

STERKIANA

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PLEISTOCENE LAND SNAILS OF SOUTHERN MISSISSIPPI
AND ADJACENT LOUISIANA

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In a previous paper (Sterkiana 3: 11-14, 1961) the author reported on the land snails of the loess of Mississippi from the northern border south to near Port Gibson, Claiborne County. In the present paper the species found from the vicinity of Vicksburg, Warren County south into West Feliciana Parish, Louisiana are listed. More time was available for collecting at the localities reported in the present paper and the lists are more complete.

There are some pitfalls in attempting to determine climatic and ecological conditions from snail faunas. Snails may live in different habitats in different parts of their ranges. Thus *Hendersonia occulta* (Say) and *Pomatopsis lapidaria* (Say) are found on floodplains in the North, but in the southern Appalachians they are usually found on talus slopes or on the slopes of ravines, and sometimes are found high up on mountain sides well away from any water. *Stenotrema barbatum* (Clapp) is found on floodplains over most of its range, but is an upland snail in parts of West Virginia. Near St. Louis, Missouri, *Stenotrema leialiciae* (Pilsbry) is found only in wet meadows in the vicinity of springs, but in Mississippi it is common on dry roadsides. Snails are adaptable. In a somewhat overgrazed mountainside

pasture in West Virginia I once found ten species of typically woodland snails in abundance crawling about after a rain. Although the trees had been removed many years ago the snails had adapted themselves to the new environment and had survived there with only short grass for cover.

Stenotrema barbatum (Clapp) is the species usually called *Stenotrema hirsutum* (Say) in loess faunal lists. It is doubtful if *S. hirsutum* occurs anywhere as a loess fossil as its range is south and east of the main loess areas. It ranges from Connecticut west to southern Indiana, south of the southern limit of Pleistocene glaciation, southward to western North Carolina and northeastern Mississippi. *Stenotrema barbatum* ranges from Massachusetts west to southern Minnesota and eastern Kansas, south to South Carolina, southern Alabama, and Missouri.

Since the loess hills of Mississippi are forested at the present time, in the absence of any factor that would prevent the growth of trees, they probably were covered with a forest at the time the loess was formed, except where it was destroyed by fire or storm. The snails found in the loess are such a mixture of northern

and southern species that it is difficult to determine the climate during the time it was deposited. It was probably moderate with cool summers which would prevent the dying off of the northern species, yet the winters were not severe enough to kill the southern species. It was probably wetter than at present - at least there were no prolonged dry spells in the Summer.

A number of species found in the loess of southern Mississippi were not found in northern Mississippi, notably *Mesodon zaletus* (Binney), *Mesodon elevatus* (Say), *Triodopsis vulgaris* Pilsbry, and *Mesomphix capnodes* (W. G. Binney). Although some of these species are found living today in the upper Mississippi Valley, it does not seem possible that they could have reached southern Mississippi by moving down along the Mississippi River without leaving some evidence of their passing. All of these species are native of northern Alabama. During the Pleistocene many species of land snails of the southern Appalachians moved southward onto the Coastal Plain and then spread westward at least as far as the Mississippi River. The presence of *Paravitrea significans* (Bland) in the loess of southern Mississippi would indicate that a similar migration of the Ozarkian Fauna occurred at the same time. Apparently there was some exchange of faunas between the Appalachians and Ozarks at this time. *Triodopsis obstricta* (Say), *Glyphyalina solida* (H. B. Baker), *Mesomphix capnodes* (W. G. Binney), *Mesomphix cupreus ozarkensis* (Pilsbry & Ferriss), and *Paravitrea multidentata* (Binney) reaching the Ozarks, and *Triodopsis aleni* (Wetherby) migrated into the southern Appalachians. *Mesodon zaletus* (Binney), *Triodopsis obstricta* (Say), *Glyphyalina praecox* (H. B. Baker), *Mesomphix capnodes* (W. G. Binney), and *Paravitrea significans* (Bland) have survived in the Tunica Hills of southwestern Mississippi, and Louisiana as relicts of this migration, although they have not been found anywhere else in Mississippi.

Some of the species reported in the previous paper were known only from immature or fragmentary material. The finding of good series of mature specimens together with a better understanding of the origin of the fauna has made it necessary to revise some of the names used in the previous paper. *Mesomphix friabilis* (W. G. Binney) is *Mesomphix capnodes* (W. G. Binney) except in Tate Co. *Zonitoides limatulus* (Binney) is *Zonitoides lateumbilicatus* (Pilsbry). *Hawitfa minuscula* (Binney) is *Helicodiscus jacksoni* Hubricht. And *Helicodiscus singleyanus inermis* H. B. Baker is *Helicodiscus intermedius* Morrison. The undescribed species of *Helicodiscus* is *Helicodiscus notius* Hubricht.

MISSISSIPPI

1. HINDS County, loess, 1 mile northeast of Edwards.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Stenotrema fraternum (Say)
Mesodon thyroidus (Say)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis vulgaris Pilsbry
Triodopsis fosteri (F. C. Baker)
Allogona profunda (Say)
Haplotrema concauum (Say)
Mesomphix friabilis (W. G. Binney)
Anguispira alternata (Say)
Helicodiscus notius Hubricht
Helicina orbiculata (Say)

2. HINDS County; loess, 1.7 miles northwest Edwards.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Stenotrema fraternum (Say)

Discus patulus (Deshayes)
Helicina orbiculata (Say)

9. CLAIBORNE County: loess, 7.6 miles east of Port Gibson.

Stenotrema leai aliciae (Pilsbry)
Mesodon thyroidus (Say)
Mesodon clausus (Say)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis fosteri (F. C. Baker)
Allogona profunda (Say)
Haplotrema concavum (Say)
Mesomphix globosus (MacMillan)
Ventridens intertextus (Binney)
Anguispira alternata (Say)
Anguispira strongylodes (Pfeiffer)
Helicina orbiculata (Say)

10. CLAIBORNE County: loess, 4 miles east of Port Gibson. Additional species.

Mesodon clausus (Say)
Triodopsis vulgatus Pilsbry
Allogona profunda (Say)
Haplotrema concavum (Say)
Glyphyalinia circumstriata (Taylor)?
Ventridens intertextus (Binney)
Discus patulus (Deshayes)
Gastrocopta armifera (Say)

11. CLAIBORNE County: loess, 2 miles south of Port Gibson.

Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Stenotrema fraternum (Say)
Mesodon thyroidus (Say)
Mesodon clausus (Say)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis fosteri (F. C. Baker)
Triodopsis albolabris (Say)
Allogona profunda (Say)
Haplotrema concavum (Say)
Mesomphix capnodes (W. G. Binney)
Ventridens intertextus (Binney)
Anguispira alternata (Say)

Anguispira strongylodes (Pfeiffer)
Discus patulus (Deshayes)
Helicodiscus notius Hubricht
Succinea ovalis Say
Cionella morseana Doherty
Helicina orbiculata (Say)
Pomatiopsis lapidaria (Say)

12. JEFFERSON County: loess, 5 miles northwest of Lorman.

Stenotrema stenotrema (Pfeiffer)
Stenotrema fraternum (Say)
Mesodon elevatus (Say)
Mesodon zaletus (Binney)
Triodopsis vulgatus Pilsbry
Triodopsis albolabris (Say)
Haplotrema concavum (Say)
Mesomphix capnodes (W. G. Binney)
Anguispira alternata (Say)

13. JEFFERSON County: loess, 2 miles northwest of Lorman.

Stenotrema fraternum (Say)
Mesodon elevatus (Say)
Triodopsis vulgatus Pilsbry
Anguispira alternata (Say)
Hendersonia occulta (Say)
Helicina orbiculata (Say)
Pomatiopsis lapidaria (Say)

14. JEFFERSON County: loess, 7.3 miles northwest of Fayette.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon thyroidus (Say)
Mesodon clausus (Say)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis fosteri (F. C. Baker)
Triodopsis albolabris (Say)
Allogona profunda (Say)
Haplotrema concavum (Say)
Ventridens demissus (Binney)
Ventridens intertextus (Binney)
Zonitoides arboreus (Say)

Anguispira alternata (Say)
Anguispira strongylodes (Pfeiffer)
Discus patulus (Deshayes)
Helicodiscus jacksoni Hubricht
Succinea ovalis Say
Cionella morseana Doherty
Hendersonia occulta (Say)
Helicina orbiculata (Say)
Pomatiopsis lapidaria (Say)

15. JEFFERSON County: loess, 3.2 miles southwest of Fayette.

Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon thyroidus (Say)
Mesodon elevatus (Say)
Mesodon clausus (Say)
Mesodon inflectus (Say)
Triodopsis fosteri (F. C. Baker)
Triodopsis albolabris (Say)
Allogona profunda (Say)
Haplotrema concavum (Say)
Mesomphix capnodes (W. G. Binney)
Ventridens intertextus (Binney)
Anguispira strongylodes (Pfeiffer)
Cionella morseana Doherty
Helicina orbiculata (Say)

16. ADAMS County: loess, Selma.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon elevatus (Say)
Haplotrema concavum (Say)
Anguispira alternata (Say)
Helicina orbiculata (Say)

17. ADAMS County: loess, 1 mile north-east of Washington.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis fosteri (F. C. Baker)
Allogona profunda (Say)
Haplotrema concavum (Say)

Mesomphix capnodes (W. G. Binney)
Ventridens demissus (Binney)
Discus patulus (Deshayes)
Helicodiscus parallelus (Say)
Succinea ovalis Say
Helicina orbiculata (Say)
Pomatiopsis lapidaria (Say)

18. ADAMS County: loess, 2 miles west of Fenwick.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon clausus (Say)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis obstricta (Say)
Allogona profunda (Say)
Haplotrema concavum (Say)
Glyphyalinia indentata (Say)
Mesomphix capnodes (W. G. Binney)
Paravitrea significans (Bland)
Ventridens demissus (Binney)
Ventridens intertextus (Binney)
Zonitoides arboreus (Say)
Anguispira alternata (Say)
Anguispira strongylodes (Pfeiffer)
Discus patulus (Deshayes)
Succinea ovalis Say
Helicina orbiculata (Say)
Pomatiopsis lapidaria (Say)

19. ADAMS County: silt along small creek, 1.6 miles west of Fenwick. In addition to the land snails this deposit contained several species of aquatic mollusks, fossil wood and other plant remains, and large numbers of spruce needles.

Stenotrema barbatum (Clapp)
Mesodon inflectus (Say)
Triodopsis fosteri (F. C. Baker)
Haplotrema concavum (Say)
Euconulus fulvus (Müller)
Guppya sterkii (Dall)
Glyphyalinia sp. (related to *G. circumstriata* (Taylor) but more depressed and with

smaller umbilicus. Probably an undescribed species).

Paravitrea multidentata (Binney)
 Paravitrea significans (Bland)
 Hawaiiia minuscula (Binney)
 Zonitoides arboreus (Say)
 Zonitoides lateumbilicatus (Pilsbry)
 Striatura exigua (Stimpson)
 Deroceras laeve (Müller)
 Helicodiscus parallelus (Say)
 Helicodiscus intermedius Morrison
 Helicodiscus jacksoni Hubricht
 Punctum minutissimum (Lea)
 Catinella gelida (F. C. Baker)
 Gastrocopta armifera (Say)
 Gastrocopta contracta (Say)
 Gastrocopta pentodon (Say)
 Gastrocopta tappaniana (C. B. Adams)
 Vertigo milium (Gould)
 Vertigo, n. sp. (same as at locality 20)
 Vertigo ovata Say
 Carychium exiguum (Say)
 Carychium exile H. C. Lea
 Hendersonia occulta (Say)
 Pomatiopsis lapidaria (Say)

20. ADAMS County: loess, south side of road, 1.7 miles west of the junction of U. S. 61 and U. S. 84, Washington.

Stenotrema barbatum (Clapp)
 Stenotrema stenotrema (Pfeiffer)
 Stenotrema leai aliciae (Pilsbry)
 Mesodon thyroidus (Say)
 Mesodon clausus (Say)
 Mesodon zaletus (Binney)
 Mesodon elevatus (Say)
 Mesodon inflectus (Say)
 Triodopsis obstricta (Say)
 Triodopsis fosteri (F. C. Baker)
 Triodopsis albolabris (Say)
 Allogona profunda (Say)
 Haplotrema concavum (Say)
 Euconulus fulvus (Müller)
 Guppya sterkii (Dall)
 Glyphyalinia lewisiana (Clapp)
 Glyphyalinia indentata (Say)
 Glyphyalinia indentata paucilirata (Morelet)

Paravitrea multidentata (Binney)
 Paravitrea significans (Bland)
 Ventridens demissus (Binney)
 Ventridens intertextus (Binney)
 Zonitoides arboreus (Say)
 Zonitoides lateumbilicatus (Pilsbry)
 Anguispira alternata (Say)
 Anguispira strongyloides (Pfeiffer)
 Discus patulus (Deshayes)
 Helicodiscus notius Hubricht
 Helicodiscus parallelus (Say)
 Helicodiscus intermedius Morrison
 Helicodiscus jacksoni Hubricht
 Punctum minutissimum (Lea)
 Succinea ovalis Say
 Succinea, n. sp.
 Catinella gelida (F. C. Baker)
 Gastrocopta contracta (Say)
 Gastrocopta pentodon (Say)
 Gastrocopta corticaria (Say)
 Vertigo, n. sp. (With teeth similar to V. alabamensis conecuhensis Clapp, but smaller and more slender than V. milium (Gould)).
 Vertigo tridentata Wolf
 Vertigo gouldi (Binney)
 Columella edentula (Draparnaud)
 Columella alticola (Ingersoll)
 Vallonia perspectiva Sterki
 Cionella morseana Doherty
 Carychium exile H. C. Lea
 Hendersonia occulta (Say)
 Helicina orbiculata (Say)
 Pomatiopsis lapidaria (Say)
 Snail eggs (Anguispira)
 Snail eggs (Discus)
 Snail eggs (Zonitoides?)

21. ADAMS County: loess, 1 mile southeast of Anna.

Stenotrema barbatum (Clapp)
 Stenotrema stenotrema (Pfeiffer)
 Stenotrema leai aliciae (Pilsbry)
 Mesodon clausus (Say)
 Mesodon zaletus (Binney)
 Mesodon elevatus (Say)
 Mesodon inflectus (Say)

Triodopsis obstricta (Say)
Triodopsis fosteri (F. C. Baker)
Triodopsis albolabris (Say)
Allogona profunda (Say)
Haplotrema concavum (Say)
Euconulus fulvus (Müller)
Glyphyalinia lewisiana (Clapp)
Glyphyalinia indentata (Say)
Glyphyalinia solida (H. B. Baker)
Paravitrea significans (Bland)
Ventridens demissus (Binney)
Zonitoides arboreus (Say)
Anguispira alternata (Say)
Anguispira strongylodes (Pfeiffer)
Discus patulus (Deshayesi)
Helicodiscus notius Hubricht
Helicodiscus jacksoni Hubricht
Succinea ovalis Say
Cionella morseana Doherty
Hendersonia occulta (Say)

22. ADAMS County: silt, ditch, 2.5 miles northeast of Anna. This deposit is on the Mississippi River floodplain, and is from 8 to 10 feet below the surface. It is probably the youngest deposit reported in this paper. Many of the shells appear to have been washed out of loess deposits on the nearby hills and were redeposited.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon thyroidus (Say)
Mesodon clausus (Say)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis fosteri (F. C. Baker)
Triodopsis albolabris (Say)
Allogona profunda (Say)
Euglandina rosea (Férussac)
Haplotrema concavum (Say)
Glyphyalinia indentata (Say)
Mesomphix globosus (MacMillan)
Ventridens demissus (Binney)
Ventridens ligerus (Say)
Ventridens intertextus (Binney)
Anguispira alternata (Say)

Anguispira strongylodes (Pfeiffer)
Discus patulus (Deshayesi)
Succinea ovalis Say
Hendersonia occulta (Say)
Helicina orbiculata (Say)

23. ADAMS County: loess, first cut east of the Mississippi River bridge, on the south side of U. S. 84, Natchez.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis obstricta (Say)
Triodopsis albolabris (Say)
Allogona profunda (Say)
Haplotrema concavum (Say)
Glyphyalinia lewisiana (Clapp)
Glyphyalinia indentata (Say)
Glyphyalinia solida (H. B. Baker)
Mesomphix capnodes (W. G. Binney)
Paravitrea significans (Bland)
Ventridens demissus (Binney)
Ventridens ligerus (Say)
Ventridens intertextus (Binney)
Zonitoides arboreus (Say)
Anguispira alternata (Say)
Anguispira strongylodes (Pfeiffer)
Discus patulus (Deshayesi)
Helicodiscus notius Hubricht
Succinea ovalis Say
Cionella morseana Doherty
Helicina orbiculata (Say)

24. ADAMS County: loess, 3 miles southwest of Natchez.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon thyroidus (Say)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis obstricta (Say)
Triodopsis denotata (Férussac)

Triodopsis obstricta X *denotata*
Triodopsis albolabris (Say)
Triodopsis alleni (Wetherby)
Allogona profunda (Say)
Haplotrema concavum (Say)
Glyphyalinia lewisiana (Clapp)
Glyphyalinia indentata (Say)
Mesomphix capnodes (W. G. Binney)
Paravitrea multidentata (Binney)
Paravitrea significans (Bland)
Ventridens ligerus (Say)
Ventridens intertextus (Binney)
Anguispira alternata (Say)
Anguispira strongylodes (Pfeiffer)
Discus patulus (Deshayes)
Helicodiscus notius Hubricht
Succinea ovalis Say
Cionella morseana Doherty
Helicina orbiculata (Say)

25. ADAMS County: loess, Cloverdale.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis fosteri (F. C. Baker)
Allogona profunda (Say)
Haplotrema concavum (Say)
Anguispira strongylodes (Pfeiffer)
Discus patulus (Deshayes)

26. WILKINSON County: loess, 5.7 miles west of Lessley.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon thyroidus (Say)
Mesodon clausus (Say)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis obstricta (Say)
Triodopsis denotata (Férussac)
Allogona profunda (Say)
Haplotrema concavum (Say)

Glyphyalinia indentata (Say)
Mesomphix capnodes (W. G. Binney)
Paravitrea multidentata (Binney)
Paravitrea significans (Bland)
Ventridens demissus (Binney)
Ventridens ligerus (Say)
Ventridens intertextus (Binney)
Zonitoides arboreus (Say)
Anguispira alternata (Say)
Anguispira strongylodes (Pfeiffer)
Discus patulus (Deshayes)
Helicodiscus notius Hubricht
Helicodiscus intermedius Morrison
Helicodiscus jacksoni Hubricht
Punctum minutissimum (Lea)
Succinea ovalis Say
Gastrocopta corticaria (Say)
Vertigo gouldi (Binney)
Helicina orbiculata (Say)
 Snail eggs (*Anguispira*)

27. WILKINSON County: loess, 2.3 miles southeast of Lessley.

Stenotrema stenotrema (Pfeiffer)
Mesodon thyroidus (Say)
Mesodon elevatus (Say)
Allogona profunda (Say)
Mesomphix globosus (MacMillan)
Mesomphix capnodes (W. G. Binney)
Anguispira strongylodes (Pfeiffer)

28. WILKINSON County: loess, 1.5 miles east of Fort Adams.

Stenotrema barbatum (Clapp)
Stenotrema stenotrema (Pfeiffer)
Stenotrema leai aliciae (Pilsbry)
Mesodon thyroidus (Say)
Mesodon clausus (Say)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis obstricta (Say)
Triodopsis albolabris (Say)
Allogona profunda (Say)
Haplotrema concavum (Say)
Mesomphix capnodes (W. G. Binney)
Paravitrea significans (Bland)

Ventridens demissus (Binney)
 Ventridens intertextus (Binney)
 Zonitoides arboreus (Say)
 Anguispira strongylodes (Pfeiffer)
 Discus patulus (Deshayes)
 Succinea ovalis Say
 Helicina orbiculata (Say)

29. WILKINSON County: loess, 0.5 mile northwest of Pond.

Stenotrema barbatum (Clapp)
 Stenotrema stenotrema (Pfeiffer)
 Stenotrema leai aliciae (Pilsbry)
 Mesodon zaletus (Binney)
 Mesodon inflectus (Say)
 Triodopsis obstricta (Say)
 Triodopsis albolabris (Say)
 Allogona profunda (Say)
 Haplotrema concavum (Say)
 Mesomphix capnodes (W. G. Binney)
 Ventridens demissus (Binney)
 Anguispira strongylodes (Pfeiffer)
 Discus patulus (Deshayes)
 Helicina orbiculata (Say)

LOUISIANA

WEST FELICIANA Parish: silt, Little Bayou Sara, Retreat. In addition to the land snails this deposit contained several species of aquatic mollusks, fossil wood and other plant remains. The spruce needles found at locality 19 were not found at this locality. The readily identifiable tree remains were of deciduous species: black walnut, beech, hickory, oak, sycamore, and maple.

Stenotrema barbatum (Clapp)
 Stenotrema leai aliciae (Pilsbry)
 Mesodon thyroidus (Say)
 Mesodon elevatus (Say)
 Mesodon inflectus (Say)
 Triodopsis albolabris (Say)
 Haplotrema concavum (Say)
 Guppya sterkii (Dall)
 Glyphyalinia, sp. (same as at locality 19)
 Glyphyalinia indentata (Say)

Paravitrea multidentata (Binney)
 Paravitrea significans (Bland)
 Hawaiiia minuscula (Binney)
 Ventridens intertextus (Binney)
 Zonitoides arboreus (Say)
 Striatura exigua (Stimpson)
 Striatura milium (Morse)
 Deroceras laeve (Müller)
 Anguispira strongylodes (Pfeiffer)
 Helicodiscus parallelus (Say)
 Helicodiscus intermedius Morrison
 Helicodiscus jacksoni Hubricht
 Punctum minutissimum (Lea)
 Succinea, sp. (immature)
 Strobilops aenea Pilsbry
 Gastrocopta contracta (Say)
 Gastrocopta pentodon (Say)
 Gastrocopta tappaniana (C. B. Adams)
 Vertigo milium (Gould)
 Vertigo, n. sp. (same as at locality 20)
 Vertigo ovata Say
 Vertigo tridentata Wolf
 Vertigo gouldi (Binney)
 Carychium exiguum (Say)
 Carychium exile H. C. Lea
 Pomatiopsis lapidaria (Say)

31. WEST FELICIANA Parish: loess, Tunica.

Stenotrema barbatum (Clapp)
 Stenotrema stenotrema (Pfeiffer)
 Stenotrema leai aliciae (Pilsbry)
 Mesodon thyroidus (Say)
 Mesodon zaletus (Binney)
 Mesodon elevatus (Say)
 Mesodon inflectus (Say)
 Triodopsis obstricta (Say)
 Triodopsis albolabris (Say)
 Allogona profunda (Say)
 Haplotrema concavum (Say)
 Glyphyalinia indentata (Say)
 Paravitrea significans (Bland)
 Mesomphix capnodes (W. G. Binney)
 Ventridens demissus (Binney)
 Ventridens intertextus (Binney)
 Anguispira strongylodes (Pfeiffer)
 Discus patulus (Deshayes)
 Helicina orbiculata (Say)

32. WEST FELICIANA Parish; loess, Brandon.

Stenotrema stenotrema (Pfeiffer)
Mesodon thyroidus (Say)
Mesodon zaletus (Binney)
Mesodon elevatus (Say)
Mesodon inflectus (Say)
Triodopsis obstricta (Say)
Triodopsis albolabris (Say)
Allogona profunda (Say)
Haplotrema concavum (Say)

Glyphyalinia lewisiana (Clapp)
Mesomphix globosus (MacMillan)
Mesomphix capnodes (W. G. Binney)
Ventridens ligerus (Say)
Ventridens intertextus (Binney)
Anguispira strongylodes (Pfeiffer)
Discus patulus (Deshayes)
Helicodiscus parallelus (Say)
Helicina orbiculata (Say)

REVIEW

NEW NAMES INTRODUCED BY H. A. PILSBRY IN THE MOLLUSCA AND CRUSTACEA, by William J. Clench and Ruth D. Turner. Academy of Natural Sciences of Philadelphia, Special Publication No. 4, 218 pp., 1962, paper cover. \$5.00 postpaid within the United States, \$5.50 postpaid for all other orders.

In this work the authors have done a fine job of compiling the vast number of new names that Henry A. Pilsbry applied to the Mollusca and Crustacea during his 75 years of dedicated work. The names range from those above the family level to subspecies, varieties, and forms. They are listed in alphabetical order and to each is added a reference to the publication in which it first appeared, as well as the locality where the specimen was found.

A bibliography of 1151 articles that H. A. Pilsbry wrote from 1882 to 1958 appears from

pages 165 to 218 inclusive. All the papers referred to in the catalogue may be found in this section.

This book is a valuable source of information for students of both malacology and paleontology. The authors state (p. 1), that "although the 'Zoological Record' has listed most of Pilsbry's names, searching through it is a slow process because 5,680 names were introduced by Pilsbry over a period of 75 years." A catalogue such as this as well as Pilsbry's bibliography dealing with works of original biological and taxonomic research will serve as a great time-saver for workers in these fields.

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A CHECKLIST OF NORTH DAKOTA PLEISTOCENE AND
RECENT MOLLUSCA

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NOTE. The following list of North Dakota mollusks is as complete as I can make it at this time. It is presented with the hope that it will stimulate correction and addition on the part of other workers. Only two checklists of North Dakota mollusks have been published, Daniels (1920) and Winslow (1921). Because the Red River forms a major portion of the eastern boundary of the state, reports of occurrence of species of mollusks in this river are included here. Two sources of these are Dall (1905) and Dawley (1947). Neither work makes specific mention of North Dakota, but it is assumed that mollusks do not recognize political boundaries and species listed for the Red River will be found on the North Dakota side as well as the Minnesota side.

It will be noticed that the sphaeriid clams, the slugs, and the operculate snails are poorly represented in this list. No extensive study of the state's molluscan fauna has been made, but these taxa are particularly poorly known.

I wish to acknowledge my great debt to Dr. Aurèle La Rocque of the Ohio State University for corrections, additions, and suggestions made by him during the preparation of this list.

The original citation, the author of the species, the date of original description, the author

of the record, the date of the record, and the page reference are given in each entry. Where I consider the name of the original citation to be obsolete, a note indicating synonymy follows the above information. All species and subspecies are listed as originally published and are consecutively numbered. An asterisk (*) preceding an entry indicates that specimens are in the collections of the University of North Dakota. The letters UND following an entry indicate that specimens are in the collections of the University of North Dakota, but no record of the occurrence of the species in North Dakota has been previously reported.

I. NAIADES

1. ACTINONAIAS CARINATA (Barnes) 1823.
Dawley 1947: 679.

2. ACTINONAIAS ELLIPSIIFORMIS (Conrad)
1836. Dall 1905: 126.

3. *AMBLEMA COSTATA Rafinesque 1820.
Dawley 1947: 679.

4. *ANODONTA GRANDIS Say 1829. Dall
1905: 129, Winslow 1921: 15, Dawley 1947:
679, Tuthill 1961: 20.

5. ?ANODONTA KENNICOTTI Lea 1861. Winslow 1921: 15.
6. ANODONTA PEPINIANA Lea 1838. Winslow 1921: 15.
7. °ANODONTOIDES FERUSSACIANUS (Lea) 1834. Dall 1905: 131, Tuthill 1961: 20.
8. FUSCONAIA FLAVA (Rafinesque) 1818. Dall, 1905: 134, Dawley 1947: 679.
9. LAMPSILIS ALATUS Say 1817. Dall 1905: 126 (see Proptera alata).
10. LAMPSILIS ELLIPSIFORMIS Conrad 1836. Dall 1905: 126 (see Actinonaias ellipsiformis).
11. LAMPSILIS GRACILIS Barnes 1823. Dall 1905: 127 (see Leptodea fragilis).
12. LAMPSILIS LUTEOLA Lamarck 1819. Dall 1905: 125, Winslow 1921: 15 (see Lampsilis radiata siliquoidea).
13. LAMPSILIS RECTUS Lamarck 1819. Dall 1905: 125 (see Ligumia recta).
14. °LAMPSILIS RADIATA SILIQUOIDEA (Barnes) 1823. Dall 1905: 125, Winslow 1921: 15, Dawley 1947: 679.
15. °LAMPSILIS VENTRICOSA (Barnes) 1823. UND.
16. °LASMIGONA COMPLANATA (Barnes) 1823. Dall 1905: 131.
17. LASMIGONA COMPRESSA (Lea) 1829. Winslow 1921: 15.
18. LEPTODEA FRAGILIS Rafinesque 1820. Dall 1905: 127.
19. °LIGUMIA RECTA (Lamarck) 1819. Dall 1905: 126.
20. °LIGUMIA RECTA LATISSIMA (Rafinesque) 1820. Dawley 1947: 679.
21. MEGALONAIAS GIGANTEA (Barnes) 1823. Dall 1905: 133.
22. OBLIQUARIA REFLEXA Rafinesque 1820. Dall 1905: 133.
23. °PROPTERA ALATA (Say) 1817. Dall 1905: 126.
24. PROPTERA ALATA MEGAPTERA Rafinesque 1820. Dawley 1947: 679.
25. QUADRULA LACHRYMOSA Lea 1827. Dall 1905: 134 (see Quadrula quadrula).
26. °QUADRULA QUADRULA Rafinesque 1820. Dall 1905: 134, Dawley 1947: 679.
27. QUADRULA RUBIGINOSA Lea 1829. Dall 1905: 134 (see Fusconaia flava).
28. QUADRULA UNDULATA Barnes 1823. Dall 1905: 133 (see Megalonaias gigantea).
29. STROPHITUS RUGOSUS (Swainson) 1822. Dall 1905: 127, Dawley 1947: 679 (see Strophitus undulatus).
30. STROPHITUS UNDULATUS (Say) 1817. Dall 1905: 127, Dawley 1947: 679.
31. SYMPHYNOTA COMPLANATA Barnes 1823. Dall 1905: 131 (see Lasmigona complanata).

2. SPHAERIIDAE

32. MUSCULIUM JAYENSE (Prime) 1851. Winslow 1921: 16 (see Sphaerium [Musculium] transversum).
33. MUSCULIUM TRANSVERSUM (Say) 1829. Winslow 1921: 16 (see Sphaerium [Musculium] transversum).

34. *PISIDIUM sp. Tuthill 1961: 21, Clayton 1961: 73.

35. PISIDIUM APICULATUM Sterki 1921. Winslow 1921: 16 (see P. subtruncatum).

36. PISIDIUM COMPRESSUM Prime 1851. Winslow 1921: 16.

37. PISIDIUM CONTORTUM Prime 1853. Winslow 1921: 16 (a form of P. nitidum).

38. PISIDIUM NITIDUM Jenyns 1832. Winslow 1921: 16.

39. PISIDIUM OBTUSALE C. Pfeiffer 1821. Winslow 1921: 16.

40. PISIDIUM PAUPERCULUM Sterki 1896. Winslow 1921: 16 (see P. nitidum).

41. PISIDIUM SUBTRUNCATUM Malm 1855. Winslow 1921: 16.

42. PISIDIUM TENUISSIMUM Sterki 1901. Winslow 1921: 16 (see P. nitidum).

43. PISIDIUM VARIABILE Prime 1851. Winslow 1921: 16.

44. PISIDIUM VARIABILE BREVIUS Sterki 1906. Winslow 1921: 16.

45. PISIDIUM VESICULARE Sterki. Winslow 1921: 16 (see P. obtusale).

46. SPHAERIUM sp. Winslow 1921: 16.

47. SPHAERIUM DECLIVE Sterki 1922. Winslow 1921: 15 (see S. striatinum).

48. SPHAERIUM JAYENSE (Prime) 1851. Winslow 1921: 15 (see S. lacustre).

49. *SPHAERIUM SIMILE Say 1817. Dall 1905: 134, Tuthill 1961: 21.

50. SPHAERIUM SOLIDULUM Prime 1851, Dall 1905: 136, (See S. striatinum).

51. SPHAERIUM SULCATUM (Lamarck) 1818. Winslow 1921: 16.

52. SPHAERIUM TRANSVERSUM (Say) 1829. Winslow 1921: 16.

3. FRESHWATER PULMONATES

53. *APLEXA HYPNORUM (Linne) 1758. Winslow 1921: 14.

54. *APLEXA HYPNORUM TRYONI Currier 1867. Winslow 1921: 14.

55. *ARMIGER CRISTA (Linne) 1758. Clayton 1961: 14.

56. *FERRISSIA PARALLELA (Haldeman) 1841. Winslow 1921: 15.

57. *FERRISSIA RIVULARIS (Say) 1819. Winslow 1921: 15.

58. FERRISSIA TARDA (Say) 1830. Winslow 1921: 15.

59. FOSSARIA OBRUSSA (Say) 1825. Tuthill 1961: 20 (see Lymnaea humilis).

60. GYRAULUS sp. Clayton 1961: 15, Tuthill 1961: 20, Thompson 1962: in press.

61. GYRAULUS ALTISSIMUS (Baker) 1919. Winslow 1921: 11.

62. GYRAULUS CIRCUMSTRIATUS (Tryon) 1866. Winslow 1921: 11.

63. GYRAULUS CIRCUMSTRIATUS WALKERI (Vanatta) 1902. Winslow 1921: 12.

64. GYRAULUS DEFLECTUS (Say) 1824. Winslow 1921: 11.

65. °GYRAULUS PARVUS (Say) 1817. Winslow 1921: 12, Clayton 1961: 13, Tuthill 1961: 20.
66. °GYRAULUS PARVUS WALKERI Vanatta 1902. Winslow 1921: 12 (see *Gyraulus circumstriatus walkeri*).
67. °HELISOMA sp. Tuthill 1961: 20.
68. °HELISOMA ANCEPS (Menke) 1830. Clayton 1961: 15, Tuthill 1961: 20.
69. °HELISOMA CAMPANULATUM (Say) 1821. Dall 1905: 90, Clayton 1961: 14.
70. °HELISOMA TRIVOLVIS (Say) 1817. Dall 1905: 88, Winslow 1921: 12, Clayton 1961: 13.
71. LYMNAEA BULIMOIDES Lea 1841. Winslow 1921: 10.
72. LYMNAEA BULIMOIDES COCKERELLI Pilsbry and Ferriss 1906. Winslow 1921: 10 (see *Lymnaea bulimoides*).
73. LYMNAEA CAPERATA Say 1829. Winslow 1921: 10 (see *Lymnaea humilis*).
74. LYMNAEA DALLI Baker 1905. Winslow 1921: 10 (see *Lymnaea humilis*).
75. °LYMNAEA HUMILIS (Say) 1822. Winslow 1921: 10.
76. LYMNAEA OBRUSSA EXIGUA Lea 1865. Winslow 1921: 10 (see *Lymnaea humilis*).
77. °LYMNAEA PALUSTRIS (MÜLLER) 1774. Dall 1905: 76, Winslow 1921: 10.
78. °LYMNAEA STAGNALIS (Linne) 1758. Winslow 1921: 11.
79. LYMNAEA STAGNALIS APPRESSA Say 1821. Winslow 1921: 11 (see *L. stagnalis*).
80. PHYSA AMPULLACEA Gould 1865. Winslow 1921: 14.
81. PHYSA INTEGRALIS (Haldeman) 1841. Winslow 1921: 14.
82. °PHYSA cf. P. LORDI (Baird) 1863. UND.
83. °PHYSA cf. P. ELLIPTICA Lea 1837. UND.
84. °PHYSA cf. P. GYRINA Say 1821. UND.
85. PLANORBIS ALTISSIMUS Baker 1919. Winslow 1921: 11 (see *Gyraulus altissimus*).
86. PLANORBIS ANTROSUS STRIATUS Baker 1902. Winslow 1921: 11 (see *Helisoma anceps*).
87. PLANORBIS (PLANORBELLA) CAMPANULATUS Say 1821. Dall 1905: 90 (see *Helisoma campanulatum*).
88. PLANORBIS CIRCUMSTRIATUS Tryon 1866. Winslow 1921: 11 (see *Gyraulus circumstriatus*).
89. PLANORBIS DEFLECTUS Say 1824. Winslow 1921: 11 (see *Gyraulus deflectus*).
90. PLANORBIS EXACUOUS Say 1821. Winslow 1921: 11 (see *Promenetus exacuus*).
91. PLANORBIS PARVUS Say 1817. Winslow 1921: 12 (see *Gyraulus parvus*).
92. PLANORBIS PARVUS WALKERI Vanatta 1902. Winslow 1921: 12 (see *Gyraulus circumstriatus*).
93. PLANORBIS TRIVOLVIS Say 1817. Dall 1905: 88, Winslow 1921: 12 (see *Helisoma trivolis*).
94. PLANORBIS UMBILICATELLUS Cockerell 1885. Winslow 1921: 12 (see *Promenetus umbilicatus*).

95. *PLANORBULA CAMPESTRIS* (Dawson) 1875, Winslow 1921: 12.

96. *PROMENETUS EXACUOUS* (Say) 1821. Winslow 1921: 11, Clayton 1961: 14.

97. *SEGMENTINA CHRISTYI* Dall 1905. Winslow 1921: 12 (see *Planorbula campestris*).

4. FRESHWATER OPERCULATES

98. *AMNICOLA CINCINNATIENSIS* (Anthony) 1841. Winslow 1921: 15 (see *Amnicola (Cincinnati) integra*).

99. *AMNICOLA EMARGINATA* Kuster 1852. Dall 1905: 118, Winslow 1921: 15.

100. *AMNICOLA (CINCINNATIA) INTEGRATA* (Say) 1821. Winslow 1921: 15.

101. *AMNICOLA LEIGHTONI* Baker 1920. Clayton 1960: 13, Tuthill 1960: 20.

102. *AMNICOLA LIMOSA* (Say) 1817. Winslow 1921: 15.

103. *AMNICOLA LIMOSA PORATA* (Say) 1821. Winslow 1921: 15 (see *Amnicola limosa*).

104. *AMNICOLA LUSTRICA* Pilsbry 1890. UND.

105. *VALVATA BICARINATA* Lea 1841, Tuthill 1960: 20.

106. *VALVATA TRICARINATA* (Say) 1817. Winslow 1921: 15, Clayton 1961: 13, Tuthill 1961: 20.

5. LAND GASTROPODS

107. *AGRIOLIMAX CAMPESTRIS* (Say) (Binney) 1842. Winslow 1921: 8 (see *Deroceras laeve*).

108. *ARION ATER* (Linne) 1758. Post 1959: 104.

109. *BIFIDARIA HOLZINGERI* Sterki 1889. Dall 1905: 28 (see *Gastrocopta holzingeri*).

110. *CARYCHIUM* sp. UND.

111. *CARYCHIUM EXIGUUM* (Say) 1822. Winslow 1921: 10.

112. *CARYCHIUM EXILE* Lea 1842. Dall 1905: 116.

113. *CARYCHIUM EXILE CANADENSE* Clapp 1906. Winslow 1921: 10.

113a. *CATINELLA GROSVENORI* (Lea) 1864. Winslow 1921: 8, Pilsbry 1948: 820.

113b. *CATINELLA GROSVENORI GELIDA* (Baker) 1927. Thompson: in press.

114. *CIONELLA LUBRICA* (Müller) 1774. Dall 1905: 33, Daniels 1920: 29, Winslow 1921: 9.

115. *COCHLICOPA LUBRICA* (Müller) 1774. Dall 1905: 33, Daniels 1920: 29, Winslow 1921: 9 (see *Cionella lubrica*).

116. *DEROCERAS* sp. Thompson 1962: in press.

117. *DEROCERAS LAEVE* (Müller) 1774. Winslow 1921: 8.

118. *DISCUS CRONKHITI* (Newcomb) 1865. Daniels 1920: 29, Winslow 1921: 8.

119. *EUCONULUS FULVUS* (Müller) 1774. Winslow 1927: 7, Thompson 1962: in press.

120. *GASTROCOPTA ARMIFERA* (Say) 1821. Daniels 1920: 29.

121. *GASTROCOPTA ARMIFERA SIMILIS* Sterki 1909. Winslow 1921: 9.

122. *GASTROCOPTA CONTRACTA (Say) 1822. Winslow 1921: 9.
123. *GASTROCOPTA HOLZINGERI (Sterki) 1889. Dall 1905: 28, Daniels 1920: 29, Winslow 1921: 28.
- 123a. GASTROCOPTA HOLZINGERI AGNA (Pilsbry and Vanatta) 1916. Daniels 1920: 29.
124. HAWAIIA MINUSCULA (Binney) 1840. Winslow 1921: 8.
125. *HELICODISCUS PARALLELUS (Say) 1821. UND.
126. NESOVITREA BINNEYANA (Morse) 1864. Winslow 1921: 7.
127. NESOVITREA ELECTRINA (Gould) 1841. Daniels 1920: 29, Winslow 1921: 7, Pilsbry 1946: 257.
128. OXYLOMA HAYDENI (W. G. Binney) 1858. Winslow 1921: 8.
129. OXYLOMA HAYDENI MINOR (W. G. Binney) 1858. Winslow 1921: 9.
130. *OXYLOMA RETUSA (Lea) 1834. Winslow in Pilsbry 1948: 786.
131. *PUPILLA BLANDI Morse 1865. Morse 1865: 211.
132. *PUPILLA MUSCORUM (Linne) 1758. Winslow 1921: 9.
133. PYRAMIDULA CRONKHITEL ANTHONYI Pilsbry 1906. Daniels 1920: 29, Winslow 1921: 8 (see Discus cronkhitei).
134. QUICKELLA VERMETA (Say) 1829. Daniels 1920: 29, Winslow 1921: 8.
135. STRIATURA MILIUM (Morse) 1859. Winslow 1921: 8.
136. *STROBILOPS LABYRINTHICA (Say) 1817. UND.
137. *SUCCINEA AVARA (Say) 1824. Winslow 1921: 8, Clayton 1960: 15.
138. SUCCINEA AVARA VERMETA (Say) 1829. Daniels 1920: 29, Winslow 1921: 8 (see Quickella vermeta).
139. SUCCINEA GROSVENORI Lea 1864. Winslow 1921: 8, Pilsbry 1948: 820 (see Catinella grosvenori).
140. SUCCINEA GROSVENORI GELIDA Baker 1927. Thompson 1962: in press (see Catinella grosvenori gelida).
141. SUCCINEA HAYDENI (W. G. Binney) 1858. Winslow 1921: 8 (see Oxyloma haydeni).
142. SUCCINEA HAYDENI MINOR W. G. Binney 1858. Winslow 1921: 9 (see Oxyloma haydeni minor).
143. *SUCCINEA OVALIS Say 1817. Pilsbry 1948: 803.
144. SUCCINEA RETUSA Lea 1834. Daniels 1920: 29 (see Oxyloma retusa).
145. VALLONIA COSTATA (Müller) 1774. Daniels 1920: 29.
146. VALLONIA CYCLOPHORELLA Sterki 1892. H. B. Baker in Pilsbry 1948: 1035.
147. *VALLONIA GRACILICOSTA Reinhardt 1883. Winslow 1921: 10, Pilsbry 1948: 1029.
148. VALLONIA PERSPECTIVA Sterki 1893. Daniels 1920: 29, Winslow 1921: 10, H. B. Baker in Pilsbry 1948: 1034.
149. *VALLONIA PULCHELLA (Müller) 1774. UND.

150. *VERTIGO* sp. Winslow 1921: 9.
151. *VERTIGO COLORADENSIS* (Cockerell) 1891. Winslow 1921: 9 (see *Vertigo gouldi coloradensis*).
152. *VERTIGO ELATIOR* Sterki 1931. Winslow 1921: 9.
153. *VERTIGO GOULDI* (Binney) 1843. Winslow 1921: 9.
154. *VERTIGO GOULDI COLORADENSIS* (Cockerell) 1891. Winslow 1921: 9.
155. *VERTIGO MODESTA* (Say) 1824. UND.
156. *VERTIGO OVATA* Say 1822. Winslow 1921: 9.
157. °*VERTIGO* cf. *V. VENTRICOSA* (Morse) 1865. Thompson 1962; in press.
158. *VERTIGO VENTRICOSA ELATIOR* Sterki 1894. Winslow 1921: 9 (see *V. elatior*).
159. *VITREA HAMMONIS* (Ström) 1767. Daniels 1920: 29, Winslow 1921: 7 (see *Nesovitrea electrina*).
160. *VITREA BINNEYANA* (Morse) 1864. Winslow 1921: 7 (see *Nesovitrea binneyana*).
161. *VITRINA ALASKANA* Dall 1905. Winslow 1921: 7.
162. °*VITRINA LIMPIDA* Gould 1850. UND.
163. °*ZONITOIDES ARBOREA* (Say) 1816. Winslow 1921: 8 (**Z. arboreus*).
164. *ZONITOIDES MILIUM* (Morse) 1859. Winslow 1921: 8 (see *Striatura milium*).
165. *ZONITOIDES MINUSCULUS* (Binney) 1840. Winslow 1921: 8 (see *Hawaiiia minuscula*).

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REPRINTS OF RARE ARTICLES ON MOLLUSCA. --- FRANCIS ROBERT LATCHFORD'S "NOTES ON THE OTTAWA UNIONIDAE." -- Transactions of the Ottawa Field-Naturalists' Club, No. 3, pp. 48-57, Ottawa, 1882. Reprinted with permission of the Council of the Ottawa Field-Naturalists' Club.

FIFTH SOIRÉE

Friday, March 10, 1882. -- Notes on the Ottawa Unionidae. F. R. Latchford.

The family of lamellibranch mollusks known as the Unionidae is represented in every part of the world, but with a very irregular distribution. While only ten species are found in Europe, fewer still in Africa and about eighty in Asia and the Islands of the Pacific, over five hundred have been described from North America. More than a hundred of these occur in the drainage of the Ohio alone; and in Georgia, the Carolinas, Alabama, and the Southern and South-Western States in general, almost every stream has its peculiar forms. Towards the north and east the species become fewer and fewer, until only eleven are found in Massachusetts. In Canada a much greater number has been met with by Messrs. D'Urban, Bell, Billings and Whiteaves, including several species introduced from the Western States through the great lakes and other avenues of water communication. In a paper read before the Field-Naturalists' Club in 1880, Mr. Heron noted twelve species from the vicinity of Ottawa, but at least twice as many are to be met with here, within a radius of forty miles. The very low state of the water in 1881 afforded me for collecting specimens of the Unionidae

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facilities of which I had ample leisure to avail myself during the midsummer vacations. I have in my spare time since then studied carefully these humble creatures; and, not content with my own determinations, have taken much pains to have the species collected identified by the best authorities. All have been checked or named by such eminent conchologists as Mr. Arthur F. Gray, of Danversport, Mass., Mr. Geo. W. Tryon, of the Academy of Sciences, Philadelphia, and Prof. J. F. Whiteaves, F. G. S., of the Geological Survey of Canada. I am therefore morally certain that, except perhaps in one or two instances, the shells which I found have been correctly determined.

The species met with belong to the genera *Unio*, *Margaritana*, and *Anodonta*. These are distinguished from one another more by the conformation of their shells than by any peculiarities of the animals themselves. Hence it is of the shells alone that most works on the Unionidae treat; and from this course it is not my intention to depart at present. The shell itself will always enable the student to distinguish one species from another. But the soft parts are by no means undeserving of attention. In species of the same group they are very much alike. In species of different groups, for instance in *U.*

rectus and *U. occidentis*, they are so dissimilar that the least practised eye can perceive differences in their form and arrangement. In all cases they present the same admirable ordination of structure to purpose that we see elsewhere throughout the works of nature's God. Even the distribution of the Unionidae is provided for, by their young being for a time endowed with hooks by which they can attach themselves to contiguous objects, often a fish or a water-bird, and be transported far from their place of birth. In the winter and spring the young, having already well formed shells, are extruded from the branchial uterus of the females in hundreds of thousands and even millions. According to a computation made by Dr. Isaac Lea, of Philadelphia, who has during fifty years studied the Unionidae, and described almost half the species known, a large specimen of *U. Multiplicatus*, Lea, contained upward of three millions of embryonic young. Nearly all perish early in their free life, being devoured by fishes, crustaceans and the larvae of many kinds of insects. Few, accordingly, attain maturity, which is reached in from six to ten years. Their food consists of animalculae, which the water flowing in through the branchial orifice conveys to the mouth, at the same time that it supplies oxygen to the lamelliform gills.

Of the species found in the vicinity of Ottawa the first to be noticed belong to the genus *Unio*. Shells of this genus are readily distinguishable from those of the genera *Margaritana* and *Anodonta*, by their having both cardinal and lateral teeth. The genus, according to Jeffrys, was established by Phillipson in 1788, but it is generally attributed to Retz, who was chairman of the meeting at which Phillipson read his essay *sistens Nova Testaceorum Genera*.

Unio complanatus, Solander, is abundant in almost all our streams and lakes, and is subject to much variation in size and colouring. What may be regarded as the typical form is common in the Rideau everywhere and in the

Ottawa above the Chaudière Falls. It is a moderately thin, brown, depressed, sub-rhomboidal shell, with a nacre of different and often of exceedingly beautiful shades of purple. The average dimensions of ten shells, five from each river, are as follows: length 3.5 in., height 1.7, diameter 0.8.

In company with the typical form, I found near Skead's Mills, in 1880, a specimen of a small variety which is of considerable interest. Although presenting every appearance of maturity, it is only an inch in height by two and a half in length. For its size it is very thick and regularly inflated. I am informed that a similar variety occurs in some streams in Western New York.

A form almost as small is found in the cold and limpid waters of Meech's Lake. But it is a thin and not a thick shell; not inflated but depressed. Its colour is a very light brown.

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About half a mile from Meech's Lake, on the creek through which it finds an outlet, are a few shallow ponds, with a bottom of coarse sand and gravel washed down from the surrounding hills. In the warmer water of these ponds, where food also must be more abundant, *U. complanatus* is three times as large as in the neighbouring lake. It differs moreover in being proportionately less depressed, and more equally rounded at both extremities. Its colour is a rich dark brown with a silken lustre, and, not unfrequently, a tinge of bright orange along the umbonal slope.

Near Kettle Island there occurs a form of much interest on account of the curious angular inflation. How extraordinary this is for a species whose most constant characteristic is its flatness, may be inferred from the fact that a representative specimen whose height is 1.6 in. measures 1.5 in. in diameter. The inflation is greatest near the dorsal margin behind the hinge-ligament.,

where a section of the shell would be an almost equilateral triangle with the base and the angles at the base slightly rounded. A specimen found by Mr. Poirier is 3 in. high, 4.9 long, and weighs 7 3/4 oz. Ten of the shells from Meech's Lake weigh only 3 oz.

At the same locality is found a still more remarkable variety and one of no little beauty. In some respects it resembles *U. Raleighensis*, Lea, from North Carolina, and in others *U. turtuosus*, Sowerby, from Maryland. It is like the former in shape and in the numerous prominent rays which diversify its surface; and like the latter in the strange peculiarity that its valves meet at the ventral margin not in a straight but in a sinuous line. A correspondent writes that under Dr. Lea's treatment it would be entitled to rank as a species. Whether a variety of *U. complanatus* or a distinct species, it is a most unique and interesting shell.

Unio gibbosus, Barnes, appears to be rare, having occurred to me only in the Ottawa near Gilmour's Mills and at Templeton, always in deep water. It is a brown, elongated shell, attenuated posteriorly, and with the dorsal margin regularly curved. It bears a slight resemblance to some forms of *U. complanatus*; but may always be distinguished by its heavier shell, the deeper purple of its nacre, and especially by the great thickness of the lamellar tooth in the right valve.

Unio ellipsis, Lea, is not uncommon on sand bars below Kettle Island, but does not seem to occur in the Rideau or in the Ottawa above this City. It differs from all other species here observed in having the beaks very near the anterior end of the shell, where the muscular impression is of great depth and the shell itself of great thickness. The cardinal teeth are paral- leled to the lateral teeth and not at a right or oblique angle to them as in our other species. The nacre of many specimens is beautifully iridescent, displaying the colours of the prism and rainbow, chastened, softened, and made perpetual.

Unio rectus, Lamarck, which is easily recognized by its dark colour and elongated form, is found in considerable numbers in the Rideau near Billings' Bridge, but is comparatively rare in the Ottawa. The ground colour of the epidermis, which at first sight appears black, proves on closer examination to be yellow, profusely rayed with broad lines of very dark green. Young shells occasionally have a purple nacre, but in mature specimens only a trace of this is seen along the lateral teeth and in the cavity of the beaks. In the Rideau it is not unusual to find *U. rectus* almost six inches in length, and I have observed it quite as large in the Ottawa near Arnprior. Though smaller in the Ottawa here, it compensates for its inferior size by its finer form. The mantle of the animal is fringed with long and delicate vibratile cilia more beautiful than the richest lace.

Unio radiatus, Lamarck, is common almost everywhere in the Ottawa above the Chaudière. At the foot of the rapids near Mechanicsville are a number of islets along whose shores may be seen large heaps of shells, of which this species constitutes no inconsiderable part. The muskrat lives chiefly on the Unionidae;

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and these heaps are the remains of his nightly repasts. To the collector they should generally serve only to point out that living specimens occur in their immediate vicinity; still, by presenting to him larger suites from which to choose than he could possibly obtain by dredging, they may sometimes afford good and even rare shells. I have obtained from them some of my best specimens of *U. radiatus*. It seldom attains a greater length than three inches, and is a very flat, obovate shell, of a green, olive or reddish color, with numerous narrow rays.

Unio luteolus, Lamarck, abounds in the Rideau Canal from the Sappers' Bridge upward, and is not uncommon in the Rideau River. Its color is from a yellowish green to a dark

olive, with distinct dark green rays. In shape it varies much more than in color. Some shells are so inflated as to be almost cylindrical; others so depressed that they cannot, when the beaks are eroded, be distinguished by any external character from *U. radiatus*. Having probably studied only the exterior of the two species, a western correspondent writes that they merge into one another in Toronto Bay. Now they cannot possibly be more alike in Lake Ontario than they are sometimes here; and however great their outward resemblance, I find that they always differ internally, especially in the form of the cardinal teeth. In *U. radiatus* these are short, erect, and triangular. In *U. luteolus*, they are long, curved, compressed and oblique.

Unio cariosus, Say, occurred to me near Black Bay, Eardley, Quebec, where I was searching for nodules and fossils in the Champlain Clays, which there form the north shore of the Lac des Chênes. It is a thin, small, ovate, inflated shell, of a yellowish color, with a few indistinct rays. Some specimens of an accompanying species of *Leda*, which lived when the clays were deposited in the post glacial period, would be taken for recent shells, so well have they preserved their thin, delicate epidermis and fragile teeth through the many thousand years that have elapsed since then.

Unio occidentis, Lea, is quite abundant in the Ottawa, near the mouth of the Gatineau, and along the sandy shores of Kettle Island. Its shape is remarkably uniform, varying only with the sex. It is an ovate and very much inflated shell, with large prominent umbones and closely approximate recurved beaks. The females are more broadly inflated than the males and are of an almost triangular shape, on account of which peculiarities they are liable to be considered forms of *U. ventricosus*, Barnes.

For beauty and diversity of coloring, there is not probably found in the world a fresh water shell which surpasses the *Unio occidentis* of

the Ottawa River. When young it is of soft and varied shades of yellow, green and red, the primary spectral colors, and sometimes of all three together, producing an effect of chromatic harmony that a painter might study with advantage. Mature specimens are rich as an autumn landscape in tints of yellow-brown and olive-green. All - but especially the young shells - have a porcelain-like lustre, which is seen at its best, when on a sunny day they lie on the clean, white sand, with just enough water to cover them. Then they shine and glow like opals in the fluent light. Moreover, their changeful colours are so differently combined with rays, sometimes few and sometimes many, fine as a hair or broad almost as an iris leaf, that, among hundreds of specimens collected, no two were alike in every respect. Each is, accordingly, a *unio*, in the sense that Pliny tells us the word was coined to express - a unique production - "from the circumstance," he says, "that no two *uniones* - pearls - are ever found alike." The barbarians who found the pearls called them *margaritae*.

That *U. occidentis*, under exactly the same conditions of life, should secrete in almost infinite variety so many different pigments is a fact which challenges attention.

Unio subovatus, Lea, which is found in the Rideau Canal and River and in the Des Chênes Lake, is chiefly remarkable for the large size to which it some-

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times attains, a specimen from the canal beyond Hartwell's Locks measuring 5.5 in. in length, 3.4 in height, and 2.2 in diameter. It bears some resemblance in outline to *U. occidentis* of which Say considered it only a variety. His opinion on this point is now held by very few; and I hardly think that anyone who compares the two as they here occur would care to pronounce them specifically identical. *U. subovatus*, is less inflated than *U. occidentis*, and less

approximate at the beaks, while with respect to beauty there is no comparison between them.

On the valves of this and other large species in the Rideau River I have observed - besides the curious spiral follicle of the larva of a phryganaceous insect, *Helicopsyche arenifera*, which was first described as a mollusk of the genus *Valvata* - a small isopod crustacean, which is worthy of note as being probably the best living, though degenerate, representative of the trilobites that once abounded here on the low tidal flats of the Silurian seas. It is I think the species described by De Kay as *Fluvicola Herrickii*.

Unio alatus, Say., was found here by Mr. Heron in 1880, and was recorded from this vicinity twenty years ago, by Mr. Whiteaves in a valuable paper published in the Canadian Naturalist. There are a few specimens in the museum of the Ottawa Literary and Scientific Society, which were probably collected by the late E. Billings, the palaeontologist. As I have not met with it on my many excursions, I think it must be rare, or at least restricted to a small area. It is the only species found here in which the wing rises higher than the right line of the hinge margin. It occurs from Georgia to Vermont and westward to Nebraska and Manitoba. Certain other species as *U. spinosus*, Lea., and *U. Shepardianus*, Lea, are confined within narrow limits to one stream.

Unio gracilis, Barnes, is another winged species which has not, till now, I believe, been recorded from any locality in Canada east of the Welland Canal. It is not at all common, Mr. Poirier and myself having found only five or six specimens during the summer. These were collected on sand bars near Kettle Island. It is an exceedingly thin and fragile, depressed, sub-triangular shell, of a greenish yellow color. The hinge margin is straight and prolonged into a large wing, uniting the two valves. It may be distinguished from *U. alatus*, by its greater fragility, lighter color,

both inside and out, and by its differently formed wing.

Unio pressus, Lea, was found by Mr. Tyrrell, of the Geological Survey, in the Rideau near the Rifle Range. Only one specimen was met with, and that he has with great kindness presented to me. It is but little more than two inches in length, very much flattened, and the hinge margin is straight with a slight alated projection. The beaks are finely undulated. Its form, its internal and external color, together with the shape of its cardinal teeth, seem to connect it with the *margaritanae*.

Unio Canadensis, Lea, was originally described from the St. Lawrence near Montreal. Both Mr. Tryon and Mr. A. F. Gray have referred to this species some shells which I collected in Nepean Bay. Mr. Gray writes: "It seems to agree well with the characters of *U. Canadensis*," and with Dr. Lea's figure. From these data, and without a typical shell with which to compare it, I am justified, I think, in referring it to that species." Mr. Tryon says: "I regard a shell which you sent me from Nepean Bay as the true *U. Canadensis*." It appears to be rare, only a few specimens having been found. It is of an oval shape and dark olive colour, with indistinct rays.

Unio borealis, A. F. Gray, is a new species. It occurs in the Ottawa, from the mouth of Brigham's Creek to Templeton, and probably much farther down. Although common, it is very seldom met with in good condition.

I first submitted this shell to Mr. Tryon, but the only specimens I had to send were so badly eroded that they could not be determined. A second lot,

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little if any better, led him to think it doubtfully referable to *U. luteolus*,* from some

forms of which the females are not easily distinguishable. Three out of four shells sent to a conchologist in Cincinnati were referred to *U. radiatus*, while the remaining one was considered a specimen of *U. luteolus*. The shells were really not in a condition to admit of being properly determined. Not until October of the past year did I succeed in collecting specimens which had the undulations of the beaks well preserved. I was led to go out so late in the season by a letter from Mr. A. F. Gray, relating to the shell in question, of which I had sent him specimens a short time previously. He regarded as correct my views that it differed essentially from both *U. luteolus* and *U. radiatus*, but thought that further study and comparisons might prove it to possess affinities with some other described species, and expressed a wish to see a large series of the best shells I could obtain. On my next holiday I went down the river to Duck Island and collected a number of male and female shells, including a few in fine condition. I despatched these to Mr. Gray on the day following, but heard nothing more about them, until February 28th, when I received the pleasing, though not unexpected information that the shell was undoubtedly a new species. The names *U. bellus* and *U. borealis* were suggested as appropriate. The latter seems the more fitting, and the species shall accordingly be known as *Unio borealis*, A. F. Gray. A description, promised at my request, has not yet been received, and I do not wish to describe the shell to-night, lest I should in any way interfere with the priority of my friend's description. The right of naming *U. borealis* belongs, to Mr. Gray, as he was the first to recognize its specific distinctness from any described *unio*.

Mr. Gray's description was received some time after the reading of my paper and is here given in full:

° After the above was written, I sent some young specimens of *U. borealis*, A. F. Gray, to Mr. Tryon, and they have convinced him, he informs me, that the species is new.

UNIO BOREALIS, - A. F. GRAY.

Shell smooth, broken only by numerous ridges of growth; obovate, very much inflated in the female form, the male more compressed, very inequilateral, obtusely angulated behind and rounded before, the basal or ventral margin rounded, beaks badly eroded and but slightly raised; ligament thick, moderately long and dark brown; umbonal slope flattened, and but slightly carinated; epidermis variable, some specimens dark olivaceous brown with broad obscure rays of dark green, others yellowish green with numerous fine rays of a brighter green, cardinal teeth rather large, somewhat compressed and corrugate; lateral teeth thick, slightly curved, and with crenulate margins; anterior cicatrices distinct, that of the adductor muscle very deeply impressed; dorsal cicatrices posterior to the centre of the cavity of the beaks; posterior cicatrices confluent and but slightly impressed; cavity of the shell deep and rounded; cavity of the beaks obtusely rounded and deep; substance of shell very thick, thickest before; nacre usually white, occasionally rosy, and sometimes a beautiful pink, and beautifully iridescent.

Transverse diameter, 3.15 inches; altitude, 1.95 inches; lateral diameter, 1.65 inches. These measures are from a large female. A male shell measures: transverse diameter 3.15 inches; altitude, 1.90 inches; lateral diameter, 1.35 inches.

For this beautiful shell, and the privilege of describing it, I am indebted to Mr. F. R. Latchford, from whom I received quite a large series of this *Unio*, which belongs to the group of which *Unio luteolus* of Lamarck may be considered the type. It differs from that species in being shorter transversely, in having a much thicker shell and having the beaks badly eroded. In its outline it bears a

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close resemblance to *Unio radiatus*, Lam., but is more inflated and has a heavier shell. It

occurs in the Ottawa River at Duck Island; it has also been found in Leamy's Lake, near Hull, in the Province of Quebec.

The variety with pink nacre has a bright orange-brown epidermis with fine rays of dark green.

A young specimen is more elongated transversely, has perfect umbones which show four well developed folds, and has a rugose posterior slope similar to *Margaritana rugosa*, Barnes.

The soft parts have not been preserved; in consequence, their arrangement cannot be described. 1

GENUS MARGARITANA, Schumacher.

The shell of this genus differs from that of *Unio* in having no lateral teeth. These, however, are not always entirely wanting in *M. margaritifera*, the celebrated pearl mussel of Great Britain and the North Atlantic and Pacific border regions of America. From the interior continental basin it is absent; and although common eastward in Quebec, it has not yet been found in this vicinity. How even a mollusk may affect the destinies of a nation may be inferred from the statement of Seutonius, that it was the hope of obtaining pearls from *M. margaritifera* which led to the invasion of Britain by Julius Caesar.

Margaritana marginata, Say, occurs sparsely in the Rideau and Ottawa in rapid water, which, indeed, is the favourite habitat of our other species also. It is small, seldom of greater length than two and a half inches, moderately thin and transversely wedge shaped. In colour it ranges from a dusky green to a deep brown, with indistinct dark rays. The shells found here are much inferior in size and colouring to specimens of the same species received from the Mohawk River, New York.

Margaritana undulata, Say, is rare in the Rideau and is not common in the Ottawa, where the least unproductive locality that I know of is above the Little Chaudière along both shores of the river. In Meech's Creek it is quite plentiful, especially near the abandoned rubber factory. It is smaller than *M. marginata*, proportionately more inflated, brighter in colour, often so bright as to be really beautiful. The distant concentric and prominent waves on the umbones from which it derives its specific name, are seldom apparent except in young shells. Many old specimens are as thick and strong anteriorly as a *U. ellipsis* of the same size, while towards the posterior margin they are as thin and fragile as the most delicate *anodonta*; and thus, as well as by having cardinal and no lateral teeth, *M. undulata* unites in itself two of the most distinctive characters of the genera between which, in the plan of creation, *Margaritana* has been assigned its place.

Margaritana rugosa, Barnes, the largest we have of the genus, is abundant at many points along the Rideau, but is quite rare in the Ottawa. As found in the former stream it resembles the typical *U. complanatus* in shape but is of a greener colour, and may, moreover, be easily distinguished from that shell both by the wrinkles which are situated along the post lateral margin up to the hinge ligament, and, of course, by the absence of lateral teeth. A shorter truncated form is occasionally met with in the same river.

I observed a few large and exceedingly fine specimens of this *margaritana* at the Chats Rapids, where I found them in a mixed company of *uniones* and *anodontae*, thirty three in number by actual count, which were living together in apparent harmony in an open space between the rocks but little if any more than a square foot in extent. They were green in colour, and had the characteristic wrinkles prominently developed. One shell exhibited in a marked degree the strange deformity that its

valves did not meet in a straight line, but, an inch or more from the posterior end, were bent sharply aside about forty degrees. I have noticed a few less striking instances of similar distortion in the same

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species from the Rideau. They are probably due to injuries received when young through coming into violent contact with a rock or pebble. To such a mishap the young of this species must often be exposed in the rapid water they frequent.

GENUS ANODONTA, Bruguières.

The transition from *Margaritana* to *Anodonta* is by no means abrupt: nihil in natura per saltum. It is made easy by a shell found here, which was first described by Say, and placed by him in the former genus - or rather in the genus corresponding to it that he had instituted, *alasmodonta*, - but which is at present universally referred to the latter. This species is now known as *Anodonta edentula*, Say. Although its name as it now stands expresses what may be called the reduplication of toothlessness, the shell is slightly exceptional to the best marked character of the genus - the absence of both cardinal and lateral teeth.

Anodonta edentula, Say, like its relatives the *margaritanae*, is to be found in water flowing rapidly over a rocky bottom. The best localities along the Ottawa that I have met with are the Little Chaudière and Chats Rapids. A capital place for collecting it and seven or eight other species of the Unionidae is the snye, as the lumbermen call it, between Mason's Mill and the opposite island. It is a comparatively thick shell, generally of a dark olive colour; but when the rays are few or narrow, the ground tint, a light brown, predominates. In the left valve of many specimens there is a short though well defined cardinal tooth with a small

notch in it analogous to the deep cleft in the primary tooth of the left valve of *Unio* and *Margaritana*.

In the narrowest and most rapid parts of Meech's Creek, and not in the ponds into which it often expands, or the lake from which it flows, there occurs a fine form of this shell which appears to be identical with the variety of *A. edentula* described by DeKay, and called by him, after the river in New York in which it is found, *A. Unadilla*. It is more inflated than the *A. edentula* from the Ottawa, often very much larger and of a lighter colour.

Anodonta undulata, Say, is found in the Rideau near Billings' Bridge, and in the Ottawa at Kettle Island. It resembles the preceding species so much that many have thought the two identical. *A. undulata* is however a thinner shell more obscurely rayed and more angularly inflated. Additional and far more distinctive characters are revealed by the microscopic examination of the young of both species. Botanists, as Mr Fletcher told us two years ago, cannot always by the leaves and blossoms alone distinguish *Drosera longifolia* from *Drosera rotundifolia*, but their minute seeds present characteristics which place the specific distinctness of the parent plants beyond all doubt. So also with the embryonic young of these two species of *Anodonta*. I have not examined them myself; but Dr. Lea's figures show that they differ in outline, and that while the hooks of *A. edentula* end in three points, those of *A. undulata* end in one.

Anodonta subcylindracea, Lea, which I have met with only at the Chats, is one of the most widely distributed shells of the genus, extending hence through the middle and western states as far south as Louisiana. Our shell in its ordinary form is identical with Dr. Lea's type. It is small, thin, inflated, almost elliptical in outline, and olive green in colour, with indistinct rays. Old shells are generally abnormal. They are so constricted along the basal margin

opposite the hinge, and so much elongated that instead of being elliptical they are kidney shaped. This reniform appearance is observable in old shells of many species of the Unionidae, *U. complanatus*, for instance, and notably *M. margaritifera*. An examination of the lines of growth will show that after a certain age the shell does not increase symmetrically. It grows rapidly in the direction of the umbonal slope, slowly in front, and scarcely at all opposite the hinge. The change produced in this way in the form of shells is very remarkable.

Anodonta Benedictii, Lea, occurs in several localities near the city, but nowhere in great numbers. I have found it at the Chats, and in a small lake on

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Meech's Creek. Mr. Fletcher collected a few fine specimens of the typical form in the Ottawa near the outlet of Leamy's Lake. It is a trapezoidal, slightly compressed, horn-coloured shell. The dorsal margin is nearly straight and is extended behind, where it forms a well marked wing.

Anodonta Lewisii, Lea, occurred to me in the Mississippi at Almonte, where it appears to be abundant. It has a much smaller wing than *A. Benedictii*, which it resembles, is more elongated, and somewhat less inflated. The beaks in perfect specimens have sharp prominent tubercles, which are arranged in a manner characteristic of the species.

Anodonta implicata, Say, is a species of which only a single living specimen has been obtained. It was found in a deep pool near the upper end of the old Chats Canal, after a search of an hour's duration, which I was led to engage in by seeing on the shore a few broken valves of an *anodonta* not previously met with. It is a large, thick, olive-brown, elongated, cylindrical shell, with a salmon-coloured nacre.

Anodonta Footiana, Lea, is not uncommon at the Chats. It is a thin, inflated, oblong, brownish species, obscurely radiated, and tinged with yellow posteriorly. A darker and less elongated form from Meech's Creek is said to be "identical with shells determined by Dr. Lea as his *A. Footiana*," which are now in Mr. Gray's cabinet.

Anodonta lacustris, Lea, inhabits lakes in the County of Ottawa. It is brown when aged, but young shells are greenish yellow. The tubercles on the beaks are arranged in close, concentric waves. Every specimen found in September, 1881, in a small lake in Masham, was infested by hundreds of mites, probably of the species found in *U. luteolus* and *A. fluviatilis* in the Rideau Canal. The same lake, which is about thirty miles from Ottawa, contains a plant, *Eriocaulon septangulare*, not recorded in the "Flora Ottawaensis" of Mr. Fletcher.

Anodonta fragilis, Lamarck, is common in Meech's Lake, near the outlet. It is an elongated, thin, depressed shell of a yellowish colour, with a straight dorsal margin, and pearly iridescent nacre. That the form regarded as *lacustris* is distinct from this appears to me somewhat doubtful.

Anodonta fluviatilis, Dillwyn, occurs in great numbers in McKay's Lake, New Edinburgh, and in the Rideau Canal; but is rare in the Ottawa, where it is found only in bays in which there is little or no current. In colour it ranges from a bright grass green to an olive-brown, with concentric yellow bands, and innumerable narrow, obscure rays. Sometimes it attains a length of six inches, but is generally about a third smaller. Its large size and brilliant colouring conspire to make it the finest *Anodonta* we have.

Repeated microscopic examinations of the young of this shell lead me to believe that the only observations which I find published on the

young of the Unionidae are not altogether correct. In his "Descriptions of the embryonic forms of thirty-eight species of the Unionidae," Dr. Lea, says: "The base in all the species always presented the anterior and the posterior margins equal, which is not the case with any of the species when fully grown. That is, if a perpendicular line be raised from the middle of the basal margin to the middle of the dorsal line, the right and the left divisions will be exactly symmetrical." Now, I thought that precisely the contrary was evident when the young of *A. fluviatilis* were observed under a high power; and Mr. Tyrrell and Mr. Fletcher, whose attention was called to the matter, thought so too. Dr. Lea, however, to whom I sent some of the young, wrote that on carefully examining them, he failed to notice the asymmetrical difference which I described. The venerable patron of the Unionidae, now in his ninety-first year, kindly presented me at the same time with the work previously referred to on "Embryonic Forms," and with several other of his valuable publications. Here was observation opposed to observation. To ascertain whether I was right or wrong, I made use of the fine solar microscope of the College of Ottawa, which gives a

magnification of two thousand diameters.

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As the outline of shell after shell was cast upon the screen, each was observed to be decidedly asymmetrical and unequally curved on the sides. The young of *U. luteolus* and *U. borealis* proved also to be inequilateral; and I have little doubt that the same want of symmetry obtains in the young of almost all other species. It seems, therefore, that Dr. Lea was mistaken in describing and figuring as symmetrical the embryonic forms of many species of the Unionidae.

With *A. fluviatilis* closes the record of the species so far observed here. Extended as it is, for a place so distant from the metropolis of the Unionidae in the Ohio Valley, it does not in my opinion include all the forms that occur in this vicinity. *A. plana*, Lea, and *A. ferussaciana*, Lea, probably occur here; and when the numerous lakes and streams around our city are more diligently searched, they will, I feel confident, furnish very material additions to the present list of the Ottawa Unionidae.

NOTE

The Ottawa Field Naturalists' Club has a limited number of Trans. Ott. Field-Nat. Club No. 3 available at \$5.00 each. Copies may be obtained from the Business Manager, Ottawa Field-Naturalists' Club, Plant Research Institute, Central Experimental Farm, Ottawa, Ontario, Canada.

REPRINTS OF RARE ARTICLES ON MOLLUSCA. --H. B. Small and P. B. Symes, 1882, "Report of the Conchological Branch for the Season of 1882." --- Trans. Ottawa Field-Naturalists' Club, No. 3, pp. 57-59. Reprinted with permission of the Council of the Ottawa Field-Naturalists' Club, Ottawa, Ontario, Canada.

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REPORT OF THE CONCHOLOGICAL BRANCH

For the Season of 1882

To the Council of the Ottawa Field-Naturalists' Club:

The undersigned beg leave to report that in this branch of the Club, nine members have been engaged in active work during the season, and that the researches made, (particularly by Mr. Latchford,) have been of a most thorough nature and have resulted in additions to the list of shells already recorded in this locality, and the discovery of some which may prove new to Canada itself; of these, a list is appended in which all are mentioned of which the identity has been proved without doubt. Descriptive notes of twenty-seven species embraced by the family Unionidae will be given by Mr. Latchford, in a paper which he is preparing on that subject to be read before the Club.

H. B. SMALL,
P. B. SYMES,
Leaders of the Conchological Branch.

APPENDIX

Descriptive notes of shells found in the

vicinity of Ottawa during the summer of 1881, not before recorded on the Club list: --

1. *Amnicola limosa*, Say. This shell is abundant in ponds near St. Louis Dam. In Mr. Heron's collections (presented by him to the Ottawa Literary and Scientific Society,) it is marked "*A. porata*, Say." The true *A. porata* of Say is, however, quite a different shell; but the *A. porata* of Gould is a synonym of *A. limosa*, Say. The true *A. porata* Say is to be found in several lakes in Ottawa County. It is larger and more globose than *A. limosa*, Say, to which it is allied, and has a more distinct umbilicus. Its distribution too is more limited, being confined to the Northern States and Canada.

2. *Amnicola decisa*, Haldeman. Specimens of this shell have been found in Leamy's Lake. It has the labium more appressed than in any of the other species of the genus found in this locality; the form too is more elongated. It was found by Mr. Heron subsequent to the publication of his list.

3. *Limnatiopsis Cincinnatiensis*, Lea. (*Amnicola Sayana*, Anthony.) A few specimens of this species have been found in Dow's Swamp. This is the first record of it having been found in Canada. This shell must not be confounded with *Amnicola Cincinnatensis*, Anthony.

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4. *Limnaea megasoma*, Say. This beautiful and distinct species was first found in Meech's Lake by Mr. Latchford, in September, 1880, and a good series was secured during the past season. This species is the largest of the *Limnaeidae*. In beauty it is surpassed only by such exceptionally fine forms of *L. stagnalis* as occur here in the Rideau Canal. *L. megasoma* is easily distinguished from all other American species by its ovate form, thick shell, and rich chestnut-brown interior. Haldeman has made it the type of his sub-genus *Bulimnaea*. It is a northern species ranging from Vermont to Lake Superior, near which it was first found by Dr. Bigsby. It was once abundant in a pond on Nun's Island, in the St. Lawrence, opposite to Montreal, but of late years it appears to have become almost extinct in that locality.

5. *Limnaea lanceata*, Gould. Three specimens of this species were found by Mr. Fletcher, in Dow's Swamp in September last; previous to this no one but Agassiz appears to have observed it either in Canada or elsewhere. As late as 1865, the date of Binney's monograph on the American *Limnaeidae*, there was only a single specimen in the cabinet of the Smithsonian Institute at Washington. The locality of the shells found by Agassiz, and named by his friend Dr. Gould, was "Pic Lake" to the north of Lake Superior. The shell of *L. lanceata* is very fragile and slender. It not a little resembles *L. (Acella) gracilis*, Say.

6. *Limnaea caperata*, Say, var.

umbilicata, Adams. By some authors this shell is regarded as merely a variety of *L. caperata*, Say; Adams, however, with others, claims that it is a distinct species and calls it *L. umbilicata*. According to Binney, who, following Haldeman, favours the former view, "It is found along the northern tier of States to Michigan; has been quoted from Louisiana; catalogued by Adams from Jamaica, and placed by Poey in the synonymy of *L. cubensis*, Pfr." It would appear, therefore, to be a very constant variety, if, indeed, it be not a distinct species. Adams acknowledges that it resembles *L. caperata*, Say, but observes that in Say's species "the aperture is but one-half the length (in *umbilicata* it is three-fifths) the revolving lines are raised, more distinct and numerous, the umbilicus is rather less, and there is one more whorl." In this locality Say's species is abundant, but Adams' is very rare - only three specimens having been obtained so far. They were found in the Rideau River at the Rifle Range by Mr. Latchford. They were sent to Mr. Tryon for examination and returned marked "*L. caperata*, Say, var. *umbilicata*."

7. *Limnaea emarginata*, Say. There once existed considerable doubt with respect to this variable shell and its identity with *L. catascopium*. Specimens in Mr. Heron's collection bear the latter name. It is now, however, very generally regarded as a distinct species. *L. emarginata* is a thicker, larger, and considerably wider shell than *L. catascopium*. It is a common shell near rapid water in the Ottawa and Rideau Rivers; very fine specimens are to be found about a mile above Billings Bridge. The true *L. catascopium* is less frequently found, being noted only from Brigham's Creek, Nepean Bay, and at the Chats Rapids, near Arnprior.

8. *Limnaea lepida*, Gould. One of the most interesting additions to the list is the above named shell which was found in Meech's Lake by Mr. Latchford in September. The

naming of Mr. Latchford's specimen has been checked by Mr. Tryon and found correct. The specimen found differs from Binney's figure only in the slighter convexity of its whorls. Its size is exactly that of the shells described by Dr. Gould, 3/5 inch by 1/4 inch. *L. lepida* has heretofore been found only in Oregon. It is very rare.

9. *Physa gyrina*, Say. This widely distributed species differs from *P. heterostropha* in having a more elongated spire and a less deeply indented suture. It is found plentiful during the spring months, in ponds near the Canada Pacific Railway at Mechanicsville.

10. *Ancylus parallelus*, Haldeman. This fresh water limpet has been found in the Ottawa River and Rideau Canal, adhering to the submerged leaves of water

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plants and to other shells. Its favourite quarters are the inner sides of the valves of dead *Unio*nes and *Anodonta*e, from which, if disturbed in the least, it is very difficult to detach them without breaking the shell. This species has been observed in New York and the Eastern States, but its range is more restricted than that of *Ancylus rivularis*.

11. *Zonites minusculus*, Binney. A few specimens of this minute *Helix* were found by Mr. Latchford in Eardley, Que., in September, and it has been reported as found near Toronto by Mr. Brodie. It has probably escaped notice in other localities on account of its small size.

12. *Vertigo milium*, Gould. A single specimen of this species was found by Mr. Latchford in Billing's Bush. It is remarkable as being the smallest species of the genus.

13. *Unio luteolus*, Lamarck. (1)
14. " *cariosus*, Say.
15. " *occidens*, Lea.
16. " *gracilis*, Barnes.
17. " *pressus*, Lea.
18. " *Canadensis*, Lea.
19. " *borealis*, A. F. Gray.
20. *Anodonta edentula*, Say.
21. " *subcylindracea*, Lea.
22. " *Benedictii*, Lea.
23. " *Lewisii*, Lea.
24. " *implicata*, Say.
25. " *Footiana*, Lea.
26. " *lacustris*, Lea.
27. " *fragilis*, Lamarck.

28. *Sphaerium truncatum*, Linsley. This species resembles *S. securis*, Prime, and might at first sight be confounded with that shell. It differs, however, in being much less inflated, less inequilateral, and lighter in colour. Its post margin is more nearly a straight line, giving the shell the appearance of having been cut short - *truncatum*. This species is found in the St. Louis Dam pond. Unlike *S. rhomboideum* and *S. sulcatum*, it is very active. Specimens kept in confinement are almost always in motion. With the syphonal tube protruding behind they will extend the foot in front more than half an inch, attach it to the side of the vessel, and then contracting it will pull the shell forward. By this means they move in every direction with ease.

(1) In the original paper, items 13-27 are joined together by a long bracket with the notation "See Mr. Latchford's paper."

NOTE. The Ottawa Field Naturalists' Club has a limited number of Trans. Ott. Field-Nat. Club No. 3 available at \$5.00 each. Copies may be obtained from the Business Manager, Ottawa Field-Naturalists' Club, Plant Research Institute, Central Experimental Farm, Ottawa, Ontario, Canada.

ANNOUNCEMENT RE

REPRINTS OF RARE PAPERS ON MOLLUSCA

Malacologists and paleontologists working in our larger institutions are only faintly aware of the difficulties faced by those who do not have a large library in their immediate vicinity. For the convenience of those who are faced with such library problems, STERKIANA is attempting to reprint articles in its field that are difficult of access for one reason or other.

So far, the reprinting program has been confined to defunct publications such as the Canadian Naturalist and Geologist and long-lived periodicals such as the American Journal of Science and the Canadian Field-Naturalist. The editors of both the latter periodicals have been most helpful in granting permission to reproduce material published in the earlier volumes of their journals.

Reprints of papers by D. H. Barnes, J. W. Dawson, Elkanah Billings, and Robert Bell have already appeared in STERKIANA Nos. 6 and 7. The program is continued in this issue (No. 8) with other papers by Barnes, S. P. Hildreth, F. R. Latchford, H. B. Small and P. B. Symes, and Robert Bell.

Separates of these papers are available at cost (half a cent per page) to malacologists and paleontologists from the Editor of STERKIANA.

Readers of this periodical are invited to submit titles of papers in STERKIANA's field which it would be advantageous to reprint. If permission to do so can be obtained, or if the articles are in defunct periodicals, every effort will be made to reproduce them in forthcoming issues of STERKIANA.

Aurèle La Rocque

DRIFT LAND SHELLS FROM THE RED RIVER, ARKANSAS

LESLIE HUBRICHT

3235 - 23rd Avenue, Meridian, Miss.

On September 2, 1962 the author collected a large series of drift shells from the Red River, at Fulton, Hempstead County, Arkansas. Ordinarily drift shells from such a large river would be of little value because of the large area from which they might have come. However, it is doubtful if drift shells could get past Lake Texoma and the Denison Dam, which greatly limits their possible source to southeastern Oklahoma, extreme northeastern Texas, and a small area in southwestern Arkansas. The presence of a number of species which had not been previously reported from this area would indicate that further collecting was desirable. Some of the shells appear to have been washed from Pleistocene deposits.

In the following list the number after the name of the species is the number of specimens collected. This is given only where less than fifty specimens were collected. For *Gastrocopta contracta*, the most abundant species, enough specimens were collected to fill a 3 dram vial; and some other species were nearly as numerous.

Polygyra leporina (Gould)
Polygyra texasiana (Moricand)
Polygyra dorfeuilliana Lea 19
Stenotrema leai aliciae (Pilsbry) 17
Mesodon thyroidus (Say) 5

Mesodon clausus (Say) 1
Mesodon inflectus (Say) 10
Triodopsis divesta (Gould) 1
Euconulus chersinus (Say)
Glyphyalinia indentata (Say)
Hawaiiia minuscula (Binney)
Hawaiiia minuscula alachuana Dall
Zonitoides arboreus (Say) 27
Striatura meridionalis (Pilsbry & Ferriss) 1
Anguispira strongylodes (Pfeiffer) 4
Helicodiscus parallelus (Say)
Helicodiscus notius Hubricht 28
Helicodiscus eigenmanni Pilsbry 1
Helicodiscus singleyanus (Pilsbry) 33
Helicodiscus intermedius Morrison
Helicodiscus, n. sp.
Helicodiscus, n. sp. 5
Helicodiscus jacksoni Hubricht 42
Helicodiscus nummus (Vanatta) 3
Punctum minutissimum (Lea)
Succinea pseudavara Webb 3
Strobilops texasiana Pilsbry & Ferriss
Strobilops aenea Pilsbry 41
Gastrocopta armifera (Say) (1 sinistral shell)
Gastrocopta contracta (Say)
Gastrocopta holzingeri (Sterki) 3
Gastrocopta pentodon (Say) 31
Gastrocopta tappaniana (C. B. Adams)
Gastrocopta corticaria (Say) 6
Gastrocopta procera (Gould)
Gastrocopta cristata (Pilsbry & Vanatta)

Gastrocopta pellucida hordeacella (Pilsbry) 29	Vertigo, n. sp. 1
Pupoides albilabris (C. B. Adams)	Vertigo, n. sp. 2
Vertigo milium (Gould)	Vertigo tridentata Wolf 2
Vertigo oscariana Sterki 4	Carychium exile H. C. Lea
Vertigo rugosula Sterki	Helicina orbiculata tropica Pfeiffer
Vertigo oralis Sterki 43	Pomatiopsis lapidaria (Say) 22
Vertigo ovata Say	Snail eggs (Zonitoides ?) 2
Vertigo teskeyae Hubricht	

 REVIEW

A REVISION OF THE SPHAERIIDAE OF NORTH AMERICA (MOLLUSCA: PELECYPODA), by H. B. Herrington. -- University of Michigan, Museum of Zoology, Misc. Publ. No. 118, 74 pp., 7 pls., 2 text figs. Ann Arbor, Michigan, April 26, 1962. -- \$ 2.85.

Friends and correspondents of Rev. Mr. H. B. Herrington have long awaited the publication of this revision; they will not be disappointed in it now that it has finally been issued. Here is the most authoritative, thorough, and detailed analysis of the Sphaeriidae to appear in half a century and one which is certain to revolutionize the attitude of malacologists and paleontologists towards this family. This estimate of the work will meet with agreement from anyone who uses it as a guide to the fingernail clams of North America and it is safe to predict that admiration and respect for the author's work will increase with use.

The author has outlined the story of his attraction to this study in a prefatory statement (pp. 5-6). It should be read with the knowledge that Herrington could devote to sphaeriids only the spare moments of a busy life as a minister until his retirement a few years ago. It should be remembered also that his ability and industry were recognized by the scientific fraternity in Canada and the United States and the grants-in-aid which helped him in his work are a tribute to his sound malacological knowledge. Here is support of scientific work at its best and the various institutions responsible should have a share in our gratitude.

Perhaps the main value of this work lies in the reduction of species from the hundreds previously described to a manageable 35 (Sphaerium 12, Pisidium 22) and the recognition of 15 Eurasian species in North America. Identification of species is rendered relatively easy by means of a key and illustrations of the diagnostic characters of each species, amplified in carefully worded descriptions.

A minor criticism may be noted here which in no way affects the general usefulness of the work. The synonymy (pp. 52-54) does not dispose of all the names previously applied to North American sphaeriids. Some of these have been dealt with in previous papers (Brooks and Herrington, 1944, Naut. 57: 93-97 and Herrington, 1954, Naut. 67: 97-104, 131-138) but there is still a residue of unsolved puzzles.

To summarize, Herrington's work will henceforth be an indispensable working reference for North American malacologists and he has earned our gratitude for giving us such a clear and complete account of the family.

Aurèle La Rocque
Department of Geology
Ohio State University.

REPRINTS OF RARE ARTICLES ON MOLLUSCA. -- D. H. Barnes, 1828, "Reclamation of Unios." --- American Journal of Science, vol. 13, No. 2, pp. 358-364. (Reprinted with permission of the Editor of the American Journal of Science, Dr. John Rodgers).

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ART. XIII. - Mr. BARNES'S Reclamation of Unios.

(Read before the Lyceum.)

TO PROFESSOR SILLIMAN.

New York, Nov. 12, 1827.

Dear Sir - In looking over the continuation of Humboldt and Bonpland's Zoological Observations, just received, I observe, that a portion of that splendid work is devoted to

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American Unios, of which the author, Mons. A. Valenciennes, describes nine species, all of which have been previously described by American naturalists, either under the same or different names; but, in several instances, no notice is taken of the original author, from whom those names were derived. This is a singular oversight, in the French naturalists, who have been distinguished by their liberality towards American authors; inasmuch as these shells have been sent to the Baron Ferussac, and set forth in his excellent Bulletin, with all due praise. It is an act of duty to Mr. Say and myself to notice this departure from the law of naturalists, that priority must have preference, in all regular publications. I have, however, no doubt, that the oversight was unintentional, and such as

will sometimes unavoidably occur. After the publication, in your sixth volume, of the shells brought from the northwestern territory, in 1820-1, I was shown a paper by Professor Rafinesque, published in Brussels, without a date, in which I discovered some of those which I had published. I am not sure which had the priority, but if it belongs to Mr. R. that circumstance probably occurred from the delay in printing the paper in your Journal, caused by my absence from the city, during the prevalence of the yellow fever, and several other unfavorable events. The want of a date in Mr. R's paper, sent to Dr. Mitchill, the only one I have seen, was I believe, owing to its being a part of a larger work of which some extra copies were bound up for the author. Mr. R's paper was totally unknown to me at the time of publishing mine, as you will perceive by the introduction, in which Mr. Say's paper is mentioned as the only one then known.

In the paper of A. Valenciennes, which is the subject of this reclamation, Mr. Rafinesque is mentioned but not followed; and the author's view appears just and reasonable, which is to leave the genus as it now stands, and not to constitute other genera from it, by the external form of the shells. Mr. Say is also respectfully mentioned, but no notice whatever is taken of the paper in your sixth volume, though several of the same species are set forth under the same names, even those of which you have given plates; and others are republished under different names. I shall notice them in detail with corrections to each.

1. UNIO OVATA. (ova tus.) - The gender of the word Unio is again mistaken. It is masculine. This error is noticed in

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your Journal, Vol. VI, page 115; and has since been corrected by Dubois, the translator of Lamarck, in his synoptical table, page 30th. This Unio is referred to Lamarck, vol. vi, page 75, No. 23, and Lamarck in this place quotes Say's American conchology, pl. 2, fig. 7. Now it so happens, that the shell thus referred, is not Mr. Say's Unio ovatus, but his U. cariosus, in a young state, and the author is correct in saying, that it nearly approaches the Unio cariosus, of Lamarck, vol. vi, p. 226. The Unio ovatus, of Mr. Say, is eminently distinguished by a slightly elevated obtuse keel around the anterior slope (posterior of Cuvier and Blainville.) See American Journal of S. and A. vol. vi. p. 113.

2. UNIO DOMBEYANUS. - The author has made two species of Lamarck's Unio Peruvianus. The one is what I have named Unio rugosus, with a plate and description, in the Journal, vol. vi, p. 126, and the other is the

3. UNIO UNDULATUS. - The same shell as that figured in the Journal, with the same name, and from the same locality, the Ohio river. In the Journal, vol. vi, p. 120, Lamarck's Unio Peruvianus is quoted with a mark of doubt. The same reason which caused that doubt, has induced M. Valenciennes to recommend, that Lamarck's name should be discontinued. It comes from the Ohio, and not from Peru. The shell here figured is a younger and smaller one than that figured in the Journal.

4. UNIO VERRUCOSUS. - This, again, is our shell with the same name. It is the variety (b) mentioned on page 124, which is always much less than the one figured in the Journal. The dimensions of the plate, of M. Valenciennes, are the same as those of our shell.

5. UNIO TUBERCULOSUS. - This is the young of our U. verrucosus, and not as the name might seem to indicate, our U. tuberculatus.

6. UNIO ROSTRATUS. - This the author marks Nobis. It is Mr. Say's well known nasutus, but not the nasuta of Lamarck, which circumstance probably led him into the error, Lamarck's name should be changed, and Mr. Say's must have preference. Both the names, nasutus and rostratus,

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are descriptive of the same character of the shell - the unusual extension of the anterior side. (See Journal, vol. vi, p. 110 - 111, and p. 273, No. 26.)

7. UNIO NAVIFORMIS, Lam. - For this, both Lamarck and this author refer to Mr. Say's Unio cylindricus, with a mark of doubt. It is the same. Mr. Say's figure represents an old shell from Dr. Barton's collection, now in the Philadelphia museum, and the figure of this author represents one which is rather younger and smoother than an intermediate one now in my collection, received from Mr. King of Buffalo, and by him brought from the Ohio. This species, of which we have now several specimens, was mentioned, p. 127 of the Journal, but not described as it had been previously described, by Mr. Say, and as one specimen only had then been found; and it seems there is yet only one known in France, which one was carried thither by the younger Michaux, and given to the museum of natural history.

8. UNIO RECTUS. - This shell resembles the Unio praelongus, of the Journal, and, indeed, it has been supposed to be the same. Lamarck's shell is, however, much less in size, and uniformly, as far as my observations have extended, differently colored on the inside. The rectus has the inside either white or with a pale tinge of red, and the praelongus is of a deep and splendid purple. The variety, with the inside

whitish green, mentioned in the Journal is the *Unio rectus*, of Lamarck, which name, and not his *purpuratus*, has the preference to ours.

Most beautiful specimens of the *Unio rectus* are found in Lake Champlain, at Ticonderoga point.

9. *UNIO HIANS*. - This is the *Alasmodonta undulata*, of Mr. Say; a genus which the French have not yet admitted into their books. It is, however, a natural genus, of which we have now five or six well characterized species; every one of which may be instantly distinguished from the *Unios*, by the color and peculiar smell of the animal, and by the yellowish tinge on the inside of the shell. It is a matter of regret that the animals have not yet, to our knowledge, been carefully examined by an acute and discriminating comparative anatomist. They will, no doubt, prove to be different. It is remarkable that this genus should still be included under the *Unio*, when it has

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not the generic characters of that genus. It always wants the LONG, COMPRESSED LATERAL TOOTH, which Lamarck inserts as a part of his generic description, (alter (sc. dens) elongatus, compressus, lateralis, infra pubem productus,) Lam. Genus *Unio*, vol. vi, p. 69; and yet Lamarck himself, has put a shell of exactly this kind, at the head of his genus *Unio*. This fact led me into a mistake concerning the *Alasmodonta arcuata*, which is Lamarck's *Unio sinuatus*, and the *Mya margaritifera*, of authors; and Lamarck has again described the young of this same species, under the name of *Unio elongatus*. Neither of these ever has the long, compressed, lateral tooth. They, therefore, belong properly to Mr. Say's genus, *ALASMODONTA*. Am. conch. p. 14-15. Both the young and the old, answering to the two species of Lamarck, just mentioned, are figured in the Journal, vol. vi. pl. 12. The same shell is figured by Pennant and Lister. It

is very remarkable, that a shell found in our waters, should be so exactly like one found in Europe. This species, though so well known abroad, was unknown to Mr. Say, when he published his treatise. It was brought to me from Tappan and Canada creek, in this state, and being unknown to Mr. Say, I supposed it new, and so described it.

I find it difficult to believe, what seems to be a very plain fact; I suspect there must be some mistake: the figures and description of this shell seem to show an exact identity, and we have compared ours with specimens labeled, *Mya margaritifera*, from Liverpool, Eng. They are the same; and yet, if the *Unio sinuata*, of Lamarck, has the long, lateral, lamelliform tooth, ours is a different shell, and the original name must stand. If that is the fact, neither of us has made a mistake. In the case of the *Unio hians*, of M. Valenciennes, we seem to perceive the same error as that above imputed to Lamarck. His shell is from our waters, and we have numerous fine specimens, all of which are destitute of the lateral tooth, by which the genus *Unio* is characterized.

This natural and useful genus contains now six species, as follows: -

1. *Alasmodonta margaritifera*, Mya L. *Unio* Lam.
 2. " *complanata*, } American
 3. " *rugosa*, } Journal, vol.
 - vi, p. 75-80.
 4. " *marginata*, } Say, Am.
 5. " *undulata*, } conch, l. c.
 6. " *purpurea*, c. } A. Valenciennes,
- mentioned below.

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All these, except the last, are known to us as well characterized, and perfectly distinct; and to persons less cautious than we are, the northwestern expedition might have afforded an opportunity of increasing the number. (See Journal, vol. vi. p. 279.)

This paper of Mons. Achille Valenciennes, on the *Naiades* terminates with an account of two *Anodontas*: the first is called *Anodonta glauca*, which is said to be new. It is well known to us, and is Mr. Say's *Anodonta marginata*. The *Anodonta* has numerous varieties, but I have yet seen no evidence of more than one species; although Lamarck describes fifteen, Mr. Say, two; this author, two; and others, more. In the same way it would be easy to increase the number to a hundred; but they would all be more alike than the numerous varieties of the *Unio purpureus*. The identical variety here figured has been brought from our southern waters, and laid on the table of the Lyceum, without being supposed worthy of particular notice.

The next the author calls *Anodonta purpurea*, which without doubt, is another of Mr. Say's genus *Alasmodonta*. This is evident from the figure, and the following part of the description. "Cette espèce est très remarquable par l'épaississement du bord inférieur, sous les crochets." I believe that no one ever saw an *Anodonta* thickened about the beaks. They are always thin, and uniformly thin throughout. But this is not all. "Ce bord un peu relevé, semble montrer un commencement du dent, et conduire ainsi vers la chambre des mulettes." This again is never found in the proper *Anodonta*, but it is a very good description of a young *Alasmodonta* before the teeth of the hinge are fully formed. When this shell is again examined the learned author will find, if my conjecture is right, on the inside, near the hinge, where the shell is thickened, a tinge of yellow. The animal, when extracted, was yel-

low, and had a rank, offensive smell, different from the fresh and not unpleasant smell of the *Unios*. The description of the *Unio hians*, mentions the same appearance about the cardinal tooth, "sous cette dent le test est très-épais: il devient ensuite très-mince." This is an exact description of the *Alasmodonta*, which is common to several species, but not often seen in the *Unio*, and never, to my knowledge, in the *Anodonta*.

We are gratified to perceive, that the method of measuring shells, and inserting the length, breadth, and diameter;

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(which method was commenced and recommended in this Journal,) is uniformly pursued in this paper. It has also been adopted in England. But the French, instead of diameter, use thickness; as it seems to us, with less propriety, for the reasons given, vol. vi, p. 111.

We regret to see the exploded error, of the axolotl's being the larva of a water salamander, again put down as a matter of undoubted science. It rests, indeed, here as elsewhere, on the authority of Cuvier; but even that authority cannot support it against a simple examination of the specimens now in the New-York Lyceum. The animal is, beyond all doubt, mature and distinct from all others.

Your cordial friend,

D. H. BARNES.

REPRINTS OF RARE ARTICLES ON MOLLUSCA. -- S. P. Hildreth, 1828, "Observations on, and descriptions of the Shells, found in the waters of the Muskingum River, Little Muskingum and Duck Creek, in the vicinity of Marietta, Ohio."
 --- American Journal of Science, vol. 14, pp. 276-291, 2 pls. (Reprinted with permission of the Editor of the American Journal of Science, Dr. John Rodgers).

ART. VII. - Observations on, and descriptions of the Shells, found in the waters of the Muskingum River, Little Muskingum and Duck Creek, in the vicinity of Marietta, Ohio; by S. P. HILDRETH,* M. D.

ALTHOUGH the river Ohio abounds in shells of the same genera as those about to be described, yet they have so generally been noticed by writers on natural history, while those living in the above streams and more immediately within the bounds of the State, have not received attention; that my observations have been confined to those streams almost exclusively.

*Dr. Hildreth, having with great propriety, made Mr. Barnes his authority for his descriptions, it was thought proper to communicate this memoir to that gentleman, in MS. - along with the drawings, and such of the latter have been engraved as were not among those contained in volumes 6 and 7 of this Journal, to which the reader is referred, for the figures now omitted. We have taken the liberty to add, in the form of notes, a few of the remarks of Mr. Barnes, communicated by our request. -- Editor.

From the variety of form, color, and outward appearance of bivalves, the most careless observer could not but be struck with their beauty, and led to admire their rich pearly luster, and variegated surface. But the more carefully they are inspected, the more beauties he will find to attract his attention and to call forth his wonder. The beds of many of our streams are strewn with the open valves of the numerous family of the Unios; and where the waters are transparent, like those of the Muskingum, they, with the interspersed pebbles, afford all the rich variety and tessellated appearance of a Roman pavement. -- Their beauties were not unknown, or neglected by that ancient race of men who once inhabited the pleasant vales of Ohio; as the valves of some of the most interesting kinds are often found buried in mounds, intermixed with other articles considered as valuable by the builders of those venerable monuments of the dead. They must also have been deemed very valuable as an article of food; as we find vast beds of the calcined shells, in the banks of the river, usually several feet below the present surface, and near them a hearth of stones with ashes and fragments of deer and fish bones promiscuously interspersed. - In those seasons of the year, when the waters were low, and game scarce, they no doubt constituted a large portion of their food. Some of the species are very fine eating.

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and much admired by the lovers of shell fish at the present day, particularly the *Unio ellipticus*, and *Alasmodonta complanata*, which are very large, and in the month of September abound in fat, to the extent of one or two ounces of clear oil in a single individual. In the early settlement of this vicinity, shells were much used for the manufacture of lime, being burnt in piles of alternate strata of logs and shells; and affording an article of the greatest purity and whiteness. They were in such abundance that a single individual could collect twenty five or thirty bushels in a day -- But at present, I think they are less numerous, being destroyed in the low stages of water by hogs, which become very fond of them and will spend whole days in the water searching for their favorite food; many times preferring them to corn, which they have been known to leave, and go in search of the more luscious clam. They have also other harrasing enemies in the Muskrats; which collect vast heaps of shells at the mouths of their favorite retreats, in the vicinity of some sunken log, on which they sit and feast upon the choicest of the molluscous race. It is also said that the white perch make use of the more thin shelled varieties, for food; being provided with strong bony plates, thickly studded with smooth round teeth, and placed in the back part of the fauces, well calculated to perform the office of "nut crackers." The favorite haunts of most of the genera are about the heads and sides of sand bars and islands, where they can nestle in the sand and coarse gravel; other kinds prefer the rocky ripples, where they can lie under the projecting edges of the loose stones; in the latter situations, are found most of the crested or winged varieties, which probably accounts for the fact, that very few of the older subjects are found with crest perfect, but generally mutilated and broken. As to their manner of propagating the species, I have been able to learn but little from my own observations, or by enquiries amongst fishermen, or others much about our rivers; and except in one or two varieties, have derived but little aid

from writers on Conchology. From the fact, that the young from the size of a pin head, to that of a pea, are found in great numbers in the sand and soft ooze at the bottom of our streams, where the water is still and calm, I am led to believe, that they are male and female, and propagated by a seminal fluid, in the manner of the finny tribe. But this is only a conjecture, which further observations may confirm or refute.

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I have as yet noticed but one variety of Univalve, in our streams; neither have I been able to collect all the species of the bivalve, as I have heard of several, which are not in my collection. -- The description of most of my shells is taken from the observations of Mr. Barnes, published in the 6th vol. of the Journal of Science; a gentleman who deserves much credit for his devotedness to American natural history.

Remarks. -- My collection is generally made up of living subjects; and the color, &c. for the drawings, selected from several individuals of the same species. -- The drawings were executed by Mr. Sala Bosworth, a young self taught artist of Marietta.

GENUS UNIO.

Generic character, from M. Lamarck.

"Shell transverse, equivalve, inequilateral, free, beaks decorticated, somewhat carious; posterior muscular impression compound; hinge with two teeth in each valve; the cardinal one short, irregular simple, or divided into two, substriated; the other elongated, compressed, lateral, extending beneath the corslet. Ligament exterior."

Remarks. -- Not expecting by these observations to throw much light on the study of Conchology, but only to describe the shells in this

vicinity, I shall not divide the genus into classes, or parts, but go on as they are numbered in the drawings - the measure is by inches and decimals.

NO. 1. UNIO CRASSUS. - Fig. 1.

A. outside of the shell, C. inside.

Shell very thick, tumid; cardinal teeth lobed, angulated; posterior cicatrix deep and rough. -- Hab. Muskingum.

Length, 3 inches; breadth, 4 inches; diameter 2 do.

Shell very thick, and oval - rounded behind, slightly angulated before; epidermis light brown; surface waved; beaks projecting; cardinal teeth deeply sulcated; anterior-cicatrix striated; cavity of the beaks capacious, but not deep; naker, (or inside of the shell) pearly white and iridescent.

Remark. -- It is a very common shell, and abounds in varieties.

NO. 2. UNIO ELLIPTICUS. - Fig. 2.

Shell regularly oval; thick, convex, glabrous, beaks depressed; teeth elevated, triangular, striated. -- Hab. Muskingum.

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Length, 3.5; breadth, 5.00; diameter, 2.125.

Shell long before; short behind, equally rounded at both extremities; beaks slightly projecting; ligament elevated above the beaks; epidermis dark brown, lighter in young specimens, and obscurely rayed -- waved on the center of the disks, and wrinkled transversely; teeth deeply divided, elevated and striated; anterior cicatrix wrinkled, posterior cicatrix rough behind and smooth before; cavity of the beaks moderate and angulated; naker pearly and beautifully iridescent on the forepart.

Remarks. -- I have a great many specimens of this shell, from very young to old; they are remarkably uniform in their proportions. Its good qualities for eating, are said to be equal to those of any other shell in these streams.

NO. 3. UNIO CUNEATUS. -- Fig. 3.

Shell ovate, wedge shaped, thick, gibbous; disks swelled; a side view of the shell bearing a strong likeness to the head of the bald eagle; lateral teeth thick; inside a rich rose color. -- Hab. Muskingum.

Length, 3.00; breadth, 4.4; diameter, 2.00.

Shell elongated and subtriangular, thick and ponderous; anterior side narrowed, thin, angulated, wedge shaped, compressed; umboes large and elevated, beaks low and distant, much decorticated; anterior lunule, long heart shaped, with an elevated ridge running from the beaks to the anterior basal margin, and projecting on that part - basal margin slightly rounded and arcuated before; anterior margin narrow and angulated; posterior margin rounded and broad; epidermis blackish brown; surface wrinkled transversely. Cardinal teeth deeply divided and sulcated; lateral teeth long, thick and striated; cicatrices deep; cavity of the beaks small and rounded; naker a rich rose color and iridescent.

NO. 4. UNIO UNDULATUS. - Fig. 4.

Shell rhombic ovate, with numerous waving folds radiating from the beaks.

Length, 4.00; breadth, 5.25; diameter, 2.00. -- Hab. Duck Creek.

Shell thick, obtusely rounded, behind, emarginate before; beaks slightly elevated; hinge margin sub-alated, compressed, carinated with a furrow on each side; anterior dorsal margin sub-truncate, epidermis blackish brown and finely

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wrinkled transversely; oblique folds, deeply indenting the anterior margin, furrows largest and deepest on the center of the disks and extending to the anterior basal margin, decussating the oblique waves; large oblong tubers below the beaks; cardinal teeth sulcated and crenated; posterior cicatrix very rough and shallow; naker pearly, irregularly spotted with olive, and most beautifully iridescent from the termination

of the ligament to the anterior basal margin, affording the richest display of colors, in which violet and purple predominate, of any shell in my collection.

No. 5. *UNIO Plicatus*. - Fig. 5

Shell sub-quadrangular, tumid with distant oblique folds; hinge margin elevated, compressed, carinated. -- Hab. Muskingum.

Length, 2.8; breadth, 2.9; diameter, 1.7.

Shell thick, posterior side short, obtusely rounded; anterior side compressed wedge shaped; beaks very prominent and projecting backwards as far as the posterior side; ligament elevated and passing between the beaks; hinge margin higher than the beaks; epidermis greenish, surface glabrous, deeply folded, indenting the anterior basal edge; cardinal teeth, sulcate, crenate, lateral in the left valve, curved, and extending up back of the cardinal tooth; posterior cicatrix rough and deep; cavity of the beaks deep and extended backwards; naker white, iridescent on the fore part, and tinged with gold color on the corslet and anterior edge.

Remarks. -- This shell does not correspond, in all particulars, with Mr. Barnes's *Plicatus*, but still I think it the same. It will stand erect very firmly when placed on the posterior side.

No. 6 & 7. *UNIO undatus*. -- Figs. 6 and 7, two varieties.

Shell sub-orbicular, very tumid; waved; lateral teeth, two in each valve. White variety, length 2.25; breadth, 2.5; diameter, 1.5. -- Hab. Muskingum.

Shell thick, disks swelled behind, depressed before; beaks projecting backwards nearly as far as the posterior side, elevated and recurved, with the ligament passing between them; anterior lunule long heart shaped; disks waved trans-

versely from the beaks to the base; basal margin rounded behind, compressed in the middle, angulated slightly before; epidermis horn color or light chestnut; surface finely wrinkled and glabrous; cardinal teeth deeply sulcated and crenated; lateral teeth, two in each valve; muscular impressions deep and posterior one rough; naker pearly white and iridescent. Variety B. is smaller than the other, and of a rich pink, or deep flesh color on the inside; both varieties will stand erect, on the posterior side, and are neat, handsome shells.

No. 8. *UNIO verrucosus purpureus*.

-- Fig. 8.

Shell nearly circular, sub-truncate before, irregularly tuberculated; tubercles transversely compressed; inside purple.

Length, 3.5; breadth, 3.6; diameter, 1.9; (larger than the figure.) -- Hab. Muskingum.

Shell very thick; rounded behind, sub-truncate before; beaks elevated, ligament deeply inserted; hinge margin nearly strait, compressed, alated; basal margin rounded; epidermis light brown, surface of the anterior part studded with transversely compressed tubercles; cardinal teeth very deeply sulcated, broad, and crenated; cavity of the beaks very deep, compressed and directed backwards; posterior muscular impression very rough, anterior one compound; naker bluish purple, and iridescent.

No. 9. *UNIO verrucosus albus*.

-- Fig. 9.

The exterior of this shell is much like that of No. 8; its form is sub-triangular, and angulated before; surface waved transversely, tubercles round and standing on the tops of the waves; cardinal teeth much smaller, and posterior cicatrix deeper; naker pearly white, and iridescent on the fore part; it is a most beautiful shell. -- Hab. Muskingum.

No. 10. *UNIO nodosus*. -- Fig. 10.

Shell sub-quadrangular, emarginate before, knotted, ridged, corrugated, lateral tooth terminating abruptly.

* Mr. Barnes, we are informed, considers it as a variety of the following. -- Ed.

Length, 2.725; breadth, 3.25; diameter, 1.7. -- Hab. Duck Creek.

Shell thick, short and obtusely rounded behind; beaks elevated, and approximate; with the ligament passing between them; anterior lunule compressed, alated; hinge margin strait; anterior dorsal, rounded; anterior margin,

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projecting; anterior basal, arcuated; basal and posterior margins, rounded; epidermis, greenish brown; corrugated and tuberculated over the center and anterior parts of the shell; tubercles large near the center of the disks, and very fine and beautiful on the beaks; wrinkled across the transverse striae on the anterior lunule, giving it a feather shaped appearance; a broad, elevated, and nodulous ridge extending from the beaks to the anterior margin, and projecting in front; cardinal teeth sulcated and deeply crenated; lateral teeth, short, thick, rough and terminating abruptly, muscular impressions nearly smooth, and the sulcus in the cardinal tooth as deep as the bed of the posterior cicatrix; cavity, deep and angular; naker, a rich pearl color, tinged with blue, and iridescent on the fore part; a very beautiful shell in its exterior, and not less admirable on the inside.

No. 11. UNIO TUBERCULATUS. -- Fig. 11.

Shell, long ovate; surface, corrugated, waved tuberculated, ribbed, disks compressed; base arcuated.

Length, 3.00; breadth, 5.00; diameter, 1.5. -- Hab. Duck Creek.

Shell, thick and rugged; anterior side compressed, narrowed, thin; posterior side, rounded, short, obtuse and broader than the anterior; beaks flat, and far back; ligament higher than the beaks; hinge margin, nearly strait, elevated, compressed; anterior dorsal, emarginate; anterior basal, emarginate; anterior margin rounded; epidermis, dark brown; surface, thinly and irregularly tuberculated; tubercles, elongated longitudinally; an elevated ridge extending from

the beaks and projecting on the anterior basal edge; irregular nodulous undulations, radiating from the elevated ridge to the hinge and anterior margins; cardinal teeth, crenated; lateral teeth, long and beautifully formed; posterior cicatrix, deep, and anterior half rough; cavity, angular, compressed and directed backwards; naker, pearly white, with spots of greenish, and most splendidly iridescent with purple, violet and gold, on the fore part.

No. 12. UNIO RUGOSUS. -- Fig. 12.

Shell, broad ovate; surface, tuberculated, ribbed, waved, disks swelled, base falcated.

Length, 1.6; breadth 1.8; diameter, 1.2.; specimen small. -- Hab. Muskingum.

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Shell, narrowed and thin before; rounded and wider behind, beaks slightly elevated; hinge margin, compressed, carinate; basal margin, falcated, emarginate and compressed; anterior margin, rounded; epidermis, dark brown; surface, rough and scaly; waved transversely, having distant, irregular, transversely compressed tubercles; a broad nodulous ridge, extending from the beaks to the anterior basal edge, and projecting on that part; small oblique waves radiating from the ridge to the hinge and anterior dorsal margins; cardinal teeth, sulcated; lateral teeth, striated; posterior cicatrix, deep and not very rough; cavity of the beaks, angular, compressed and directed backwards; naker, white and moderately iridescent.

No. 13. -- UNIO CYLINDRICUS.

Fig. 13.

Shell, much elongated transversely, sub-cylindrical; disks, flattened, beaks not much elevated; teeth, sulcated obliquely.

Length, 1.5; breadth, 3.5; diameter, 1.2. -- Hab. Muskingum.

Shell, thick, and elongated before; ligament much depressed between the valves; hinge margin, strait and elevated; anterior dorsal margin,

truncate and emarginate; posterior dorsal, rapidly narrowed; posterior margin, rounded and shortened; anterior margin, rounded; anterior basal, projecting; basal margin, shortened and arcuated; epidermis, olivaceous, wrinkled transversely, and maculated with deep green pyramidal spots, with the base inverted between the wrinkles; a broad nodulous ridge, extending from the beaks to the anterior basal margin, and projecting in front; with small elevations radiating from the ridge to the hinge and anterior dorsal margins; cardinal teeth, deeply crenated; lateral teeth, long and well defined; cavity of the beaks, deep, and directed backwards; posterior cicatrix, deep and rough; naker, pearly white, with colored spots; beautifully iridescent on the fore part.

Remark. -- I have every size of this shell, from one inch to full grown.

No. 14. UNIO PHASEOLUS. -- Fig. 14*

Shell, long ovate, thick; disks, rather flattened, ligament higher than the beaks; beaks, depressed and decorticated.

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Length, 2.00; breadth, 3.5; diameter, 1.4.
-- Hab. Muskingum.

Shell, thick and ponderous; anterior side, narrowed, thin, angulated; beaks, low; anterior lunule, carinated; basal margin, arcuated; anterior margin, narrow and rounded; dorsal margin, higher than the beaks; posterior margin, rounded and slightly gaping; epidermis, light olive and finely wrinkled transversely; cardinal teeth, rather small, lightly sulcated, and finely crenated; lateral teeth, very broad and thick; posterior muscular impression rough and deep; anterior one, deep and striated; naker, pearly; cavity of the beaks, shallow, and inner surface marked with several deep folds, running obliquely from the cardinal teeth to the anterior

* White variety of Cuneatus, No. 3. (D.H.B.)

-- Ed.

margin.

Remark. -- Quite a common shell in the Muskingum.

NO. 15. UNIO ORBICULATUS. --

Fig. 15.

Shell, nearly round; inflated, beaks somewhat prominent, broad and directed backwards; anterior lunule, broad heart shaped; cardinal teeth, elevated, angulated.

Length, 2.5; breadth, 2.5; diameter, 1.75.
-- Hab. Muskingum.

Shell, nearly orbicular; anterior margin, broad, and slightly rounded; posterior, short and narrow; disks, much inflated; dorsal margin, lightly rounded, and basal margin the same; ligament, thick and elevated, passing between the beaks; beaks, a little projecting, distant and decorticated; epidermis, a dark chestnut on the center of the disks, passing into a light brown as it approaches the margin; surface lightly waved on the upper part of the disks, and finely wrinkled below, transversely; cardinal teeth, direct, elevated and deeply sulcated; lateral teeth, thick and prominent; posterior cicatrix, deep, and rough before; anterior cicatrix, broad, finely waved; striated and beautifully iridescent; cavity, broad and deep; naker, flesh color, and very iridescent with purple and violet.

Remarks. -- This shell is a variety of the crassus; but differs so much from any I have seen that it deserves notice.

No. 16. UNIO FOLIATUS, Fig. 16.

Shell, shaped like a grape leaf, surface waved; disks, swelled; base, arcuated, and anterior margin deeply emarginate.

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Length, 2.00; breadth, 2.00; diameter, 1.12.
-- Hab. Ohio.

Shell, compressed and deeply emarginate before; rounded and projecting behind; beaks flat and eroded; ligament, more elevated than the

beaks, and passing between them; hinge margin, broad and strait; anterior dorsal margin, projecting; anterior margin, emarginate; anterior basal, projecting; basal margin, arcuated; two elevated ridges, extending from the beaks, and projecting on the anterior dorsal and basal margins, with a broad furrow between; epidermis, dark olive; waved transversely, and obscurely rayed with green, across the waves; cardinal teeth small, and that in the right valve deeply sulcated; lateral teeth, short and thick; posterior cicatrix, deep and smooth; anterior one, strongly impressed and rough behind; cavity, broad and shallow; naker, white, tinged with a beautiful pea green; iridescent on the fore part.

Remarks. -- Having but one specimen of this shell, I am unable to determine whether it is a new variety, or only a "lusus naturae."

* In Mr. Barnes's opinion it is new and distinct. -- Ed.

No. 17. UNIO ALATUS. -- Fig. 17.

Shell ovately triangular; hinge margin elevated into a large wing; valves growing together on the back of the ligament, inside purple.

Length, 4.5; breadth, 6.5; diameter, 1.7. -- Hab. Duck Creek.

Shell moderately thick, disks flat and compressed, long before and short behind; beaks depressed; ligament concealed between the valves; hinge margin nearly strait; anterior dorsal, emarginate; anterior margin, rounded and broad; posterior margin, rounded and narrow; surface deeply wrinkled; teeth elevated and crenate; anterior cicatrix, very broad; posterior composed of three distinct impressions, and also a row of very small impressions across the cavity of the beaks; naker, red-purple, very brilliant, and most splendidly iridescent on the forepart.

Remarks. -- It is difficult to procure a perfect specimen, of a full grown subject, the wing being more or less mutilated. The figure of this specimen has been drawn with great care,

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and I believe is a faithful representation of the individual designed. The inner surface of some shells, is sprinkled over with small grains, like mustard seed in size, while others are nearly or quite free from them, as is the case with the present shell.*

*We are informed by Mr. Barnes, that they may be procured in abundance at Ticonderoga. -- Ed.

No. 13. UNIO PRAELONGUS. -- Fig. 18.

Shell much elongated transversely, narrow, thick, tumid, beaks flat, lateral tooth long; thin; inside white, tinged with green or purple.

Length, 2.25; breadth, 5.6; diameter, 1.9. -- Hab. Duck Creek.

Shell, very long oval; anterior side somewhat pointed; posterior side short rounded, obtuse; beaks depressed; ligament elevated above the beaks; basal margin slightly compressed; when young, rounded; epidermis, blackish brown, wrinkled transversely, and rayed obscurely; naker, white, and tinged with spots of green, or purple under the beaks, with a row of small muscular impressions in the cavity; posterior cicatrix deep and not very rough; iridescent on the forepart.

No. 19. UNIO GIBBOSUS. -- Fig. 19.

Shell, elongated transversely, thick and gibbous; lateral tooth thick, incurved, inside purple.

Length, 2.00; breadth, 4; diameter, 1, 1.00. -- Hab. Muskingum.

Shell, much elongated transversely, thick and heavy; rapidly narrowed and rostrate before, narrow and rounded behind; disks somewhat compressed; anterior side much produced; beaks flat; ligament elevated; anterior dorsal margin, depressed and flattened; basal margin, nearly strait; epidermis, dark brown, deeply wrinkled transversely; naker, purple; teeth, crenate; lateral tooth, thick and rough, and folded over towards the inside of the shell; posterior cicatrix,

deep, and rather rough; so deep that in old specimens, it is often worn through on this part.

No. 20. UNIO RADIATUS. -- Fig. 20.

Shell, ovate, thin, finely striated, glossy, rayed, within bluish white. †

† In Mr. Barnes's opinion, a young *Ventricosus*, and not the true *Radiatus*. -- Ed.

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Length, 2.00; breadth, 3.5; diameter, 1.4.

-- Hab. Duck Creek.

Shell, thin and fragile; anterior side, broad; disks, convex; beaks, slightly elevated, and approximate; ligament, elevated; hinge margin, elevated, compressed, carinate; basal margin, a little shortened; in young shells, rounded; anterior margin, narrow; posterior, broad and rounded; anterior dorsal, subtruncate; epidermis, greenish yellow, rayed with dark green, and finely striated transversely; surface, smooth and glossy; cardinal teeth, crenated and long; cavity of the beaks, small; posterior muscular impression, broad; naker, bluish white, or pearl color.

Remarks. -- This is a very neat, and handsome shell - outer surface remarkably clean, and free from parasitic plants* -- It is said to be very superior for eating.

*Because it is young. Mr. Barnes. -Ed.

No. 21. UNIO OVATUS. -- Fig. 21.

Shell, roundish ovate, convex, umboes elevated, beaks recurved, and approximate; anterior lunule, flattened; teeth, crest-like, elevated.

Length, 3.75; breadth, 5.00; diameter, 2.25.

-- Hab. Muskingum.

Shell, broader before, and narrower behind the beaks; thin and translucent when young; and not thick when old; disks, swelled; umboes, prominent; ligament, partly concealed; anterior lunule flattened, and fuscous, becoming lamellar with striae and wrinkles; epidermis, yellowish,

or horn color; surface, glabrous and shining, deeply wrinkled, and rayed in young subjects; cardinal teeth, crest like, elevated, compressed, oblique, nearly on a line with the anterior dorsal margin; lateral teeth, short and elevated; cicatrices, smooth and polished; cavity, large and somewhat angular; naker, pearly white.

Remarks. -- This is one of the most common shells in the Muskingum, and remarkably uniform in its appearance. I think it a near relation of the *gracilis*.

No. 22. UNIO TRIANGULARIS.

-- Fig. 22.

Shell, triangular, gibbous inflated, rayed, gaping; anterior slope, flattened, ribbed, cancellate; inside, white.

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Length, 1.25; breadth, 2.00; diameter, 1.1.

-- Hab. Duck Creek.

Shell, moderately thick, acutely angulated before, obtuse, and somewhat angulated behind; disks, inflated; anterior slope, flattened, very broad, ribbed longitudinally, and wrinkled transversely; beaks, one third from posterior extremity, decorticated, approximate, and somewhat elevated; anterior lunule, oval heart shaped, in the smaller, and perfectly heart shaped in the larger specimens; basal margin, a little depressed near the anterior extremity; anterior margin, angulated; posterior margin, rounded and broad; epidermis, yellowish green, rayed with dark green, finely striated transversely, and with from three to six, more conspicuous transverse wrinkles; anterior slope, marked with longitudinal ribs, which are beautifully cancellated; ribs, projecting and forming a dentated edge; cardinal teeth, two in each valve, compressed and crenulate; lateral teeth, short, projecting, and terminating abruptly; naker, bluish white, slightly iridescent.

No. 23. UNIO GRACILIS. -- Fig. 23.

Shell, ovately triangular, very thin and fragile; hinge margin, elevated; ligament, concealed.

Length, 2.5; breadth, 3.5; diameter, 1.25.
-- Hab. Little Muskingum.

Beaks, depressed and placed far back; ligament, between the valves, and covered; anterior lunule, distinct; hinge margin, elevated into a large wing, in the perfect specimens; epidermis, sea green, wrinkled and striated transversely, glabrous; cardinal teeth, very small, scarcely projecting; lateral teeth, very thin and delicate; naker, bluish white, ringed with violet, and beautifully iridescent.

Remark. -- This shell is but a small specimen of the gracilis, in these waters. I have heard of one three times the size -- the wing is much mutilated. The contour of the shell, independent of the wing, is much like that of the alatus. It is a more delicate shell, and inside more beautifully irised, if possible -- not a common shell in this vicinity, as I have but one specimen.*

The above, are all the specimens of the U-nio, that have as yet fallen under my notice; but as my researches have

*It is abundant in Lake Champlain. (D. H. B.)
-- Ed.

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been but partial, I have no doubt, of being able to add a number more to my collection.

ALASMODONTA.

Generic Character.

Shell, transverse, equivalve, inequilateral, free; beaks, decorticated; posterior muscular impression, compound; hinge, with prominent cardinal teeth in each valve, but without lateral teeth.

No. 24. ALASMODONTA RUGOSA. --

Fig. 24.

Length, 2.25; breadth, 4.10; diameter, 1.20.
-- Hab. Little Muskingum.

Shell, oblong oval, about equally broad, before and behind; beaks, very slightly elevated, wrinkled and decorticated, wax color beneath; ligament, external, and rather higher than the beaks; anterior lunule, distinct, with a slightly elevated ridge, extending from the beaks to the anterior basal margin; basal margin, a little shortened, or nearly strait, the other margins rounded; epidermis, chestnut brown, with a silky luster; surface of the anterior part folded in a pinnate form; folds deeper and larger as they approach the anterior basal margin; curved upwards, and extending to the hinge, indenting the edge, and appearing on the inside; teeth large and elevated, having in some specimens, a curved appearance; cicatrices, smooth; cavity, small; naker, pale flesh colored in the center, pearly on the margin, with a narrow border of dark chocolate; surface, glossy, with a rich blue tinge, over the fimbriated portion of the shell.

Remarks. -- I have several specimens of this shell, young and old -- in some, the teeth are much deformed, but the valves are equal and uniform.

No. 25. ALASMODONTA COMPLANATA. --

Fig. 25.

Shell, ovately quadrangular; hinge margin, elevated into a large wing; valves, connate; ligament, concealed; wing, pinnate.

Length, 4.75; breadth, 5.9; diameter, 1.75.
-- Hab. Duck Creek.

Shell, short behind; disks, much flattened; beaks, slightly projecting; ligament, between the valves; anterior lunule, much compressed, and folded across the traverse wrinkles;

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hinge margin, elevated into a large wing, which is pinnated, or folded; forming an obtuse angle with the post dorsal margin; basal margin, rounded; anterior dorsal, arcuated; anterior margin, truncate; posterior, rounded; epidermis, dark brown, with a tinge of red below the beaks; surface, wrinkled; slightly elevated ridges and fur-

rows extending from the beaks, to the anterior margin; teeth, elevated, sulcated, and radiating from the beaks; cicatrices, smooth; cavity, small and angular; naker, bluish white, and iridescent on the forepart, with a border of rich reddish brown, on the margin.

Remarks. -- I have several specimens of this shell, in all of which the wing is folded, in some, very beautifully -- generally found in ripples, or rapid water, and rocky bottom.

GENUS ANODONTA

Generic Character.

Shell transverse, with three obsolete muscular impressions, hinge simple; destitute of teeth.

No. 26. ANODONTA UNDULATA. --

Fig. 26

Shell very thin, not thicker than brown paper; convex, nearly oval; epidermis greenish, or olivaceous, darker on the umbo; obscurely rayed and striated longitudinally; rays lighter than the general surface; distantly waved transversely, waves appearing on the inside; beaks prominent, acute, approximate; slightly decorated, wax color beneath; ligament partly concealed; hinge margin rectilinear; anterior dorsal margin compressed and angulated; anterior margin sub-truncated; posterior margin

rounded and projecting; basal margin ovals rounded; surface glossy and polished; destitute of cardinal or lateral teeth; naker light cerulean, tinged with violet; cavity capacious; basal and anterior margins bordered with a broad line of rich brown.

Length, 1.75; breadth, 3.00; diameter, 1.25. -- Hab. Little Muskingum. A very delicate and beautiful shell.

The only specimen of univalve, is figured No. 27, and was found in the Little Muskingum; it is the largest I have seen of that species, smaller ones being very common. -- It appears to belong to the genus Paludina; species Decisa; as described in American Conchology, plate 2, fig. 6. -- It is 1.5 in length, and 1.00 in diameter.

Closing Remarks. -- In the above list of shells there are four varieties, which I have not seen described, and have ventured to

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give them specific names, viz. Orbiculatus, Phaseolus, and Foliatus, of the Unios; and Undulata, of the genus Anodonta -- my other descriptions are generally copied from Mr. Barnes, except in particulars where my specimens differed from his. The subject is in a manner new to me, and lacks the finish of an experienced workman.

EDITORIAL NOTE. This paper is accompanied by two plates which are not reproduced here as it is nearly impossible, judging by previous experience, to obtain satisfactory reproduction by the means available to STERKIANA.

A. L.

REPRINTS OF RARE ARTICLES ON MOLLUSCA. -- Robert Bell on Recent Land and Fresh-water Shells collected around Lakes Superior and Huron in 1859-60. --- Canadian Naturalist and Geologist, vol. 6, pp. 268-270, 1861.

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ARTICLE XVII. -- List of Recent Land and Fresh-water Shells collected around Lakes Superior and Huron in 1859-60. By Mr. Robert Bell, Assistant to Alexander Murray, Esq., Geological Survey of Canada.

(For the "Canadian Naturalist.")

TERRESTRIAL GASTEROPODA.

1. *Helix alternata*, Say. North shore of Lake Huron; Manitoulin Islands and the smaller islands between them and the main land; S. W. side of Georgian Bay. On a small island near Lacloche Island about a pint of these shells was collected in the space of two yards.

2. " *albolabris*, Say. Keweenaw Point; Grand Island; north shore of L. Huron; Manitoulin Islands; S. W. side of Georgian Bay.

3. " *monodon*, Raskett. Grand Island; E. shore of L. Superior; Grand Manitoulin Island; S. W. side of Georgian Bay; Sarnia.

4. " *tridentata*, Say. S. W. side of Georgian Bay.

5. " *concava*, Say. Rabbit Island; Sarnia.

6. " *multilineata*, Say. Abundant on swampy ground at Sarnia.

7. " *aborea*, Say. East side of L. Superior; Sault Ste. Marie; N. side of L. Huron; Ma-

nitoulin Islands; S. W. side of Georgian Bay.

8. " *striatella*, Anthony. East shore of L. Superior and north of L. Huron; Grand Manitoulin Island.

9. " *lineata*, Say. East shore of L. Superior; Sault Ste. Marie; Bruce Mines; Mississauga River; Grand Manitoulin Island.

10. " *labyrinthica*, Say. Batchawah-nah Bay; Sault Ste. Marie; Mississauga River; Grand Manitoulin Island.

11. " *chersina*, Say. Bruce Mines.

12. " *fuliginosa*, Griff. S. W. side of Georgian Bay; Sarnia.

13. *Succinea ovalis*, Gould. Tequamenen River (near Whitefish Point); Mississauga River; Grand Manitoulin Island; Sarnia.

14. " *avara*, Say. Manitouwaning Bay.

15. *Bulimus harpa*, Say. Bruce Mines.

16. *Vertigo* ----- Various localities on the East side of L. Superior.

FRESH-WATER GASTEROPODA.

1. *Physa heterostropha*, Say. Numerous localities on the south side of L. Superior; Goulais River; Sugar Island; Manitouwaning Bay; White Cloud Island; Owen Sound; Sarnia.

2. " *elongata*, Say. Township of Notawasaga.

3. *Limnaea stagnalis*, Lam. L'Anse; Grand Marais; Grand Island; Sarnia.

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4. *Limnaea umbrosa*, Say. Manitouwaning; Lacloche Island; Owen Sound; Sarnia.

5. " *umbilicata*, Say. Manitouwaning.

6. " *caperata*, Say. Tequamenen River; Batch-ah-wah-nah Bay.

7. " *modicella*, Say. Sarnia.

8. *Planorbis trivolvis*, Say. Sousonwagami Creek (S. side L. Superior); Sarnia.

9. " *campanulatus*, Say. Lacloche Island; Manitouwaning; Owen Sound; Small lake at Cape Rich; Sarnia.

10. " *bicarinatus*, Say. Tequamenen River; Batch-ah-wah-nah River; Lacloche Island; Manitouwaning; Sarnia.

11. " *armigerus*, Say. Bruce Mines; Manitouwaning.

12. " *parvus*, Say. Sousonwagami Creek.

13. *Amnicola porata*, Say. Sousonwagami Creek; Owen Sound.

14. *Valvata tricarinata*, Say. Sousonwagami Creek; Owen Sound.

15. " *humeralis*, Say. Owen Sound.

16. *Paludina decisa*, Say. Tequamenen River; Goulais River; Batch-ah-wah-nah River; Owen Sound; Sarnia.

17. *Melania Niagarensis*, Lea. Tequamenen River; Batch-ah-wah-nah Bay, a large coarse variety; common along the shore of Geor-

gian Bay from Cabot's Head to Collingwood.

18. " *acuta*, Lea. Abundant in St. Mary's River below the Sault.

FRESH-WATER LAMELLIBRANCHIATA.

1. *Unio complanatus*, Lea. Sousonwagami Creek; Tequamenen River; Batch-ah-wah-nah Bay; Goulais River; Mississauga River; Lacloche Island.

2. " *radiatus*, Lam. Sousonwagami Creek; Batch-ah-wah-nah Bay; Goulais River; Sugar Island; Mississauga River; Lacloche Island.

3. " *ventricosus*, Barnes. Mississauga River, very abundant.

4. " *rectus*, Lam. Mississauga River.

5. " *ellipsis*, Lea. Mississauga River.

6. *Margaritana rugosa*, Barnes. Mississauga River.

7. " *marginata*, Lea. Mississauga River.

8. *Anodonta cygnea*, Linn. Sousonwagami Creek; Lacloche Island.

9. " *subcylindracea*, Lea. Batch-ah-wah-nah Bay; Goulais River; Sousonwagami Creek.

10. " *Benedictiana*, Lea. Sousonwagami Creek; Grand Marais; Batch-ah-wah-nah Bay; Sugar Island; Lacloche Island.

11. " *fragilis*, Lam. Sousonwagami Creek.

12. " . A species like *A. implicata*, Say, Batch-ah-wah-nah Bay.

13. *Cyclas similis*, Say. Owen Sound. nen River.

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14. *Cyclas partumeia*? Say. Amagoos Creek (Batch-ah-wah-nah Bay); Tequame-

15. *Cyclas* ----- . A very small species was found in great numbers in the stomachs of whitefish at Marquette in the beginning of July.

16. *Psidium dubium* ? Say. Tequamemen River.

ANNOUNCEMENT: MALACOLOGIA, A NEW INTERNATIONAL MALACOLOGICAL JOURNAL

Thanks to a great deal of hard work and some sound planning on the part of several malacologists, the Institute of Malacology, 2415 South Circle Drive, Ann Arbor, Michigan, will now publish MALACOLOGIA, an International Journal of Malacology. Volume 1, No. 1, is dated September 1962 and sample pages have been distributed by mail to the malacological fraternity.

The following statements by the Editors will make the scope and goals of this new publication clear:

"There is a definite need for a malacological journal which publishes longer papers (i. e., those over 7-10 pages). No publication now exists which can handle such papers on an international scale, and very few local journals can publish long papers. Expansion of one of the present local malacological journals into a larger, international journal seems to be neither possible nor economically feasible. The need for such a publication is becoming more and more acute with the current rapid increase in malacological research.

"The Institute of Malacology, a non-profit organization, proposes to publish an international journal of malacology, *Malacologia*, planned specifically for lengthy and significant papers. The journal will have an international editorial board of competent and well-known malacologists, will publish in five languages, and will be inexpensive enough to ensure a relatively large subscription."

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