

*Orepidula plana* Say. In aperture of dead *Polinices duplicata* Say.

*Natica canrena* Lam. Rare, sand bars.

*Polinices duplicata* Say. Common on sand bars.

*Sigarctus perspectivus* Say. Not common, sand bars.

*Turbo castaneus* Gmel. Rare, low-water line.

*Fissuridea alternata* Say. Dead, low-water line.

## CLAM BAYOU

*Venus campechiensis* Gmel. Common.

*Barnea costata* Linn. Not common, buried in sand and mud.

These two species were peculiar to this part of the island as far as I was able to ascertain. All other species that were found here were also found at Tarpon Bay. A single fragment of *Voluta junonia* Hwass. was found on the beach near this locality.

## NOTES ON THE ANATOMY AND TAXONOMY OF CERTAIN LAMPSILINAE FROM THE GULF DRAINAGE

BY A. E. ORTMANN, PH. D.

1. *PTYCHORRANCHIUS GREENI* (Conrad) (1834); *PTYCHORRANCHIUS FOREMANIANUM* (Lea) (1842); *PTYCHORRANCHIUS TRINACRUM* (Lea) (1861).

Simpson (1914, pp. 336-338) gives these as separate species, but he unites (and rightly so) *woodwardianus* Lea (1857) and *velatus* Conrad (1853) with *foremanianus*, and *simplex* Lea (1845) and *flavescens* Lea (1845) with *greeni*.

The three species admitted by Simpson belong to the Alabama drainage, and the first (*greeni*) is reported from Black Warrior River, the two others from the Coosa River. Simpson points out the possible identity of *trinacrus* with *foremanianus*. He distinguishes *greeni* by being smaller and more delicate, and having a more nearly elliptical outline.

It is impossible for me to see in *trinacrus* anything but an individual variation of *foremanianus*, chiefly, since shells similar to this have never been found subsequently. The

characters given for *g* in addition, I should River, has the rays while *foremanianum*, and blotches.

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Thus there are two system, the one belo the other to the Co Many Coosa specime blotches; the shape and, on the other h and also in the Black and others which are best to regard these fo which should bear t (1834). The type Cahaba Rivers, while (1842) represents the *Anatomy*. Already supium and glochidii The marsupium plac *Ptychobranchius* (see: 308). I have mate localities.

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Chatooga River, C female (without shel

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<sup>1</sup>Ball (Ecology 3, 1922, a third form: *Ptychobran* garded as the compressed

characters given for *greeni* can be recognized in most cases, and, in addition, I should say that *greeni*, from the Black Warrior River, has the rays poorly developed, and has no blotches, while *foremanianum*, from the Coosa, has more distinct rays and blotches.

Specimens from Cahaba River approach *greeni* in shape and color markings, yet the latter are often more distinct, showing rays, but without forming blotches.

Thus there are two types of *Ptychobranchus* in the Alabama system, the one belonging to the Black Warrior and Cahaba, the other to the Coosa, but they are not sharply separated. Many Coosa specimens have poorly developed rays and no blotches; the shape is very variable, not always triangular; and, on the other hand, there are specimens in the Cahaba, and also in the Black Warrior, which have more distinct rays, and others which are somewhat triangular. Thus I think it is best to regard these forms as local varieties of the same species, which should bear the name: *Ptychobranchus greeni* (Conrad) (1834). The typical form is found in Black Warrior and Cahaba Rivers, while the variety, *Pt. greeni foremanianum* (Lea) (1842) represents this in the Coosa River.<sup>1</sup>

*Anatomy.* Already Lea has described and figured the marsupium and glochidium of *U. woodwardianus* and *foremanianus*. The marsupium places these forms undoubtedly into the genus *Ptychobranchus* (see: Ortman, Ann. Carnegie Mus. 8, 1912, p. 308). I have material of the soft parts from the following localities.

Coosa River, Wilsonville, Shelby Co., Ala.—1 gravid female (without shell), H. H. Smith coll., Nov. 4, 1911.

Chatooga River, Cedar Bluff, Cherokee Co., Ala.—1 gravid female (without shell), H. H. Smith coll., Nov. 1910.

Black Warrior River, Walker Co., Ala.—6 gravid females (without shells), H. H. Smith coll., Oct. 15, 1912.

The first two localities undoubtedly represent the *foremani-*

<sup>1</sup> Ball (Ecology 3, 1922, p. 112) distinguishes, in the Black Warrior River, a third form: *Ptychobranchus greeni flavescens*, which apparently should be regarded as the compressed headwaters-form of *greeni*.

autumn-type, the last typical *greeni*, since many shells are at hand from a number of localities in the various drainages, showing the shell-characters as described above. Glochidia were present in all soft parts, except one of *greeni*, and thus the breeding season apparently begins in autumn.

No unusual features are shown in the soft parts. It should be mentioned, however, that the inner lamina of the inner gills is, in one specimen, entirely connected with the abdominal sac, while in the others it is more or less free behind: the maximum is about one half of the length of the abdominal sac. The number of folds of the marsupium varies according to the size of the individual, from 8 to 12. I do not observe any dark pigment on the edge of the marsupium, but the material has been a long time in alcohol. The placentae are the usual shape and quite solid. Glochidium subovate, without hooks, higher than long, L. 0.15, H. 0.18 mm: thus they are somewhat smaller than those of *Pt. fasciolare* (Raf.).

*The genus Medionidus in the Alabama drainage.*

*Medionidus conradicus* (Lea) (1934), common in the headwaters of the Cumberland and Tennessee drainages (see: *M. plateolus* (Raf.) Ortman, Proc. Amer. Philos. Soc. 57, 1918, p. 575), has been reported also from the Alabama system, but according to my observations, this is incorrect. The genus is represented, there, indeed, but by different forms, which may be distinguished as follows.

- a<sub>1</sub> Color rays not reticulated or spotted, but straight and continuous, the finer ones sometimes wavy. Corrugations of posterior slope rather fine. *M. conradicus*
- a<sub>2</sub> Color rays reticulated or interrupted, spotted. Corrugations of posterior slope coarser.
- b<sub>1</sub> Rays poorly developed, forming, over the whole surface, a painting of a reticulated character. No distinct posterior ridge. Posterior end of shell not pointed. Nacre bluish. *M. parvulus*
- b<sub>2</sub> Rays better developed, rather broad, but also composed of reticulations, or interrupted. Posterior ridge distinct. Posterior end of shell pointed. Nacre often of reddish or salmon color. *M. acutissimus*

2. *MEDIONIDUS PARVUS*

Simpson, Descr. Cat. 11  
*Type-locality:* Coosa  
 (southern Chattooga River  
 Swamp Creek, northwest  
 in Whitfield Co., Ga.).

The Carnegie Museum  
 Exact localities are recorded  
 Cahaba River, Lily  
 Call coll.

Coosa River, Wedushka  
 H. Smith coll.

Coosa River, near Upper  
 H. H. Smith coll.—1 sp.

Coosa River, Riverside  
 Smith coll.

Choccolocco Creek, Jr.  
 1 spec., H. H. Smith coll.

Conasauga River, Co.  
 females (with soft parts)

*M. parvulus* is a *M. conradicus*-like character, the rays and corrugations of the posterior slope (Lea, 1867) has described the form. According to him, the middle of the outer gill is free from the inner gills are free from the middle of the outer gill length, and the posterior slope is reticulated. The glochidium is subovate.

According to my two specimens, it is identical with that of *M. conradicus*, p. 335; NAUT. 28, 1915. Inner lamina of inner gill is free from the outer gill for about half of its length, with exception of the posterior end, which is notably long and smaller, depending on size of the gill, number of ovis.

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*M. acutissimus*

2. *MEDIONIDUS PARVULUS* (Lea) (1860).  
 Simpson, Descr. Cat. 1914, p. 248.

*Type-locality*: Coosa River, Ala., and "Chattanooga, Ga." (surely Chattooga River, Ga. is meant). Simpson adds: Swamp Creek, northwest Ga. (tributary to Conasauga River, in Whitfield Co., Ga.).

The Carnegie Museum possesses 15 specimens of this species. Exact localities are recorded for the following.

Cahaba River, Lily Shoals, Bibb Co., Ala.—5 spec., R. E. Call coll.

Coosa River, Weduska Shoals, Shelby Co., Ala.—1 spec., H. H. Smith coll.

Coosa River, near Upper Clear Creek, Talladega Co., Ala., H. H. Smith coll.—1 spec.

Coosa River, Riverside, St. Clair Co., Ala.—1 spec., H. H. Smith coll.

Choccolocco Creek, Jackson Shoals, Talladega Co., Ala.—1 spec., H. H. Smith coll.

Conasauga River, Conasauga, Polk Co., Tenn.—2 gravid females (with soft parts), A. E. Ortmann coll., May 24, 1915.

*M. parvulus* is a *M. conradicus* with the painting of a reticulate character, the rays not or poorly developed, and the corrugations of the posterior slope somewhat coarser. Lea (Obs. 11, 1867) has described the soft parts, and also the glochidium. According to him, the marsupium has 10 ovisacs, is located in the middle of the outer gill, occupying one third of its length. The inner gills are free from the abdominal sac over half of its length, and the posterior half of the mantle-margin is crenulated. The glochidium is "elongate pouch shaped".

According to my two females, the anatomy is practically identical with that of *M. conradicus* (Ann. Car. Mus. 8, 1912, p. 335; NAUT. 28, 1915, p. 142; NAUT. 34, 1921, p. 90). Inner lamina of inner gills connected with abdominal sac anteriorly for about half of its length. Papillae of mantle margin small, with exception of 1 or 2 anterior ones, which are remarkably long and subcylindrical. Marsupium larger or smaller, depending on size of shell, located near the middle of the gill, number of ovisacs up to 20. Color of soft parts the

same as in *M. conradicus* (blackish), of marsupium white, with no pigment on edge. Glochidium: L. 0.19, H. 0.25 mm., thus corresponding to the minimum measurements known in *conradicus*. Shape the same, subspatulate.

3. *MEDIONIDUS ACUTISSIMUS* (Lea) (1831). Simpson, 1914, p. 251. A synonym is *U. rubellinus* Lea (1857), which represents an old shell, while *acutissimus* is young.

The *type-locality* for *acutissimus* is the Alabama River, and it has been reported (by Conrad) also from Black Warrior River, Erie, Greene Co., Ala. (I was unable to locate a place of that name). *U. rubellinus* is from Othcalooga Creek, Gordon Co., Ga.

I have 16 specimens with the following exact localities.

Sipsey River, Texas, Marion Co., Ala.—3 spec., H. H. Smith coll.

Calaba River, Gurnee, Shelby Co., Ala.—1 spec., H. H. Smith.

Coosa River, Weduska Shoals, Shelby Co., Ala.—2 spec., H. H. Smith coll.

Talladega Creek, Talladega Co., Ala.—4 specimens, Hartman collection.

Choccolocco Creek, Jackson Shoals, Talladega Co., Ala.—1 spec., H. H. Smith.

Chattooga Creek, Trion, Chatooga Co., Ga.—2 males, 1 gravid (discharging) female, (all with soft parts), A. E. Ortman's coll., May 19, 1915.

(To be continued)

#### A KEY TO THE FAMILY TEREBRIDAE\*

BY PAUL BARTSCH

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In working up the Terebridae of the Mazatlantic faunal area, it was found desirable to subject the entire family to a critical examination, and the large collections in the United States National Museum have furnished some rather interesting infor-

mation. Believing that prove of use to students of form of a key.

Two genera are recognized *Terebra* which is character columellar fold or twist present. The rest of the n

It is interesting to find t have a status in this new: Smith, which is not consid H. & A. Adams to merit r

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NOTES ON THE ANATOMY AND TAXONOMY OF CERTAIN LAMPSILINAE  
FROM THE GULF DRAINAGE

BY A. E. ORTMANN, PH. D.

(Continued from page 60)

## MEDIONIDUS ACUTISSIMUS (Lea).

Also this species differs from *M. conradicus* in the reticulated painting and the coarser corrugations of the posterior slope. It differs from *M. parvulus* by the fact that the rays are more frequently present and rather broad (but also composed of reticulations). From both, *conradicus* and *parvulus*, it is distinguished by more prominent posterior ridge and pointed posterior epd. The nacre is very frequently of a reddish or salmon color.

The soft parts have been described by Lea (under *U. rubellinus*, Obs. 6. 1858). He reports that the marsupium occupies nearly the whole length of the outer gill, with a wide reddish-brown border on the edge. The inner lamina of the inner gill is free nearly half of the length of the abdominal sac.

In my specimens I have found that the inner lamina of the inner gills is free for about one-half of the abdominal sac (more or less). In the gravid female, there are 2 to 4 long papillae on the mantle-edge in the same position as in the other species. These papillae are cylindro-conical in shape. The marsupium is large, yet it does not occupy the whole gill, but a large section in the middle of it, leaving non-marsupial a more considerable portion anteriorly, and a smaller portion posteriorly (it is quite probable that it is smaller in younger specimens). The number of ovisacs on the left side is at least 22 (with some posterior ones discharged); on the right side, they are hard to count, since they are largely discharged, but probably there were still more of them. Also my specimen has the margin of the marsupium broadly colored with brown pigment. Color of soft parts rather light: the black of *conradicus* and *parvulus* being replaced by brown.

Glochidium of the same shape as that of the other species, but larger: L. 0.26 to 0.27, H. 0.32 to 0.33 mm.

Thus the anatomical investigation furnishes in the larger marsupium with brown edge, in the prevailing brown, not black, pigment of the soft parts, and in the larger glochidia additional specific characters for *M. acutissimus*. The latter, in its affinities, is more remote from *conradicus*, while *pareubus* stands very close to this.

4. *CARUNCULINA PAULA* (Lea) (1840).  
Simpson, 1914, p. 159.

Choctawhatchee River, Blue Springs, Barbour Co., Ala.—soft parts of 4 males and 5 barren females, H. H. Smith coll., Oct., 1915.

The anatomy of these specimens agrees in all respects with that of *C. parva* (Barn.) (see: Ann. Carn. Mus. 8, 1912, p. 338, and NAUT. 28, 1915, p. 129). In one of my specimens, a female, the supraanal opening is closed, in the others open. There is some blackish pigment at the edge of the marsupium. The caruncle is white or brownish.

These specimens have been identified (as *Lampalis paula*) by B. Walker, but since I do not possess the shells, I cannot exactly say what Walker understood by this name. However, specimens in the Carnegie Museum from various sources, among them two thus labeled, received from the Alabama Museum (from Chattahoochee River, Columbus, Muscogee Co., Ga.), hardly differ from *C. parva* (Barnes). They do not have the cloth-like epidermis seen in the typical *parva*, and young shells are not so black, but more greenish, with lighter concentric bands. Further, the female is more distinctly swollen and dilated in the postbasal region. But these characters occasionally may turn up in *C. parva*, chiefly in southwestern (Arkansas) material.

5. *CARUNCULINA MÆSTA* (Lea) (1841).  
*Toxolasma lividum* (Raf.) Ortman, Proc. Amer. Philos. Soc. 57, 1918, p. 573; *Car. mæsta* Ortmann, NAUT. 34, 1921, p. 89.  
*U. corvunculus* Lea, 1868.

Othcalooga Creek, Calhoun, Gordon Co., Ga.—a number of shells, and soft parts of one gravid female, H. H. Smith coll., July, 1913.

Choctawhatchee Creek barren female with 1915.

All these specimens I have pointed out, distinguished from *T. mæsta* drainage, and specimens from East Tennessee (189). Also the glochidia.

My specimen with confirms the late end instances in this species.

This is one of the of the Alabama fauna found in the Cumberland Ozarks, and its variety to Arkansas, but not is present again (under drainage, chiefly in this connection, th (1914, p. 154) from I my opinion, that this

6. *MICROMYIA NERUI* Ortman, Proc. Amer.

This is a common of drainages, and is very Alabama drainage, a Georgia. In fact, its Black Warrior River Alabama, in the Black

The following synonym region have been ascert

*U. radians* Lea (18. with wide rays. Nacri Calhoun), Gordon Co waters of Coosa).

*U. jonesi* Lea (1859

ation furnishes in the larger in the prevailing brown, not s, and in the larger glochidia *M. acutissimus*. The latter, in om *conradicus*, while *parvulus* (1840).

Springs, Barbour Co., Ala.—  
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Proc. Amer. Philos. Soc. 57,  
, NAUT. 34, 1921, p. 89.

ordon Co., Ga.—a number  
avid female, H. H. Smith

Choccolocco Creek, White Plains, Calhoun Co., Ala.—1  
barren female with soft parts, H. H. Smith coll., July 31,  
1915.

All these specimens were labeled *corvunculus* by Walker. I have pointed out, that the shell named *corvunculus* cannot be distinguished from *T. lividum* (= *C. maesta*) of the upper Tennessee drainage, and also the soft parts do not differ from specimens from East Tennessee and the Ozarks (NAUT. 34, 1921, p. 89). Also the glochidia are the same.

My specimen with glochidia was collected in July, which confirms the late end of the breeding season observed in other instances in this species.

This is one of the species indicating the close connection of the Alabama-fauna with that of the Tennessee. *C. maesta* is found in the Cumberland-Tennessee drainages and in the Ozarks, and its variety *glans* (Lea) in the central basin, south to Arkansas, but not on the Gulf plain. But the typical *maesta* is present again (under the name of *corvunculus*) in the Alabama drainage, chiefly in the headwaters. It should be mentioned, in this connection, that *glans* has been reported by Simpson (1914, p. 154) from Etowah River, Ga.: there is no doubt, in my opinion, that this refers to *maesta*.

#### 6. MICROMYA NEBULOSA (Conrad) (1834).

Ortmann, Proc. Amer. Philos. Soc. 57, 1918, p. 577.

This is a common species in the Cumberland and Tennessee drainages, and is very variable. But it is also found in the Alabama drainage, and in the Chattahoochee system in Georgia. In fact, its *type-locality* is in the headwaters of the Black Warrior River in Alabama ("mountainous regions of Alabama, in the Black Warrior River").

The following synonyms founded upon specimens from this region have been ascertained previously (l. c.).

*U. radians* Lea (1857). Probably a rather normal female, with wide rays. Nacre white or rose. Othcalooga Creek (near Calhoun), Gordon Co., Ga. (tributary to Oostanaula, headwaters of Coosa).

*U. jonesi* Lea (1859). Normal female, with narrow rays.



Nacre white or salmon. Euharlee Creek, Bartow Co., Ga. (tributary of Etowah River, headwaters of Coosa).

*U. sparus* Lea (1868). A normal male with well developed rays. Nacre salmon. Swamp Creek, Whitfield Co., Ga. (tributary to Conasauga River, south of Dalton, headwaters of Coosa).

*U. linguiformis* Lea (1860). A male, with poorly developed rays, but normal in shape. Columbus, Ga. (Chattahoochee drainage; also reported from French Broad River in Tennessee).

*U. sinus* Lea (1838). A male with strongly developed rays, originally described from Cumberland River, but reported by Simpson (1914, p. 124) also from Othcalooga Creek Gordon Co., Ga.

To these, however, should be added the following synonyms.

*U. planus* Lea (1860). Already Simpson (1914, p. 125) suspects that this is only a form of *nebulosus*. The figure represents a male, and it is a rather short *nebulosus*, with rays well-developed. Such specimens are not at all rare. Coosa River, Wetumpka, Elmore Co., Ala.

*U. difficilis* Lea (1868). Made a synonym of *planus* by Simpson. The figured specimen is a small, rather short male, with few rays. Swamp Creek, Whitfield Co., Ga. (also given from headwaters of Holston River, Washington Co., Va.).

I have before me a rather large number of this species from the Coosa drainage, from Conasauga River in Polk Co., Tenn., from Swamp Creek, Whitfield Co., Ga. (type-locality of *sparus* and *difficilis*), from Cowan Creek, Cherokee Co., Ala., Little Wills Creek and Green Creek, Etowah Co., Ala.; Shoal Creek, St. Clair Co., Ala.; Choccolocco Creek, Talladega Co., Ala.; and Spring Creek, near Kewatchee Springs, Shelby Co., Ala. I have also material from the Cahaba River, in Bibb Co., Ala.

All this material shows that *M. nebulosa* is widely distributed in this region, and that the Alabama-form cannot be distinguished from that of the Tennessee. In Conasauga River, at Conasauga, Polk Co., Tenn., I collected myself 2 males and 1 gravid female (discharging glochidia, May 24, 1915). The anatomical characters are those of *M. nebulosa*, and also the glochidia are identical.

The present upper Tennessee (particularly noted, *iris*) westward Mississippi and southward with that of the Mississippi this species. Alabama and species has *formis*). Sir This is in the rest of the n

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of the following synonyms.

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 Washington Co., Va.).

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 Cherokee Co., Ala., Little  
 h Co., Ala.; Shoal Creek,  
 eek, Talladega Co., Ala.;  
 Springs, Shelby Co., Ala.

River, in Bibb Co., Ala.  
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*M. nebulosa*, and also the

The presence, in this case of the identical species, both in the  
 upper Tennessee and the Alabama drainages should be particu-  
 larly noted, since this type of shell, although it extends (as *M.*  
*iris*) westward to the Ozarks, and northward all over the  
 Mississippi and Ohio drainages, is not found to the southward  
 and southwestward. Thus a connection of the Alabama range  
 with that of the interior basin by way of the coastal plain and up  
 the Mississippi valley is excluded, and we must assume that  
 this species managed to get across the divide between the  
 Alabama and the Tennessee. It also should be noted that this  
 species has been recorded from the Chattahoochee (*linguae-*  
*formis*). Simpson gives also Wolfsville, Union Co., N. Car.  
 This is in the Catawba-Wataree drainage, far away from the  
 rest of the range, and appears as rather doubtful.

7. MICROMYA VIREX (Conrad) (1834).  
 Simpson, 1914, p. 136.

A species widely distributed in the Gulf drainage from Mis-  
 sissippi to Georgia, with a variety (*nigrina* Lea) in Florida. It  
 is closely allied, in the shell characters, to *M. nebulosa*, but  
 generally more elongate, with very well developed rays, which  
 usually are wide and stand rather crowded, although they may  
 be absent on the anterior part of the shell. The rays are  
 not "wavy", as Simpson describes them, but rather inter-  
 rupted, spot-like, but not always so. On account of the  
 crowded character of the rays, the general color of the epider-  
 mis appears rather dark, dark green to blackish. The nacre is  
 mostly white, rarely reddish. The shell grows to a larger size  
 than that of *M. nebulosa*; the posterior expansion of the female  
 is of about the same character. The synonyms given by  
 Simpson surely belong here; they are: *U. exiguus* Lea (1840);  
*U. stagnalis* Conrad (1849); *U. rutilans* Lea (1856); *U. subellip-*  
*sis* Lea (1856).

I have material from the Tombigbee, Sipse, and Black  
 Warrior River systems, from the Cahaba and Coosa drainages,  
 up to Murray Co., Ga. and Polk Co., Tenn.; from the Escam-  
 bia and Choctawhatchee drainages in southern Alabama and  
 from the Chattahoochee in Georgia. Soft parts are at hand  
 from the following localities.

Conasauga River, Conasauga, Polk Co., Tenn.—2 males and 1 young female, A. E. Ortmann coll., May 24, 1915.

Little River (trib. to Chattooga), Cherokee Co., Ala.—1 young male, 1 gravid female (glochidia), H. H. Smith coll., Octob., 1915.

Choccolocco Creek, White Plains, Calhoun Co., Ala.—1 male, 1 female, H. H. Smith coll., July 31, 1915.

Choctawhatchee River, Blue Springs, Barbour Co., Ala.—1 barren and 1 gravid female (glochidia), H. H. Smith coll., the former May 11, the latter Octob., 1915.

The specimens from the Choctawhatchee were labeled by Walker: *vibex* var.? I do not have the shells of them. But other specimens with shells from the Choctawhatchee drainage, thus labeled, are surely *vibex*, differing only by more or less purplish shades in the naere, thus forming a transition to the var. *nigrina*, known from Florida. Whatever they are, the soft parts do not differ from those of *vibex*.

I have described (Ann. Carnegie Mus. 8, 1912, p. 340) the barren female of *M. vibex nigrina* (Lea). The mantle margin of the typical *vibex* essentially agrees with this. There are about 12 (or more, in *nigrina* 10) cylindro-conical papillae, of large or medium size, which are somewhat distant from each other, with a few smaller ones anterior to them. In young females, the larger papillae are nearly the same size; in the larger ones, they are more irregular, and stand at irregular intervals, and the posterior part of the mantle-edge may be without them; but a group of 6 to 8 large papillae in its anterior part is evident.

The marsupium is of the normal Lampsiline type; the number of ovisacs varies with age, from a few up to 25 or 30. The edge of the marsupium has blackish pigment.

Anal opening separated from the supraanal by a moderate mantle-connection. The anal has crenulations, the branchial opening has papillae. Inner lamina of inner gills connected with abdominal sac. Palpi with posterior margins connected at base only. The male has a few, small, and distant, rudimentary papillae on the mantle edge. Color of soft parts whitish, anal and branchial openings with black pigment, and

a streak of this runs along the mantle edge of female blackish papillae of female blackish

Glochidium subspatulate and *liciosa* groups, all of which are about L. 0.21, H. 0.27 mm.

Thus the anatomy of the present form is related to *M. nebulosa* and *M. nigrina*, the least closely allied to *M. vibex*. The slight difference in size as well as the transitional nature of the present form, to a degree, a group.

It should be pointed out that the Tennessee-drainage system, two species of *M. nigrina* are allied, but different from the same should be the former. However, it is difficult to conclude that the evolution prevailed at the geological and geographical connection of the *nebulosa* stock changed in the a wider distribution. A second immigration which then reached the Tennessee-drainage enough to change its distribution geographically restricted (to the Tennessee-drainage) chiefly in the headwaters.

1103.

alk Co., Tenn.—2 males and  
H., May 24, 1915.

Cherokee Co., Ala.—1 young  
H. H. Smith coll., Octob.,

Calhoun Co., Ala.—1 male,  
31, 1915.

Prings, Barbour Co., Ala—  
chidia), H. H. Smith coll.,  
a., 1915.

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e the shells of them. But  
e Choctawhatchee drainage,  
ring only by more or less  
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a blackish pigment.

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osterior margins connected  
7, small, and distant, rudi-  
edge. Color of soft parts  
s with black pigment, and

a streak of this runs forward along the mantle-margin. Pap-  
illae of female blackish-brown.

Glochidium subspatulate, of similar shape to that of the *iris*-  
and *lienosa*-groups, and closely agreeing with it in dimensions,  
L. 0.21, H. 0.27 mm.

Thus the anatomy bears out the relationship of this species  
to *M. nebulosa* and *M. iris*, and we should regard *M. vibex* as at  
least closely allied to *nebulosa*, from which it may have de-  
scended. The slight irregularity in the papillae of the mantle-  
edge, in size as well as in their distance from each other,  
is transitional towards forms like *lienosa*, and thus *M. vibex* may  
present, to a degree, a connection between the *iris*- and *lienosa*-  
groups.

It should be pointed out that we thus have, in the Alabama  
system, two species representing the form *nebulosa* of the  
Tennessee-drainage: an identical one, *nebulosa*, and a closely  
allied, but different one, *vibex*. For the latter, of course,  
the same should be said with regard to its origin, as to the  
former. However, *vibex* being distinct from *nebulosa*, we are  
to conclude that the conditions which brought about its distri-  
bution prevailed at least twice, at different times during the  
geological and geographical history of this region. There was  
an older connection of the waters, permitting a first immi-  
gration of the *nebulosa*-stock into the Alabama-system. This  
stock changed in the course of time into *vibex*, and reached  
a wider distribution upon the coastal plain (as far as Florida).  
A second immigration took place later, and the *nebulosa*-stock  
which then reached the Alabama-drainage did not have time  
enough to change its characters, and remained more geographi-  
cally restricted (to the Alabama and Chattahoochee systems,  
chiefly in the headwaters).

(To be continued)

to the cardinal teeth of "*abruptus*", Call himself (ibid. page 492) writes that they are "nearly smooth", in which he is correct. Those of the "*retusa*", the reader may prove by inspection of several, are in fact, remarkably "sulcated".

"Nacre flesh color, and very iridescent with purple and violet". Such coloring in the *abruptus* has never been seen by the writer, but applies very well to some specimens of the *retusa*. The nacre of the latter is generally said to be "deep purple", but it is sometimes white, and sometimes with a blush of pink; especially when young.

An attentive reading of Hildreth's description will show that his shell was correctly placed by the earlier naturalists—for it must be remembered that the several species called *subrotunda*, *torsus* etc., might have been lumped together by them. Say at any rate never mentioned the *torsus* or *retusa* in any of his writings.

Whether Hildreth's species be the *subrotunda* or the *retusa* is merely of academic interest; the facts which interest us being that it is absolutely *not* Say's species, *Unio abruptus*; and the latter name, after resting in the synonymy for almost a hundred years, must be used as the valid name of what has been incorrectly called *Unio orbiculatus* Hildreth.

GAYLE, LOUISIANA.

NOTES ON THE ANATOMY AND TAXONOMY OF CERTAIN LAMPSILINAE  
FROM THE GULF DRAINAGE

BY A. E. ORTMANN, PH. D.

(Continued from page 105)

8. MICROMYA VANUXEMENSIS UMBRANS (Lea) (1857).

See: *Lampsilis propria* and *umbrans*=*vanuxemensis*, Simpson, 1914, p. 105 and 103.

*E. vanuxemensis*, of the Cumberland-Tennessee-system, has also been reported from the upper Coosa drainage. The following accepted synonyms are from this region.

*U. umbrans* (= *umbrosus*), Lea, 1857. A typical female in shape, with dark brown epidermis and dark purple nacre.—Othcalooga Creek, Gordon Co., Ga.

*U. tenebrius* Lea, 1857. The figure represents a male, with dark brown epidermis and purple or salmon nacre.—Etowah River, Ga.

*U. fubaceus* Lea, 1861. A male, not full grown. Epidermis dark brown, nacre purplish and salmon near the margin.—Coostanaula River, Ga.

Another, very closely allied form, has been reported from this region: *U. proprius* Lea (1865). Simpson (p. 104) suspects that it may be only a smaller and paler form of *vanuxemensis*. It originally comes from Lafayette, Walker Co., Ga. (headwaters of Chattooga River). But, remarkably enough, Simpson gives it also from Clinch River, Va. Now, in the upper Tennessee region, occasional specimens of *vanuxemensis* turn up which are lighter in color of the epidermis and nacre, and, if they are also small, they would very well agree with *proprius*. But in this region, they form only an individual variation, and a very rare one.

In the Coosa drainage, specimens with lighter color of epidermis and nacre prevail, as is shown by the rich material from this region before me. But they are by no means smaller than the normal *vanuxemensis*. There are specimens fully as large as the general run of *vanuxemensis* in the upper Tennessee, although, exactly as in the latter, they seem to remain uniformly smaller in certain creeks. On the other hand, with regard to the color of the epidermis and nacre, there are, in the Coosa drainage, specimens fully as dark as the normal *vanuxemensis*, but such specimens are rare, and, if found, are mostly associated with lighter ones. From many places, only the light form is at hand. As a rule, old and worn specimens are the ones which incline toward the darker tints. Thus we have the following conditions: in the Tennessee-drainage, there is a dark form, the typical *vanuxemensis*, which rarely shows an inclination to become lighter; in the Coosa drainage, there is a light form, which sometimes shows an inclination to become darker. The light shells from the Tennessee cannot be distinguished from the normal Coosa-form; and the dark shells of the latter cannot be told apart from the normal Tennessee-form. These are exactly the conditions which are required for the separation of these forms as varieties of *one* species.

The normal form (1865). However to this stock, the (has only page po name, founded a phase of the Coosa and *fubaceus*. In from the lighter variations of it.

I have two male of *umbrans*, and the beaks, but lig larger, the nacre tint of the Coosa-fish on the margin position to yellow that he had only *b*

The name of the *sis umbrans* (Lea) Lea (1857); *U. fol*

I have investigated Coosauuga River 2 gravid females (24, 1915,

Shoal Creek, St. (with glochidia). I Morgan Creek, S H. H. Smith coll.,

The structure of that of the typical p. 342; NAUT. 19 the glochidia vary to 0.30 mm.

Attention should be given. This species Tennessee drainage; it to it, so that it can that it must have

The normal form of the Coosa has been called *U. proprius* Lea (1865). However, also *umbrans*, *tenebricus*, and *fabaceus* belong to this stock, the oldest name being *umbrans* Lea (1857) (has only page precedence over *tenebricus*). Unfortunately, this name, founded upon two females only, stands for the dark phase of the Coosa-form, and the same is true also for *tenebricus* and *fabaceus*. But they cannot be separated upon this ground from the lighter form (*proprius*); they are simply individual variations of it.

I have two males from Othcalooga Creek, which are topotypes of *umbrans*, and they have the epidermis olive-brown near the beaks, but lighter (light brown) upon the sides. In the larger, the nacre has that beautiful, characteristic salmon tint of the Coosa-form; the smaller is pale salmon inside, whitish on the margin. Already Lea says, that there is a "disposition to yellowness" on the sides. Thus I have no doubt that he had only two unusually dark specimens before him.

The name of the Coosa-form should be: *Micromya vanuxemensis umbrans* (Lea) (1857), with the synonyms: *U. tenebricus* Lea (1857); *U. fabaceus* (1861); *U. proprius* Lea (1865).

I have investigated the anatomy of the following material.

Conasauga River, Conasauga, Polk Co., Tenn.—1 barren, 2 gravid females (with glochidia), A. E. Ortmann coll., May 24, 1915,

Shoal Creek, St. Clair Co., Ala.—1 male, 2 gravid females (with glochidia), H. H. Smith coll., Oct., 1914.

Morgan Creek, Shelby Co., Ala.—5 males, 2 barren females, H. H. Smith coll., July 3, 1914.

The structure of the soft parts is absolutely identical with that of the typical *vanuxemensis* (see: Ann. Carn. Mus. 8, 1912, p. 342; NAUT. 1915, p. 65; 34, 1921, p. 91). Also here the glochidia vary a little in size: L. 0.21 to 0.23, H. 0.27 to 0.30 mm.

Attention should again be directed to the geographical distribution. This species is found, first, in the Cumberland-Tennessee drainages; then there is an Alabama-form closely allied to it, so that it can be separated only as a variety, indicating that it must have reached the Coosa-drainage by crossing over

from the Tennessee. The complete absence of this type of shell from the Mississippi valley, the coastal plain, and the lower parts of the Alabama-system, renders the idea impossible that it might have come from those parts, migrating from West to East.

9. *MICROMYA LIENOSA CONCESTATOR* (Lea) (1857).

See: Simpson, 1914, p. 100 and 102.

Simpson admits the close affinity of *concestator* to *lienosa*, and says that *lienosa* differs in being larger and stouter, in being darker and not quite so shining. It is said to be found from the Mississippi and lower Ohio drainage to southwestern Georgia, with the type-locality in southern Alabama, while *concestator* is said to be distributed from North Carolina to Louisiana, and possibly Texas. *M. lienosa* thus would be more western and northern, *M. concestator* more southern and eastern, the two forms overlapping in the Gulf drainage.

Examining my material, which comes from nearly the whole range of these two forms (Ga., Ala., Miss., La., Ark., Ky., and Ind.) I am able to verify these differences at least to a certain degree, but surely size and solidity do not hold good. Specimens from the West, indeed, generally are rather black in color, but I observe the same color in specimens from the Choctawhatchee drainage in southeastern Alabama and from the Chattahoochee in Georgia. Individuals with more brownish epidermis, and then often with more distinct rays, it is true, are more abundant towards the East, but in Alabama they are often associated with and grade into more blackish forms, so that no sharp line can be drawn.

These conditions make it impossible to distinguish the two forms as *species*. The best we can do is to separate them as *varieties*, and to call the more eastern, brownish form: *Micromya lienosa concestator*. But we must remember that there will be cases where it is hard to decide to which form a particular specimen may belong.

Among a number of specimens received from the Alabama Museum and labeled by Walker, it is very evident that this difficulty was encountered. Of specimens labeled *concestator*, I have soft parts from the following localities.

Choctawhatchee R.  
2 males, H. H. Smith  
East Choctawhatchee  
female (glochidia), J.

The anatomical structure  
*lienosa* as described by  
340, and NAUT. 30,  
of the same shape and

10. *LAMPUSILIS CLAI*  
onym of *L. claibornensis*.

From the Choctawhatchee  
*Lampusilis obtusa* by  
description of this form  
makes this a synonym  
subspecies anyway".

These specimens of  
delicate shell and the  
brown (or dark greenish  
yellowish of the rest, at  
distinct rays. This form  
*bornensis*, belonging to  
Rivers, or even a speci-  
final decision depends,  
material.

The affinity of this  
in its anatomy. I have  
Choctawhatchee River  
1 gravid female (with  
Smith coll., May 11, 1915)  
Pea River, 4 miles N  
2 young males (shells and  
1915.

The gravid female has  
*claibornensis* (and that of  
Ann. Carn. Mus. 8, 1915)  
papillae below the branch  
p. 406) for *obtusius*, undot-  
fecting anterior portion of



of this type of shell  
 in, and the lower  
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 ting from West to

(1857).

tator to *lienosa*, and  
 solidier, in being  
 to be found from  
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 North Carolina to  
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 form: *Micromya*  
 that there will  
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rom the Alabama  
 evident that this  
 eled *concestator*, I

Choctawhatchee River, Blue Springs, Barbour Co., Ala.—  
 2 males, H. H. Smith coll., May 11, 1915.

East Choctawhatchee River, Dale Co., Ala.—1 male, 1 gravid  
 female (glochidia), J. A. Burke coll., Nov., 1915.

The anatomical structure of these is identical with that of *M.*  
*lienosa* as described previously (Ann. Carnegie Mus. 8, 1912, p.  
 340, and NAUT. 30, 1916, p. 55). Also the glochidia are  
 of the same shape and size (see: *ibid.* 1912, pl. 20, f. 5).

10. *LAMP SILIS CLAIBORNENSIS OBTUSA* (Lea) (1840). (Syn-  
 onym of *L. claibornensis*, according to Simpson, 1914, p. 70).

From the Choctawhatchee drainage I have 5 shells labeled  
*Lampsilla obtusa* by Walker. They fully agree with Lea's  
 description of this form, and H. H. Smith remarks: "Simpson  
 makes this a synonym of *claibornensis*: I should call it a good  
 subspecies anyway".

These specimens differ from *claibornensis* in having a more  
 delicate shell and the color of the posterior slope, which is dark  
 brown (or dark greenish in young shells), contrasting with the  
 yellowish of the rest, and produced by the confluence of the in-  
 distinct rays. This form might be, indeed, a local race of *clai-*  
*bornensis*, belonging to the Choctawhatchee and Chattahoochee  
 Rivers, or even a species taking its place in these parts; the  
 final decision depends, however, on the investigation of more  
 material.

The affinity of this form to *claibornensis* is clearly shown  
 in its anatomy. I have received the following soft parts.

Choctawhatchee River, Blue Springs, Barbour Co., Ala.—  
 1 gravid female (with glochidia) (without the shell), H. H.  
 Smith coll., May 11, 1915.

Pea River, 4 miles N. of Elamville, Barbour Co., Ala.—  
 2 young males (shells and soft parts) J. A. Burke coll., Nov.,  
 1915.

The gravid female has the anatomy agreeing with that of *L.*  
*claibornensis* (and that of *L. siliquoides*, for that matter) (see:  
 Ann. Carn. Mus. 8, 1912, pp. 348, 349). The "large dark  
 papillae below the branchial opening", described by Lea (1863,  
 p. 406) for *obtusus*, undoubtedly refers to the "flap", the pro-  
 jecting anterior portion of the inner edge of the mantle in front

of the branchial. The glochidia have also been described and figured by Lea (1858, p. 46, pl. 5, f. 1), and their measurements given as: L. 0.192, H. 0.256. I found them to agree with those of *clubbornensis*: L. 0.21, H. 0.27 mm.

11. *LAMPUSILIS EXCAVATA* (Lea) (1857).

See: Simpson, 1914, p. 41.

When I described the anatomy of this species (Ann. Carn. Mus. 8, 1912, p. 352), I did not have any females. The glochidia were known then from the description and figure given by Lea (1874, pl. 21, f. 6). I have now the following soft parts.

Forks of the Black Warrior River, Walker Co., Ala.— 1 gravid female, H. H. Smith coll., Oct. 15, 1912.

This female shows the mantle flap developed exactly as in *L. ovata* (Say) (and related forms); posteriorly, it is lamellar with almost smooth edge (only with traces of crenulations); anteriorly, it projects in the shape of a lacerated lobe. On the inside, there is a black-brown streak.

The glochidia are subovate, of the same shape as in *L. ovata*, L. 0.20 to 0.21, H. 0.24 to 0.25 mm. This differs from the dimensions given by me previously for *L. ovata* and *L. ovata ventricosa* (as: L. 0.24 to 25, H. 0.28 to 0.29). *These latter dimensions, however, are a mistake.* Subsequent measurements of my old material have shown that the figures are the same as in *L. excavata*. Also the glochidia of *L. ovata satura*, L. 0.22, H. 0.25 (NAUT. 30, 1916, p. 56) agree with these. Already Surber (Bur. Fisher, doc. no. 771, 1912, p. 9) has correctly given the dimensions of the glochidia of *L. ovata ventricosa* as: 0.205 × 0.255, and of *L. satura* (ibid. no. 813, 1915, p. 6) as: 0.205 × 0.245 mm.

12. *LAMPUSILIS CLARKIANA* (Lea) (1852).

Synonyms: *Unio clarkianus* Lea (1852); *U. spilmani* Lea (1861); *U. gerhardi* Lea (1862). (Simpson, 1914, pp. 53, 54, makes the first two synonymy, while he has the third as a separate species).

The *type-locality* of *U. clarkianus* is said to be Williamsport, Maury Co., Tenn. (on Duck River), but there is no doubt that

this is a mistake. In Simpson's report on the

*U. spilmani* is from or Floating Turtle Creek (Tombigbee drainage), nowa, Ga.?, which (trib. to Coosa). In a Macon Co., Ala. (P. seem to be widely distributed.

All these forms now differ only in color already united the first *gerhardi* is the same lighter, yellowish color rays, while the others or without rays. A sp. River is to be regarded resembles this form. In others before me, which because there are all the

This species is from the interior basin. The dorsal from yellowish (sometimes quite dark narrower or wider. The in the cavity. It is a in shape, the male of elongated. The greatest found in the postbasal *clarkiana*, is much less so that the female she produced into a point, paratively little different apart; there is a gentle female, but this does not seen in *ventricosa*.

I have the following r

also been described (f. 1), and their measurements I found them to agree 27 mm.

species (Ann. Carn. to any females. The description and figure give now the following

Walker Co., Ala.—  
15, 1912.

developed exactly as anteriorly, it is lamellicornate (crenulations); serrated lobe. On the

shape as in *L. ovata*,

This differs from *L. ovata* and *L. ovata* (0.28 to 0.29). These subsequent measurements that the figures are of *L. ovata saturata*, agree with these. (771, 1912, p. 9) has *L. ovata ventricosa* (ibid. no. 813, 1915,

*spillmani* Lea (1861); pp. 53, 54, makes third as a separate

to be Williamsport, there is no doubt that

this is a mistake. Lea gives also: Georgia or Alabama, and Simpson specifies: Cahaba and Black Warrior Rivers, Ala.

*U. spillmani* is from "Luxpalila Creek" (=Lookapallila or Floating Turtle Creek), near Columbus, Lowndes Co., Miss. (Tombigbee drainage), and *U. gerhardti* is given from "Chattooga, Ga.", which probably means Chattooga River, Ga. (trib. to Coosa). In addition, Simpson gives for this: Shorter, Macon Co., Ala. (Tallapoosa drainage). Thus these forms seem to be widely distributed over the Tombigbee-Alabama system.

All these forms resemble each other in general shape, and differ only in color of epidermis and nacre. Simpson has already united the first two; but I have no doubt that also *gerhardti* is the same shell. This differs only by the generally lighter, yellowish, color of the epidermis, with poorly developed rays, while the others are yellowish, brownish or blackish, with or without rays. A specimen collected by myself in Chattooga River is to be regarded as a *topotype* of *gerhardti*, and closely resembles this form. But I cannot sharply distinguish it from others before me, which resemble the darker *clarkianus*-type, because there are all transitions.

This species is analogous to *L. ovata ventricosa* (Barnes) of the interior basin. The color of the epidermis varies a good deal, from yellowish (chiefly in younger shells) to brownish, sometimes quite dark brown. Rays may be absent or present, narrower or wider. The nacre is whitish, often tinted salmon in the cavity. It is a rather compressed shell, and resembles, in shape, the male of *L. ovata ventricosa*, but is slightly more elongated. The greatest difference from the latter, however, is found in the postbasal expansion of the female, which, in *clarkiana*, is much less developed, and situated more anteriorly, so that the female shell is not subtruncated posteriorly, but produced into a point. The male and female shells are comparatively little differentiated, so that it is hard to tell them apart; there is a gentle projection in the postbasal region of the female, but this does not reach, by any means, the proportions seen in *ventricosa*.

I have the following material:

Conasauga River, Conasauga, Polk Co., Tenn.—1 female, with soft parts, coll. by myself, May 24, 1915.

Chattooga River, Trion, Chattooga Co., Ga.—1 gravid female (with eggs), coll. by myself, May 19, 1915.

Beaver Creek, St. Clair Co., Ala.—1 specimen, probably male, H. H. Smith coll. (identified by Walker as *clarkiana*).

Coosa River, Coosa Valley, St. Clair Co., Ala.—1 spec., young, H. H. Smith coll. (identified by Walker as *clarkiana*).

Choccolocco Creek, Jackson Shoals, Talladega Co., Ala.—1 spec., young, H. H. Smith coll. (identified by Walker as *clarkiana*).

Talladega, Talladega Co., Ala.—1 spec., probably male, Hartman collection (originally labeled *spillmanii*).

Sipsey River, Elrod, Tuscaloosa Co., Ala.—2 spec., probably females, H. H. Smith coll. (labeled by Walker *clarkiana*).

Buttahatchee River, Hamilton, Marion Co., Ala.—7 spec., at least 2 females among them, H. H. Smith coll. (labeled by Walker *clarkiana*).

It should be noted that all specimens from the Tombigbee drainage have more brownish epidermis (lighter or darker), while yellowish epidermis prevails in shells from the Coosa system, yet a few of the latter are also brownish.

Of the two females I collected with soft parts, the one taken on May 19 in Chattooga River has eggs, but not glochidia. This would indicate the beginning of the breeding season in the spring, and is *entirely abnormal*. But it is known that also in other cases the breeding season becomes irregular in the southern states.

The anatomy agrees with that of *L. ovata ventricosa*, *excavata*, and related forms. The mantle flap is similar to that of these forms, with a free lobe anteriorly, not very distinct in my specimens, since it is contracted by the action of the alcohol, but several large teeth or lacerations are seen. The edge of the posterior part of the flap is nearly smooth, with a few indistinct crenulations. Also the color on the inside is normal: brownish, with a black longitudinal streak, but, on account of the contracted condition, I cannot recognize that peculiar eye-spot. There is no question that this species belongs in the *ovata*-group of *Lampsilis*.