

ECOLOGICALLY ANNOTATED LIST OF SPECIES
CLASS PELECYPODA

Order Prionodesmacea

Family Unionidæ

GENUS LAMPSILIS Rafinesque, 1820

Subgenus Lampsilis s. s.

1. *L. multiradiata* (Lea)—Reported by Mr. Wm. A. Marsh from the "Big Vermilion River." It prefers muddy or sandy bottoms, with only a few feet of water.

2. *L. ventricosa* (Barnes)—Found in all three counties,—at White Heath, Monticello, Salt Fork, Muncie and Hillery. It is a very variable species in color, rays, degree of corpulency and thickness of the shell. It prefers muddy bottoms of the larger streams, and is frequently associated with *Euryntia fasciata* Raf. At Havana, Ill., on the Illinois River, it is a very common clam.

GENUS EURYNTIA Rafinesque, 1820

3. *E. anodontoides* (Lea)—Found only at Monticello, Piatt Co. It is a member of the deeper water fauna, either muddy or sandy bottoms, where it can burrow; often among rocks near shores. In the Winter it burrows into the mud. At Havana, Ill., it is one of the most abundant clams.

4. *E. ellipsiformis* (Conrad)—Reported by Mr. W. W. Calkins from the "Vermilion River." Its habitat is about the same as that of *L. multiradiata*.

5. *E. lienosa* (Conrad)—Reported by Mr. Wm. A. Marsh from the "Little Vermilion River."

6. *E. ligamentina* (Lamarck)—Found only once, at Muncie, Vermilion Co., on a muddy bottom.

7. *E. fasciata* (Rafinesque)—Found in all three counties,—White Heath, Monticello, St. Joseph, Muncie and Hillery. Very plentiful. It prefers the larger streams and thrives on any kind of a bottom. Those on sandy bottoms are thicker-shelled. The St. Joseph specimens are quite thin.

8. *E. subrostrata* (Say)—Abundant at St. Joseph, Champaign Co., in quiet, muddy water. Dr. Charles C. Adams also found it very plentiful in a small pond, partly dried up, at White Heath, Piatt Co.

GENUS CARUNCULINA Simpson (in Baker), 1898

9. *C. glans* (Lea)—Found only at St. Joseph, Champaign Co., about the outlet to a slaughter house. *C. parva* also occurs in this stream but not at this particular place.

10. *C. parva* (Barnes)—St. Joseph and Crystal Lake, Champaign Co.; Hillery, Vermilion Co. The female shells are greatly inflated. The species prefers a muddy bottom, burying itself to a depth of several inches; slow streams, and nearly always near their sources, are preferred. Quite abundant.

GENUS OBOVARIA Rafinesque, 1819

(Subgenus Obovaria s. s.)

11. *O. circulus* (Lea)—Hillery, Vermilion Co. It is a typical member of the Wabash River Drainage System, and is quite abundant. It prefers the deeper waters.

GENUS TRITOGONIA Agassiz, 1852

12. *T. tuberculata* (Barnes)—Sangamon River, at White Heath and Monticello; very abundant and of large size. It lives in water of all depths, preferring a sandy bottom. Musk rats do not eat this species frequently because the valves fit tightly, and because at the least signs of any intrusion, *tuberculata* closes its valves tightly and keeps them closed for a long period. Musk rats prefer other clams, such as are easier to open.

GENUS STROPHITUS Rafinesque, 1820

13. *S. edentulus* (Say)—White Heath and Monticello, Piatt Co., St. Joseph, Champaign Co. In the larger streams and bayous, on muddy bottoms, usually associated with *Anodonta grandis*.

GENUS ANODONTA Lamarck, 1799

14. *A. grandis* (Say)—At all stations in the three counties, —in lakes, bayous, and streams, preferring waters devoid of current. Muddy bottoms are preferred. Very often the entire

outside of the shell is found to be covered with the bryozoon *Plumatella polymorpha*. A hydrachnid mite, *Diplodontus* sp. frequently infests the mantle cavity. Dead valves are very often found with *Ancylus* attached to them.

15. *A. grandis* Say var. *gigantea* Lea—Mr. Wm. A. Marsh reports it from the "Big Vermillion River." No specimens were collected which could be referred to this or any of the other varieties.

16. *A. implicata* (Say)—Only at St. Joseph, Champaign Co. The only other Illinois record is that of Mr. Marsh from Lake Co. The very great variation within the species of *Anodonta*, even among individuals of the same species, makes it very difficult to make accurate determination from shell characters alone. Slight differences in the habitat (from muddy to gravelly or sandy situations) often produce marked varietal differences. The St. Joseph specimens were all dead, and the identification was made by Dr. Frank C. Baker.

GENUS ANODONTOIDES Simpson (in Baker), 1898

17. *A. ferussacianus* (Lea) var. *subcylindraceus* (Lea)—Found in all three counties (Monticello, St. Joseph, Crystal Lake and Muncie), in small streams or near the sources of the larger ones; the habitat is much the same as that of *Carunculina parva* with which species it is usually associated. Fairly abundant.

GENUS ARCIDENS Simpson, 1900

18. *A. confragosus* (Say)—Found only at Monticello and White Heath. It is a typical Illinois River species, abundant at Havana. Like *Eurynia anodontoides* and a few others, it appears to slowly ascend the Sangamon River, but the shallow water inhibits its establishment in large numbers.

GENUS LASMIGONA Rafinesque, 1831

Subgenus *Platynaias* Walker, 1917

19. *L. compressa* Lea—Hillery, Vermillion Co. Usually buried several inches in mud in streams that are neither deep nor rapid. It is fairly common.

Subgenus *Lasmigona* s. s.

20. *L. costata* (Rafinesque)—White Heath and Monticello only. This also is a deep river species which ascends in small numbers such tributaries as the Sangamon. It prefers muddy bottoms, but at one station it was the only form among the rocks. Muskrats prefer this species to other clams. This may account for the non-abundance of *costata* in shallow waters.

Subgenus *Pterosygna* Rafinesque, 1831

21. *L. complanata* (Barnes)—White Heath and Monticello, Piatt Co., St. Joseph, Champaign Co. Its habitat is much the same as that of *L. costata* and the two are usually found together. *Amblema undulata* is also usually associated with them. A specimen of *complanata* was found which measured ten inches across. Young shells are plentiful, and in many instances are distorted by cow hoofs.

GENUS *ALASMIDONTA* Say, 1818Subgenus *Pressodonta* Simpson, 1900

22. *A. calceola* (Lea)—White Heath and Monticello. Associated with *A. marginata*, on muddy bottoms in water only a few feet deep.

Subgenus *Rugifera* Simpson, 1900

23. *A. marginata* (Say)—White Heath, Monticello and Hillery. With the preceding species; not very abundant.

GENUS *ELLIPTIO* Rafinesque, 1819Subgenus *Elliptio* s. s.

24. *E. gibbosus* (Barnes)—White Heath, Piatt Co., collected by Dr. Charles C. Adams; also at Hillery, Vermilion Co. It prefers flowing waters of a few feet in depth only, with muddy bottoms in which these clams usually remain buried.

GENUS *UNIOMERUS* Conrad, 1853

25. *U. tetralasmus* (Say)—Crystal Lake, Champaign Co. Found always buried deeply in mud of quiet waters.

GENUS *PLEUROBEMA* (Rafinesque, 1820) Agassiz

26. *P. clava* (Lamarck)—Hillery, Vermilion Co., Dr. J. D. Hood, collector. This is another of the typical members of the Wabash River drainage. It prefers deeper waters, usually muddy bottoms.

27. *P. coccinea* (Conrad)—Monticello, Piatt Co., and Hillery, Vermilion Co. Fairly abundant at Monticello, in soft mud and usually seeking the deeper waters.

GENUS FUSCONAIA Simpson, 1900

28. *F. rubiginosa* (Lea)—White Heath, Monticello, St. Joseph, Homer Park, Muncie and Hillery. Very abundant; prefers the deeper waters, any kind of bottom.

GENUS QUADRULA (Rafinesque, 1820) Agassiz

Section Quadrula s. s.

29. *Q. cylindrica* (Say)—Hillery, Vermilion Co., Dr. J. D. Hood, collector. Rare at this place; typical of Wabash River drainage.

Section Theliderma (Swainson, 1840) Simpson

30. *Q. metanevra* (Rafinesque)—Deep waters of the Middle Fork at Hillery, Vermilion Co. Rare.

31. *Q. pustulosa* (Lea)—White Heath and Monticello, Piatt Co. This is another of the abundant and typical species of the Illinois River at Havana; it prefers muddy bottoms, but is often found among rock and sand.

GENUS AMBLEMA Rafinesque, 1819

32. *A. undulata* (Barnes)—In all three counties; very abundant. In streams and rivers of all depths, usually with muddy bottoms. Young shells are often deformed by cow hoofs. None of the closely related species, *A. plicata* and *Megaloniaias heros* were found, although at Havana, Illinois, they are quite abundant.

GENUS ROTUNDARIA (Rafinesque, 1820) Simpson

33. *R. granifera* (Lea)—Only one dead valve was found at Hillery, Vermilion Co. It is very typical. The species probably inhabits the deeper waters.

Order Teleodsmacea
Superfamily Cyrenacea
Family Sphæriidæ

GENUS SPHÆRIUM Scopoli, 1777

34. *S. occidentale* (Prime)—Muncie, Vermilion Co., in soft mud of ponds and bayous, or cut-offs; abundant wherever the

current is sluggish or wanting. Usually associated with *Musculium transversum*. This Sphærium was often found in places completely dried up in the Summer.

35. *S. sulcatum* (Lamarck)—In soft mud at Crystal Lake, near Urbana. Not abundant.

36. *S. solidulum* Prime—A form very close to this species, and probably referable to it, was collected in mud at Crystal Lake, near Urbana; rare.

37. *S. stamineum* Conrad—Monticello, Piatt Co., St. Joseph and Homer Park, Champaign Co. In small creeks, rivers and ponds, buried in mud or among the roots of aquatic plants.

38. *S. striatinum* Lamarck—Very abundant at Crystal Lake, St. Joseph, and the Salt Fork, Champaign Co., and at Hillery, Vermilion Co. It lives in soft mud, or at times sandy situations, buried often to a depth of eight inches. Among roots of water plants, associated with *Musculium transversum* and *M. partumeium*.

GENUS MUSCULIUM Link, 1807

39. *M. partumeium* Say—Crystal Lake, Salt Fork and Urbana, Champaign Co. Not very abundant, associated with *transversum* in soft, muddy bottoms.

40. *M. transversum* Say—Very abundant in all three counties, perhaps the most abundant of all the Sphæriidæ. Gregarious, usually associated with *M. partumeium*, *S. striatinum*, *S. occidentale* and some species of *Pisidia*. It lives in soft mud in ponds and slowly moving streams, under and among stones, among roots of aquatic plants and similar situations. Individuals were found with from 20 to 30 young within the mantle cavity.

41. *M. truncatum* Linsley—Reported from Urbana by Dr. Frank C. Baker, the specimens being in the collections of the Ill. State Lab. Nat. Hist.

GENUS PISIDIUM Pfeiffer, 1821

42. *P. compressum* Prime—Crystal Lake and Salt Fork, Champaign Co., buried in soft mud or among the roots of aquatic plants. It was very abundant in small streams and lakes.

43. *P. noveboracense* Prime—Salt Fork and in a stream of the Embarras River drainage, Northwest of Champaign, Champaign Co., in waters of moderate current, buried in soft mud or sand.

44. *P. walkeri* Sterki—Salt Fork, Champaign Co., associated with *P. compressum*, among roots of plants.

CLASS GASTROPODA
 SUBCLASS Anisopleura
 Order Prosobranchiata
 Superfamily Taenioglossa
 Family Viviparidæ

GENUS CAMPELOMA Rafinesque

45. *C. rufum* Haldeman—Monticello, Piatt Co. Also reported by Mr. Wm. A. Marsh from the Vermilion River. It prefers muddy shores of streams usually not very rapid; burrows in the mud.

Family Valvatidæ

GENUS VALVATA Muller, 1774

46. *V. bicarinata normalis* Walker—St. Joseph, Champaign Co., on water lilies and on the bottom of slowly moving streams or ponded waters, often burrowing itself into the mud or vegetable debris. It withstands much dessication.

Family Amnicolidæ
 Subfamily Amnicolinæ

GENUS AMNICOLA Gould and Haldeman, 1840

Subgenus Amnicola s. s.

47. *A. limosa* Say var. *parva* Lea—Crystal Lake, Urbana, and Champaign Co. at St. Joseph, in mud and among roots of water plants, usually in shallow water where there is but little current.

Subgenus Cincinnatia Pilsbry, 1891

48. *A. cincinnatiensis* Lea—Monticello, Piatt Co., Crystal Lake and Urbana, Champaign Co., Muncie, Vermilion Co. On the surface of muddy bottoms or buried in same; also on aquatic plants and about roots; usually near shore.

Subfamily Pomatiopsinæ

GENUS POMATIOPSIS Tryon, 1862

49. *P. lapidaria* Say—Crystal Lake, Champaign Co. Amphibious; among vegetation and debris at margins of ponds. It withstands much dessication and is very often to be found in temporary waters.

Family Pueuroceridæ

GENUS PLEUROCERA Rafinesque, 1818

50. *P. elevatum* Say var. *Levisii* Lea—White Heath and Monticello, Piatt Co. It prefers sandy bottoms of large streams, or among rocks. At Havana, Illinois, this is a very common species. The Piatt Co. specimens are very typical, and the species is fairly abundant, associated with *Goniobasis livescens*.

GENUS GONIOBASIS Lea, 1862

51. *G. livescens* Menke—Monticello, Piatt Co., and Hillery, Vermilion Co., among water weeds, on muddy or sandy bottoms; common.

52. *G. pulchella* Anthony—"Big Vermilion River" according to Mr. W. W. Calkins, Mr. E. C. Faust in the Journal of Parasitology (Vol. iv, No. 3) gives as the host of *Cercaria aurita* Faust, *G. pulchella*, but he does not state who determined his material. He gives as his locality "Salt Fork of Sangamon River, Homer," which locality is somewhat dubious,—geographically speaking.

53. *G. semicarinata* Say—"Big Vermilion River" according to Mr. Wm. A. Marsh. This may prove to be a mistake for *G. costifera* Haldeman, which species it resembles considerably.

Subclass Euthyneura

Order Pulmonata

Suborder Basommatophora

Superfamily Linnophila

Family Physidæ

GENUS PHYSA Draparnaud, 1801

54. *P. ancillaria* Say var. *warreniana* Lea—Crystal Lake, Champaign Co., after the Salt Fork was dredged. Not common. It resembles *P. sayii* but is only one-half its size. The specimens are mature.

55. *P. gyrina* Say—In all ponds and streams visited, in all three counties,—a most prolific and active species, probably the commonest of all gastropods. It is found on stones, twigs, aquatic plants, in slow running water, stagnant pools, ponds, rapid streams, temporary pools, at times in damp places far from bodies of water. It endures dessication. In January, 1909, I found it crawling on the under side of ice at Crystal Lake.

56. *P. sayii* Tappan—Urbana, Champaign Co., Dr. Frank C. Baker det. The specimens are in the collections of the Ill. State Lab. Nat. Hist. Excepting for *warreniana*, I found no *Physa* which approached *sayii*.

GENUS APLEXA "Fleming" Sowerby, 1822

57. *A. hypnorum* Linnæus—Muncie, Vermilion Co., in slowly moving or ponded waters, usually on plants or debris, under leaves, or on the muddy bottoms. It endures much dessication.

Family Ancyliidæ

Subfamily Ferrissiinæ Walker, 1917

GENUS FERRISSIA Walker, 1903

Subgenus *Lævapex* Walker, 1903

58. *F. kirklandi* Walker—Salt Fork, Crystal Lake, and Urbana, Champaign Co. Found in great abundance on stems and the under sides of leaves of water lilies. The water of the lake was ponded since the dredging of the Salt Fork; this limpet was not found prior to the ponding of the waters of this lake. *F. tardus* was the only form found prior to this, but after the dredging of the Salt Fork, *tardus* disappeared completely and was replaced by *kirklandi*. *Gundlachia meekiana*, present in the lake before its waters became ponded, also disappeared.

(Subgenus *Ferrissia* Walker, 1903)

59. *F. rivularis* Say—White Heath, Piatt Co., Salt Fork, Urbana, Champaign Co., on sticks and plants. At White Heath, Piatt Co., Salt Fork, Urbana, Champaign Co., on sticks and plants. At White Heath it was found in a small stream near the Sangamon River, attached to rocks where the current was the strongest. In the Salt Fork also, it sought places of swift current.

60. *F. shieki* Pilsbry—Salt Fork, Urbana, Champaign Co. In the collections of the Ill. State Lab. Nat. Hist. Special attention was paid to the Ancyliidæ to rediscover *shimeki*, but none were located.

61. *F. tardus* Say—Sangamon River at White Heath, Piatt Co., on stones and empty *Anodonta* valves, usually among rich algal growth, preferring quiet, shallow water. It was found at Urbana, Crystal Lake, and in the Salt Fork. See remarks under *kirklandi*. Mr. Charles A. Hart collected it at Muncie, on rocks in Stony Creek.

GENUS GUNDLACHIA Pfeiffer, 1850

Subgenus Kincaidella Hannibal, 1912

62. *G. meekiana* Stimpson—Crystal Lake, Urbana, abundant on floating sticks; April. After the Salt Fork was dredged and the waters of Crystal Lake became ponded, this interesting limpet disappeared.

Family Lymnæidæ

Subfamily Lymnæinæ

GENUS LYMNÆA Lamarck, 1799

Subgenus Pseudogalba Baker, 1913

63. *L. humilis* Say var. *modicella* (Say)—White Heath, Piatt Co., Crystal Lake, Champaign Co., Muncie, Vermilion Co. Very abundant, on sticks and woods, on muddy bottoms, etc., stones, of slow moving streams or ponds. It prefers the marginal zone, often entirely out of the water on damp, or moist mud banks; sometimes quite distant from water. At the Brownfield Woods it was present in the intermittent stream, a stream which was usually dry. This Lymnaea endure much dessication. It is associated mostly with *L. parva* and *Physa gyrina*.

64. *L. obrussa* (Say)—Urbana, Salt Fork, Crystal Lake, Champaign Co. In ponded waters, among leaves; also in small streams with sluggish current, upon sticks, leaves, stones, etc. It also can endure considerable dessication.

65. *L. parva* (Lea)—Salt Fork, Crystal Lake, Champaign Co., associated with *L. humilis modicella* and of more or less the same general habits. Not very common.

(Subgenus Galba Shranck, 1803)

66. *L. caperata* (Say)—Urbana and Cottonwood Woods, Champaign Co., Muncie, Vermilion Co. Usually in temporary bodies of water, ponds, bayous and slowly moving streams, preferring the outer zone where it lies among the vegetation and debris associated with *Aplexa hypnorum*, *Physa gyrina* and *Sphaerium occidentale*. Endures much desiccation.

67. *L. palustris* (Muller)—Urbana, Champaign Co., collections of the Ill. State Lab. Nat. Hist. Young specimens were collected by me in 1910 in a creek feeding into the Salt Fork near a slaughter house at St. Joseph. The surfaces of these were much malleated.

Subfamily Planorbinae

GENUS PLANORBIS Muller, 1774

Subgenus Hipeutis Agassiz in Charpentier, 1837

68. *P. exacuouus* Say—Crystal Lake, Urbana, Champaign Co. Similar in habits and habitat as *P. parvus*, associated with it. Sometimes it is found on lily pads.

(Subgenus Gyraulus Agassiz [in Charpentier,] 1837)

69. *P. deflectus* Say—Crystal Lake, Urbana, Champaign Co. On sticks, stones, and plants in quiet waters, usually in deeper water than that preferred by *parvus*.

70. *P. parvus* (Say)—Monticello, Piatt Co., Crystal Lake, Urbana, and Salt Fork, Champaign Co. On stems of submerged plants and on objects in the water. Often in tangled masses of *Spirogyra* and other algae. Very abundant, often associated with *P. exacuouus*.

(Subgenus Helisoma Swainson, 1840)

(Section Pierosoma Dall, 1905)

71. *P. trivolvis* (Say)—White Heath and Monticello, Crystal Lake, Urbana, Salt Fork, St. Joseph, and Homer Park, Muncie, Hillery and Danville. Very abundant, crawling along muddy bottoms of streams, ponds, etc., on sticks, stones, aquatic plants, etc. Gregarious. Associated usually with *Physa* and *Lymnaea*.

GENUS SEGMENTINA Fleming, 1817

72. *S. armigera* Say—Monticello, Piatt Co., Cottonwood Woods, Crystal Lake and Urbana, Champaign Co., Muncie,

Vermilion Co. In small streams and ponded waters, in hoof prints of cattle, marshy areas, etc., on aquatic vegetation, debris of all sorts, crawling on muddy bottoms, etc. Endures much dessication. Associated usually with other Planorbinae.

Superfamily Akteophila

Family Auriculidæ

GENUS CARYCHIUM Muller, 1774

73. *C. exile* H. C. Lea—White Heath, Piatt Co., Brownfield Woods, Champaign Co., Hillery, Vermilion Co. Almost amphibious; very abundant in wet places under logs and pieces of wood, in wet moss, and quite often in standing water under logs. At Hillery it is the dominant mollusk of the swampy lowlands. Gregarious; on one occasion over a hundred specimens were taken from a log two feet long and about a foot in diameter. Its movements are slow and erratic, the long shell seemingly too heavy for the animal; it is carried at an angle of about 55°. This species usually occurs alone, but at times the following snails are its companions: *Gastrocopta contracta* and *tappaniana*, *Agriolomax campestris*, *Vitrea hammonis* and *indentata*, and *Zonitoides arboreus*. Of these, the most common companion is *G. Contracta*. In very wet places it is associated with the smaller species of *Lymnaea*. No specimens of *C. exiguum* were found, although Baker ('02, p. 256) states the two species are almost always found together. Almost a thousand specimen of *Carychium* were examined.

Suborder Stylommatophora

Monotremata

Vasopulmonata

Orthurethra

Family Valloniidæ

GENUS VALLONIA Risso, 1826

74. *V. pulchella* Muller Monticello, Piatt Co., Urbana, Champaign Co., Danville, Vermilion Co. This is a species of the open prairie, and is plentiful under logs in open lots. I have never found it in the deep woods. No other species of *Vallonia* was found although a very careful search was made.

Family Pupidae

GENUS STROBILOPS Pilsbry, 1892

75. *S. affinis* Pilsbry—In back yard of Mr. C. A. Hart's home at 923 W. Green St., Urbana. Under logs that laid there undisturbed for many years. Not abundant with *Gastrocopta contracta*.

76. *S. labyrinthica* (Say)—Brownfield Woods only. Not common. It was found near the outer border of the woodland, in open spots as a rule. Under loose bark of logs, in half decayed wood, under logs, among dead leaves and in the sod at base of trees; usually associated with *Gastrocopta contracta*, *Zonitoides arboreus*, *Vitrea indentata* and *Euconulus chersinus*. Its movements are slow and deliberate. The shell is carried flat, occasionally wobbling from side to side.

GENUS PUPOIDES Pfeiffer, 1854

77. *P. marginatus* (Say)—Near the Cottonwood Woods, Champaign Co., and at Oakwood, Vermilion Co. This is a species of the open prairie, occurring under logs and railroad ties. It is seldom found in woods.

GENUS GASTROCOPTA Wollaston, 1878

78. *G. armifera* (Say)—Urbana and Mount Hope Cemetery, Champaign Co., Muncie, Vermilion Co. This species prefers the dry upland and open associations, living as a rule under logs, stones and other objects. Not found as yet in the deep forest.

79. *G. armifera* Say var. *affinis* Sterki—Monticello, Piatt Co., under a log in a wet lowland association. This subspecies appears to be adapted to more hygrophytic habitats than is *armifera* s. s.

80. *G. contracta* (Say)—At all localities in the three counties. This is the commonest member of the *Pupidae*, and next to *Zonitoides arboreus*, perhaps the commonest snail. It prefers the mesophytic forest, living there under a great variety of situations, and from this optimum, it runs into both upland and lowland types, being able to withstand more the hydrophytic than the mesophytic extremes. It commonly lives under bark and in the interstices of bark, under logs, etc. On one occasion fifteen specimens were collected from a square meter

of clear forest floor. It also lives in crumbly soil. It is associated with a host of other snails, particularly the following: *Helicodiscus parallelus*, *Zonitoides arboreus*, *Gastrocopta tappaniana*, *G. holzineri*, *Strobilops labyrinthica*, *Pyramidula perspectiva* and *alternata*, *Zonitoides nitidus*, *Z. minusculus*, *Vitrea indentata* and *hammonis*, *Paravitrea significans*, *Euconulus chersinus* and *Sphyradium edentulum*. All, or most of these, are species that inhabit the moist areas under logs, or under bark. In Mr. Hart's back yard, *contracta* was associated with *G. armifera*, *Vallonia pulchella*, *Euconulus trochiformis* and *Strobilops affinis*. The movements of *contracta* are slow and precise, the shell being carried erect, though appearing cumbersome for the animal.

81. *G. holzigeri* (Sterki)—Brownfield Woods, Champaign Co. Found only on one occasion, under a log, associated with *G. contracta* and *Helicodiscus parallelus*. It prefers exposed hillsides.

82. *G. pentodon* (Say)—Brownfield Woods, Champaign Co., Muncie, Vermilion Co., very rare.

83. *G. tappaniana* (C. B. Adams)—Monticello, Piatt Co., Brownfield Woods, and University Forest, Champaign Co., Hillery, Vermilion Co. This species is rare in the Brownfield Woods, occurring only in moist places, such as under logs, pieces of bark and dead leaves, stones, and rubbish of all sorts, or on twigs or at base of trees. At Hillery I found it under pieces of bark in the river bottoms, associated with *contracta* and *Carychium exile*. The shell is carried almost flat. The animal moves about very sluggishly.

GENUS VERITGO Muller, 1774

Subgenus *Vertigo* s. s.

84. *V. ovata* Say—Monticello, Piatt Co., low moist places, under leaves, stones, sticks, etc.

85. *V. tridentata* Wolf—Brownfield and Cottonwood Woods, rare. Under loose bark of fallen trees, associated with *Gastrocopta contracta* and *Sphyradium edentulum*. According to Binney, this is one of the more aquatic species. Shimek records it on rather exposed, rocky, moss-covered banks.

Subgenus *Angustula* Sterki

86. *V. milium* (Gould)—Monticello, Piatt Co. Under a log in a wet lowland association, with *Gastrocopta armifera* var. *affinis*. Rare.

Heterurethra

Superfamily Elasmognatha

Family Succineidæ

GENUS SUCCINEA Draparnaud, 1801

87. *S. avara* Say—Monticello, Piatt Co., Brownfield and Cottonwood Woods, Champaign Co. Not common. Usually found in a wet lowland association, attached to stones, leaves, stems and trunks of trees.

Sigmurethra

Superfamily Holopoda

Family Helicidae

GENUS POLYGYRA (Say, 1818) Pilsbry

Subgenus Triodopsis Rafinesque, 1819

88. *P. albolabris* (Say)—Hillery, Vermilion Co. It occurs plentifully among the leaves and under logs in the ravines of the moist woods. Usually associated with *fraudulenta*, *elevata* and *zaleta*. Forest fires almost wiped out this species and others of the genus from this area.

89. *P. clausa* (Say)—Danville, Vermilion Co., in moist woods, under a log; not common.

90. *P. elevata* (Say)—Brownfield Woods, Champaign Co., Muncie and Hillery, Vermilion Co. At Hillery, this species is very common on the wooded clay hillsides, and among the accumulations of leaves and debris in the ravines. Associated with *albolabris*, *thyroides*, *fraudulenta* and *zaleta*.

91. *P. fraudulenta* Pilsbry—Hillery, Vermilion Co., not very common. In the ravines, also in an outcrop of loess. Prefers a moist situation under fallen leaves or bark of logs. Usually associated with other of the larger gelices.

92. *P. mitchelliana* (Lea)—Hillery, Vermilion Co., among leaves on moist ground in the ravines. Rare.

93. *P. pennsylvanica* Green—White Heath, Piatt Co., Brownfield Woods, Champaign Co., Muncie and Hillery, Ver-

milion Co. The White Heath specimens are very dark, almost brick red in color. This species is usually found at the base of tree trunks and about logs, and among fallen leaves. A few times, in November, I noticed them in small cavities in the surface of the soil. It is usually associated with *Zonitoides arbo-reus*, *Pyramidula alternata* and *Polygyra thyroides*. *Circinaria concava* is often present as an intruder, as is evident from the number of empty shells of this *Polygyra*.

This *Polygyra* is very shy in nature, its movements slow, and as a rule very careful. The shell is carried back of the center of the animal and lies almost flat. The least disturbance causes the animal to retreat into its shell. Upon coming out again, it apparently uses much caution. Shrews eat this *Polygyra* quite often. In the burrow of one shrew, under a log, 93 empty shells of *pennsylvanica* were found. Of these, 42 (or 48%) had the spires broken by the shrew. It would appear that due to the extreme shyness of this snail, the shrew is obliged to break the shells in order to get at the animal. In this same place were 154 empty shells of *P. thyroides* of which only 23 or 16% had the spires broken. The habits of *thyroides* will be discussed in their proper place, suffice it to say here that this snail is bolder, and hence the shrew gets its choice meal with a minimum expenditure of effort.

94. *P. thyroides* (Say)—White Heath, Piatt Co., Brownfield and Cottonwood Woods, Champaign Co., Muncie and Hillery, Vermilion Co. About half of the specimens found were dentate. This species is our commonest of the larger helices, and is typical of the mesophytic woods. It endures conditions entering into the xerophytic and hydrophytic associations, but is able to get along much better in the wet than in the dry. Dryness causes it to aestivate. In the Cottonwood Woods it was very abundant. This woods is damper than the Brownfield. I found that in woods that were dry, though not exactly xerophytic, that there was a tendency among the *thyroides* to approach the subspecies *bucculenta*. While typically a ground species, *thyroides* has been found to ascend tress, having been found as much as ten feet from the ground. In this respect it resembles *Pyramidula alternata*.

In habits this species is very bold, and even when handled quite roughly, it does not withdraw into its shell. A small percentage, however, seem to be more cautious. This snail is a voracious feeder; its excrement is dark in color, often olive green, its form long and slender, spirally coiled. During Spring i. e., as they emerge from hibernation, the "basking" habit is well marked. The common short-tailed shrew, *Blarina brevicauda* Say, preys largely upon this snail. During Winter the shrews leave the barren corn fields and burrow into the woods. Here their burrows open under logs; the *Polygras* hibernate under logs, often in burrows of shrews. In fact it would appear as if *Blarina* prepares a suitable retreat for these snails in order that later, when snow covers the ground, its feast may be a certainty. In the notes under *pennsylvanica* reference was made to 154 empty shells of *thyroides* in a shrew's nest, and that of these, only 23 had the spires broken. The reason for this is that this snail is not timid and hence the shrew does not have to break the shell to get at the animal. The few broken shells probably indicate individuals that were somewhat cautious, or, due to considerable handling by the shrew, some of these snails retreated into their shells.

Shull ('07, P. 495) has shown that shrews move the snails near the ground surface as the temperature falls, and move them further into the burrows when the temperature rises. Dead shells were never transported. The basis for distinguishing between live and dead snails must be odor. Another serious enemy of *thyroides* is *Circinaria concava*.

95. *P. zaleta* (Binney)—Brownfield Woods, Champaign Co. (one young shell), Hillery, Vermilion Co. At the last place this species has its optimum habitat requirements, living in the damp, wooded ravine slopes, among dead leaves, twigs, debris, and in the loose crumbly earth and humus. It wants shade. Its companions are usually *albolabris elevata*, and *fraudulenta*. It is not a timid species.

(Subgenus *Stenotrema* Rafinesque, 1819)

96. *P. fraterna* (Say)—Hillery, Vermilion Co., in shaded, moist situations, under bark, leaves and logs. Usually with *thyroides*.

97. *P. hirsuta* (Say)—White Heath, Piatt Co., Brownfield and Cottonwood Woods, Urbana, Champaign Co., Muncie and Hillery, Vermilion Co. A rather common species, living in damp situations, such as under debris or bark of fallen logs, or under loose bark of standing dead trees. Adults from the Brownfield Woods vary greatly in size. The following snails are associated with it: *Gastrocopta contracta*, *Zonitoides arboreus*, *Vitrea indentata*, *V. hammonis*, *Polygyra thyroides*, *Pyramidula alternata* and *P. perspectiva*. The animal is very active. The young are more gregarious than the adults. I found this snail frequently among the gills of fleshy fungi, and among mycelium.

98. *P. monodon* (Rackett)—Muncie and Hillery, Vermilion Co. Its habitat is similar to that of *hirsuta*, excepting that it prefers drier situations. Usually it is found under stones. In one instance I found it in the open prairie, under a boulder. It associated with *Vitrea hammonis*, *Zonitoides arboreus* and *Pyramidula perspectiva*. The open prairie form is smaller than those from damp ravines.

Superfamily Agnathomorpha
Family Circinariidae

GENUS CIRCINARIA (Beck, 1837) Pilsbry

99. *C. concava* (Say)—White Heath, Monticello, Brownfield Woods, Cottonwood Woods, St. Joseph, Homer Park, Muncie, Hillery and Danville. A fairly common species, found in almost all kinds of situations. At times it was found under four to eight inches of soil. It probably is also subterranean in habits. I have found it at night crawling boldly over logs in search of prey. It seems to prefer cool, damp woods, and at Hillery was rather abundant under debris on the banks of the Middle Fork of the Vermilion River. The species is more or less solitary in habits, though at times two and three may be found together; usually one or two of these disappear mysteriously. Ordinarily *concava* is timid, but when in quest of food it knows neither fear nor delay, and its appetite is always voracious. The lair of *Circinaria* is decorated with the empty shells of its victims, in the main part species among which it had associated. These usually are our several species of *Polygyra*, *Vitrea indentata*, *Paravitrea significans*, *Zonitoides*

arboreus and *Philomyces carolinensis*. It seems to have respect for the slimy mucus of *Philomyces*, but the stiff hairs on the shell of *Polygyra hirsuta* do not seem to worry it. It is nocturnal in habits.

Superfamily Aulacopoda

Family Zonitidæ

Subfamily Zonitidæ

GENUS VITREA Fitzinger, 1853

100. *V. hammonis* Strom—Monticello and White Heath, Piatt Co., Brownfield and Cottonwood Woods, Urbana, St. Joseph, Champaign Co., Muncie and Hillery, Vermilion Co. This species prefers a moist situation. It is gregarious, occurring in great numbers in crevices of the bark of decaying trees, logs and in debris. It is usually associated with *Euconulus trochiformis*, *Gastrocopta contracta*, *Zonitoides nitidus* and *Carychium exile*.

101. *V. indentata* (Say)—Monticello and White Heath, Piatt Co., Brownfield and Cottonwood, Urbana, St. Joseph and Homer, Champaign Co., Muncie and Hillery, Vermilion Co. Very abundant, gregarious, almost as abundant as *Z. arboreus*, occurring in almost as many diverse habitats. It was collected in the interior of very soft and wet logs, in small cavities in the pileus of a fleshy fungus (*Russula emetica* Fr.) in the interstices of bark, under logs, in crumbly soil under logs, in leaf mould, under loose bark of standing dead trees, in moss, under fallen twigs, under stones, in both high and low places, at times in situations that were quite dry. It was found almost always with *Z. arboreus* and *nitidus*, but frequently with the following species also: *Polygyra hirsuta*, *thyroides*, *monodon*, *fraterna*, and *fraudulenta*, *Helicodiscus parallelus*, *Pyramidula alternata*, *P. perspectiva*, *Vitrea hammonis*, *Paravitrea significans*, *Euconulus chersinus*, *Philomyces carolinensis*, *Strobilops labyrinthica*, *Gastrocopta contracta* and *Agriolimax campestris*.

In bringing to the laboratory Pupidæ, Zonitidæ and other of the smaller snails, it was quite an easy matter to separate *indentata*. All that was necessary was to slightly moisten the entire mass and then just pick up the snails that were crawling away. These were *indentata*,—it is not a shy species, in fact is perhaps our boldest and most active one. It carries its shell

at an angle of 45° but the rapid movements of the animal in crawling causes the shell to wobble from side to side. It is a voracious feeder. The eggs are tiny, 1.2 mm. by 0.99 mm. They are laid during April, and the young hatch in 21 days.

GENUS PARAVITREA Pilsbry, 1898

102. *P. significans* (Bland)—Brownfield and Cottonwood Woods, Champaign Co. Not common. This is the first record of this species in Illinois, and its range is thus extended about three hundred miles northward. Dr. Bryant Walker made the identification. Fourteen specimens were collected in three years, of these nine came from the Brownfield Woods. It occurs under logs, large limbs, etc., usually in the crumbly soil. In fact nearly all my material came from such soil. Moist, cool situations are preferred, and in the Brownfield Woods it was found only in the deepest ravines, and on the north slopes of these. In the Cottonwood Woods it was taken in the lowest portions, where the moisture was greatest. It appears to be subterranean in habits. It was collected with *V. indentata*, *Z. arboreus*, *Circinaria concava* (which feeds on it) and *Pyramidula alternata*. It is a very shy species. Its movements are slow and careful. The shell is carried at an angle of about 30° from the horizontal.

GENUS EUCONULUS Kobelt

103. *E. chersinus* (Say)—Brownfield Woods, Champaign Co. Not common. Under damp logs, in the interstices of bark, on fallen leaves, twigs, etc., and once under stones. It does not seem to prefer the very moist situations, and is usually associated with *Gastrocopta contracta*, *Paravitrea significans*, *Strobilops labyrinthica*, *Vitrea indentata*, *Zonitoides arboreus*, *Pyramidula alternata*, *Helicodiscus parallelus* and *Sphyradium edentulum*. The animal is very shy.

104. *E. trochiformis* (Montfort)—In Mr. Hart's back yard, Urbana, under a log; not very common.

Subfamily Ariophantinae

GENUS ZONITOIDES Lehman, 1862

105. *Z. arboreus* (Say)—White Heath, Monticello, Brownfield and Cottonwood Woods, Urbana, St. Joseph, Homer, Homer Park, Muncie, Oakwood, Hillery and Danville; almost

everywhere and in all sorts of situations; perhaps the commonest snail. It prefers damp places, especially under boards, logs, interstices of bark, fallen twigs, under stones, in leaf mould, and in crumbly soil. In Winter individuals are found all huddled together in deep crevices and in the burrows of insects. This species is associated with nearly all the mollusks found in the Augerville Woods, including those of the hygrophitic plant association.

Gregarious, very active, very voracious. The shell is carried at an angle of 45° , the head and neck stretched out far. The eye peduncles are always thrust out nervously, as if in search of danger. It is relatively easy to separate *arboreus* from *nitidus* and *hammonis* by the manner in which the shell is carried. In addition to this, the animal of *nitidus* is decidedly blacker. In *hammonis* the last whorl is much wider than in the other species.

106. *Z. minusculus* (Binney)—Monticello, Piatt Co., Brownfield and Cottonwood Woods, Urbana, Champaign Co., Muncie, Vermilion Co. Not common. Found in the woods among decayed logs, in humus and old leaves, under bark, etc. It prefers damp and cool habitats, but at times is to be found in moist prairie situations, under boulders. This species is probably subterranean in habits.

107. *Z. nitidus* (Muller)—Monticello, Piatt Co., Brownfield and Cottonwood Woods, Urbana, Champaign Co., Muncie and Hillery, Vermilion Co. This species is commonly gregarious under logs and loose bark. It prefers damp situations and so far has been found in this region only along the shaded ravines. It often congregates in the interstices of the bark. Associated with *arboreus*, *indentata*, *hammonis*, *Agriolimax campestris* and *Gastrocopta contracta*.

GENUS GASTRODONTA Albers, 1850

108. *G. intertexta* (Binney)—Reported by Mr. Wm. A. Marsh from Vermilion Co.

109. *G. ligera* (Say)—Reported by Mr. Wm. A. Marsh from Vermilion Co.

Family Limacidæ

GENUS AGRIOLIMAX Morch, 1868

110. *A. campestris* (Binney)—White Heath, Monticello, Brownfield and Cottonwood Woods, Urbana, St. Joseph, Homer, Homer Park, Muncie, Oakwood, Hillery and Danville. Another of our very abundant mollusks. It is found everywhere, in forest and open, on streets and walks, under debris of all kinds, under logs, bark, stones, leaves, etc., preferring cool, moist habitats as a rule, and associating with nearly all the terrestrial mollusks, in particular with the Zonitidæ. In hydrophytic associations it is found with Lymnæidæ and Physidæ, sometimes in places that are extremely wet.

The average duration of the egg stage, as determined in the laboratory, was 13 days 7 hours. The eggs are spherical, 1.5 mm. to 2.5 mm. in diameter. Sometimes unusually large and elliptical eggs occur among them. The young slugs measure 3 mm. upon hatching.

Family Philomycidæ

GENUS PHILOMYCUS (Rafinesque, 1820) Ferussac

111. *P. carolinensis* (Bosc)—White Heath, Piatt Co., Brownfield Woods, Cottonwood Woods, Urbana, St. Joseph, Homer, Homer Park, Champaign Co., Muncie, Oakwood, Hillery and Danville, Vermilion Co. This is the commonest slug occurring under bark. It frequents "starting" bark of fallen or standing dead trees, sometimes in the interior of decayed trunks. With *Pyramidula alternata* it is the first invader under bark, thus favoring rapid disintegration of the wood. This slug is more or less solitary, but under the bark of a large log as many as a dozen specimens will be found scattered about.

The eggs resemble drops of whitish gelantine with their centers much whiter. They measure 4 mm. by 3.2 mm. When deposited they are practically spherical, but within a few hours they change to elliptical. The egg stage is approximately seventeen days.

This slug has frequently been found completely covered with the excrement of the larvæ of *Scolecampa liburna*, a lepidopter that riddles dead, soft wood. In such cases the bark still covers the log, although it is completely loosened. This slug lives among certain ants (*Camponotus herculeaneus* L.),

among salamanders (*Plethodon erythronotus*), coleopterous larvæ (especially of *Pyrochoa flabellata*), diplopods, chilopods, etc. The ease and thoroughness with which this slug covers itself with thick mucus is, no doubt, a very successful protection against being devoured by other animals. Even *Circinaria* respects this slime.

Family Endodontidæ
Subfamily Endodontinæ

GENUS PYRAMIDULA Fitzinger, 1833

Subgenus Patula Held, 1837

112. *P. alternata* Say—At all localities in all three counties. Gregarious; fairly abundant. It seeks moist habitats, usually under starting bark, where, with the preceding species, it is the first invader. Under stones, leaves, debris, in humus, etc. It associates usually with Zonitidæ and Pupidæ. Considerable variation in the height of the spire was noted.

Specimens collected in very humid regions died if placed in cages that were not kept moist, but specimens collected in dry habitats, did well in the laboratory. If the cages were kept moist, these individuals also did well. This species is inclined to be quite bold, but when it must retreat into the coils of its shell, it secretes an abundance of red, frothy mucus which completely fills the aperture. This has saved many an individual from the carnivorous snail, but the short-tailed shrew, *Blarina brevicauda*, simply breaks the top of the spire and thus reaches its victim. On rainy days *P. alternata* climbs to a height of ten feet or more. Its eggs are white, opaque, agglutinated and almost spherical. They measure on the average 2.25 mm. in diameter, and the entire egg stage lasts about thirty days.

113. *P. solitaria* Say—Brownfield Woods, Champaign Co., and Muncie, Hillery, Vermilion Co. Only one specimen was found in the Brownfield Woods; it was juvenile, and was found buried in six inches of soil. At Muncie, six specimens were found in four inches of soil, under a log. Dead individuals were quite plentiful at Hillery. This species associates, as a rule, with *alternata*.

Subgenus Gonyodiscus Fitzinger, 1833

114. *P. perspectiva* Say—Brownfield and Cottonwood Wood, Champaign Co., Hillery and Oakwood, Vermilion Co. In the

Brownfield and Cottonwood Woods the species was abundant, usually two individuals found together. This is probably the northernmost range of this species; it is very abundant in Tennessee and Alabama. It seems to prefer a much drier habitat than the other *Pyramidulas*. It was also found under bark of standing trees. On one occasion it was collected under a boulder in the glacial drift near Hillery. At this same town, a dozen specimens were found under the bark of a single log. It associates with other *Pyramidulas*, and with the *Polygyrinæ* and *Zonitidæ*.

GENUS HELICODISCUS Morse, 1864

115. *H. parallelus* Say—At all localities in the three counties. It is plentiful in places, usually found in the crevices of the bark, under logs, in loose, crumbly soil, etc., preferring cool situations either moist or wet. It is very rare in the dry, open areas. It associates with the majority of the smaller forms. It appears to be subterranean in habits. The animal is very shy, its movements very slow. The shell is carried almost flat. In eating it nibbles at the surface of leaves, resembling in this respect the work of certain leaf skeletonizers of the insect realm.

Subfamily Punctinæ

GENUS SPHYRADIUM Charpentier

116. *S. edentulum* Draparnaud—Brownfield Woods, rare; only three specimens were found in three and one-half years. These were under logs of moderate size, and in the interstices of bark, associated with *Gastrocopta contracta*.

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