

OCCASIONAL PAPERS OF THE MUSEUM OF
ZOOLOGY

UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN PUBLISHED BY THE UNIVERSITY

ON THE NOMENCLATURE OF CERTAIN NORTH
AMERICAN NAIADES

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Much confusion still prevails with regard to the nomenclature of North American Naiades. Two papers of Simpson (1900 and 1914) have done much to clear up the situation, but a number of cases have been contested in recent times and changes have been introduced or suggested.

A final revision of the nomenclature has often been urged. But since all attempts made to attain this object have been rather unsatisfactory, the present writers have tried to come to an understanding with regard to the disputed cases, and the present paper is the outcome of their joint labors.

The principal source of controversy has always been as to the standing of the many species described by Rafinesque between 1820 and 1831. It has seemed to us that the main difficulty in nearly all previous opinions has been the reliance upon the so-called Rafinesque-Poulson types without regard to the provisions of the International Code of Nomenclature.

So far as the Rafinesquian specimens in the Poulson Collection are concerned, it is not claimed, except in one case, that they are the original types of Rafinesque's species. They simply represent what Rafinesque understood or claimed in 1831 to be the species that he had described in 1820.

The Law of Priority as laid down in the Code (Art. 25) is as follows:

"Article 25. The valid name of a genus or species can only be that name under which it was first designated on the condition:

"(a) That this name was published and accompanied by an indication, or a definition, or a description."

Under this provision it has been held by the International Commission:

"Opinion I. The word 'indication' in Art. 25a is to be construed as follows:

"A. With regard to specific names, an 'indication' is (1) a bibliographic reference, or (2) a published figure (illustration), or (3) a definite citation of an earlier name for which a new name is proposed.

"B. With regard to generic names, (1) a bibliographic reference, or (2) a definite citation of an earlier name for which a new name is proposed, or (3) the citation or designation of a type species.

"In no case is the word 'indication' to be construed as including museum labels, museum specimens or vernacular names."

The fundamental idea underlying the present study is that no name should be accepted as valid that was not originally described, figured, or designated in such a way as to be identifiable. If the original description is insufficient, no subsequent identification of the type can revive that name, if the form has been satisfactorily described in the meantime under another name.

In considering the various questions involved in the present paper, the writers have endeavored to approach each case in a judicial manner and under the restrictions imposed by the Code. We have attempted to dismiss from our minds everything that has been written by other writers, and without predisposition, prejudice or bias, to consider each case solely on the merits of the original description. The descriptions of Lamarck are to be subjected to the same rules and have been accordingly so treated.

The references given under each form discussed do not represent a synonymy, but are intended to furnish a list of those places in literature which in each case bear upon the question in hand.

At the inception of the work it was agreed by the authors that their conclusions should be submitted to Dr. H. A. Pilsbry for his criticism and that in all cases where they were unable to agree his decision should be final and accepted by the authors. Dr. Pilsbry very kindly consented to act in that capacity, and the authors are under great obligations to him for his interest in the project and for the large amount of time that he has taken in examining the many problems that were thus submitted to him. We have adopted his decisions in all of the contested cases and have quoted largely from his remarks upon others. As now issued, the paper represents the unanimous opinion of all three of us on questions of nomenclature.

We are also very much indebted to Dr. C. W. Stiles, of Washington, D. C., Secretary of the International Commission, for his advice as to the proper interpretation and application of the Code to several cases which arose in the progress of the work.

The bibliographic references are brought down to January 1, 1922.

FUSCONAIA EBENUS (Lea), 1831

Type locality: Ohio River.

Obovaria obovalis Rafinesque, '20, p. 311.

Unio ebenus Lea, '31, p. 84, pl. 9, f. 14.

Quadrula ebena (Lea) Simpson, '14, p. 897.

Quadrula obovalis (Raf.) = *Q. ebenus* (Lea), Vanatta, '15, p. 558 ("type" examined).

Although the so-called (Rafinesque-Poulson) "type" of *O. obovalis* Raf. has been identified as *U. ebenus* Lea, the original description of the former can be applied to several species (*ebenus*, *subrotundus*, and even to forms of the genus *Pleurobema*, *U. plenus* for instance). Nothing is said of the peculiar incurved beaks of *ebenus* and the deep beak cavities. Thus, *obovalis* cannot be recognized from the original description, and *ebenus* Lea is valid.

FUSCONAIA SUBROTUNDA (Lea), 1831

Type locality: Ohio.

Obliquaria sintoxia Rafinesque, '20, p. 310.

Unio subrotundus Lea, '31, p. 117, pl. 18, f. 45.

Obl. sintoxia Raf. = *Obl. triangularis* Raf., '20, Conrad, '34, p. 72 (the latter not identified; see also under *Pleurobema pyramidatum*).

Quadrula subrotunda (Lea) Simpson, '14, p. 892.

Quadrula sintoxia (Raf.) = *Q. subrotunda* (Lea), Vanatta, '15, p. 558 ("type" examined).

Quadrula subrotunda (Lea) = *Obl. sintoxia* Raf., Walker, '16^c, p. 46, and '18^c, p. 169 ("if identifiable").

Fusconaia subrotunda (Lea) Ortmann, '19, p. 7.

Vanatta says that *Unio subrotundus* Lea is preoccupied by *Obliquaria subrotunda* Raf. '20; that this is not so has been pointed out by Walker ('16^c).

Obl. sintoxia Raf. cannot be recognized, in fact, according to the measurements of the "type" given by Vanatta, it

belongs rather to *kirtlandianus* Lea than to *subrotundus*. The original description is unsatisfactory in other respects and applies to several forms (*ebenus*, *kirtlandianus*, *subrotundus*), and one character, the rose-colored nacre, applies to none of these. Thus *sintoxia* should be discarded and *subrotundus* Lea stands.

The selection of *sintoxia* Raf. as the type of the genus *Sintoxia* by Herrmannsen ('49, p. 527) has no effect upon the revival of this name, Rafinesque's species being, in our opinion, unidentifiable.

FUSCONAIA FLAVA (Rafinesque), 1820

Type locality: Small tributaries of Kentucky, Salt, and Green rivers.

- Obliquaria flava* Rafinesque, '20, p. 305, pl. 81, f. 13, 14.
- Unio rubiginosus* Lea, '29, p. 427, pl. 8, f. 10.
- U. flavus* Raf. = *U. rubiginosus* Lea, Conrad, '34, p. 69; Ferussac, '35, p. 27; Conrad, '37, p. 74.
- Quadrula rubiginosa* (Lea) Simpson, '14, p. 872.
- Q. flava* (Raf.) = *Q. rubiginosa* (Lea), Vanatta, '15, p. 557 ("type" examined).
- Fusconaia flava* (Raf.) = *U. rubiginosus* Lea, Utterback, '16, p. 26.
- Quadrula rubiginosa* (Lea) = *Obl. flava* Raf., Walker, '18^c, p. 169, ("if identifiable").

The figures represent rather correctly the outline and posterior ridge, and the description mentions the compressed shell, the yellowish brown color of the epidermis, the pale salmon color of the nacre, and the yellow orange color of the soft parts. Also the remark that the species is found in small rivers is significant.

These characters, together with the figures, cannot be applied to any other species of the Ohio drainage and are entirely sufficient for the identification of the species, and thus *flava* Raf. stands.

FUSCONAIA UNDATA (Barnes), 1823

Type locality: Wisconsin and Fox rivers.

Unio undatus Barnes, '23, p. 121, pl. 4, f. 4.

U. undatus Barnes = *U. mytiloides* Raf., '20, Lea, '29, p. 418.

U. trigonus Lea, '31, p. 110, pl. 16, f. 40.

U. obliqua Lam. '19 = *undatus* Bar., Lea, '34, p. 88 (type of Lam. examined).

U. undatus Bar. = *U. trigonus* Lea, Conrad, 34, p. 72; Ferussac, '35, p. 28.

Quadr. obliqua Lam. = *U. undatus* Bar., Simpson, '00c, p. 788.

U. undatus Bar. = *U. trigonus* Lea, Walker, '10^a, p. 24.

Quadrula undata (Bar.) = *U. trigonus* Lea, Simpson, '14, p. 880.

Fusconaia undata (Bar.) and *F. undata trigona* (Lea), Utterback '16, pp. 22, 24.

Walker has positively shown that original description and figure of Barnes can be referred only to *U. trigonus* Lea, an opinion already held by Conrad and Ferussac.

In that connection, however, Walker (p. 17) points out that possibly *trigonus* may be a variety of *undatus*, an idea taken up by Utterback.

The identification of the type of *obliqua* Lam. as *undatus* Bar. by Lea is obviously incorrect. See also under *Pleurobema cordatum*.

The question whether *undata* is a good species or a variety of *flava* does not affect the validity of either name.

FUSCONAIA COR (Conrad), 1834

Unio cor Conrad, '34, p. 28, pl. 3, fig. 3.

Unio cor Con. = *U. edgarianus* Lea = *U. tuscumbiensis* Lea '71 = *U. andersonensis* Lea, Frierson, '16^a, p. 102, pl. 3, figs. 1-2 3 (supposed type figured).

Fusconaia cor (Con.) = *U. edgarianus* Lea = *U. obuncus* Lea = *U. andersonensis* Lea, Ortmann, '18, p. 532.

Pleurobema cor (Con.) "possibly = *U. edgarianus* Lea or some other species of that group," Walker, '18^c, p. 172.

"The supposed synonyms *Unio mytilloides* Con., *Unio crapulus* Lea and *U. lewisii* Lea are to be deleted, all being distinct from the type of *U. cor*."

“Conrad gave an excellent description of *U. cor*. His figure is poor, representing the shell as too full in the beaks and too convex. It is a case of emphasizing, or in this case of ‘restoring,’ a prominent feature, such as may be found in many published figures. The figure, like others in the same paper, was reduced, therefore drawn free-hand, and it has the faults of many of Conrad’s free-hand figures.

“Writing in 1834, Conrad could not be expected to so describe his species as to exclude others, yet to be discovered, in a numerous and difficult group.

“The type form of *U. cor* has apparently not been rediscovered. It has the beaks more produced than *U. edgarianus*, is thicker, more solid, the valves less broadly impressed, the epidermis less polished. As species go in this group, it would be considered distinct from *edgarianus*.

“*P. appressa* Lea has more the texture of *cor*, but it has a less angular posterior ridge and is invariably more compressed. This is particularly noticeable if small specimens of *appressa* of the size of *cor* are compared. The somewhat ebenus-like beaks of *cor* are another distinguishing feature.

“*P. cor* is thus distinct from *edgariana* and *appressa* as species are now estimated in that group of *Pleurobemas*.” (H. A. P.)

The localities given by Conrad for this species are the Elk and Flint rivers, Alabama, both of which are in the Tennessee system.

MEGALONAIAS GIGANTEA (Barnes), 1823

Type locality: Mississippi River, Prairie du Chien.

Unio giganteus Barnes, '23, p. 119 (as variety of *U. crassus* Say).

Unio undulatus Barnes, '23, p. 120, pl. 2, f. 2.

Unio heros Say, '29, p. 291.

U. undulatus Bar. = *U. heros* Say, '31, pl. 16.

Unio multiplicatus Lea, '31, p. 70, pl. 4, f. 2.

U. heros Say = *U. multiplicatus* Lea, Conrad, '34, p. 69.

Quadrula heros (Say), Simpson, '14, p. 825.

Megaloniaias heros (Say), Utterback, '16, p. 43.

Unio undulatus Bar. = *U. peruviana* Lam. ('19) = *U. giganteus* Bar.
= *U. heros* Say, Frierson, '16, p. 63.

U. undulatus Bar. = *U. heros* Say, Ortmann, '18, p. 539.

"The original figures of *Unio undulatus* Barnes agree closely with some broad examples compared by Pilsbry (also by Frierson). In Barnes' figure the characteristic tuberculation of *heros* would fall within the eroded area, the sculpture of which was but slightly indicated by the engraver; but the express statement of Barnes, 'Disks tuberculated below the beaks,' cannot be ignored. The figures might represent either *heros* or *undulatus* of authors (*costatus* Raf.), but the description is certainly decisive for *heros*.

"*Unio giganteus* was included by Barnes in *U. crassus*, which he described as waved. The only waved *Unio* seven inches long occurring in the region of Prairie du Chien is *U. heros*.

"Probably the beak region was eroded and the tuberculation thus escaped notice. In the absence of any other species which fills the requirements, I believe with Frierson that *Megaloniaias gigantea* should replace *M. heros*." (H. A. P.)

The view of Frierson that *U. peruvianus* Lam. is "almost certainly" this species cannot be maintained. The figure in the Encyclopédie cited by Lamarck is unmistakable. It has swollen beaks, which are not in evidence in *gigantea*, and no other points in the description indicate this species. In fact, *peruvianus* is the species generally known as *U. plicatus* Say. See *Amblyma peruviana*.

Genus PLECTOMERUS Conrad, 1853.

Type: *U. trapezoides* Lea.

Bariosta Rafinesque, '31, p. 2 (type, *U. ponderosus* Raf.); Frierson, '14^a, p. 7.

Plectomerus Conrad, '53, p. 260 (no type named).

The *U. trapezoides* has been placed in *Crenodonta* (correctly *Amblema*, which see) by Simpson ('00⁶) and Ortmann ('12), but after the restriction of this genus to the species of the type of *A. costata* (with beak sculpture not extending upon the disk), it cannot remain in it. Utterback has created for *gigantea* Bar. (*heros* Say) the genus *Megalonaias*, but it does not appear safe to unite *trapezoides* with this, while the anatomy of the female of *trapezoides* is incompletely known.

The best way, for the present, is to introduce a separate genus for *trapezoides* (Lea). Two names should be considered in this connection. The first is *Bariosta* Raf. '31, founded upon the single species *ponderosus* Raf. Frierson believes that this is the same as *trapezoides* Lea, but, as will be shown under *trapezoides* (which see), *ponderosus* is not recognizable and *Bariosta* is thus not available.

The other name is *Plectomerus* Con. No type is given for this and about nine other species are assigned to it, all "plicate" forms, generally belonging to *Amblema* and *Megalonaias*. But among them is also *Plect. crassidens* Lam. (a) = *U. trapezoides* Lea, and thus it is admissible to restrict *Plectomerus* Con. to this species as type, and with it probably goes also *U. sloatianus* Lea '40 = *atromarginatus* Lea '40 = *plectophorus* Con. '50, also standing, as separate species, under Conrad's *Plectomerus*.

If *trapezoides* should finally prove to be congeneric with *gigantea*, Utterback's *Megalonaias* (1916) would have to give way to *Plectomerus* (1853).

PLECTOMERUS TRAPEZOIDES Lea, 1831

Unio crassidens var. a. Lamarck, '19, p. 71.

Unio dombeyana Valenciennes, '27, p. 227, pl. 53, figs. 1, 1^a, 1^b.

Unio trapezoides Lea, '31, p. 69, pl. 3, f. 1.

Unio interruptus Say, '31^a, p. 525.

Unio (Bariosta) ponderosus Rafinesque, '31, p. 2.

U. trapezoides Lea = *U. interruptus* Say, Conrad, '34, p. 72.

U. crassidens var. a Lam. = *U. trapezoides*, Lea, Lea, '34, p. 87 (type examined).

U. trapezoides Lea = *U. crassidens* var. a Lam. = *U. interruptus* Say, Ferussac, '35, p. 27.

U. dombeyana Val. = *U. plicata* Say, Ferussac, '35, p. 27 (type lost); = *Q. heros* Say var., Vanatta, '10, p. 102.

Plectomerus crassidens (Lam.) = *U. interruptus* Say = *U. trapezoides* Lea, Conrad, '53, p. 261.

Bariosta ponderosus Raf. = *U. crassidens* Lam. = *U. trapezoides* Lea, Frierson, '14^a, p. 7.

Quadrula trapezoides Lea = *U. crassidens* var. a Lam. = *U. dombeyana* Val., Simpson, '14, p. 830.

Quadrula trapezoides (Lea) = *U. crassidens* Lam., Utterback, '16, p. 88, foot-note; Walker, '18^c, p. 174.

Our acceptance and adoption of Dr. Pilsbry's opinion as to the recognition of Lamarck's *Unio crassidens* carries with it the retention of Lea's name for this species.

The original description of *Unio ponderosus* is entirely inadequate for the recognition of the species as between *Unio crassidens* Lam. and *Unio trapezoides* Lea.

The proportionate dimensions given by Rafinesque for his *Unio nigra* (*crassidens* Lam.) and his *U. ponderosus* are the same, as they are in fact, in *crassidens* and *trapezoides*. The difference between the two species being that in *crassidens* the greatest height is at the anterior third of the shell, while in *trapezoides* it is at the posterior third.

Rafinesque in his generic diagnosis of *Bariosta* states that it has the form of *Scalenaria*. The only identifiable species of that genus is *scalenius*, of which he gives a figure. While there is not much reliance to be placed on his figures for exact-

ness, as a matter of fact his figures of that species are not at all like *trapezoides*, but his figure No. 25 has almost exactly the outline of *crassidens*. *Crassidens* resembles *Scalenaria* more than *trapezoides* in that the greatest diameter is at the anterior third of the shell, while in *trapezoides* it is at the posterior third. The position of the axis as given by Rafinesque is the same in *Scalenaria scalenia* and *Bariosta ponderosa*. The general shape given, "triangular or oval-triangular," applies better to *crassidens* than to *trapezoides*. *Trapezoides* would hardly be called a "thick and heavy" shell. It is certainly not nearly as much so as *crassidens*.

The "lamellar tooth, curved and not oblique," and the "oblique ridge ending to a point" would seem to point to *trapezoides*, but many specimens of *crassidens* have a well-marked umbonal ridge which ends at or just above the posterior point, and the characteristic sculpture of the disk of *trapezoides* is indicated by only one word (rough), which surely is not an appropriate description of it.

The "scabrous" lamellar tooth does not apply to either species, and the "many uneven wrinkles inside" are quite unintelligible.

For these reasons *ponderosus* must be considered to be unidentifiable, and with it goes *Bariosta* into the discard.

Genus AMBLEMA Rafinesque, 1819

Type: Amblema costata Raf. '20.

Amblema Rafinesque, '19, p. 427; '20, p. 314 (no type named).

Crenodonta Schlueter, '36, Simpson, '00c, p. 766 (as section of *Quadrula*) (type: *Unio plicatus* Say); Ortmann, '17, p. 245 (as genus).

Amblema Raf., Frierson, '14^a, p. 7 (type *A. costata* Raf.); Utterback, '16, p. 31; Ortmann, '18, p. 538; Walker, '18^b, pp. 47, 171.

Amblema Raf. '20 originally had five species. Frierson (l. c.) has designated *A. costata* as the generic type. This is a rec-

ognizable species (see below) and is congeneric with *U. plicatus* Say, the type of *Crenodonta* Schlueter '36, *Amblema* Raf. '19, thus supersedes *Crenodonta*.

AMBLEMA COSTATA Rafinesque, 1820

Type locality: Ohio River and small rivers of Kentucky.

Amblema costata Rafinesque, '20, p. 315, pl. 82, figs. 13-14.

Unio undulatus Barnes, '23, p. 120, pl. 2, f. 2.

U. costatus Raf. = *U. undulatus* Bar., Conrad, '34, p. 68; Ferussac, '35, p. 27; Conrad, '36, p. 17.

Quadrula undulata (Bar.), Simpson, '14, p. 819.

Quadrula costata (Raf.) = *Q. undulata* (Bar.), Vanatta, '15, p. 556 ("type" examined).

Amblema costata Raf. = *U. undulatus* Bar., Frierson, '16c, p. 62.

Amblema plicata costata (Raf.) = *U. undulatus* Bar., Utterback, '16, p. 39; Ortmann, '18, p. 538.

Quadrula undulata (Bar.) = *A. costata* Raf. or *U. rariplacata* Lam., '19, Walker, '18c, p. 170.

There is unanimity among all authors that *A. costata* of Rafinesque is one of the "plicate" forms of mussels. This is absolutely clear from the original description and figure, and most authors (all except Walker) have unhesitatingly identified it with *U. undulatus* Bar. of authors.

Rafinesque calls his species in the description "*aplati*" (flattened or compressed), and thus it is evident that we should refer *costata* to that form of the *plicata* group (genus *Amblema*) which differs from the others in the first place by its compressed shell, and this is the shell commonly called *undulatus* Bar.

Thus, *A. costata* is identifiable from the original description, which in addition has been verified by Vanatta by the examination of the so-called Rafinesque-Poulson type. The name is valid.

As to *undulatus* Bar., see under *Megaloniaias gigantea* Bar.

AMBLEMA PLICATA (Say), 1817

Type locality: Lake Erie.

Unio plicata Say, '17.

U. plicatus Say = *U. rariplicata* Lam. ('19), Barnes, '23, p. 120; Ferussac, '35, p. 27.

U. plicatus Say = *U. peruvianus* Lam. ('19), Conrad, '34, p. 71.

U. hippopæus Lea, '35, p. 163; '48, p. 67, pl. 1, f. 1.

Quadrula plicata hippopæa (Lea), Simpson, '14, p. 816.

Amblyma plicata (Say) = *U. hippopæus* Lea, Utterback, '16, p. 33.

U. plicatus Say = *U. hippopæus* Lea, Ortman, '18, p. 539.

Of all the "plicate" forms (*Amblyma*), only one is found in Lake Erie, from which locality Say's species was originally reported. Thus, this name must be used for the Lake Erie form, which is the *hippopæus* of Lea. It cannot be used for the form with greatly swollen beaks found in the large rivers of the interior basin (*peruviana*, which see).

AMBLEMA PERUVIANA (Lamarck), 1819

Type locality: Erroneously given as Peru.

Unio peruviana Lamarck, '19, p. 71, citing Encyclopédie, pl. 248, fig. 7.

Unio plicatus Barnes (not Say), '23, p. 120.

U. plicatus Say, '17 = *U. peruviana* Lam., Conrad, '34, p. 71; Lea, '34, p. 87 (type examined); Ferussac, '35, p. 27.

Quadrula plicata (Say), Simpson, '14, p. 814.

Amblyma peruviana (Lam.), Utterback, '16, p. 33.

Quadrula peruviana (Lam.), Walker, '18^c, p. 168.

A "plicate" species, the original description of which calls the beaks swollen (*umbonibus tumidis*). This is the most prominent character of it, and plainly indicates the form which has been called *U. plicatus* by subsequent authors, but it is not the real *A. plicata* from Lake Erie.

Lamarck cites the figure in the Encyclopédie, which is an excellent one and leaves no doubt as to the form described.

Frierson ('16^c, p. 62) says that *peruviana* "almost certainly" is *heros* Say, but the character of the beaks and the figure precludes this (see under *Megalonaïs gigantea*).

Genus *QUADRULA* Rafinesque, 1820

Type: *Obliquaria* (*Quadrula*) *quadrula* Raf.

Quadrula Rafinesque, '20, p. 305 (as subgenus of *Obliquaria*); Simpson, '00^c, p. 765 (as genus), '14, p. 811; Ortmann, '12, p. 250; Walker, '18^c, p. 43.

The subgenus *Quadrula* was introduced by Rafinesque for nine species, with no type named, but among them *Obliquaria* (*Quadrula*) *quadrula*, which should be the type (Rules, Art. 30, I. (d)) by absolute tautonymy.

Swainson ('40, p. 378) introduced the subgenus *Theliderma* for seven species, among them the type of *Quadrula* (*lachrymosa* = *quadrula*), but no type was named.

Agassiz ('52, p. 48) elevated *Quadrula* to the rank of a genus, with eight species. No type was named, but among the species is *U. rugosus* Bar. = *Q. quadrula*.

H. and A. Adams ('58, p. 497) make *Theliderma* Sw. a synonym of the subgenus *Quadrula* Raf., giving 17 species, but no type. Among the species are *lachrymosa* and *asperima*, both = *quadrula*.

Simpson ('00^c and '14) accepts *Quadrula* as genus, designating *Obliquaria* (*Quadrula*) *metanevra* Raf. as type.

Ortmann ('12) restricts *Quadrula* with *metanevra* as type, and so does Walker ('18^c).

According to the Code, *Quadrula quadrula* Raf. must be the "ipso facto" type. The subsequent designation (by Simpson) of *metanevra* is against the rules.

H. and A. Adams having made *Theliderma* a synonym of *Quadrula*, and Simpson ('00^c, p. 775) having selected for the section *Theliderma* the species *lachrymosa* (= *quadrula*) as type, *Theliderma* became a synonym of *Quadrula*. Thus, the genus and section in which *quadrula* stands must retain the name *Quadrula*.

This makes it necessary to find a new name for the section *Quadrula* (Simpson, '00), in which *metanevra* stands. *Orthonymus* Agassiz ('52, p. 48) is available, having for its type *U. cylindricus* Say; *metanevra* belongs to this group.

QUADRULA PUSTULOSA (Lea), 1831

Type locality: Ohio (and incorrectly Alabama) rivers.

Obliquaria retusa Rafinesque, '20, p. 306, pl. 81, f. 19-20.

Obliquaria bullata Rafinesque, '20, p. 307.

Unio pustulosus Lea, '31, p. 76, pl. 7, f. 7.

U. bullatus Raf. = *U. pustulosus* Lea, Conrad, '34, p. 68; '38, p. 82.

Quadrula pustulosa (Lea), Simpson, '14, p. 848.

Quadr. pustulosa (Lea) probably = *Obliquaria retusa* Raf., Vanatta, '15, p. 556 ("type" examined).

Qu. pustulosa pernodosa (Lea) = *Obl. bullata* Raf., Vanatta, '15, p. 557 ("type" examined).

Obl. retusa Raf. = *Quadr. pustulosa* (Lea), Walker, '16c, p. 46 (if identifiable); '18c, p. 168.

Quadr. bullata (Raf.), Utterback, '16, p. 49; foot-note, p. 198.

Quadr. pustulosa (Lea), Ortman, '18, p. 539.

Quadr. pustulosa pernodosa (Lea) = *obl. bullata* Raf., Walker, '18c, p. 169.

As has been pointed out by Vanatta, Ortman and Walker, *bullata* Raf. cannot be used, being preoccupied by *Obliquaria flexuosa bullata* Raf. ('20, p. 307). Moreover, although the so-called "type" of *bullata* may be *pustulosa pernodosa* (which is only a variation of *pustulosa*), Rafinesque's description contradicts this. It mentions an oblique furrow of the shell and rosy nacre, characters which are not found in *Q. pustulosa*.

As to *Obl. retusa*, even the identification of the so-called Poulson "type" is doubtful. From description and figure it is absolutely impossible to recognize it as *Q. pustulosa*, and not even the characteristic tubercles are mentioned or figured.

Thus, both names, *retusa* and *bullata*, should be discarded and *pustulosa* stands.

QUADRULA PUSTULOSA PRASINA (Conrad), 1834

Type locality: Fox River at Green Bay.

Unio prasinus Conrad, '34^b (May), p. 44, pl. 3, f. 1.

Unio schoolcraftensis Lea, '34 (Sept.), p. 37, pl. 3, f. 9.

Unio prasinus Conrad, '37, p. 79, pl. 44, f. 2.

Quadrula pustulosa schoolcraftensis, Simpson, '14, p. 850.

Simpson ('14, p. 849) makes *U. prasinus* Con. a synonym of *Quadrula pustulosa* (Lea), while he admits *U. schoolcraftensis* Lea as a variety of *pustulosa*.

The fact is that *prasinus* and *schoolcraftensis* were founded upon the same specimen. Both names were published in 1834; but according to Conrad (Mon. 9, '37, p. 80), *prasinus* dates from May, *schoolcraftensis* from September of that year. Thus *prasinus* has the priority.

QUADRULA QUADRULA Rafinesque, 1820

Type locality: Ohio River.

Obliquaria (Quadrula) quadrula Rafinesque, '20, p. 307.

Unio rugosus Barnes, '23, p. 127, pl. 8, f. 9.

Unio lachrymosus Lea, '28, p. 272, pl. 6, f. 8.

Unio asperrimus Lea, '31, p. 71, pl. 5, f. 3.

U. quadrulus Raf. = *U. rugosus* Bar. = *U. asperrimus* Lea, Ferussac, '35, p. 27.

Quadrula lachrymosa (Lea), Simpson, '14, p. 841.

Quadrula quadrula Raf. = *Q. lachrymosa asperrima* (Lea), Vanatta, '15, p. 556 ("type" examined).

Obliqu. quadrula Raf. = *Q. lachrymosa* (Lea), Walker, '16^c, p. 46, and 18^e, p. 167 ("if identifiable").

Quadrula quadrula Raf., Utterback, '16, p. 53.

The original description of Rafinesque is sufficient to recognize this species. The oblique rib and depression of the disk, forming a sinus behind, are described, also the general character and position of the tubercles. Thus the specific name *quadrula* stands. The species is the type of the genus *Quadrula* by absolute tautonymy.

QUADRULA NODULATA Rafinesque, 1820

Type locality: Kentucky River.

Obliquaria (Quadrula) nodulata, Rafinesque, '20, p. 307, pl. 81, f. 17-18.

Unio pustulatus Lea, '31, p. 79, pl. 7, f. 9.

U. nodulatus Raf. = *U. pustulatus* Lea, Conrad, '34, p. 70; '37, p. 80.

Quadrula pustulata (Lea), Simpson, '14, p. 856.

Quadrula nodulata (Raf.) = *Q. pustulata* (Lea), Vanatta, '15, p. 557 ("type" examined).

Quadrula nodulata (Raf.), Utterback, '16, p. 57.

Obli. nodulata Raf. = *Q. pustulata* (Lea), Walker, '18c, p. 168 ("if identifiable").

The original description of *nodulata* mentions and the (poor) figure shows the characteristic posterior "wing" of this shell; also the arrangement of the distant (text) tubercles in two rows is suggested in the figure. A nodulous shell with these characters can only be the *pustulata* of Lea. Thus, Rafinesque's species is recognizable, which is confirmed by Vanatta's examination of the so-called Rafinesque-Poulson "type."

QUADRULA METANEVRA Rafinesque, 1820

Type locality: Kentucky River.

Obliquaria (Quadrula) metanevra Rafinesque, '20, p. 305, pl. 81, f. 15-16.

Unio nodosus Barnes, '23, p. 124, pl. 6.

U. metanevra Raf. = *U. nodosus* Bar., Conrad, '34, p. 70; Ferussac, '35, p. 27; Conrad, '35, p. 10, pl. 5, f. 2.

Theliderma metanevra (Raf.), Swainson, '40, p. 378.

Quadrula metanevra (Raf.), Agassiz, '52, p. 48; Simpson, 14, p. 834.

There has never been any doubt, since the time of Conrad, as to the identity of this species, and indeed Rafinesque's description and figure are identifiable.

However, this species should not be regarded as the type of the genus *Quadrula*. It belongs in the group of *U. cylindricus* Say, for which *Orthonymus* Agassiz ('52) is to be used as sectional (or subgeneric) name (see above).

QUADRULA VERRUCOSA (Rafinesque), 1820

Type locality: Ohio River.

Obliquaria verrucosa Rafinesque, '20, p. 304, pl. 81, f. 10-12.

Unio tuberculatus Barnes, '23, p. 125, pl. 7, f. 8.

U. verrucosus Raf. = *U. tuberculatus* Bar., Conrad, '34, p. 72; Fergusson, '35, p. 27.

Tritogonia tuberculata (Bar.), Simpson, '00c, p. 608; '14, p. 318.

Trit. verrucosa (Raf.) = *Trit. tuberculata* (Bar.), Vanatta, '15, p. 554 ("types" examined).

Obl. verrucosa (Raf.) = *Trit. tuberculata* (Bar.), Walker, '16c, p. 45, and '18c, p. 170 ("if identifiable").

Quad. verrucosa (Raf.), Utterback, '16, p. 62; Ortmann, '18, p. 540.

Unio tuberculatus Bar. is not preoccupied by *Obliquaria tuberculata* Raf., as noted by Vanatta but corrected by Walker ('16).

The original description of *O. verrucosa* and the extremely poor and crude figure indicate an elongated shell, rather closely covered upon the disk by tubercles. This is sufficient to recognize the species: no other shell has tubercles on the disk and is elongated at the same time. Thus, *verrucosa* stands as the specific name.

The use of the generic names *Quadrula* or *Tritogonia* Ag. ('52) involves a purely taxonomic, not a nomenclatorial, question.

Genus CYCLONAIAS Pilsbry n. n.

Type: *Obliquaria tuberculata* Rafinesque, 1820.

Cyclonaias tuberculata (Raf.), '20 = *Quadrula* (*Rotundaria*) *tuberculata*, Simpson, '14, p. 80.

Rotundaria Rafinesque, '20, p. 308 (no type named); Herrmannsen, '47, p. 407 (type, *Obliquaria subrotunda* Raf.); Agassiz, '52, p. 48 (type, *Obliquaria tuberculata* Raf.); Simpson, '00, p. 794, as subgenus of *Quadrula* (type, *Obliquaria tuberculata* Raf.).

Agassiz and Simpson's conception of *Rotundaria* with *O. tuberculata* as type cannot stand, since Herrmannsen ('47)

designated *O. subrotunda* as the type of this genus, which makes *Rotundaria* the same as *Obovaria* as used by Simpson (type, *U. retusa* Lam., congeneric with *O. subrotunda* Raf.). See *Obovaria*. No other name being available for the present genus, Dr. Pilsbry has suggested that of "*Cyclonaias*," which we adopt here with the type given above.

PLETHOBASUS CYPHYUS (Rafinesque), 1820

Type locality: Falls of the Ohio at Louisville, Ky.

Obliquaria cyphya Rafinesque, '20, p. 305.

Unio asopus Green, '27, p. 46, f. 3.

Unio cyphia Raf. = *U. asopus* Green = *U. cicatricosus* Say, '29 = *U. varicosus* Lea, '29, Conrad, '34, p. 68.

U. cyphia Raf. = *U. asopus* Green, Ferussac, '35, p. 27.

U. cyphus Raf., Call, '00, p. 496.

Pleurobema cyphia (Raf.) = *Pl. asopus* (Green), Vanatta, '15, p. 556 ("type" examined).

Obl. cyphya Raf. = *Pleurob. asopus* (Green), Walker, '18, p. 181 ("if identifiable").

Plethobasus cyphus (Raf.), Ortmann, '19, p. 65.

The chestnut-brown color of the epidermis, the flexuous border of the shell, the thick oblique rib of the disk with a few tubercles, characters given in the original description, undoubtedly indicate this species, as maintained by Call. Thus the name *cyphya* (not to be spelled *cyphia*) stands.

LEXINGTONIA DOLABELLOIDES (Lea), 1840

Type locality: Holston River, Tennessee.

Unio dolabelloides Lea, '40, p. 288.

Pleurobema dolabelloides (Lea), Simpson, '14, p. 752.

Lexingtonia dolabelloides (Lea), Ortmann, '18, p. 545.

LEXINGTONIA CONRADI (Vanatta), 1915

Type locality: (*maculatus* Conrad) Elk and Flint rivers, tributaries of Tennessee in Alabama.

Unio maculatus Conrad, '34, p. 30, pl. 4, f. 4 (not *Unio nigra maculata* Raf., '20).

Pleurobema maculatum (Con.), Simpson, '14, p. 737

Pleurobema conradi Vanatta, '15, p. 559.

Lexingtonia dolabelloides conradi (Van.), Ortmann, '18, p. 546.

Pleurobema conradi, Van., Walker, '18^c, p. 172.

The new name *conradi* has been properly introduced by Vanatta to take the place of the preoccupied *maculatus* Con.

If the two forms are to be regarded as varieties of the same species, which is not determined here, *dolabelloides* as the oldest valid name is that of the main species; while *conradi* is that of the variety. The earlier name *maculatus* Con. must not be considered.

Genus PLEUROBEMA Rafinesque, 1819

Type: *Pleurobema mytiloides* Raf., '20 = *Unio clava* Lam., '19.

Pleurobema Rafinesque, '19, p. 427; '20, p. 313 (no type named).

Herrmannsen, '47, p. 292 (type, *Unio mytiloides* Raf. = *Unio clava* Lam.); Agassiz, '52, p. 49; Simpson, '00^c, p. 745, and '14, p. 732.

Scalenaria Rafinesque, '20, p. 309 (no type named); Herrmannsen, '48, p. 422 (type, *Unio scalenius* Raf.).

In his original description of *Pleurobema* (1819) Rafinesque cited two undescribed species, *mytiloides* and *conica*? The latter never was described, so that if the former can be recognized, when subsequently described, it *ipso facto* became the type, the genus being monotypic.

Pleurobema (1820) was founded upon two species, *mytiloides* and *cuneata*; both are surely *U. clava* Lam. (which see). Herrmannsen designated *U. mytiloides* Raf., which was unnecessary if our position that *Pleurobema* is really monotypic is correct. If not, his was the first designation of a type for the genus. Agassiz took up Rafinesque's generic name, but without naming a type. Since, however, *mytiloides* (= *clava*) is the only species of Rafinesque included in the original diagnosis, this becomes the type. Thus, Simpson was justified on

either ground in giving *clava* Lam. as the type of *Pleurobema*, because *mytiloides* is a synonym of *clava*.

The designation of *U. scalenius* Raf. as the type of *Scalenaria* by Herrmannsen makes this name a synonym of *Pleurobema* (we choosing to give preference to the latter according to Art. 23 of the Code, concerning names of the same date), and renders the subsequent designation of another species by Agassiz as the type of *Scalenaria* wholly inoperative.

PLEUROBEMA CORDATUM (Rafinesque), 1820

Type locality: Ohio River.

Unio obliqua Lamarck, '19, p. 72.

Oblivaria lateralis Rafinesque, '20, p. 310.

Obovata cordata Rafinesque, '20, p. 312, pl. 82, figs. 6-7.

U. obliqua Lam. = *U. undatus* Bar. ('23), Lea, '34, p. 28 (type examined).

U. cordatus Raf. = *U. obovata* Raf. (for *obovalis* ?), Conrad, '34, p. 68.

U. triangularis Raf. = *lateralis* Raf. = *sintoxia* Raf. = *pachostea* Raf. = *mytiloides* Raf. = *rubra* Raf. = *pyramidatus* Lea, Conrad, '34, p. 72.

U. obliqua Lam. = *obovalis* Raf. = *ebenus* Lea, Ferussac, '35, p. 28.

U. cordatus (Raf.) Conrad, '36, p. 48, pl. 25.

U. obliquus Lam. = *undatus* Bar. = *cordatus* Con., Lea, '38, p. 125.

U. obliquus Lam. and *U. solidus* Lea, Call, '00, pp. 501, 504, pl. 57, 59.

Quadrula obliqua (Lam.), Simpson, '14, p. 881.

Quadrula obliqua Lam. = *Obliq. lateralis* Raf., Vanatta, '15, p. 557 ("type" examined).

Quadrula cordata Raf. = *Q. plena* (Lea), Vanatta, '15, p. 558 ("type" examined).

Quadrula obliqua Lam. = *obliq. lateralis* Raf., Walker, '18^b, p. 167 (*vide* Vanatta).

That the description of *U. obliqua* Lam. is imperfect and that the species cannot be identified from it has been stated by Lea ('29, p. 422). Later ('34) he identified *obliqua* from the type as *undatus* Bar., which, as we see from his Synopsis in 1838, is the same as *cordatus* Con. ('36), while the real *undatus* is a *Fusconaia* and the same as *trigonus* Lea. See *Fusconaia undata*.

This identification of the type has no effect if the species has been described satisfactorily in the meantime. Two names of Rafinesque, *lateralis* and *cordatus*, should be considered first. The latter has been used for this species by Conrad and an excellent figure been given; the former has been referred here by Vanatta after examination of the so-called Rafinesque-Poulson "type."

Conrad's use of *cordatus* is contradicted again by Vanatta, who says that the supposed type of *cordatus* is *U. plenus* Lea. But this does not agree with the original description and figure, which unmistakably indicate the so-called *obliqua* Lam. and *cordatus* of Conrad ('36). It is a triangular, thick, swollen shell, with a sinus on the postero-inferior margin and a depression upon the disk, with brown epidermis and white nacre. The outline of Rafinesque's figure (6) expresses the character of a young "*obliqua*" very well, and his *cordata* was a young shell about one inch long.

"The specimen in the Rafinesque-Poulson collection (No. 20221, A. N. S.) is a characteristic *Unio obliqua* Lam., larger and less rayed than Conrad's (Mon., pl. 25), but agreeing closely with it in form. Mr. Vanatta concurs in this determination. He was formerly misled by some lots of the same form which had been carelessly labelled '*U. plenus* Lea.'" (H. A. P.)

On the other hand, *Obl. lateral* Raf. is also this species. The description indicates a thick, swollen shell of oval, oblique shape, with an oblique, curved depression upon the disk, brown epidermis and white nacre, which is sufficient for its recognition. Vanatta's examination of the so-called Rafinesque-Poulson "type" has confirmed this.

Thus, there are two names available for this shell, *lateralis* and *cordata*, both recognizable from the original description,

and both introduced before Lea had established the identity of *U. obliqua* Lam. No selection has been made by previous authors, and thus we are at liberty to select *cordata* as the specific name. This corresponds to the recommendation made in the Code, Art. 28, C: "A specific name accompanied by both description and figure stands in preference to one accompanied only by a diagnosis."

PLEUROBEMA PLENUM (Lea), 1840

Type locality: Ohio River, Cincinnati, Ohio.

Obovaria cordata Rafinesque, '20, p. 312, pl. 82, pp. 6, 7.

U. cordatus Raf. = *U. obovata* Raf. Conrad, '34, p. 68 (*obovata* a mistake, possibly *obovalis* meant).

Unio plenus Lea, '40, p. 286.

Quadrula plena (Lea) Simpson, '14, p. 886.

Quadrula cordata (Raf.) = *Qu. plena* (Lea) Vanatta, '15, p. 558 ("type" examined).

Pleurobema obliquum cordatum (Raf.) Ortmann, '18, p. 548.

Ob. cordata Raf. = *Qu. plena* (Lea) Walker, '18c, p. 168 ("if identifiable").

Rafinesque's name *cordata* cannot be revived for *plenus* Lea, since the original description and figure directly contradict this approximation (see under *Pleur. cordatum* and Pilsbry's note). Lea's name *plenus* stands for this form.

PLEUROBEMA CATILLUS (Conrad), 1836

Type locality: Scioto River, Ohio.

Unio catillus Conrad, '36, p. 30, pl. 13, f. 2.

Unio solidus Lea, '38, p. 13, pl. 5, f. 13.

U. coccineus Lea, '37 = *U. coccineus* Con., '36 = *U. catillus* Con., Lea, '38, p. 131.

Quadrula solida (Lea), Simpson, '14, p. 885.

U. catillus Con. = *Qu. coccinea* (Lea), Simpson, '14, p. 884.

Pleurobema obliquum catillus (Con.) = *U. solidus* Lea, Utterback, '16, p. 79; Ortmann, '18, p. 548.

Lea has pronounced *U. catillus* Con. to be identical with his (and Conrad's) *coccineus*, and subsequent authors up to

Simpson have followed him. However, *catillus* Con. differs from *coccineus* Con. (figured on the same plate) by the greater obesity of the shell, and this is exactly the character by which *U. solidus* Lea differs from *coccineus*. Thus, *catillus* clearly is the same as *solidus*, having priority over it.

Utterback was the first to recognize this, but his treatment of this group (introducing, besides *Pl. (obl.) catillus*, another species called *Pl. catillus* Con. = *solidus* Lea) is contrary to all nomenclatorial rules. According to Ortmann, all these forms are variations or varieties of *Pl. cordatum* (Raf.).

PLEUROBEMA COCCINEUM PAUPERCULUM (Simpson), 1900

Type locality: Niagara Falls.

Quadrula coccinea paupercula Simpson, '00c, p. 789 (not *Unio pauperculus* (Lea) '61) = *Quadrula paupercula* (Lea), Simpson, '14, p. 862.
Quadrula coccinea magnalacustris Simpson, '14, p. 884.

Simpson's *Quadrula coccinea paupercula* is not a homonym of *Unio pauperculus* Lea, the original form of the name of Lea's species. It is a forbidden name as long as the two forms are placed in the same genus. If they are placed in different genera, as *Quadrula paupercula* (Lea) and *Pleurobema coccineum pauperculum* (Simpson), the name *pauperculus* is valid in each case.

PLEUROBEMA PYRAMIDATUM (Lea), 1831

Type locality: Ohio.

Obliquaria rubra Rafinesque, '20, p. 314 (standing under genus *Amblema*).

Pleurobema mytiloides Rafinesque, '20, p. 313, pl. 82, f. 8, 9, 10.

Unio pyramidatus Lea, '31 (not '34 as given by Simpson), p. 109, pl. 16, f. 39.

U. triangularis Raf. = *U. lateralis* Raf. = *U. sintoria* Raf. = *U. mytiloides* Raf. = *U. rubra* Raf. = *U. pyramidatus* Lea, Conrad, '34, p. 72.

U. mytiloides Raf. = *U. rubra* Raf. = *U. pyramidatus* Lea, Ferussac, '35, p. 28; Conrad, '36, p. 41, pl. 20.

Quadrula pyramidata (Lea), Simpson, '14, p. 888.

Quad. rubra (Raf.) = *Q. pyramidata* (Lea), Vanatta, '15, p. 557 ("type" examined).

Pleurobema obliquum rubrum (Raf.), Ortmann, '18, p. 550.

Obl. rubra Raf. = *Q. pyramidata* (Lea), Walker, '18^c, p. 169 ("if identifiable").

Obliquaria rubra Raf. is not identifiable from the original description. Only the red nacre speaks for this, but hardly any other character; in fact, several of the latter contradict it. The beaks are said to be little prominent, and the comparison with *Elliptio* and *Obliquaria ellipsaria* could not possibly be understood, if this is *pyramidatus*.

Pleurobema mytiloides Raf., which has been taken for *pyramidatus*, is the *U. clava* Lam. (which see) on account of the distinct rays in figure and description.

Obliquaria triangularis Raf. '20, p. 309, is not this, because of the statement that there is no longitudinal depression on the disk. The same is true of *Obliquaria sintoxia* Raf., '20, p. 310 (moreover, the so-called Poulson "type" of the latter has been identified by Vanatta as *Fusconaia subrotunda* (Lea) (which see). It is also true of *Obovaria pachostea* Raf., p. 312 (= *Amblema antrosa* Raf., p. 322), which has a rounded shell. Of *Obliquaria lateralis* Raf., p. 310, it has been shown that it is *Pleurobema cordatum* (Raf.) (which see).

The oldest valid name, therefore, is *U. pyramidatus* Lea.

PLEUROBEMA CLAVA (Lamarck), 1819

Type locality: Incorrectly given as Lake Erie.

Unio clava Lamarck, '19, p. 74.

Unio elliptica Rafinesque, '20, p. 296.

Obliquaria scalenia Rafinesque, '20, p. 309, pl. 81, f. 24-25.

Pleurobema mytiloides Rafinesque, '20, p. 313, pl. 82, f. 8-9-10.

Pleurobema cuneata Rafinesque, '20, p. 313.

Unio patulus Lea, '29, p. 331, pl. 12, f. 20.

Un. clava Lam. = *U. scalenia* Raf., Lea, '34, p. 89 (type examined).

U. triangularis Raf. = *U. lateralis* Raf. = *U. sintoxia* Raf. = *U. pachostea* Raf. = *U. mytiloides* Raf. = *U. rubra* Raf. = *U. pyramidatus* Lea, Conrad, '34, p. 72.

U. scalenius Raf. = *U. cuneata* Raf. = *U. patulus* Lea, Conrad, '34, p. 71.

U. cuneatus Raf. = *patulus* Lea, Ferussac, '35, p. 28.

U. mytiloides Raf. = *U. pyramidatus* Lea = *U. rubra* Raf., Ferussac, '35, p. 28.

U. clava Lam. = *U. scalenia* Raf., Ferussac, '35, p. 28.

U. clava Lam. = *U. scalenius* Raf., Conrad, '35, p. 5, pl. 3, f. 1; Lea, '38, p. 126.

U. mytiloides Raf. = *U. rubra* Raf. = *U. pyramidatus* Lea, Conrad, '36, p. 41, pl. 20.

Cunicula patula (Lea), Swainson, '40, p. 378.

Pleurobema clava (Lam.) and *Pl. mytiloides* (Raf.), Agassiz, '52, p. 49.

Pleurobema clava (Lam.), Simpson, '00c, p. 745; '14, p. 735.

Pleurobema clava (Lam.) = *U. elliptica* Raf. = *Obl. scalenia* Raf. = *Pl. cuneata* Raf., Vanatta, '15, p. 555 ("types" examined).

The original description of *U. clava* Lam. is very poor; however, a "sublongitudinal, oviform shell, with the anterior (posterior) side very short," cannot be referred to any other American species. The short anterior side (indicating the anterior position of beaks) is very characteristic. This identification is confirmed by Lea's examination of the type. The original locality (Lake Erie), given by Lamarck, is erroneous.

Pl. mytiloides Raf. has been taken by Conrad and others to be *U. pyramidatus*, but it is clearly recognizable from Rafinesque's description and figure. The latter, as usual, is exaggerated, but distinctly represents a phase frequently assumed by *clava*, chiefly when old. It cannot be *pyramidatus* on account of the presence of distinct rays. The recognition of *mytiloides* has no bearing upon the nomenclature of the species; it is, however, important for that of the genus (see above).

The identification of *scalenia* Raf. with this species is evident from the original description and figure and is confirmed

by the so-called Rafinesque-Poulson "type." It has no bearing upon the nomenclature of this species, but is important for the validity of the subgenus *Scalenaria* (*Scalenilla*) of the genus *Dysnomia* (which see).

PLEUROBEMA LEWISI (Lea), 1861

Type locality: Coosa River, Alabama.

Unio lewisi Lea, '61, p. 40.

Pleurobema cor Simpson, '14, p. 765 (not *U. cor* Conrad, '34).

Pleurobema lewisi (Lea), Walker, '16^a, p. 114.

The synonymy of this species has been settled by Walker and nothing remains to be added.

PLEUROBEMA SIMPSONI Vanatta, 1915

Type locality: Chattahoochee River, Columbus, Ga.

Unio striatus Lea, '40, p. 287 (not *U. striatus* Goldfuss, '39).

Pleurobema striatum (Lea), Simpson, '14, p. 795.

Pleur. simpsoni Vanatta, '15, p. 539.

Unio striatus Lea, Walker, '16^c, p. 47.

Pleurobema simpsoni Van., Walker, '18^c, p. 173.

The introduction of *simpsoni* Van. is justified (see Walker, '18^c).

However, attention should be called to the probability that *U. modicus* Lea ('57, p. 157), *Pleurobema modicum* Simpson ('14, p. 794) and *U. amabilis* Lea ('65, p. 89) and *Pleurobema amabile* Simpson are synonyms of *U. striatus*. In this case either would have priority, *modicus* being the earlier name.

Genus ELLIPTIO Rafinesque, 1819

Type: *Unio crassidens* Lam. = *U. nigra* Raf.

Elliptio Rafinesque, '19, p. 426; '20, p. 291 (no type named); Simpson, '00, 700, as section of *Unio* (type, *U. crassidens* Lam. = *U. nigra* Raf.); Ortmann, '12, p. 65 (genus, type the same).

Euryxia Rafinesque, '19, p. 426; '20, p. 297 (no type named); Herr-

mannsen, '47, p. 436 (type, *U. dilatata* Raf.); Agassiz, '52, p. 45 (type, *U. recta* Lam.).

Cunicula Swainson, '40, p. 378 (no type named); Herrmannsen, '47, p. 335 (type, *U. purpurascens* Lam.).

The type of *Eurymia* has been designated by Herrmannsen as *U. dilatata* Raf., a species congeneric with the type of *Elliptio*. Thus, *Elliptio* and *Eurymia* are equivalent and have the same date of publication. Our preference given to *Elliptio* is justified by Art. 28 of the Code and the recommendation (c) as to page precedence. Agassiz's designation of *recta* as the type of *Eurymia* thus becomes invalid.

Herrmannsen's type of *Cunicula* being congeneric with the type of *Elliptio*, that genus also becomes a synonym of *Elliptio*.

ELLIPTIO CRASSIDENS (Lamarck), 1919

Type locality: Lake Erie (erroneous).

Unio crassidens var. b. Lamarck, '19, p. 71.

Unio nigra Rafinesque, '20, p. 291, pl. 80, f. 1-4.

Unio cuneatus Barnes, '23, p. 263.

U. crassidens, var. b. Lam. = *U. cuneatus* Bar., Lea, '34, p. 87 (type examined).

U. niger Raf. = *U. cuneatus* Bar., Conrad, '34, p. 70.

U. niger Raf. = *U. crassidens* var. b. Lam. = *U. cuneatus* Bar., Ferrussac, '35, p. 27; Conrad, '36, p. 49, pl. 26.

Unio crassidens Lam. Simpson, '14, p. 606.

U. nigra Raf. = *U. crassidens* Lam. (of Simpson), Vanatta, '15, p. 555 ("type" examined).

Elliptio niger (Raf.), Utterback, '16, p. 88; Ortman, '18, p. 555.

Unio crassidens Lam. = *U. nigra* Raf., Walker, '18^c, p. 174 (if identifiable).

"Lamarck proposed this species to include several long, solid forms which we now know belonged to three species, still another being included by him in the citation of a figure from Lister. One of these species is now known, from examination of his specimens, to be a plicate shell; the others are smooth. There is some difference of opinion as to whether he intended to describe *crassidens* as plicate, but as he included two

smooth forms without mentioning that they differed from the main description in this character, it appears likely that he did not intend to describe the surface. However, if he did, there is intrinsically no more reason for attributing folds to his form (a) than to (b) and (c) in interpreting his definitions. He did not designate either of the forms as a "Var.," as he was accustomed to do where the divergence was thought by him to be considerable. Any one of the included species could be selected to bear the name "*crassidens*" in a restricted sense, but preferably either form (a) or (b) which he possessed. A method of dividing species has been provided in the International Rules of Nomenclature.¹

"Lea was the first to learn what Lamarck's species was from an examination of the original specimens (Obs. I, p. 199; II, p. 125). He definitely restricted *crassidens* to Lamarck's form (b), which he stated to be the *Unio cuneatus* Barnes. Whether this action was generous or best may be questioned, but he undoubtedly had the right to do so under the rules, which provide that 'such designation is not subject to change.'

"Lamarck's description, with those of forms (a) and (b), are ambiguous. Experts differ as to what parts of it are intelligible without knowledge of the types. But, excluding the reference to Say's *Unio crassus*, which Lamarck did not recognize as his own *U. ligamentina*, it cannot fairly be claimed that one of the forms included in *crassidens* is more recognizable than another. Unless the species is to be thrown

¹ Art. 31. The division of a species into two or more restricted species is subject to the same rules as the division of a genus, etc. (*Rep. Zool. Nomencl.*, Proc. 7th, Internat. Zool. Congr., 1912, p. 47).

In the division of a genus it is held that "If an author in publishing a genus with two or more valid species failed to designate or indicate its type, any subsequent author may select the type, and such designation is not subject to change" (*op. cit.*, p. 46, IIg).

out entirely as insufficiently defined, there seems little reason for reconsidering Lea's restriction, which has been accepted for three-fourths of a century." (H. A. P.)

ELLIPTIO DILATATUS (Rafinesque), 1820

Type locality: Ohio River.

Unio dilatata Rafinesque, '20, p. 297.

Unio gibbosus Barnes, '23, p. 262, pl. 11, f. 12.

U. dilatatus Raf. = *U. gibbosus* Bar., Conrad, '34, p. 68; Ferussac, '35, p. 27; Conrad, '36, p. 42, pl. 21.

Unio gibbosus Bar., Simpson, '14, p. 597.

U. dilatata Raf. = *Obliquaria sinuata* Raf. = *U. gibbosus* Bar., Vanatta, '15, p. 555 ("types" examined).

U. dilatata Raf. = *U. gibbosus* Bar., Walker, '16^c, p. 46 and 18^c, p. 175 ("if identifiable").

Elliptio dilatatus (Raf.), Utterback, '16, p. 90; Ortmann, '18, p. 556.

The original description of *dilatata* Raf. indicates a long, elliptical, posteriorly somewhat attenuated, brownish shell, with violet nacre. This can be only one species of the Ohio, the *gibbosus* Bar., and the latter name has to give way to *dilatatus*.

ELLIPTIO COMPLANATUS (Dillwyn), 1817

Type locality: Maryland and New Jersey.

For this well-known species Haas (Vid. Middel, Dansk Naturh. Foren., LXV, 1913, p. 54) has revived the name of *Unio violaceus* Spengler (1793), relying on the identification of the type. However, Walker ('18^a, p. 3) has shown that this name cannot be used, since the original description of *violaceus* is entirely insufficient to recognize the species. "Moreover, the species had been named *Mya complanata* in the Portland Catalogue, 1786, p. 100." (H. A. P.)

ELLIPTIO PRODUCTUS (Conrad), 1836

Type locality: Savannah River, Augusta, Ga.

Obliquaria cuprea Rafinesque, '20, p. 304, pl. 81, f. 8-9.

U. dilatatus Raf. = *U. cuprea* Raf., Conrad, '34, p. 68; Ferussac, '35, p. 27.

Unio productus Con., '36, p. 31, pl. 14, f. 1; Simpson, '14, p. 690.

Elliptio cuprius, Ortmann, '19, p. 110.

The name *Obliquaria cuprea* is not preoccupied by *Unio fasciata cuprea* Raf. (p. 294). Figure and description indicate a long, elliptical shell, posteriorly attenuated, with copper-colored nacre, found in the Monongahela and Potomac rivers.

This description (and the figure) might be applied to two species: *Ell. dilatatus* found in the Monongahela, as done by Conrad and Férussac, and *Ell. productus* found in the Potomac. Thus, the name *cuprea* is not clearly defined, is not valid and should not be used.

If, under the rule laid down by Pilsbry in regard to *crassidens*, the first reviser has the right to designate which of the several species represented in the composite species should bear the original name, the action of Conrad (l. c.) in referring this species to *dilatata* would seem to be decisive.

ELLIPTIO RAFINESQUEI (Vanatta), 1915

Type locality: Black Creek, Florida.

Unio fuscatus Lea, '43, p. 11 (not *U. viridis fuscata* Raf., '20, p. 294, nor. *U. fragilis fuscata* Raf., '20, p. 295).

Unio fuscatus Lea, Simpson, '14, p. 643.

Unio rafinesquei Vanatta, '15, p. 559; Walker, '18^c, p. 175.

The change of the name introduced by Vanatta is justified, *fuscatus* being preoccupied in the genus *Unio*.

ELLIPTIO PUSILLUS (Lea), 1840

Type locality: Ogeechee River, Georgia.

Unio pusillus Lea, '40, p. 286.

Unio buxeus Lea, '52, p. 261, pl. 15, f. 13.

Unio pusillus Lea, Simpson, '14, p. 611.

Unio buxeus Lea = *U. pusillus* Lea, Vanatta, '15, p. 555.

U. pusillus Lea, Walker, '16^c, p. 46; '18^c, p. 175.

Vanatta says that *U. pusillus* Lea, '40, is preoccupied by *Unio pusilla* Raf. '20. However, as Walker has pointed out, the latter was published as *Obliquaria pusilla*, and thus does not invalidate *U. pusillus*.

LASTENA LATA (Rafinesque), 1820

Type locality: Kentucky River.

Anodonta (*Lastena* or *Hemistena*) *lata* Rafinesque, '20, p. 317, pl. 82, f. 17-18.

Unio dehiscens Say, '29, p. 308.

Unio oriens Lea, '31 (not '34 as stated by Simpson), p. 73, pl. 6, f. 5.

Odatelia radiata Rafinesque, '32, p. 154.

Anodonta lata Raf. = *U. dehiscens* Say = *U. oriens* Lea, Conrad, '34, p. 70.

Hemilastena dehiscens (Say), Agassiz, '52, p. 50.

Lastena lata (Raf.) = *Odatelia radiata* Raf., Simpson, '00c, p. 654; '14, p. 453.

Lastena lata Raf. = *Hemistena lata* Raf., Frierson, '14^a, p. 7.

Lastena lata Raf., Vanatta, '15, p. 554 ("type" examined); Walker, '18c, p. 175.

There is no dispute over the specific name. However, Utterback ('16, p. 104) uses the generic name *Lastena* for shells of the type of *Anodonta* (*Lastena*) *ohioensis* Raf., supposed to be identical with *Anodonta imbecillis* Say, and Herrmannsen ('47, p. 577) has designated *A. ohioensis* Raf. as the type of *Lastena*.

But it is utterly impossible to positively recognize *A. ohioensis* as the same species as *A. imbecillis* (which see), and *A. ohioensis* thus being not identifiable, the generic or subgeneric name *Lastena* cannot be transferred to it, and Simpson was bound to use it, as he did, for *lata*, the names *Hemistena* Raf., *Odatelia* Raf., and *Hemilastena* Ag. becoming synonyms to it (see also Walker, '18^a, p. 4).

Genus LASMIGONA Rafinesque, 1831

Type: *Alasmidonta costata* Raf.

Lasmigona Rafinesque, '31, p. 4 (no type named, two species including *costata*).

Symphynota Simpson, '00^c, p. 662 (type, *compressa* Lea) (not *Symphynota* Lea, '29; type, *U. alata* Say).

Lasmigona Raf., Frierson, '14^c, p. 40 (type, *costata* Raf.); Ortmann, '18, p. 557; Walker, '18^a, p. 2, and 18^c, p. 177.

Subgenus PLATYNAIAS Walker, 1918

Symphynota Simpson, 00^c, p. 662 (type *compressa* (Lea), not *Symphynota* Lea).

Platynaias Walker, '18^a, p. 2 (type, *compressa* Lea).

Subgenus ALASMINOTA Ortmann, 1914

Sulcularia Rafinesque, '31, p. 5 (type, *Alasmodon badius* Raf., not identifiable); Ortmann, '18, p. 557.

Alasminota Ortmann, '14, p. 43 (type, *Margaritana holstonia* Lea); Walker, '18^a, p. 2.

Subgenus LASMIGONA s. s. Rafinesque, 1831

Lasmigona Rafinesque, 31, p. 4 (no type named); Simpson, '00^c, p. 564 (type, *A. costata*); Walker, '18^a, p. 2.

Subgenus PTEROSYNA Rafinesque, 1831

Pterosyna Rafinesque, '31, p. 5 (type, *Alasmidonta complanata* Bar.); Walker, '18^c, p. 61.

Pterosygna Simpson, '00^b, p. 665; Walker, '18^a, p. 2.

"Frierson has shown that the original type of Lea's *Symphynota* was *Unio alatus* Say, and it is therefore a synonym of *Proptera* Raf., and that consequently *Lasmigona* Raf. as the earliest available name becomes the generic type" (Walker). Thus, also, the subgeneric name of *Symphynota* must be changed, and Walker's name *Platynaias* has priority. The name *Sulcularia* Raf., being founded upon an unidentifiable species (see under *L. holstonia*), cannot be used, and *Alasminota* Ortm. stands. *Pterosygna* Simpson clearly is only a slip of the pen for *Pterosyna* Raf.

LASMIGONA (PLATYNAIAS) COMPRESSA (Lea), 1829

Type locality: Ohio and Norman's Kill, Albany, N. Y.

Unio viridis Rafinesque, '20, p. 293.

Symphynota compressa Lea, '29, p. 450, pl. 12, f. 22; Simpson, '14, p. 481.

Lasmigona viridis (Raf.) = *Symphynota compressa* Lea, Frierson, '15, p. 59.

Unio viridis Raf. Not = *Symphynota compressa* Lea, Walker, '15, p. 74.

Unio viridis Raf. = *Symphynota viridis* Con., '36, Vanatta, '15, p. 554 ("type" examined).

Lasmigona (Platynaias) compressa (Lea), Walker, '18^a, p. 2; 18^c, p. 177.

Lasmigona (Platynaias) viridis (Raf.), Ortmann, '19, p. 116.

Opinion of Ortmann:

The description of Rafinesque's *U. viridis* may be referred to two species, *Symph. compressa* Lea, a western form, and *U. subviridis* Con. (= *tappaniana* Lea), an eastern form. It is impossible to make out which was intended. Identifying it with the western form, the size (only 1½ inches) does not agree; identifying it with the eastern form, the locality (Kentucky drainage) does not fit. Moreover, the two forms are so very similar that it is hard to distinguish young *compressa* from *subviridis* of the same size. This uncertainty of the determination is also expressed by the rather lively dispute over *U. viridis*, and thus we are to regard this species as not identifiable. The determination of the "type" by Vanatta is irrelevant, and thus *compressa* Lea is valid.

Opinion of Walker:

Rafinesque's *U. viridis* is not this species, but the *subviridis* Con. or *tappaniana* Lea (see under *subviridis*). Thus, Lea's name *compressa* stands.

Both views lead to the same conclusion. However, the identity of *U. viridis* is important for the nomenclature of the next species (*subviridis*), which see.

"*L. compressa* Lea is not *U. viridis* Raf." (H. A. P.)

LASMIGONA (PLATYNAIAS) SUBVIRIDIS (Conrad), 1835

Type locality: (*viridis* Raf.) Ohio and Kentucky rivers and small tributaries to them; (*subviridis* Con.) Schuylkill River; Juniata River; creeks in Lancaster County, Pennsylvania.

Unio viridis Rafinesque, '20, p. 293.

Unio viridis or *subviridis*, Conrad, N. Fr. Sh. app. '35, pl. 9, f. 1.

U. viridis Raf., Conrad, '36, p. 35, pl. 17, f. 1.

Unio tappanianus Lea = *U. viridis* Con. (not Raf.), Lea, '38, p. 62, pl. 17, f. 55.

Symphynota viridis (Con.), Simpson, '14, p. 484.

Lasmigona subviridis (Con.) = *U. viridis* Con. (not Raf.) = *U. tappanianus* Lea, Frierson, '15, p. 57.

U. viridis Raf. = *Symph. viridis* Con., Vanatta, '15, p. 554 ("type" examined).

Lasmigona viridis (Raf.) = *subviridis* (Con.) = *tappaniana* (Lea), Walker, '15, p. 74, and '18, p. 177.

Lasmigona (Platynaias) subviridis (Con.), Ortmann, '19, p. 121.

"The identification of this species was made by Conrad after he was acquainted with the Poulson Collection which contained a valve of *U. viridis* var. *fuscata* Raf. This valve, labelled River Kentucky, measures L. 47, H. 28, D. (one valve) 8 mm. It differs thus from Rafinesque's dimensions and proportions of the type of *viridis*. The valve is an entirely typical *Las. subviridis* (*tappaniana*).

"The measurements have been considered fully by Walker and by Ortmann. They could apply to *L. subviridis* only upon the hypothesis that Rafinesque meant '*larger*' when he wrote '*longeur*.' A specimen of *L. subviridis* 1½ inches long 'at most' would be small for the species, and those of this length I have measured are invariably more compressed than Rafinesque's ratios call for.

"It seems inadvisable to replace a well-defined name accompanied by a figure by one which obliges us to correct the author's statement of size, to suppose that he measured a speci-

men of unusual diameter, and to either discredit his locality or grant a considerable extension of the known range of species. Adding to this, there is no figure and the type is lost. On the whole, it appears that *Lasmigona subviridis* (Con.) should stand and *U. viridis* Raf. go into the discard." (H. A. P.)

LASMIGONA (ALASMINOTA) HOLSTONIA (Lea), 1838

Type locality: Holston River.

Alasmodon (Sulcularia) badium Rafinesque, '31, p. 5.

Margaritana holstonia Lea, '37, p. 42, pl. 14, f. 37.

Alasmidonta holstonia (Lea), Simpson, '14, p. 502.

Alasmodon badium Raf. = *Marg. holstonia* Lea, Frierson, '14, p. 7.

Symphynota (Alasminota) holstonia (Lea), Ortman, '14, p. 43.

Lasmigona (Sulcularia) badia (Raf.), Ortman, '18, p. 557.

From the original description of *Al. badium* we cannot be sure that *M. holstonia* Lea was intended. The term "obtuse" used for the cardinal tooth suggests also *Alasmidonta minor* (Lea), as in *holstonia* the teeth are generally rather sharp. Other characters of the shell are very indefinite and do not furnish any positive indication of the species.

Thus *Al. badium* is not identifiable, and with the specific the subgeneric name (*Sulcularia*) also should be discarded.

LASMIGONA (LASMIGONA) COSTATA (Rafinesque), 1820

Type locality: Kentucky River.

Alasmidonta costata Rafinesque, '20, p. 318, pl. 82, f. 15-16

Alasmodonta rugosa Barnes, '23, p. 278, pl. 13, f. 21.

Lasmigona costata Raf., Rafinesque, '31, p. 5.

Alasmodonta costata Raf. = *A. rugosa* Bar., Conrad, '34, p. 72; Ferussac, '35, p. 25.

Symphynota (Lasmigona) costata (Raf.), Simpson, '00, p. 665; '14, p. 488.

Lasmigona costata (Raf.), Frierson, '14, p. 40.

There is no doubt about this species. The original description and figure distinctly indicate the chief characters of it.

This species has become the type of *Lasmigona* by elimination of the other species mentioned by Rafinesque (*Alasmidonta marginata* Say), as first pointed out by Simpson.

ANODONTA IMBECILLIS Say, 1829

Type locality: Wabash River.

Anodonta (Lastena) ohioensis Rafinesque, '20, p. 50.

Anodonta imbecilis Say, Walker, '18c, p. 176.

U. levissimus (Lea) = *An. ohioensis* Raf., Conrad, '34, p. 70; Férussac, '35, p. 25.

Anodonta imbecillis Say, Simpson, '14, p. 395.

Lastena ohioensis (Raf.), Utterback, '16, p. 109.

Anodonta imbecillis Say, Walker, '18c, p. 176.

Anodonta ohioensis Raf., Ortmann, '19, p. 162.

There is nothing in the original description of *A. ohioensis* Raf. that supports the assumption that it is the well-known *A. imbecillis* Say. In fact, the most striking character of *imbecillis* distinguishing the shell from other Anodontas, the depressed beaks, is not mentioned. Rafinesque gives for the subgenus *Lastena*, in which he places *ohioensis*, differential characters of the hinge: "two obtuse, transversal ridges, nearly lamelliform, divergent from each side of the beak." Nothing corresponding to this is seen in *imbecillis*. In addition he says, "Lamellar ridges fully separated from the margin of the shell." Fine ridges, parallel to the upper margin, indeed, are seen in *imbecillis*, but they exist also in other species of *Anodonta*, more or less distinctly developed, but are extremely hard to distinguish.

The rest of the description of the shell of *ohioensis* applies to several small or young Anodontas, and Conrad and Férussac believe that *ohioensis* is *Proptera levissima* (Lea), '29, to which the description, indeed, might also be referred.

A. ohioensis is thus not identifiable, and the name cannot be used, and consequently, also, the application of the generic

name *Lastena* to this form (and *imbecillis*) is incorrect. If *imbecillis* is to be separated from *Anodonta*, as Utterback proposes, another name will have to be found.

Genus SIMPSONICONCHA Frierson, 1914

Hemilastena Simpson, '00c, p. 673, '14, p. 323 (type, *ambigua* Say) (not *Hemilastena* Agassiz, '52; type, *dehiscens* Say = *lata* Raf.).

Simpsonaia Frierson, '14^a, p. 7 (type, *ambigua* Say) (*Nomen præoccupatum*).

Simpsoniconcha Frierson, '14^c, p. 40 (type, *ambigua* Say); Walker, '18^a, p. 4, and '18^c, pp. 64, 178.

Hemilastena Ag. is a synonym of *Lastena* Raf. (which see), as pointed out by Frierson and Walker, thus a new generic name for the one species (*ambigua* Say) belonging to it was in order.

Genus ALASMIDONTA Say, 1818

Subgenus DECURAMBIS Rafinesque, 1831

Decurambis Rafinesque, '31, p. 4; Frierson, '14^a, p. 7.

Rugifera Simpson, '00c, p. 670; '14, p. 504; Walker, '18^c, p. 178.

Type: *Alasmodon* (*Decurambis*) *scriptum* Raf. = *Alasmodonia marginata* (Say).

The validity of *Decurambis* depends on the recognition of either of the two species originally attributed to it, *Alasmodon scriptum* Raf. and *atropurpureum* Raf. '31. As will be seen under *Alasmodonia marginata* (Say), the former at least is undoubtedly identical with this, which is the type of Simpson's *Rugifera*. Thus *Decurambis* supersedes *Rugifera*.

ALASMIDONTA (DECURAMBIS) MARGINATA (Say), 1819

Type locality: Scioto River, Chillicothe, Ohio.

Alasmodonia marginata Say, '19.

Alasmodon (*Decurambis*) *scriptum* Rafinesque, '31, p. 4.

Alasmodon (*Decurambis*) *atropurpureum* Rafinesque, '31, p. 4.

A. marginata Say = *A. scriptum* Raf., Conrad, '34, p. 72; Ferrussac, '35, p. 25.

- Alasmidonta (Rugifera) truncata* (Wright), Simpson, '00, p. 671.
Alasmidonta marginata (Say), Simpson, '01, p. 16 (Scioto River);
 Fox, '01, p. 47 (Scioto River, Chillicothe, Ohio).
Alasmidonta (Rugifera) marginata (Say), Simpson, '14, p. 505.
Alasmodon scriptum Raf. = *A. marginata* Say, Frierson, '14^a, p. 7.
Alasmodon atropurpureum Raf., '31 = *Margaritana raveneliana* Lea,
 '34; Frierson, '14^a, p. 7.
Alasmidonta (Decurambis) marginata (Say), Ortmann, '18, p. 561.

There is no doubt as to the priority of *marginata* Say, but the identification of *scriptum* and *atropurpureum* is important with regard to the validity of the subgeneric name *Decurambis*.

In *A. scriptum*, the posterior truncation, nearly flat, with transverse furrows and ribs, and the color of the epidermis as described, make it positive that *A. marginata* Say was intended. Thus *scriptum* is recognizable, and the subgenus *Decurambis*, in which it stands, is valid (see above).

This makes it unnecessary to identify *A. atropurpureum* Raf. According to Frierson, this is the same as *raveneliana* Lea, but Ortmann ('18) has shown that specimens taken for *atropurpureum* are not *ravenelianum*, but a form (variety or variation) of *marginata*. But the correct identification of those specimens is not yet assured, and for the present *atropurpureum* is an unidentified form.

ALASMIDONTA (DECURAMBIS) VARICOSA (Lamarck), 1819

Type locality: Schuylkill River, Philadelphia, Pa.

Unio varicosus Lamarck, '19, p. 78 (Schuylkill River).

Alasmodonta marginata Say, '19 (Scioto River).

U. varicosus Lam. = *Alasmodonta undulata* Say, Lea, '29, p. 424; Ferussac, '35, p. 26.

U. varicosus Lam. = *Alasmodonta marginata* Say, Lea, '34, p. 91 (type examined).

Alasmodon corrugata DeKay, '43, p. 198, pl. 24, f. 259.

Alasmidonta (Rugifera) marginata (Say), Simpson, '99, p. 670.

Alasmidonta marginata (Say), Simpson, '01, p. 16 (Scioto River);
 Fox, '01, p. 47 (Scioto River, Chillicothe, Ohio).

Alasmidonta varicosa (Lam.), Simpson, '01, p. 17 (Atlantic drainage).

Alasmidonta (Rugifera) varicosa (Lam.), Simpson, '14, p. 506.

Alasmidonta (Decurambis) varicosa (Lam.), Ortmann, '19, p. 190.

The description of *U. varicosa* from Schuylkill River, "*U. testa ovato-rhombea, tenui, fusco, virente, radiata; natibus rugis crassis, undatis, variciformibus,*" fits best the species of the *marginata* group of the Atlantic drainage. Two other species with "variciform" beak sculpture come into question—first *Strophitus edentulus* (Say), but of this the bars of the beak sculpture are not very heavy and not waved ("undati"); the other *Alasmidonta undulata* (Say), with very heavy beak sculpture, has not a "thin" shell. Thus, *varicosa* is identifiable, and, in addition, this identification has been confirmed by Lea, by the examination of the type, in so far as he pronounced it to be *marginata*—that is to say, the Atlantic representative of the western *marginata*. This determination was made before any other name was given to this form. Thus, *varicosa* is valid also on this ground.

STROPHITUS UNDULATUS (Say), 1817

Type locality: Not given (probably near Philadelphia).

Anodonta undulata Say, '17, pl. 3, f. 5.

Anodonta pennsylvanica Lamarck, '19, p. 86 (Schuylkill River, Phila.).

Anodonta undulata Say = *A. rugosus* Sw., Conrad, '34, p. 73; Fergusson, '35, p. 25.

Strophitus undulatus (Say), Simpson, '14, p. 349.

STROPHITUS RUGOSUS (Swainson), 1822

Type locality: United States.

Anodon rugosus Swainson, '22, pl. 96.

Strophitus edentulus (Say), '29 = *Anodon rugosus* Sw., Simpson, '14, p. 345.

Strophitus edentulus (Say), Walker, '18^c, p. 176.

The two forms are distinguishable, but have been misunder-

stood by Simpson. *Str. undulatus* is a smaller shell, with more inflated and prominent beaks, and more tapering posterior end. It is positively known only from the tidewaters (Delaware and Schuylkill rivers) near Philadelphia.

Walker calls attention to the mistake made by Simpson in retaining *edentulus* Say ('29), although he gives *rugosus* Sw. ('22) as a synonym.

An examination of Swainson's description and figures leaves no doubt that his species is the inflated, black form of *S. edentulus* that occurs in the eastern states and is usually sent out as *S. undulatus* Say.

Swainson's description is as follows:

"Shell transverse, oval; rather thick and ventricose; both extremities obtuse; the anterior side (from the umbones to the exterior margin) obliquely rounded; umbones prominent; hinge margin rather thick, slightly curved and swelled immediately under the umbones; sinus short, abrupt, curved; epidermis coarse, black and much wrinkled; inside stained with yellow and having a narrow reddish rim or margin."

No dimensions are given, but the figures (3) measure: length 63, height 39, diameter 32 mm.

No exact locality is given, but it is stated that the specimens came from the United States.

This is quite different from the typical *S. undulatus* Say.

Genus PTYCHOBANCHUS Simpson, 1900

Ptychobanchus Simpson, '00^a, p. 79 (type, *phaseolus* Barnes).

Ellipsaria Raf., Frierson, '14^a, p. 7 (type, *fasciolaris* Raf.).

One of the four species listed by Rafinesque under his subgenus *Ellipsaria* is *Obliquaria ellipsaria*, and therefore, by the rule of absolute tautonomy (Code, Art. 30d), it *ipso facto* becomes the type of the subgenus. *O. ellipsaria* is a synonym

of *lineolata* Raf. (belonging to *Plagiola*), and consequently *Ellipsaria* becomes a synonym of *Plagiola* Raf. Frierson's designation of *fasciolaris* as the type is absolutely void. *Ptychobranchnus* Simpson will therefore stand.

PTYCHOBANCHUS FASCIOLARE (Rafinesque), 1820

Type locality: Ohio, Wabash, and Kentucky rivers.

Obliquaria (*Ellipsaria*) *fasciolaris* Rafinesque, '20, p. 303.

Unio phaseolus Hildreth, '28, p. 283.

U. fasciolaris Raf. = *U. phaseolus* Hild., Conrad, '34, p. 69; Ferussac, '35, p. 27.

Ptychobranchnus phaseolus (Hild.), Simpson, '00c, p. 613; '14, p. 333.

Obl. fasciolaris Raf. = *Ptych. phaseolus* (Hild.), Frierson, '14^a, p. 7.

Ptychobranchnus fasciolaris (Raf.) = *Pt. phaseolus* (Hild.), Vanatta, '15, p. 554 ("type" examined).

Ellipsaria fasciolaris (Raf.), Ortmann, '18, p. 563.

Obl. fasciolaris (Raf.) = *Ptych. phaseolus* (Hill.), Walker, '18c, p. 179 ("if identifiable").

The first part of the original description of *O. fasciolaris* Raf. contains nothing that opposes the assumption that this is *phaseolus*, but it also does not contain anything that clearly indicates this species. However, further on, Rafinesque says that there is a remarkable character in this species, consisting in the presence of several oblique ridges on the inside of the shell. This unquestionably refers to the ridges and depressions seen inside of the shell of the female of the genus *Ptychobranchnus*, and since an Ohio shell is described, this can be only *Pt. phaseolus*. Thus the specific name *fasciolaris* stands.

OBLIQUARIA REFLEXA Rafinesque, 1820

Type locality: Kentucky River and Letart Falls (Meigs County, Ohio).

Obliquaria reflexa Rafinesque, '20, p. 306.

Unio cornutus Barnes, '23, p. 122, pl. 4, f. 5.

U. reflexus Raf. = *U. cornutus* Bar., Conrad, '34, p. 71; Ferussac, '35, p. 28; Conrad, '35, p. 7, pl. 4, f. 1.

Obliquaria reflexa Raf., Simpson, '00c, p. 610; '14, p. 330.
Obl. reflexa Raf., Vanatta, '15, p. 554 ("type" examined).

The original description is recognizable; mentioned are the thick, convex, rounded shell, truncated posteriorly, sinuated on the post-basal margin, the rugosities of the posterior slope, and the "knobs" of the medial elevation of the shell, all characters of this species.

O. reflexa has been designated as the type of *Obliquaria* Raf. by Simpson ('00).

CYPROGENIA IRRORATA (Lea), 1828

Type locality: Ohio.

Obovaria stegaria Rafinesque, '20, p. 312, pl. 82, f. 4-5.

Unio irroratus Lea, '28 (not '30 as given by Simpson), p. 269, pl. 5, f. 5.

U. stegarius Raf. = *U. irroratus* Lea, Conrad, '34, p. 71; Ferussac, '35, p. 28; Conrad, '38, p. 83, pl. 46, f. 1.

Cyprogenia irrorata (Lea), Simpson, '14, p. 326.

Cypr. stegaria (Raf.) = *C. irrorata* (Lea), Vanatta, '15, p. 554 ("type" examined); Ortmann, '19, p. 218.

Cypr. irrorata (Lea) = *Ob. stegaria* Raf., Walker, '17c, p. 46; '18c, p. 179 ("if identifiable").

Cypr. stegaria (Raf.), Ortmann, '18, p. 565.

Rafinesque's original figure of *stegaria* is absolutely insufficient to recognize the species as the same as *irroratus* on account of the complete absence of tubercles, and, moreover, these tubercles are not mentioned in the description, except in variety (*tuberculata*), which is said to have a few remote tubercles; but this also does not exactly fit *irroratus*, which generally has a great number of crowded tubercles. Since also nothing is said about the very characteristic color-pattern of the epidermis, except that it is brown (which it is generally *not*), it is impossible to identify Rafinesque's species, and thus Lea's name (*irrorata*) stands, notwithstanding the subsequent

determination of the so-called Rafinesque-Poulson "type" of *stegaria*.

"The Rafinesque-Poulson shell is stated to be of the var. *tuberculata* Raf. It is an *irrorata* of the usual size and greenish color." (H. A. P.)

Genus OBOVARIA Rafinesque, 1819

Type: *Unio retusa* Lam.

Rotundaria Rafinesque, '20, p. 308 (no type named); Herrmannsen, '47, p. 407 (type, *Obliquaria subrotunda* Raf.); Simpson, '00, p. 794, as a subgenus of *Quadrula* (type, *Obliquaria tuberculata* Raf.); Ortman, '12, p. 257, as a genus (type, the same).

Obovaria Rafinesque, '19, p. 426; '20, p. 310 (no type named); Herrmannsen, '47, p. 132 (type, *Obovaria obovalis* Raf., not recognizable); Agassiz, '52, p. 46 (type, *U. retusa* Lam., congeneric with *Obliq. subrotunda* Raf.); Simpson, '00, p. 408 (type, *U. retusa* Lam.).

"Rafinesque proposed *Obovaria* in 1819 with a diagnosis but no type or recognizable species, since none of those mentioned as belonging to the genus had then been described. The diagnosis clearly indicates a certain assemblage of Uniones which had not before been segregated, viz., those with a rounded shell with the axis (*i. e.*, the vertical from the beaks) nearly median; such as the species subsequently included by Simpson in *Obovaria*, *Theliderma*, and *Rotundaria*. For some part of this assemblage the genus defined in 1819 is valid.

"In 1820 Rafinesque further limited the genus, describing six species, one of which, *U. obovalis*, was designated type by Herrmannsen in 1847; this species has never been identified, and is believed to be unrecognizable. In 1852 another of the original species, *Ob. torsa*, was selected as type by Agassiz. This type has been accepted by Simpson, 1900, and by subsequent authors, whose action is here endorsed.

"As the type of *Rotundaria* is congeneric with *O. torsa*, that name becomes a synonym of *Obovaria*, being one year later in date." (H. A. P.)

OBOVARIA RETUSA (Lamarck), 1819

Type locality: (Incorrectly given as Nova Scotia).

Unio retusa Lamarck, '19, p. 72.

Obovaria torsa Rafinesque, '20, p. 311, pl. 82, f. 1-3.

U. retusa Lam. = *U. torsus* Raf., Lea, '34, p. 88 (type examined);
Férussac, '35, p. 28; Conrad, '36, p. 19, pl. 8.

Obovaria retusa (Lam.) = *U. torsa* Raf., Agassiz, '52, p. 46.

Obovaria retusa (Lam.), Simpson, '14, p. 290.

O. retusa (Lam.) = *O. torsa* Raf., Vanatta, '15, p. 552 ("type" examined).

Lamarck's original description is, in spite of the incorrect locality given (Nova Scotia), perfectly recognizable. The rounded, swollen shell, with incurved beaks, and the violaceous nacre is unmistakable.

Rafinesque's *torsa* is also undoubtedly this, and his figures give fairly well the general character of the species.

OBOVARIA SUBROTUNDA (Rafinesque), 1820

Type locality: Ohio River.

Obliquaria subrotunda Rafinesque, '20, p. 308, pl. 81, f. 21-23.

Obovaria striata Rafinesque, '20, p. 311.

Unio circulus Lea, '29, p. 433, pl. 9, f. 14.

U. subrotundus Raf. = *U. pusilla* Raf. = *U. striata* Raf. = *U. circulus* Lea, Conrad, '34, p. 71.

U. subrotundus Raf. = *U. circulus* Lea, Férussac, '35, p. 28.

Obovaria circulus (Lea), Simpson, '14, p. 291.

Ob. subrotunda (Raf.) = *Ob. striata* Raf. = *Ob. circulus* (Lea),
Vanatta, '15, p. 552 ("type" examined).

Obovaria subrotunda (Raf.), Ortmann, '18, p. 567.

Obl. circulus (Lea) = *Obl. subrotunda* Raf., Walker, '18c, p. 180 ("if identifiable").

Rafinesque's description and figures indicate a rather thick, nearly round, swollen shell, with beaks almost central ("*equilaterale*"), brownish-yellow epidermis, and whitish-purple nacre. A shell from the Ohio with these characters will be easily recognized as the *circulus* Lea. Thus *subrotunda* is

valid. The other names given by Rafinesque (*pusilla* and *striata*) do not need to be considered, since Conrad made already a selection among the available names, choosing *subrotundus*.

OBOVARIA LENS (Lea), 1831

Type locality: Ohio and Tennessee.

Unio levigata Rafinesque, '20, p. 296, pl. 80, f. 11-13.

Unio lens Lea, '31, p. 80, pl. 8, f. 10.

U. levigatus Raf. = *U. lens* Lea, Conrad, '34, p. 70.

Obovaria lens (Lea), Simpson, '14, p. 293.

Obovaria levigata (Raf.) = *O. lens* (Lea), Vanatta, '15, p. 552 ("types" examined).

Obovaria subrotunda levigata (Raf.), Ortmann, '18, p. 568.

Ob. lens (Lea) = *U. levigata* Raf., Walker, '18c, p. 180 ("if identifiable").

The description and figure of *levigata* indicate a strongly transversely-elliptical shell, which does not at all fit *lens* of Lea, which generally is rather rounded or only very slightly transverse. Thus, without knowledge of what the so-called Poulson-Rafinesque "type" is, nobody would ever suspect that Rafinesque's shell is this.

Also the character "swollen" (*bombée*) does not apply to *lens*, and *levigata* must be regarded as not identifiable.

OBOVARIA OLIVARIA (Rafinesque), 1820

Type locality: Kentucky River.

Amblema olivaria Rafinesque, '20, p. 314.

Unio ellipsis Lea, '28, p. 268, pl. 4, f. 4.

U. olivarius Raf. = *U. ellipsis* Lea, Conrad, '34, p. 70; Ferussac, '35, p. 28-34.

Obovaria ellipsis (Lea), Simpson, '14, p. 299.

Ob. olivaria (Raf.) = *O. ellipsis* (Lea), Vanatta, '15, p. 553 ("type" examined).

Ob. ellipsis (Lea) = *A. olivaria* Raf., Walker, '18c, p. 180 ("if identifiable").

The specific description of *olivaria* may be applied to *ellipsis* Lea: Shell thick, little convex, oval, elliptic, beaks hardly

prominent, nearly superior; epidermis striate, olivaceous; nacre white, iridescent; length 2-3 inch. Yet it does not positively indicate this species. However, in connection with the generic characters given for *Amblema*, the species is well characterized by the terms "*dent bilobee ridee, laterale au sommet,*" which could not be used for any other species. Thus *olivaria* stands.

Rafinesque ('20, p. 288) states in substance that he did not repeat the generic characters in his specific descriptions, as it would make them long and prolix. But when necessary, as in this case, they should be read into the description of the species.

GENUS ACTINONAIAS Fischer and Crosse, 1893

Actinonaias Fischer and Crosse, '93, p. 556 (no type named, containing Mexican species inc. *sapotalensis* Lea).

Actinonaias Fischer and Crosse, '93, p. 556 (no type named, containing Mexican species inc. *aztecorum* allied to *plicatulus* Charp.).

Nephronaias Simpson, '00c, p. 591 (type, *plicatulus* Charp.).

Nephronaias Ortmann, '12, p. 324 (containing 3 species, incl. *sapotalensis*).

Nephronaias Frierson, '17, p. 47 (type, *plicatulus* Charp.).

Actinonaias Frierson, '17, p. 48 (type, *sapotalensis* Lea); Walker, '18c, p. 75.

The final settlement of the generic names *Nephronaias* and *Actinonaias* depends on the knowledge of the anatomy of the Mexican type of *Nephronaias* (*plicatulus* Charp.). The anatomy of the type of *Actinonaias* (*sapotalensis*) is known (Ortmann), and since certain North American species agree with this, this name should be used for them. The designation of the type of *Actinonaias* (*sapotalensis*) is from Frierson.

ACTINONAIAS CARINATA (Barnes), 1823

Type locality: Fox River (Wisconsin).

Unio crassus Say, '17, pl. 1, f. 8 (not *U. crassus* Retzius, 1778).

Unio ligamentina Lamarck, '19, p. 72.

Unio crassus Say, Rafinesque, '20, p. 293.

Unio fasciata Rafinesque, '20, p. 294.

Unio ellipticus Barnes, '23, p. 259, pl. 13, f. 19 (not *U. elliptica* Raf., '20).

Unio carinatus Barnes, '23, p. 259, pl. 11, f. 10.

U. ligamentina Lam. = *U. crassus* Say, Lea, '34, p. 88 (type examined).

U. fasciatus Raf. = *U. carinatus* Barn., Conrad, '34, p. 69; '35, p. 3, pl. 1.

U. crassus Say = *U. carinatus* Barn., Ferussac, '35, p. 27, 33.

Lampsilis ligamentina (Lam.), Simpson, '14, p. 79.

U. crassa (Say), Raf. = *U. fasciata* Raf. = *U. pallens* Raf., '31 = *Lamp. ligamentina* (Lam.), Vanatta, '15, p. 551 ("types" examined).

U. fasciata Raf. = *U. siliquoidea* Bar., '23 = *U. luteolus auct.*, Frierson, '19, p. 139.

Actinonaias ligamentina (Lam.), Ortmann, '19, p. 232.

U. crassus and *U. ellipticus* are *nomina præoccupata*. *U. ligamentina* is absolutely unrecognizable (the description could not possibly be poorer), and so is *U. fasciata*, which might be this or *fasciolaris* Raf. and even *U. siliquoidea* Barn., according to Frierson (see under *L. siliquoidea*). The description applies to both and the so-called Rafinesque-Poulson "type" is the so-called *ligamentina*. It might also be any other species with elliptical outlines and with rays (*iris* group).

The first *valid* name (recognizable and not preoccupied) under which the present species was published is *carinatus* Bar., and a good figure of this has also been given. The determination of the type of *U. ligamentina* Lam. by Lea was subsequent to this, and thus has no effect.

ACTINONAIAS PECTOROSA (Conrad), 1834

Type locality: Elk River, near its junction with Tennessee, Northern Alabama.

Unio vittatis Rafinesque, '31, p. 2.

Unio pectorosus Conrad, '34 (May), p. 37, pl. 6, f. 1.

Unio perdir Lea, '34 (August or September) (not '27 as given by Simpson), p. 72, pl. 11, f. 31.

U. pectorosus Con., '34 (May), = *U. perdir* Lea, '34 (September), Conrad, '36, p. 25, pl. 11, f. 1.

Unio biangularis Lea, '40, p. 288.

Unio biangulatus Lea, '42, p. 197, pl. 9, f. 8.

Lampsilis biangularis (Lea), Simpson, '14, p. 59.

Lampsilis perdix (Lea), Simpson, '14, p. 88.

Nephronaias pectorosa (Con.) = *U. perdix* Lea = *U. biangularis* Lea = *U. biangulatus* Lea = (possibly) *U. vittatis* Raf., Ortmann, '18, p. 569.

U. vittatis Raf. would have priority, if identifiable. Its shell is oval and has been compared by Rafinesque with *L. fasciola* Raf., but is said to be larger, rounder, with straight rays. This does not fit *pectorosa*, which surely is not "rounder" than *fasciola*, and there are additional characters in the original description which cannot be reconciled with *pectorosa*, chiefly "2 or 3 oblique ribs." *U. vittatis* is not identifiable.

It has been questionably referred to *inflatus* and *siliquoides* Bar. by Conrad ('34, p. 69).

The identity of Conrad's and Lea's species is evident to anyone familiar with this form, and the preference of *perdix* by Simpson is due only to the incorrect date given for it. Already Conrad ('36) has claimed his species and has quoted the correct dates.

Genus TRUNCILLA Rafinesque, 1819

Type: *Truncilla truncata* Raf.

Truncilla Rafinesque, '19, p. 427; '20, p. 300 (no type named); Herrmannsen, '49, p. 627 (type, *Truncilla truncata* Raf.).

Amygdalonaias Crosse and Fischer, '93, p. 557 (type, *U. cognatus* Lea); Simpson, '00, p. 604; Ortmann, '12, p. 327.

Since *Tr. truncata* Raf. (= *elegans* Lea) is supposed to be congeneric with *U. cognatus* Lea, and since Herrmannsen has designated *truncata* as the type of *Truncilla*, this name will have to be used for the present genus superseding that of *Amygdalonaias*.

This will necessitate a change in the name of the genus which has been usually called *Truncilla*. See under *Dysnomia*.

TRUNCILLA TRUNCATA Rafinesque, 1820

Type locality: Ohio River.

Truncilla truncata Rafinesque, '20, p. 301.

Unio elegans Lea, '31, p. 83, pl. 9, f. 13.

U. truncatus Raf. = *U. donaciformis* Lea, '28 = *U. elegans* Lea, Conrad, '34, p. 72.

U. truncatus Raf. = *U. elegans* Lea, Ferussac, '35, p. 27.

Plagiola elegans (Lea), Simpson, '14, p. 307.

Pl. elegans (Lea) = *Tr. truncata* Raf. = *U. metaplata* Raf., '31; Vanatta, '15, p. 553 ("types" examined).

Pl. elgeans (Lea) = *Tr. truncata* Raf., Walker, '16c, p. 45; '18c, p. 179 ("if identifiable").

Amygdaloniaias truncata (Raf.), Utterback, '16, p. 148; Ortmann, '18, p. 570.

This shell is small, has a "semi-triangular," somewhat quadrate shape, the posterior end is truncate, and the margin and growth lines (*rides*) are curved (concave) behind. This is a satisfactory description of the species when compared with the only other "truncate" form of the Ohio (*triquetra*).

U. donaciformis Lea, said to be also identical (Conrad), is closely allied, but the description of the shape does not fit it.

The name *Truncilla truncata* is not preoccupied by *Unio truncata* Spengler (1793), and thus *truncata* stands.

TRUNCILLA DONACIFORMIS (Lea), 1828

Type locality: Ohio.

Unio nervosa Rafinesque, '20, p. 296, pl. 80, f. 8-10.

Unio donaciformis Lea, '28, p. 267, pl. 4, f. 3.

Unio zigzag Lea, '29, p. 440, pl. 12, f. 19.

U. nervosa Raf. = *U. donaciformis* Lea, Say, '34.

U. nervosa Raf. = *U. zigzag* Lea, Conrad, '34, p. 70.

U. nervosa Raf. = *U. zigzag* Lea, Ferussac, '35, p. 27.

Plagiola donaciformis (Lea), Simpson, '14, p. 308.

The original description of the rays of *nervosa*, "*Nervures flexueuses, concentriques, vermiculaires,*" might suggest *U. donaciformis*, yet it surely is not quite exact, and the figure,

if correct in this respect, does not support this view. Further, the description says that the shell is larger behind (also shown in figure), and that the borders are undulated (see also figure), and these are characters which cannot be found in *donaciformis* by any means. Thus *nervosa* is not identifiable.

Genus *PLAGIOLA* Rafinesque, 1819

Type: *Unio securis* Lea = *Obliquaria lineolata* Raf.

Plagiola Rafinesque, '19, p. 426; '20, p. 302 (no type named); Herrmannsen, '47, p. 279 (type, *Obliquaria interrupta* Raf.); Agassiz, '52, p. 42 (first species, *Obliquaria lineolata* Raf. = *U. securis* Lea); Simpson, '00, p. 603 (type, *U. securis* Lea).

Herrmannsen designated an unrecognizable species *Obliquaria interrupta* Raf. (see under *Dysnomia brevidens*) as the type of *Plagiola*, and consequently *Plagiola* should be used in the sense of Agassiz and Simpson.

PLAGIOLA LINEOLATA Rafinesque, 1820

Type locality: Falls of the Ohio, at Louisville, Ky.

Obliquaria (Plagiola) depressa Rafinesque, '20, p. 302, pl. 81, f. 5-7.

Obliquaria (Plagiola) lineolata Rafinesque, '20, p. 303.

Obliquaria (Ellipsaria) ellipsaria Rafinesque, '20, p. 303.

Unio securis Lea, '29, p. 437, pl. 11, f. 17.

U. lineolatus Raf. = *U. depressus* Raf. = *U. ellipsaria* Raf. = *U. securis* Lea, Conrad, '34, p. 70.

U. lineolatus Raf. = *U. depressus* Raf. = *securis* Lea, Ferussac, '35, p. 28.

U. securis Lea = *U. depressus* Raf., Lea, '38, p. 124.

Plagiola lineolata Raf. = *U. securis* Lea, Agassiz, '52, p. 48.

U. lineolatus (Raf.), Call, '00, p. 469.

Plagiola securis (Lea) = *Obl. depressa* Raf., Simpson, '00c, p. 603; '14, p. 305.

Pl. lineolata (Raf.) = *Obl. depressa* Raf. = *Obl. ellipsaria* Raf. = *Pl. securis* (Lea), Vanatta, '15, p. 553 ("types" examined).

Pl. securis (Lea) = *Obl. depressa* Raf. = *Obl. lineolata* Raf., Walker, '17c, p. 45; '18c, p. 179 ("if identifiable").

Pl. securis (Lea) = *Pl. lineolata* (Raf.), Utterback, '16, p. 150, footnote.

Plagiola lineolata (Raf.), Ortmann, '18, p. 571.

In the description of both *depressa* and *lineolata* Raf. the chief character of this species, great compression and posterior narrow and flat truncation, are mentioned, and thus there is no doubt about the identification. Also the peculiar color pattern is indicated in both. *O. ellipsaria* Raf. is also identifiable as this species.

Conrad first pointed out the identity of Rafinesque's species and selected the name *lineolata*, and thus it has to stand.

Genus LEPTODEA Rafinesque, 1820

Type: Unio fragilis Raf.

Leptodea Rafinesque, '20, p. 295 (as subgenus of *Unio*), no type named; Herrmannsen, '47, p. 584 (type, *U. fragilis* Raf.).

Lasmonos Rafinesque, '31, p. 5 (type, *fragilis* Raf., '31, not *fragilis*, '20); Utterback, '16, p. 151 (type, *fragilis* Raf., '20; see below).

Paraptera Ortman, '11, p. 368 (type, *gracilis* Bar., '23 = *fragilis* Raf., '20); Walker, '18c, p. 72.

Leptodea, Frierson, '14^a, p. 6 (type, *leptodon* Raf., '20).

Since *U. fragilis* Raf. has been made the type of *Leptodea* by Herrmannsen, *Paraptera* Ort. becomes a synonym having the same type, and the subsequent designation of *U. leptodon* Raf. as the type by Frierson becomes invalid.

Utterback in giving as the type of *Lasmonos* the "*Lasmonos fragilis* Raf., '20," confused *Unio (Leptodea) fragilis* Raf., '20, and *Lasmonos fragilis* Raf., '31. The latter is not identifiable (see under *Leptodea leptodon*).

LEPTODEA LEPTODON (Rafinesque), 1820

Type locality: Lower Ohio River.

Unio (Leptodea) leptodon Rafinesque, '20, p. 295, pl. 80, f. 5-7.

Anodon purpurascens Swainson, '23, pl. 160.

Unio velum Say, '29, p. 293.

Symphynota tenuissima Lea, '29, p. 453, pl. 11, f. 21.

Lasmonos fragilis Rafinesque, '31, p. 5.

U. leptodon Raf. = *Symph. tenuissima* Lea = *An. purpurascens* Sw., Conrad, '34, p. 70.

- Symph. leptodon* Raf. = *S. tenuissima* Lea = *An. purpurascens* Sw.
 = *U. planus* Bar., '23, Ferussac, '35, p. 25; Conrad, '36, p. 58, pl. 33.
Lampsilis leptodon (Raf.), Simpson, '14, p. 188.
Leptodea leptodon Raf., Frierson, '14^a, p. 6.
Lasmonos leptodon (Raf.), Utterback, '16, p. 156.
Paraptara leptodon (Raf.), Ortmann, '18, p. 571.

There is no doubt about the specific name *leptodon* Raf. and all authors have accepted it. Description and figures are entirely satisfactory.

However, with regard to the validity of the generic name *Lasmonos* Raf., it is important to know what *Lasmonos fragilis* Raf., '31, is. Rafinesque does not quote his *Unio* (*Leptodea*) *fragilis* of '21 under it, and thus we are to assume that it is different. The chief character of this shell is the rudimentary condition of the cardinal teeth, and this suggests that it might be *leptodon*. However, it fits also certain phases of *L. fragilis* (Raf.), '20. The rest of the description does not clear up matters, since a sub-oval, thin shell, olivaceous outside and purplish inside, fits both species, and the posteriorly broader shell with a small wing rather points to *fragilis* '20. The words "some nodulities behind" fit neither. Thus *Lasmonos fragilis* is not identifiable and *Lasmonos* cannot be used under any conditions.

LEPTODEA FRAGILIS (Rafinesque), 1820

Type locality: Ohio River.

- Unio* (*Leptodea*) *fragilis* Rafinesque, '20, p. 295.
Unio gracilis Barnes, '23, p. 174.
Lasmonos fragilis Rafinesque, '31, p. 5.
Unio fragilis Raf. = *U. gracilis* Bar., Conrad, '34, p. 69; Ferussac, '35, p. 25; Conrad, '36, p. 55, pl. 30; Frierson, '14^a, p. 7.
Lampsilis gracilis (Bar.), Simpson, '14, p. 181.
Lampsilis fragilis (Raf.) = *L. gracilis* (Bar.); Vanatta, '15, p. 552 ("type" examined).
Lasmonos fragilis Raf., Utterback, '16, p. 152 (quotations in part incorrect).

Paraptera fragilis (Raf.) = *U. gracilis* Bar., Ortmann, '18, p. 572.

Lamp. gracilis (Bar.) = *U. fragilis* Raf., '20 = *Lasmonos fragilis* Raf., '31; Walker, '18, p. 182 ("if identifiable").

The description of *U. fragilis*, chiefly its comparison with *U. leptodon*, makes it sure that this is the *gracilis* Bar. The shell is thin, fragile, not elongate and attenuated posteriorly (as *leptodon* is), but somewhat dilated behind. Also the characters of the pseudocardinals are mentioned.

It remains doubtful whether *Lasmonos fragilis* is this shell or *Leptodea leptodon* (see under the latter).

Genus CARUNCULINA Simpson, 1898

Type: *Unio parvus* Barnes.

Toxolasma Rafinesque, '31, p. 2 (no type named).

Corunculina Simpson, '98, p. 109 (*error typographicus*) (only species, *U. parvus* Bar.).

Carunculina Simpson, '00, p. 563, and '14, p. 148 (type, *Unio texensis* Lea).

Toxolasma Raf., Frierson, '14^a, p. 7 (type, *lividus* Raf. = *glans* Lea); Ortmann, '18, p. 572.

The revival of the generic name *Toxolasma* depends upon the identity of *U. lividus* Raf. As will be shown under *Car. mæsta*, *lividus* is not recognizable, and thus the name *Toxolasma* should be discarded.

As type of *Carunculina*, *U. parvus* must be taken, for at the first publication of this subgenus only this species was included.

CARUNCULINA MÆSTA (Lea), 1841

Type locality: French Broad River, East Tennessee.

Unio (Toxolasma) lividus Rafinesque, '31, p. 2.

Unio pullus Conrad, '38, p. 100, pl. 55, f. 2.

Unio mæstus Lea, '41, p. 82.

Unio cylindrellus Lea, '68, p. 144.

Unio corvunculus Lea, '68, p. 144.

Unio glans Pilsbry and Rhoads, '96, p. 502 (not *glans* Lea, '34).

Lampsis cylindrella (Lea), *L. mæsta* (Lea), *L. corvunculus* (Lea), *L. pullus* (Con.), Simpson, '14, pp. 155-160.

Toxolasma lividum (Raf.) = *U. glans* Lea, Frierson, '14^a, p. 7.
Toxolasma lividum (Raf.) = *U. pullus* (Con.) (part) = *U. mastus*
Lea = *U. cylindrellus* Lea, Ortmann, '18, p. 573.
U. (Tox.) lividus Raf. = *Car. glans* (Lea) or possibly = *pullus*
Con., Walker, '18^c, p. 180-181 ("if identifiable").

This is the form representing *Car. glans* Lea in the upper Tennessee region, but it differs from the typical *glans* of the interior basin at least as a variety.

It has been claimed by Frierson and Ortmann that *U. lividus* Raf. is this form. It is, according to description, a small shell (1 inch) of elliptical shape, "swelled," not thick, with rough, brown epidermis and livid purple nacre, from Rock Castle River, Kentucky (Upper Cumberland).

This description may be applied to two species of this region, the present one and *Ligumia vanuxemensis* (Lea), and there is nothing in it which permits a final decision. Moreover, the dimensions given by Rafinesque fit in part (diameter 37% of length) both species, in part (height 75%) neither of them. Thus *lividus* is not recognizable and cannot be used, and with it the generic name *Toxolasma* must be rejected. Occasional specimens of *vanuxemensis* have quite exactly the proportions given by Rafinesque.

U. pullus Conrad resembles this form very much. But since it originally came from an entirely different region (Wateree River, South Carolina) it cannot be identified with certainty and should be disregarded, at least for the present.

U. mastus Lea surely is this upper Tennessee form of *glans* (from French Broad River). The figure represents a very large male; but similar specimens have been found by Ortmann in the French Broad drainage, fully agreeing with this in all characters, including the proportional dimensions (height of male, 58-63% of length; of females, 63-68%; diameter of male 38-43%; of female, 39-48%; Lea's figures for height and

diameter are 60% and 40%, respectively). Thus the name *mæstus* Lea is the oldest available one.

The later names given by Lea and claimed by Ortmann as possible synonyms (*cylindrellus* and *corvunculus*) need not be considered here. Their validity depends upon taxonomic considerations, and these two forms require additional study before their standing can be settled.

Genus CONRADILLA Ortmann, 1921

Type: *Unio cælatus* Conrad.

Conradilla Ortmann, Naut., XXXIV, 1921, p. 90.

CONRADILLA CÆLATA (Conrad), 1834

Type locality: Tennessee, Elk, and Flint rivers.

Unio (Lemiox) rimosus Rafinesque, '31, p. 3.

Unio cælatus Conrad, '34, p. 338, pl. 1, f. 2; '34, p. 29, pl. 13, f. 4.

Micromya cælata (Con.), Simpson, '14, p. 34.

Lemiox rimosus (Raf.) = *U. cælatus* Con., Frierson, '14, p. 7.

Lemiox rimosus (Raf.), Ortmann, '16, p. 39; '18, p. 574.

Micromya cælata (Con.), Walker, '18^a, p. 4, 18^c, p. 185 (new generic name should be proposed).

Frierson has identified *U. rimosus* with *U. cælatus* chiefly on the strength of the word "rimose" in the description, which is intended to describe the sculpture of the shell. Walker objects to this. Although this word may be taken as giving a good description of this feature of the shell, other points in the description do not fit.

Rafinesque ('31, p. 4) makes the following explicit statement of his theory of comparative measurements: "The comparative proportions of the length, breadth, diameter and axis of the Unios and other bivalve shells having been misunderstood by some, it may be needful to state that my formula is a kind of abbreviation of a longer exposition. Thus, when I say, *length one-half, diameter one-third, axis one-fourth of the breadth*, I meant to say and must be understood to state

the following longer account: *The length of the shell is one-half, the diameter is one-third, and the axis is at one-fourth of the breadth, or largest dimension of the shell.*

"In longitudinal shells this is reversed, the length being the longest dimension becomes the size of comparison."

Vanatta ('15, p. 549) seems to have overlooked this statement, and consequently his explanation of the meaning of Rafinesque's fractions is obviously incorrect.

In course of the investigations made in the preparation of this paper we have found Rafinesque's comparative measurements in most cases very exact and are of the opinion that they are to be relied upon as a means for identifying many of his species. The discrepancy pointed out by Walker ('18, p. 5) is an important one and a serious objection to the approximation of *rimosus* to this species.

But this much is sure, that Rafinesque describes his shell as elliptic, which *calatus* is not, and that he describes it as broader behind, which again does not fit. It is also correct that the "rimose" character of the shell in *calatus* is not restricted to the posterior part, while the main part of the surface is smooth, as stated in the description of *rimosus*, but that it covers nearly three-fourths of the entire shell.

The term "rimose" might also be applied, according to Walker, to *Medionidus conradicus* (Lea), and the rest of the description would not speak against this.

"In discussing *U. rimosus* Raf. Frierson claims that by 'Broader . . . behind' Rafinesque means what we would term longer behind; but even so, the dimensions do not fit. Rafinesque's shell measured, L. $1\frac{1}{2}$, H. 1, D. $\frac{1}{4}$ inch. A specimen measures, L. $1\frac{1}{2}$, H. $1\frac{1}{8}$, D. $\frac{5}{8}$ inch. This is a rather compressed and low example, but more than double the diameter assigned by Rafinesque. It may be claimed that Rafin-

esque's measurement of diameter was an error; in cases where a figure is present to serve as guide for such corrections they are justified. Otherwise nobody has a right to change an author's express statements to make them conform to a theoretical identification. *Unio rimosus* is not identifiable." (H. A. P.)

Thus, the name *rimosus* for the species cannot be used, and consequently also *Lemiox* for the genus is not available. Since the species should be placed in a separate genus (see Ortmann) a new name was needed, and Ortmann (l. c.) has proposed that of *Conradilla*.

MEDIONIDUS CONRADICUS (Lea), 1834

Type locality: Unknown.

Unio plateolus Rafinesque, '31, p. 3.

Unio conradicus Lea, '34, p. 63, pl. 9, f. 23.

Unio conradicus Conrad, '38, p. 87, pl. 47, f. 3.

Medionidus conradicus (Lea), Simpson, '14, p. 247; Walker, '18e, p. 70.

Medionidus plateolus (Raf.) = *conradicus* Lea, Ortmann, '18, p. 575.

The original description of *U. plateolus* Raf. is entirely insufficient to recognize this species. The chief characters are: general shape (elliptic-lanceolate and very compressed), small size (2 inches), and color (brown, inside bluish). They apply to *conradicus*, but also to a number of other species, chiefly of the genus *Ligumia* (*trabalis* and the *iris* group), or a young *leptodon*, or a flat, young *dilatata*. Besides, the shell is called attenuate and subacute behind, which does not fit *conradicus* very well, and the characteristic wrinkles of the posterior slope in this species and the rays, which generally are distinct, have not been mentioned. Thus *plateolus* is not identifiable.

Genus LIGUMIA (Swainson), 1840

Type: *Unio recta* Lam.

Eurynia Rafinesque, '20, p. 297 (no type named); Herrmannsen, '47, p. 564 (type, *U. dilatata* Raf.); Agassiz, '52, p. 45 (type, *U. recta* Raf.); Simpson, '00, p. 534 (type, *U. recta* Lam.).

Ligumia Swainson, '40, p. 378 (type, *recta* Lam.).

The first designation of a type for *Eurynia* was that of *U. dilatata* Raf. by Herrmannsen, and thus *Eurynia* becomes a synonym of *Elliptio* (which see). This opens the way for the admission of *Ligumia* Swainson with the same type as *Eurynia* of Agassiz and Simpson.

LIGUMIA RECTA (Lamarck), 1819

Type locality: Lake Erie.

Unio recta Lamarck, '19, p. 74 (Lake Erie).

U. rectus Lam. = *U. latissimus* Raf., Conrad, '34, p. 71; Férussac, '35, p. 27; Vanatta, '15, p. 551 ("type" examined).

Unio sageri Conrad, '36, p. 53, pl. 29, f. 1 (Detroit River).

Lampsilis recta sageri (Con.), Simpson, '14, p. 96 (Lake Erie and Detroit River).

Eurynia recta (Lam.), Ortmann, '18, p. 582 (Lake Erie); Walker, '18c, p. 184 (Lake Erie).

LIGUMIA RECTA LATISSIMA (Rafinesque), 1820

Type locality: Ohio River.

Unio latissima Rafinesque, '20, p. 297, pl. 80, f. 14-15 (Ohio River).

Unio rectus Conrad, '36, p. 33, pl. 15 (interior drainage) (not *U. recta* Lam.).

Lampsilis recta (Lam.), Simpson, '14, p. 95 (Mississippi drainage).

Eurynia recta latissima (Raf.), Ortmann, '18, p. 582 (interior drainage); Walker, '18c, p. 184 (Ohio drainage).

The statement of Conrad, Férussac, and Vanatta that *recta* Lam. is identical with *latissima* is correct only when we do not separate these two forms, but if they should be separated as varieties, *recta* Lam. refers to the Lake Erie form, which is evident not only from the locality given but also from the

description of the color of the *epidermis*: blackish-brown. The Ohio form is pure black or greenish-black.

Rafinesque's *latissima* is well described, the elongated shape, black epidermis, and large size being mentioned, and undoubtedly refers to the Ohio form. *U. sageri* thus becomes a synonym of *recta*, which is the main species, and *latissima* is the variety.

LAMPSILIS ANODONTOIDES (Lea), 1831

Type locality: *teres*, Wabash River; *anodontoides*, Mississippi, Alabama, and Ohio rivers.

Unio teres Rafinesque, '20, p. 321.

Unio anodontoides Lea, '31 (not '34, as Simpson gives), p. 81, pl. 8, f. 11.

Unio teres Raf. = *anodontoides* Lea, Conrad, '34, p. 72; Ferussac, '35, p. 27; Conrad, '36, p. 52, pl. 28 (Poulson's "type" examined and figured).

U. teres Raf., Call. '00, p. 452.

Lampsilis anodontoides (Lea), Simpson, '14, p. 90, and *L. fallaciosa* (Smith) ('99) Simpson, '14, p. 92.

Lampsilis anodontoides (Lea) = *U. teres* Raf., Utterback, '16, p. 179, foot-note.

"Whether the *Unio teres* Raf. was based upon specimens of *U. anodontoides* Lea or *Lamp. fallaciosa* Smith is a question upon which authorities of equally good judgment have held opposing views and where certainty does not seem attainable. Conrad's figure, said to be from a specimen labelled by Rafinesque, is *anodontoides*; but it is larger than Rafinesque's measurements, therefore not the original type. It has been lost.

"Rafinesque's type measured '*environ*' L. 75, H. 30, D. 50 mm. The nearest specimen now measured is, L. 78, H. 33, D. 24 mm. In the most obese examples of either species the height still surpasses the diameter, which in Rafinesque's shell was said to be far greater than in any specimen of either species mentioned.

"As stated above, the method of 'correcting' an author's measurements to force them to agree with what species we will is essentially unscientific. It savors of mediæval theological procedure. If great dependence is placed upon these proportions in some cases, why throw them away when they do not suit our convenience? In the case of *Unio teres*, its adoption would mean the rejection of certainties for a name resting on a description requiring arbitrary alteration, and after that, practically arbitrary selection between two closely related forms. *U. teres* should be discarded as not identifiable." (H. A. P.)

LAMPSILIS SILIQUOIDEA (Barnes), 1823

Type locality: Wisconsin River.

Unio luteola Lamarck, '19, p. 79.

Unio fasciata Rafinesque, '20, p. 294.

Lampsilis fasciola Rafinesque, '20, p. 299.

Unio inflatus Barnes, '23, p. 266.

Unio siliquoides Barnes, '23, p. 269, pl. 13, f. 15.

U. cariosus Say, '17 = *U. luteola* Lam., Lea, '29, p. 417-425; Conrad, '34, p. 68; Ferussac, '35, p. 26.

U. siliquoides Bar. = *U. inflatus* Bar., Lea, '29, p. 419; Conrad, '36, pp. 23-40.

U. inflatus Bar. = *U. siliquoides* Bar., Conrad, '34, p. 69.

U. luteola Lam. = *U. siliquoides* Bar., Lea, '34, p. 91 (type examined).

U. fasciata Raf. = *U. carinatus* Bar., '23, Conrad, '34, p. 69; '35, p. 3, pl. 1.

U. fasciolus Raf. = *U. multiradiatus* Lea, '29, Conrad, '36, p. 26, pl. 11, f. 2 (Poulson's specimen examined).

U. siliquoides Bar. = *U. inflatus* Bar., Conrad, '36, p. 22, pl. 9, f. 1.

Lampsilis luteola (Lam.), Simpson, '14, p. 60.

Lamp. luteola (Lam.) = *L. fasciata* Raf., Vanatta, '15, p. 551 ("type" examined).

U. fasciata Raf. = *U. siliquoides* Bar. = *U. luteolus* Lam. (of authors), Frierson, '19, p. 139.

Of the names applied to this form, the oldest is *luteola* Lam. According to description and locality this has been referred to

U. cariosus Say '17, by Lea, Conrad, and Férussac, but Lea changed his opinion after the examination of Lamarck's type, identifying it with *siliquoides* Bar. There is no question that Lamarck's brief description applies better to *cariosa* ("posterior end broader and rounded") and that of the localities given, the first (Susquehanna) has only *cariosus*, but not *siliquoides*. If the type of *luteola* is the latter, the description is unsatisfactory. In either case, the name *luteola* cannot be used.

The next name to be discussed is *fasciata* Raf. Conrad considers this to be *carinatus* Bar. (*ligamentinus* auct.), and according to Vanatta the "type" confirms this. However, Frierson thinks that it is *siliquoides*. The original description of *fasciata* (see also under *Actinonaias carinata*) gives the characters: elliptic, convex, shell not thick; epidermis little rugose, olivaceous, with brown rays; nacre bluish, cardinal tooth rugose, divaricate; lateral tooth carinate; size up to over three inches. This fits both species, and thus *fasciata* is not identifiable.

In view of Rafinesque's statement that his *fasciata* occurs in the Ohio, Muskingum, Kentucky, Salt, Green, and other rivers, and that while it is ordinarily a small species, yet he had seen it more than three inches in length, it would seem to be conclusive that it is not the same as *siliquoides* Bar.

A series of comparative measurements shows that of the possible species known in the Ohio system to which it might be approximated *fasciola* Raf. and *carinata gibba* Simp. are the only ones that at all correspond to those given by Rafinesque. As between these two, so far as proportions are concerned, there is not much choice. In the absence of any specification as to the character of the rays of *fasciata*, it is impossible to refer it with any certainty to either, although the comparison with *ochracea* would seem to indicate *fasciola* rather

than *carinata gibba*. It must, therefore, be held to be unidentifiable.

Then follows *U. fasciola* Raf. According to Vanatta, the Poulson type belongs to *luteola auct.* (= *siliquoidea* Bar.), but this is contradicted by Conrad, who mentions also a specimen from the Poulson Collection, which is called *fasciolus*, and is identical with *multiradiatus* Lea. Moreover, as will be shown under *Lampsilis fasciola*, Rafinesque's description does not fit the present species, but does fit *multiradiata* very well. Thus, also, this name cannot be used.

Next are two names given by Barnes, '23, *inflatus* and *siliquoideus*. That these are identical and belong here has been recognized by Lea, '29, confirmed by Conrad, and accepted by Simpson, and there is no doubt that *siliquoideus* is the male, *inflatus* the female. Of these two names, *siliquoideus* has been selected by Lea in '29, while Conrad, in '34, selected *inflatus*, but changed subsequently ('36) to *siliquoideus*. The latter thus is the valid name, and should be used for the species hitherto commonly called *luteola*.

LAMPSILIS VENTRICOSA (Barnes), 1823

Type locality: Wisconsin and Mississippi rivers, Prairie du Chien, Wis.

Lampsilis cardium Rafinesque, '20, p. 298, pl. 80, f. 16-19.

Unio ventricosus Barnes, '23, p. 267, pl. 13, f. 14.

U. cardium Raf. = *U. ventricosus* Bar., Conrad, '34, p. 68.

Lampsilis ventricosa (Bar.), Simpson, '14, p. 38.

L. cardium Raf. = *L. ventricosa* (Bar.), Vanatta, '15, p. 551 ("type" examined).

L. cardium Raf. = *L. ovata* Say, '17, Ortmann, '18, p. 583.

L. ventricosa (Bar.) = *L. cardium* Raf., Walker, '18c, p. 184 ("if identifiable").

Conrad and Vanatta (examination of the alleged Poulson-Rafinesque "type") make *cardium* the same as *ventricosa*.

From the original description this cannot be confirmed. *Cardium* might be *ovata*, *ventricosa*, or even *Proptera capax* Green, and from the comparison of *L. ovata* Say with *cardium* given by Rafinesque we should conclude that *cardium* is the female of *ovata* (*ovata* differs chiefly by the less swollen shape and non-dilated posterior end). This is also supported by the figure of *cardium*, which shows distinctly a rather sharp posterior ridge. At the best, *cardium* is not identifiable, and thus this name cannot supersede *ventricosus*.

LAMPSILIS FASCIOLA Rafinesque, 1820

Type locality: Kentucky River.

Lampsilis fasciola Rafinesque, '20, p. 299.

Unio multiradiatus Lea, '29, p. 434, pl. 9, f. 15.

U. fasciolus Raf. = *U. multiradiatus* Lea, Ferussac, '35, pp. 26, 32; Conrad, '36, p. 26, pl. 11, f. 2 (Poulson's specimen examined).

Lampsilis multiradiata (Lea), Simpson, '14, p. 55.

Lampsilis luteola (Lam.) = *L. fasciola* Raf., Vanatta, '15, p. 551 (Poulson's "type" examined).

L. fasciola Raf. = *U. multiradiatus* Lea, Ortmann, '18, p. 584.

Conrad and Vanatta have examined a specimen in the Rafinesque-Poulson Collection, and Férussac an authentic specimen from Rafinesque; Conrad and Férussac pronounce *fasciola* to be the same as *multiradiata*, while Vanatta says that it is *luteola* (= *siliquoidea*). There is evidently some mistake about the supposed "type."

However, Rafinesque's description is unmistakable. It "indicates a shell of the *cardium-ovata* type, with unequal, flexuous rays, which fits *multiradiata* Lea, but not *luteola* Lam." (Ortmann), and Conrad has also pointed out as the essential character the numerous "unequal, green, undulated or flexuous rays." Thus *fasciola* is identifiable and valid.

Genus DYSNOMIA Agassiz, 1852

Type: *Unio foliatus* Hild. = *Obliquaria flexuosa* Raf.

Truncilla Rafinesque, '20, p. 300 (no type named); Herrmannsen, '47, p. 627 (type, *Truncilla truncata* Raf.); Agassiz, '52, p. 44 (no type named, first species, *Tr. triqueter* Raf.); Simpson, '00, p. 516 (type, *Tr. triqueter* Raf.).

Dysnomia Agassiz, '52, p. 43 (no type named, first species, *Obliquaria flexuosa* Raf.); Simpson, '00, p. 521, as subgenus of *Truncilla* (type, *U. foliatus* Hild. = *Obl. flexuosa* Raf.).

Since the type of *Truncilla* has been designated by Herrmannsen as *Tr. truncata* Raf., this name takes the place of *Amygdalonaias* (which see). The next available name for this genus is *Dysnomia* Agassiz, the type of which has been fixed by Simpson.

Subgenus TRUNCILLOPSIS n. n.

Type: *Truncilla triqueter* Raf.

Truncilla (subgenus) Simpson, '00, p. 517 (type, *Truncilla triqueter* Raf.).

The removal of *Truncilla* and the extension of the subgeneric name *Dysnomia* to cover the whole genus necessitates the introduction of a new subgeneric name for what was hitherto the subgenus *Truncilla s. s.* of Simpson. The name of *Truncillopsis* is therefore proposed.

DYSNOMIA (TRUNCILLOPSIS) TRIQUETRA (Rafinesque), 1820

Type locality: Falls of the Ohio (at Louisville, Ky.).

Truncilla triqueter Rafinesque, '20, p. 300, pl. 81, f. 1-4.

Unio triangularis Barnes, '23, p. 272, pl. 13, f. 17.

Unio cuneatus Swainson, Phil. Mag., '23, p. 112.

Unio formosus Lea, '31 (not '34, as given by Simpson), p. III, pl. 16, f. 31.

U. triqueter Raf. = *U. triangularis* Bar. = *U. formosus* Lea = *U. cuneatus* Sw., Conrad, '34, p. 72; Ferussac, '35, p. 27.

Truncilla triquetra Raf., Simpson, '14, p. 5.

Truncilla triquetra Raf., Vanatta, '15, p. 550 ("type" examined).

The generally accepted identity of *Tr. triquetra* Raf., which is evident from description and figure, has been confirmed by Vanatta's examination of the so-called Rafinesque-Poulson "type."

DYSNOMIA (TRUNCILLOPSIS) BREVIDENS (Lea), 1831

Type locality: (Incorrectly given as Ohio) corrected by Lea, '34, p. 85, to Cumberland River.

Obliquaria interrupta Rafinesque, '20, p. 302.

Unio brevidens Lea, '31 (not '34, as given by Simpson), p. 75, pl. 6, f. 6.

U. interruptus Raf. = *U. brevidens* Lea, Conrad, '34, p. 69; Ferussac, '35, p. 28; Conrad, '38, p. 88, pl. 48.

Truncilla brevidens (Lea), Simpson, '14, p. 7.

Truncilla brevidens (Lea) = *Obl. interrupta* Raf., Vanatta, '15, p. 550 ("type" examined).

Tr. brevidens (Lea) = *Obl. interrupta* Raf., Walker, '16^c, p. 45; '18^c, p. 186 ("if identifiable").

Tr. interrupta (Raf.), Ortmann, '18, p. 586.

Vanatta's view that *Obliquaria interrupta* Raf. is preoccupied by *Unio solenoides interrupta* Raf. does not hold good (Walker). However, the original description of *O. interrupta* is not sufficient to recognize the species.

It is evident that Rafinesque's type of his *interrupta*, if a specimen of *brevidens*, was a male shell, no mention being made of the characteristic posterior inflation and truncation of the female *brevidens*. A normal male *brevidens* of exactly the same length as the type of *interrupta* is 10% higher and 25% more inflated. Many specimens could be selected that are proportionately higher. The proportions given by Rafinesque for his shell do not, therefore, agree with those of *brevidens*.

The question of locality should also be considered. Rafinesque says, "Found in the Kentucky and Ohio rivers." So far as we have been able to ascertain, there is no record of the

occurrence of *brevidens* in the Ohio. It is not given in any of the Ohio lists that we have seen. *Brevidens* is a characteristic species of the Tennessee system. Like some other Tennessee species, by stream transference in the head-waters, it has got into the Cumberland River, but not out into the Ohio.

We know practically nothing of the fauna of the Kentucky. We have no records of this species having been found there.

On the other hand, the various forms of the *nebulosa* group are generally distributed in the Ohio and its southern tributaries. It seems very strange that Rafinesque seems never to have collected any species of that group. At least none have been identified among his species.

An "ovate-elliptical shell, not thick, and little swollen, with reddish-brown epidermis and interrupted rays and white nacre," may be very well applied also to forms of *Ligumia* of the *nebulosa-iris* group.

In this connection attention should also be called to the possibility that Rafinesque's shell may have been a specimen of *teniatus* Con. A specimen of nearly the same size has exactly the same proportions as those given by Rafinesque for his shell. In all other respects, except perhaps color, including the character of the lateral teeth, it agrees with *interruptus*. While this species does not occur in the Ohio, it is found in the Cumberland and is quite likely to be found in the Kentucky as *brevidens*.

Punctata Lea would also apply. Except that it is usually not so high proportionately as *interruptus*, in other respects it agrees quite as well as *teniata*. It would seem to us that it is quite as possible that Rafinesque had one of these or some allied species before him as that he had *brevidens*.

"The Rafinesque-Poulson specimen of *interruptus* is a female *brevidens*, very solid, diameter nearly one-half the length,

55.5 x 26.5 mm.; 'peu epais' would alone throw it out." (H. A. P.)

Subgenus SCALENILLA n. n.

Type: *Unio sulcatus* Lea.

Scalenaria Rafinesque, '20, p. 309 (no type named); Herrmannsen, '48, p. 422 (type, *Obliquaria scalenia* Raf.); Agassiz, '52, p. 43 (no type named); Simpson, '00, p. 519 (type, *Unio sulcatus* Lea).

The type of *Scalenaria* has been designated by Herrmannsen as *Obliq. scalenia* Raf., which is the same as *Pleurobema clava* (Lam.), which see. Thus this name becomes a synonym of *Pleurobema*. Subsequent attempts by Agassiz (first species) and Simpson to select as type *Obliq. obliquata* Raf. (an unidentifiable species) or *U. sulcatus* Lea (supposed to be the same as *obliquata*) are invalid. Since there is no available name for this subgenus, we propose that of *Scalenilla*.

' DYSNOMIA (SCALENILLA) SULCATA (Lea), 1829

Type locality: Ohio.

Obliquaria (Scalenaria) obliquata Rafinesque, '20, p. 309 (Kentucky-River).

Unio sulcatus Lea, "May or June," 1829 (not '30, as given by Simpson), p. 430, pl. 8, f. 12.

Unio ridibundus Say, October 7, 1829, p. 308.

U. obliquatus Raf. = *U. sulcatus* Lea, Conrad, '34, p. 70.

U. obliquatus Raf. = *U. sulcatus* Lea = *U. haysianus* Lea = *U. ridibundus* Say, Ferussac, '35, pp. 28, 34.

Scalenaria obliquata (Raf.) = *U. sulcatus* Lea (male) = *U. ridibundus* Say (female), Agassiz, '52, p. 43.

Truncilla (Scalenaria) sulcata (Lea), Simpson, '14, p. 14.

Trunc. obliquata (Raf.) = *Tr. sulcata* (Lea), Vanatta, '15, p. 550 ("type" examined).

Tr. sulcata (Lea) = *Ob. obliquata* Raf., Walker, '16^c, p. 45, and '18^c, p. 186 ("if identifiable").

U. sulcatus Lea is not preoccupied by *Pleurobema cuneata sulcata* Raf. ('20), as Vanatta claims (see Walker).

Obl. obliquata is not identifiable from the original descrip-

tion, for every word of it applies as well to *Pleurobema pyramidatum* (Lea): shell thick, swollen, ovate-triangular, the three sides curved, a light oblique and longitudinal depression; epidermis nearly smooth, black; nacre rose-purplish; size 2-3 inches. In fact, the black epidermis and the size fit *U. pyramidatus* better than *U. sulcatus*.

Thus the name *obliquata* cannot be revived.

DYSNOMIA (PILEA) TURGIDULA (Lea), 1858

Type locality: Cumberland River and Florence, Ala.

Unio turgidulus Lea, '58, p. 40 (male).

Unio deviatius Reeve, '64, pl. 15, f. 61 (female).

Truncilla deviata (Rve.) (male and female) Walker, '10^c, pp. 78, 81.

Tr. florentina (Lea) (in part) and *Tr. deviata* (Reeve), Simpson, '14, pp. 30-31.

Tr. curtisi Frierson and Utterback, Utterback, '16, p. 190, pl. 6, f. 14, pl. 28, f. 109.

Tr. turgidula (Lea) = *U. deviatius* Rve., Ortmann, '18, p. 590.

Tr. curtisi Fr. and Utt. = *Tr. deviata* (Rve.), Walker, '18^c, p. 185.

Walker ('10) was the first to indicate that *turgidulus* Lea is the male of the female *deviatius*, by arranging his key for the males of *Truncilla* in such a way that the characters seen in *turgidulus* lead to the male of *deviatius*, but he did not expressly stated this in the text, using only the name *deviata*, while *turgidulus* has the priority.

The identity of *Tr. curtisi* from the Ozarks has been recognized by Walker ('18) and is evident from Utterback's description and figures. The examination of authentic specimens distributed by Utterback has settled this beyond any doubt.

DYSNOMIA (PILEA) TORULOSA (Rafinesque), 1820

Type locality: Ohio and Kentucky River.

Amblyma torulosa Rafinesque, '20, p. 314, pl. 82, f. 11-12.

Amblyma gibbosa Rafinesque, '20, p. 315.

Unio perplexus Lea, '31, p. 112, pl. 27, f. 42.

U. torulosus Raf. = *U. gibbosus* Raf. = *U. perplexus* Lea, Conrad, '34, p. 72.

U. gibbosus Raf. = *U. perplexus* Lea, Ferussac, '35, p. 27.

U. gibbosus Raf. = *U. torulosus* Raf. = *U. perplexus* Lea, Conrad, '36, p. 50, pl. 27, f. 1.

Truncilla perplexa (Lea), Simpson, '14, p. 24.

Tr. torulosa (Raf.) = *Ambl. gibbosa* Raf. = *Tr. perplexa* (Lea), Vanatta, '15, p. 550 ("type" examined).

Tr. torulosa (Raf.), Ortmann, '18, p. 589.

Tr. perplexa (Lea) = *A. torulosa* Raf. = *A. gibbosa* Raf., Walker, '18c, p. 186 ("if identifiable").

"Lea's *Unio perplexus* is preoccupied by Say for a variety of *U. ridibundus* not noticed by Simpson (Am. Con., Pt. I, Binney's Reprint, p. 155)." (H. A. P.)

Rafinesque's crude figure of *A. torulosa* is sufficient to recognize in it the female of this species, since it distinctly shows the posterior expansion of the female shell and the characteristic nodes. Also the description confirms the identity. *A. gibbosa* undoubtedly is the male belonging here, and the two large, nodulous ribs and the oblique furrow between them are unmistakable. This identification with *perplexus* Lea is supported by Vanatta's examination of the so-called Rafinesque-Poulson "type."

Conrad's first selection ('34) of the name *torulosa* in preference to *gibbosa* must stand, although he subsequently ('36) reversed this.

DYSNOMIA (DYSNOMIA) FLEXUOSA (Rafinesque), 1820

Type locality: Kentucky, Salt, and Green rivers.

Obliquaria flexuosa Rafinesque, '20, p. 306.

Unio foliatus Hildreth, '28, p. 284, p. 16.

Unio (Epioblasma) biloba Rafinesque, '31, p. 2.

U. gibbosus Raf. probably = *Epioblasma biloba* Raf., Ferussac, '35, p. 27-34 (authentic specimen of *biloba* examined).

U. flexuosus Raf. = *foliatus* Hild., Conrad, '35, p. 8, pl. 4, f. 2 ("type" examined).

Dysnomia flexuosa (Raf.) = *U. foliatus* Hild., Agassiz, '52, p. 43.

Truncilla (Dysnomia) foliata (Hild.), Simpson, '14, p. 18.

Epioblasma biloba Raf. = *U. foliatus* Hild., Frierson, '14^a, p. 7.

Trun. flexuosa (Raf.) = *Tr. foliata* (Hild.), Vanatta, '15, p. 557 ("type" examined).

Tr. foliata (Hild.) = *Obl. flexuosa* Raf. = *Ep. biloba* Raf., Walker, '18^e, p. 186 ("if identifiable").

Conrad and Vanatta have found that the so-called Rafinesque-Poulson "type" of *flexuosa* is the same as *foliatus* Hild. The original description of *flexuosa* mentions two gentle elevations of the shell, and between them a *wide* and *flat* depression. This is a very prominent character of the species and cannot be applied to any other shell. Also the description of the margins of the shell as "flexuous" is significant. Thus the specific name *flexuosa* stands.

As to *biloba*, its recognition is important with regard to the validity of the subgenus *Epioblasma* (as against *Dysnomia*). Férussac is not sure about the identity of his authentic specimen of *biloba*. The phrase "belly bilobed" has suggested the idea that it is the female of *flexuosa*, but this is not bilobed below, but bisinuata, with only one large lobe. Also the description of the shell as elliptical does not fit, for it is triangular. Further, the beaks are not prominent, as described, and nothing is said about the very striking feature, the two ridges of the shell, and the deep and wide radial furrow.

Thus the description of *biloba* is not recognizable, and with this name also that of the subgenus, *Epioblasma*, goes into the discard.

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