal character of the species. Mr. Reeve's fig. 7a represents a smooth variety of *salebrosum*, Anthony. Mr. Lea's description and figure are given below.

Schizostoma constrictum.—Shell smooth, somewhat fusiform, rather thin, yellowish horn-color; spire obtuse; sutures impressed; whorls

constricted; fissure rather large, somewhat oblique; aperture large, elliptical, whitish within; columella smooth, subangular at the base.



Habitat.—Tuscaloosa; Alabama.

Diameter, .43; length, .75 of an inch.

Observations.—A single specimen only of this species was among the shells submitted to me by Dr. Budd. It differs from those I have seen in having a rather broad channel impressed immediately above the centre of the whorl. This character may, however, differ in other individuals. The fissure is rather wide, but not deep. The apex being eroded, the number of whorls could not be ascertained. The aperture is about one-half the length of the shell. There is no appearance of bands about this specimen.—*Lea.*

23a. *S. Showalteriana*, LEA.

Schizostoma Showalterii, LEA, Proc. Acad. Nat. Sci., 112, 1864. Obs., xi, p. 105, t. 23, f. 56.

Description.—Shell smooth, cylindrical, elevated, thick, honey-yellow, without bands; spire exerted; sutures very much impressed, furnished below with a cord; whorls flattened; fissure rather small; aperture small, elliptical, white within; outer lip acute, somewhat sinuous; columella somewhat thickened above and below.

Operculum elongate, dark brown.

Habitat.—Coosa River, Alabama; E. R. Showalter, M.D.

Diameter, .54 of an inch; length, 1.2 (?) inches.

Observations.—This species, of which I have but a single specimen, is the highest in the spire of any I have seen, and it is to be regretted that it is not more perfect, the three lower whorls only remaining. These, however, indicate a high spire, which is not common in the genus. The lower whorl reminds one of *constrictum* (nobis), but that species is short, not so thick, has a larger aperture, and the callus is not so thick on the columella. It also has a constriction around the body-whorl which this species has not. It is also devoid of the well marked cord which runs round the sutures of this species, which cord is very remarkable. There are a few iridescent striae on the upper part of the last whorl in this specimen. Being an imperfect specimen, neither the number of whorls nor the proportion of the aperture can be ascertained. In a former paper I named a fine *Schizostoma* after Dr. Showalter, which he sent to me as new; but I find that Mr. Anthony had very shortly before described the same shell under the name of *carinifera*. Wishing very much that Dr. Showalter's name should be permanent in a genus to which he has so much contributed in bringing so many new species to light, I dedicate this fine species to him, as an acknowledgment of the debt due to him by all students of malacology.—Lea.

Fig. 707.



The specific name *Showalterii* having become a synonyme, it cannot be revived by the same author for another species in the same genus. To obviate all difficulty, I have slightly changed the termination of the name.

24. *S. salebrosum*, ANTHONY.

Gyrotoma salebrosum, ANTHONY, Proc. Acad. Nat. Sci., p. 66, Feb., 1860. BINNEY, Check List, No. 333.

Melatoma salebrosum, ANTHONY, REEVE, Monog., sp. 8 and 15.

Gyrotoma robusta, ANTHONY, Proc. Acad. Nat. Sci., p. 67, Feb., 1860. BINNEY, Check List, No. 332. BROU. List, p. 28.

Melatoma robustum, ANTHONY, REEVE, Monog., sp. 14a, b.

Melatoma rectum, ANTHONY, of REEVE, Monog., sp. 7a.

Description.—Shell fusiform, robust, thick, nodulous, of a dusky olive-color; spire truncated, leaving scarcely more than the body-whorl, but indicating by traces on the truncation the loss of three or four others; fissure moderately open, waved, not deep; body-whorl roughly nodulous at the upper part and ornamented by three dark bands below; aperture ample, ovate, dusky within and banded by three broad bands; columella deeply rounded, covered with a thick deposit of callus, white at its lower portion, but tinged with dark brown at the fissures.

Fig. 708.



Habitat.—Coosa River, Alabama.

Length of shell, three-fourths; breadth of shell, one-half of an inch. Length of aperture, nine and one-half sixteenths; breadth of aperture, five-sixteenths of an inch.

Observations.—This species presents the unusual characteristic of a nodulous surface, which character has not been observed in any species hitherto described by any American author. These nodules are very conspicuous and much compressed laterally, so as to present very much the appearance of coarsely folded ribs.—Anthony.

The nodules, or rather folds of *S. salebrosum*, by which Mr. Anthony distinguishes it from *S. robustum* are caused by the arrest of growth and indicate the position of former mouths of the shell.

The type of *S. robustum* (which I figure) is a more than usually smooth variety, but I have before me a number of specimens, which exhibit the intermediate stages between it and the folded *S. salebrosum*.

Mr. Reeve's fig. 7a, intended for *S. rectum*, is, I think, referable to this species.

Mr. Lea's *incisum* is not the same as *salebrosum*, as he supposes, but is quite a different shell in form.

The following is Mr. Anthony's description of

Schizostoma robustum.—Shell fusiform, robust, thick, of a dark olive-color; spire obtuse, consisting of one perfect whorl remaining, with marks of two or three more, lost by truncation; body-whorl broad, curved, not deep, closed behind by a cord-like cincture, very prominent, beneath which and close to it is a narrow depression or furrow; aperture narrow, ovate, banded inside; columella well rounded and covered by callus; lines of growth very distinct and much curved, rendering the shell rough by their prominence.

Habitat.—Coosa River, Alabama.

My cabinet.

Length of shell, seven-eighths; breadth of shell, nine-sixteenths of an inch. Length of aperture, ten-sixteenths; breadth of aperture, five-sixths of an inch.

Observations.—This is a large, robust species, somewhat resembling *Melania ampla* (nobis) in form, and not unlike it in coloring; it is about the largest species I have seen in this genus, and certainly not the least beautiful; compared with *G. salebrosa* (nobis) herein described, it is larger, smoother, more inflated and has not the rib-like prominences so characteristic of that species; the lower part of the columella is somewhat flattened and thickened, and another thickening takes place at the aperture, leaving a thinner space between the two points.—Anthony.

Fig. 709.



25. *S. glandula*, LEA.

Schizostoma glandula, LEA, Proc. Acad. Nat. Sci., p. 187, 1860. Jour. Acad. Nat. Sci., v, pt. 3, t. 35, f. 53, March, 1863. Obs., ix, p. 71.
Gyrotoma glandula, Lea, BINNEY, Check List, No. 319. BROT, List, p. 27.

Description.—Shell smooth, short, much inflated, rather thick, yellowish horn-color, minutely striate, imperforate; spire short; sutures much impressed; whorls six, banded, the last large and swollen; lip-cut oblique and short; aperture rather large, elliptical, white within; columella whitish and thickened above; outer lip sharp and somewhat sinuous.

Operculum ovate, brown, with the polar point very close to the inner lower edge.

Habitat.—Coosa River, Alabama; E. R. Showalter, M.D.

Diameter, .36; length, .57 of an inch.

Observations.—A single specimen only was received from Dr.

Showalter. The lip-cut in this species is not deep, but it is wider than usual, and, being oblique, presents more of the whorl within than usual. In the specimen before me there are two small, hair-like bands, one immediately under the shoulder and the other very near to the base, and in the middle there is a slight indication of a band, but these indistinct bands do not become visible in the interior except in a very small degree. The shoulder is slightly impressed, giving the suture a hem. In color it is nearly the same with *glans* herein described, but it differs entirely in the lip-cut, and is a much smaller species with a much lower spire. It is very likely that in other specimens the color may be found to vary. The outer lip stands well off from the body-whorl, and the base is subangular. The aperture is more than one-half the length of the shell. The hem is large and well defined. It is near to *virens* (nobis) in outline and size, but differs entirely in the color, bands and shoulder.—Lea.



Closely allied to the following species (*S. incisum*) it may be distinguished by being heavier, of different color, higher spire and by the body-whorl not being so much flattened around its superior portion.

26. *S. incisum*, LEA.

- Anculosa (Schizostoma) incisum*, LEA, Philos. Proc., ii, p. 243, Dec., 1842. Philos. Trans., ix, p. 23, t. 9, f. 28.
Schizostoma incisum, Lea, WHEATLEY, Cat. Shells U. S., p. 28. HANLEY, Conch. Misc. Melania, t. 5, f. 44, 45.
Gyrotoma incisum, Lea, BINNEY, Check List, No. 323. BROT, List, p. 27. ADAMS, Genera I, p. 305.
Melania incisum, Lea, REEVE, Monog. sp. 4.
Melania incisum, Lea, JAY, Cat., 4th edit., p. 274.
Leptoxis incisum, Lea, BINNEY, Check List, No. 363. HALDEMAN, Monog., p. 2, t. 1, f. 24-26.
Gyrotoma quadrata, ANTHONY, Proc. Acad. Nat. Sci., p. 63, Feb., 1860. BINNEY, Check List, No. 330.
Melania quadratum, Anthony, REEVE, Monog., fig. 7b (not 7a. nor 8).
Schizostoma virens, LEA, Proc. Acad. Nat. Sci., p. 187, 1860. Jour. Acad. Nat. Sci., v, pt. 3, t. 35, f. 59. Obs., ix, p. 75.
Gyrotoma virens, Lea, BINNEY, Check List, No. 335. BROT, List, p. 28.
Gyrotoma obliqua, ANTHONY, MSS.

Description.—Shell smooth, ovately gibbous, thick, yellowish-brown; spire short; whorls four, flattened; columella thickened above; aperture large, ovate, white.

Habitat.—Alabama.

Diameter, .44; length, .64 of an inch.—Lea.

As this shell was one of the first species of the genus described, there did not appear to be so much necessity at that time for an accurate and extended description. That of *S. quadratum*, by Mr. Anthony, will give a better idea of the specific characters.

Fig. 711.



Gyrotoma quadrata.—Shell short, smooth, fusiform, rather thick, olivaceous; spire short, composed of about four very low whorls, the upper two being partially obliterated by erosion; fissure rather broad, waved, but not remarkably deep; sutures distinct; whorls distinctly, but not squarely, shouldered; aperture elliptical, occupying more than half the length of the shell; within three-banded; columella with a light callous deposit.

Habitat.—Coosa River, Alabama.

Length of shell, nine-sixteenths; breadth of shell, seven-sixteenths of an inch. Length of aperture, six-sixteenths; breadth of aperture, three-sixteenths of an inch.

Observations.—The most remarkable characteristic at first view of this species is its short, square form; its color is dark, and the bands,

Fig. 712.



Fig. 713.



which are very broad, are not very distinct; hence its general aspect is not so pleasing to the eye as many others; the fissure is broadly separated from the body of the shell; outer lip very sharp and sinuous, forming, with the columella, a small not very distinct sinus at base.

In form it approaches most nearly perhaps to *G. salebrosa* (nobis), but is more delicate in texture, thinner and has no armature as in that species.—Anthony.

Mr. Lea considers *quadrata*, Anthony, to be a synonyme of his *S. incisum*. An inspection of a number of specimens of both species enables me to agree with him entirely. To these I unite *S. virens*, Lea, recently published, believing it to be a small variety of the same species.

Schizostoma virens.—Shell very slightly nodulous, very much inflated, rather thick, dark green, very minutely striate, imperforate; spire short; sutures impressed; whorls rather flattened and with three bands; lip-cut oblique, short; aperture elongate, nearly pear-shaped, within darkly banded; columella whitish and thickened above; outer lip sharp and sinuous.

Operculum ovate, dark brown, with the polar point near to the inner lower edge.

Habitat.—Coosa River, Alabama; E. R. Showalter, M.D.

Diameter, .32; length, .50 of an inch.

Observations.—This is rather a small species; at least the specimens before me indicate this. There appear to be about six whorls, the upper ones being disposed to put on indistinct folds. The lower whorl is flattened on the middle, has a distinct shoulder above, the top of which is yellowish. It is furnished with three dark,

broad bands. There is no appearance of a hem below the suture. The upper whorls are slightly inflated. The lines of growth are distinctly marked. The aperture is nearly two-thirds the length of the shell, and the base is subangular, and disposed to form a channel like *Lithasia*. The three dark, broad bands are well marked within the aperture. This species is nearer in general outline and color to *bulbosa*, Anthony, than any which have come under my notice, but it does not belong to the deep fissured group and the spire is by no means so high. The aperture is more than half the length of the shell.—Lea.



Species unknown to me.

Gyrotoma conica, Shuttleworth (ubi), Brot, List, p. 27.

Genus ANCULOSA, SAY.

Anculosa, SAY, Jour. Acad. Nat. Sci., ii, p. 178, Nov., 1821. CONRAD, Am. Jour. Sci., xxv, p. 342, 1834. MULLER, Syn. Test. Viv., p. 39, 1836. SWAINSON, Manual Malacol., 1840. HALDEMAN, Suppl. to Monog. Limniades, Oct., 1840. SOWERBY, Conch. Manual, 2d edit., p. 66, 1842. WHEATLEY, Cat. Shells U. S., p. 27, 1845. LEA, Philos. Trans., ix, p. 14, 1846. ANTHONY, Proc. Acad. Nat. Sci., p. 67, Feb., 1860.

Anculosa, Conrad, HERMANNSON, Indices Gener. Malac., i, p. 51, 1846. *Anculotus*, SAY, Jour. Acad. Nat. Sci., v, pt. 1, p. 128, Aug., 1825. CONRAD, New Fresh Water Shells, p. 62, 1834. COUTHCOY, Bost. Jour., ii, p. 184, Feb., 1839. ANTHONY, Bost. Jour., iii, p. 278, Jan., 1840. DEKAY, Moll. N. Y., p. 101, 1843. CHENU, Bibl. Conch., i, iii. CONRAD, p. 26, 1845. GRAY, Genera, Zool. Proc., xv, p. 153, 1847. WOODWARD, Manual, i, p. 131, 1851. JAY, Cat., 4th edit., p. 276, 1852. REEVE, Conch. Iconica, Sep., 1860.

Ancylotus, Say, HERMANNSON, Indices Gen. Mal., i, p. 51, 1846.