RICHARD J. NEVES

ILUS.

s my pleasure to meet Dr. J.
gist, and to inspect three of
en. This species, although
915, was not described until
. Only five examples were
en obtained. For purposes
nown that one of these is in
ademy of Sciences at Phila-
m at Honolulu, one in my
collection of Dr. O.
eresting one, being of a uni-
ll brown dorsal spots; and it
o long settled and "worked"
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ghana should have escaped
ng operations of recent years.

nce asked one of the editors
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s only ready reply was—you
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s food—the "long green",
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Tridacna (with real teeth),
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-shell or paper. All that is
bers and the *prompt payment*
THE NAUTILUS will cease its
lome one else may try again,
s Greeley said about starting

Ortmann 1923

L. holstonia

THE NAUTILUS.

Vol. XXXVI JANUARY, 1923. No. 3

THE ANATOMY AND TAXONOMY OF CERTAIN UNIONINAE AND ANODONTINAE FROM THE GULF DRAINAGE.

BY A. E. ORTMANN, PH. D.

The following notes are based largely upon the examination of material of fresh-water mussels, which the Carnegie Museum has received in part from G. H. Clapp, in part from the Alabama Museum of Natural History—it has been collected mostly by H. H. Smith and his assistants, but a few forms have been taken by myself in northern Georgia and Tennessee.

1. FUSCONAIA SUCCISSA (Lea) (1852).

See *Quadrula succissa*, Simpson, Descript. Catal. 1914, p. 867. There is no doubt that *Unio cacao* Lea is a synonym to this.

Choctawhatchee River, near mouth of Gittey's Mill Creek, Geneva Co., Ala. Two specimens (shells only), Victor Hutchinson coll.

Pea River (trib. to Choctawhatchee), Fleming's Mill, Dade Co., Ala. Eight specimens, shells and soft parts (6 males, 2 females), J. A. Burke coll., Nov., 1915.

Structure of the normal, primitive Unionine type. Supra-anal opening present; it is slightly shorter than the anal, and separated from it by a well developed mantle-connection, which is shorter than the supraanal; in the largest male, however, the

connection apparently is torn. Anal opening with the inner edge finely crenulated, almost smooth. Branchial opening with strong papillae on inner edge. Palpi of the normal, subfalciform shape, their posterior margins connected for one-third to one-half of their length.

Gills normal; inner lamina of the inner gill free from abdominal sac, except at anterior end. In the female, all four gills are marsupial, with the septa more strongly developed and standing more closely than in the male.

Although the shape of the placentae and the glochidia are unknown, I have no doubt that this is a species of the genus *Fusconaia*, and not of *Quadrula*, for the reason that, in shell characters, it is extremely close to the *F. barnesiana*-group (see NAUT. 31, 1917, pp. 58–64), and does not at all resemble the species of *Quadrula*, which all are more or less sculptured. *F. succissa* is very much like the headwaters-form of *barnesiana* (var. *bigbyensis* Lea), it differs, however, in the complete absence of rays, and the peculiar color of the nacre, which is highly iridescent and more or less purplish, often whitish toward the cavity of the shell, darker toward the margin. These tints are unknown in *F. barnesiana.*

The beak-sculpture of *F. succissa* is unknown, but the fact that even in the smallest specimens at hand, with the beaks very little eroded, no sculpture is seen, indicates that it must have been poorly developed, as is characteristic for *Fusconaia.*

In the two largest specimens (males) the gills had that characteristic blackish tint observed in *barnesiana;* for the rest, the soft parts were discolored by the action of the alcohol.

This species is known from the Choctawhatchee system in southern Alabama and western Florida. *F. barnesiana* and its varieties are from the Tennessee-Cumberland drainage; and the third species of this group, *F. ozarkensis* (Call), is from the Ozark Mountains; thus the distribution of the group is markedly discontinuous.

2. MEGALONAIAS TRIUMPHANS (Wright) (1898).

Quadrula triumphans Simpson, Descr. Cat., 1914, p. 823.

Coosa River, Wilsonville, Shelby Co., Ala. Five males,

eight females (soft parts
June 15, 1914.

Coosa River, Weduskı
H. H. Smith coll., Augu

Coosa River, Coosa V
H. H. Smith coll.

M. triumphans is the
Coosa River in Alabama
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River, as reported by Sir
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The differences between t
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As is to be expected,
Megalonaias, created by
Natural. 4, 1916, p. 4
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Of course, no gravid fe
supium and the glochid
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with the abdominal sac
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at the posterior end of t
gills are marsupial. In
my specimens are badly
certain the presence of a

3. AMBLEMA PERPLICATA
Quadrula elliotti, Simp
Othcalooga Creek, Cal
Two shells and soft pa
H. Smith coll., the for
1911.

eight females (soft parts only) and one shell, H. H. Smith coll., June 15, 1914.

Coosa River, Weduska Shoals, Shelby Co., Ala. Two shells, H. H. Smith coll., August, 1913.

Coosa River, Coosa Valley, St. Clair Co., Ala. One shell, H. H. Smith coll.

M. triumphans is the representative of *M. heros* Say in the Coosa River in Alabama, and it may run into *heros* in the Alabama River. At any rate, *heros* is known from Tombigbee River, as reported by Simpson, and confirmed by specimens in the Carnegie Museum (from McIntosh, Washington Co., Ala.). The differences between the two forms are very slight. *M. heros*, as a rule, has the posterior wing of the shell less developed and less elevated, and thus the shell appears more elongated, and the upper and lower margins are more nearly parallel; while *M. triumphans* has a more elevated posterior wing, rendering the shell higher and shorter in outline, with the upper and lower margins diverging.

As is to be expected, *triumphans* also belongs to the genus *Megalonaias*, created by Utterback for *heros* (Amer. Midl. Natural. 4, 1916, p. 41). The essential characters, both of shell and soft parts (as far as our material permits) are seen. Of course, no gravid females being at hand, the charged marsupium and the glochidium is unknown. It deserves special mention that connection of the inner lamina of the inner gill with the abdominal sac is well developed in all of my specimens, and mostly complete, only in a few there are short holes at the posterior end of the foot. In my barren females all four gills are marsupial. In the region of the anal opening all of my specimens are badly injured, and I have been unable to ascertain the presence of a supraanal opening.

3. AMBLEMA PERPLICATA ELLIOTTI (Lea) (1856).

Quadrula elliotti, Simpson, 1914, p. 819.

Othcalooga Creek, Calhoun, Gordon Co., Ga. (type locality). Two shells and soft parts of four males and three females, H. H. Smith coll., the former in July, 1914, the latter in July, 1911.

Conasauga River, Whitfield Co., Ga. Shells, H. H. Smith.

Coahulla Creek, Herndon's Mill, Whitfield Co., Ga. Shells, H. H. Smith.

Chattooga River, Cedar Bluff, Cherokee Co., Ala. Shells, H. H. Smith.

The anatomy agrees completely with that of *A. perplicata* (Conrad), as described previously (Ann. Carn. Mus. 8, 1912, p. 247, and NAUT. 28, 1914, p. 21); of course, the gravid condition of the female and the glochidium have not been observed.

Already Simpson is inclined to regard this as a form of *perplicata*, from which it is said to differ in the more decidedly quadrate outline (with the posterior margin almost squarely truncate) in the narrower anterior and higher posterior end (due to the better development of the posterior wing), and in the smaller and less elevated pseudo-cardinals. In my specimens of *elliotti*, I cannot discover any difference whatever in the hinge teeth; but the other characters are noticeable. However, such specimens are found practically all over the range of *perplicata*, from the Alabama system westward. I have material not only from the Coosa-Alabama Rivers, but also from Mississippi, Louisiana, Texas, Arkansas, Oklahoma, Kansas, Missouri and southern Illinois, and everywhere specimens of the *elliotti*-type may turn up. Simpson gives, for the latter, the range: "southern" (apparently misprint for "northern") "Georgia to Texas", but it seems to have a wider distribution, and moreover, the two forms insensibly run into each other. This is preëminently so in the Coosa River, from which I have a number of specimens labeled (by Walker) *perplicata*, which show all possible transitions toward *elliotti*. The latter form, indeed, seems to be, in the upper Coosa system, the prevailing form, and for this reason we should let it stand as a variety of *perplicata*, although elsewhere it is merely an individual variation of *perplicata*.

4. QUADRULA ASPERATA (Lea) (1861).

See *Quadrula pustulosa pernodosa* (Lea), Simpson, 1914, p. 851 (in part).

This is the shell, which represents, in the Alabama system,

the *Q. pustulosa* (Lea) of the interior basin. I have quite a number of specimens from the headwaters of the Coosa, down to Wetumpka, Elmore Co., Ala. In the Cahaba, Black Warrior, and Tombigbee drainages, similar, but somewhat different forms turn up; but I propose to restrict myself here to the Coosa-form.

Simpson has united this form with *Q. pustulosa pernodosa*, and Walker, who has identified part of the material at hand, has labeled it thus. However, the original *U. pernodosus* Lea does not come from the Alabama System, but is from "North Carolina", from rivers tributary to the Tennessee, and is nothing but an individual phase of the common *Q. pustulosa* (see Proc. Amer. Philosoph. Soc. 57, 1918, p. 540).

Simpson's diagnosis of *pernodosa* is entirely insufficient: "suborbicular, moderately inflated, pustulous; epidermis yellowish brown"; every word of this fits also the typical *pustulosa*. According to my observations, the Coosa-form is indeed different from the true *pustulosa*. But its chief characters are not found in shape or sculpture, for both are extremely variable, although, in the average, the Coosa-form is more rounded, that is to say, the posterior upper margin is not elevated, and does not form an angle with the posterior margin, but curves down into it very gently and gradually. But such specimens are not infrequent in the interior basin among *pustulosa*. The main difference of the two forms is in the color pattern. Typical *pustulosa* has rays, sometimes obliterated, it is true, in old specimens, but very generally present in younger and well preserved individuals; of these rays, chiefly one in the middle of the disk is noticeable, which is strongly developed, broad, often breaking up into a few large blotches. I have never seen this color pattern in the corresponding Coosa-form, but in its place there are concentric, narrow bands of blackish, dark green, or sometimes brownish color, following the growth rests. Sometimes these band are absent, but there are never rays here.

The name of *pernodosa* cannot be used for this Coosa-form; but there is no doubt that *U. asperatus* Lea stands for it. It originally comes from the Alabama River, Claiborne, Ala., and from the Coosa River, Ala. It should be known as *Quadrula*

asperata (Lea), and should rank as a *species*, since there are no transitional forms to *pustulosa* known to me, and since also the geographical distribution is different from that of the typical *Q. pustulosa*.

Q. asperata is very variable in the development of the tubercles of the disk. In young specimens they are generally absent, but begin to appear at a certain stage of the growth. Sometimes individuals turn up which have none or only few tubercles at a comparatively advanced age, and such specimens seem to be rather frequent in the headwaters of the Coosa, in northern Georgia. Walker has labeled them *Q. pustulosa kieneriana* (Lea). The same name he has given to the soft parts (without shells) of three specimens from Etowah River, Cartersville, Bartow Co., Ga. (H. H. Smith coll., October 1910). Of these, two were barren females, and in their anatomy they were identical with *Q. pustulosa*.

The question is, whether these specimens are the real *kieneriana*, which Simpson regards as a variety of *pustulosa*, with the diagnosis: "suborbicular, smooth or somewhat nodulous; epidermis ashy brown or greenish brown", and, according to the measurements given, it is smaller than *asperata*. According to this, shells with poorly developed tubercles should be called *kieneriana*, and Walker apparently has acted upon this principle. Yet I think that this is not correct, and that most of the specimens without nodules, or with only a few, chiefly those from the headwaters of the Coosa, are only individual variations of *Q. asperata*, for there is no other difference, and they insensibly pass into each other.

There is in the Coosa a closely allied form to *Q. asperata*, with the same concentric color-bands, which, however has the growth rests standing more closely, and has smaller tubercles. This may be the real *kieneriana*. But I am not in a position to affirm this positively, since my material is too meagre.

5. *Pleurobema georgianum* (Lea) (1841).

Pleurobema georgianum (Lea), Simpson, 1914, p. 792.

Pleurobema favosum (Lea) (1856), Simpson, ibid., p. 798.

Conasauga River, Conasauga, Polk Co., Tenn. Two males,

three gravid females with soft parts, A. E. Ortmann coll., May 24, 1915.

Conasauga River, Tennga, Murray Co., Ga. Two shells, H. H. Smith coll., Sept. 15, 1914.

Cowan Creek, Cherokee Co., Ala. One shell, H. H. Smith coll., Novemb. 1910.

Shoal Creek, St. Clair Co., Ala. One male and one female, soft parts only, H. H. Smith coll., Oct. 1914.

The three shells from Tennga, Cowan Creek, and the soft parts from Shoal Creek, were labeled by Walker *Pl. favosum.*

The type-locality of *U. georgianus* is: "Stump Creek, Georgia", which undoubtedly stands for Stamp Creek, near Cartersville, Bartow Co., Ga., in the drainage of Etowah River. No other locality, and only one specimen is known. *U. favosus* is founded upon a number of specimens from Othcalooga Creek, Gordon Co., Ga. (trib. to Oostanaula River, near Calhoun), and also in this case no additional exact localities are known, although Simpson gives: "Alabama system".

I do not entertain any doubt that *U. georgianus* and *favosus* are identical. They come from the same general region, and, according to the material at hand, this species has its home in the headwaters of the Coosa River in northeastern Alabama and northern Georgia. *U. georgianus* is founded upon a rather small specimen (L. 41 mm.), of normal shape, with yellowish brown epidermis, without rays or spots, while the figure of *U. favosus* represents a larger specimen (L. 52 mm.) of the same, regular shape, with the epidermis yellowish green or brownish, and with a row of green spots upon the posterior ridge. These spots, as far as I can see, are the only difference of the two "species", for the rest, they agree completely in color, outline and general shape, and also the diameter is about the same: 39 per cent of the length in *georgianus*, 38 per cent of the length in *favosus.*

My material shows conclusively that the color markings in this species are variable: in the set from Conasauga collected by myself, the epidermis is yellowish or brownish olive; the larger specimens are without spots, the smaller ones have more or less distinct spots on the posterior ridge, and in the smallest

they appear as an interrupted broad ray. In the other specimens, collected by Smith, the spots are rather distinct.

The shape of the shell is rather subovate, almost subelliptical in outline. In the larger specimens, however, the lower margin is not very convex, but in part more nearly straight. Very young specimens (from Tennga) are comparatively higher than old ones. In my specimens, the diameter varies from 33 per of the length to 41 per cent, the average being, in specimens from Conasauga, 36 percent, in the others about 39 per cent. The maximum size (male from Conasauga) is: L. 61, H. 40, D. 20 mm. (this is the most compressed individual, D. 33 per cent).

As we shall see below, this is a real *Pleurobema* according to the anatomy. It stands very close to the small-creek-form *Pl. oviforme argenteum* (Lea) of the upper Tennessee region (see: Proc. Amer. Philos. Soc. 57, 1918, p. 552), and the fact, that this latter form is found in tributaries of the Tennessee not far from the Coosa drainage (Chickamauga Creek in Catoosa Co., Ga., and Hiwassee drainage in Tennessee) suggests that there actually is genetic relationship between the two forms, and that *Pl. georgianum* reached the upper Coosa by crossing over the divide from the upper Tennessee (by stream piracy).

Pl. georgianum differs from *Pl. oviforme argenteum* only in the regular, suboval, almost subelliptical outline, while in the latter, the outline generally is subrhomboidal or subtrapezoidal, that is to say, there is a more or less distinct angle between the upper and the posterior margins. The compression of the two forms is nearly the same. In color pattern, they are also much alike, except that the spots, in *argenteum*, are often accompanied by more or less rays upon the disk. However, also in *argenteum*, rays and spots may be entirely absent.

The soft parts from Conasauga agree with those from Shoal Creek. The females of the former locality were gravid with glochidia (May 25). The anatomy is identical with that of *Pl. oviforme argenteum* (Naut. 34, 1921, p. 85). This concerns also color, the soft parts being either whitish or pale orange. The color of the marsupium (placentae) is cream or pale orange, exactly as in the *clava*-group of *Pleurobema* (to which *oviforme*

belongs). Glochidia of the usual shape, subelliptical, L. O. 13, H. O. 15 mm., and thus they are slightly smaller than those of the *dum*-group and also a little higher in proportion to length, but in the latter respect they agree with specimens of *argenteum* from Chickamauga Creek (see: Sect. I, c.).

6. *Pleurobema hagleri* (Frierson) (1900).

Simpson, 1914, p. 776.

North River, Hagler's Mill, Tuscaloosa Co., Ala. Two shells, H. H. Smith coll.

Valley Creek, Toadvine, Jefferson Co., Ala. Soft parts (without shells) of one male and one barren female, H. H. Smith coll.

Both localities are in the Black Warrior drainage, the first close to the type-locality (Tyner, Tuscaloosa Co.). The specimens have been identified by B. Walker.

Although no gravid females were at hand, the anatomy indicates that this species probably is a *Pleurobema*. The soft parts were discolored by the alcohol.

The affinities of this species are still obscure.

7. *Pleurobema patsaligense* Simpson (1900).

Simpson, 1914, p. 788.

Little Patsaliga Creek, Crenshaw Co., Ala. Two shells, topotypes, C. Goodrich don.

Sandy Creek, Evergreen, Conecuh Co., Ala. twelve shells, H. H. Smith coll.

Choctawatchee River, Blue Springs, Barbour Co., Ala. One shell, and soft parts of ten others (six males and four barren females), H. H. Smith coll.

The single shell from the Choctawhatchee is absolutely identical with the sets from the other two localities in the Escambia drainage, and thus it is shown that this species belongs to both systems.

Concerning the soft parts, the same is to be said as in the case of *Pl. hagleri*, and also its systematic affinities require further elucidation. It should be pointed out, that the shells of these two species (and of others from Alabama) show certain

similarities to the genus *Elliptio*: it is not impossible that we have here the intergrading forms between *Elliptio* and *Pleurobema*.

8. *Pleurobema modicum* (Lea) (1857).

Pl. striatum (Lea) (1840), *Pl. modicum* (Lea) (1857), *Pl. amabile* (Lea) (1865), see: Simpson, 1914 p. 794, 795.

All three forms are from the Appalachicola system, the first two from the Chattahootchee River, Columbus, Ga., the last from the upper Flint drainage at Butler, Taylor Co., Ga. I have the following material:

Chattahoochee River, Ga. Two shells, Hartman collection (labeled *striatus*).

Pea River, Fleming's Mill, Dade Co., Ala. Eleven shells, ten of these with soft parts (five males, five barren females), J. A. Burke coll., Nov., 1915 (marked "Pea R., no. 2").

Choctawhatchee River, Blue Springs, Barbour Co., Ala. Soft parts (without shells) of seven males and five barren females, H. H. Smith coll., Oct., 1915 (marked "Choct. R., no. 6, same as Pea R., no. 2").

According to the published descriptions and figures, the differences of these supposed three species may be tabulated as follows:

a_1 Nacre flesh color to purplish. Posterior point of shell near base and lower margin of shell nearly straight.

a_2 Shell rather compressed, Dia. 33 to 36 per cent of length. *striatum.*

b_2 Shell more swollen. Dia. 42 to 45 per cent of length. *modicum.*

a_2 Nacre whitish or yellowish. Posterior point of shell more elevated above base and lower margin more convex. Shell rather swollen. Dia. 41 to 43 per cent of length. *amabile.*

The position of the posterior point of the shell is very variable and unfit to serve as diagnostic character. My two shells from Chattahootchee River, labeled *striatus*, possess the dia. of 40 and 41 per cent, and thus connect *striatum* and *modicum* more closely; I think that there is no doubt that these two are actually identical. Since W
Publ. 6, 1918, p. 183)
pied by *Unio striatus* (
oldest available name.
1915, p. 559, introduce
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My set of shells from
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Georgia, S. E. Alabam

9. LASMIGONA (ALASMI
Alasmidonta holstonia
son, 1914 pp. 502, 503.

See also: *L.* (*Sulcul*
Proc. Amer. Philos. S
holstonia, Ortmann, Na

This species, commo
see, has also been rep
River, and undoubtedl
cates a close connection
of the upper Tennessee,
widely distributed alsc

ally identical. Since Walker has shown (Univ. Mich. Miscell. Publ. 6, 1918, p. 183) that *U. striatus* Lea (1840) is preoccupied by *Unio striatus* Goldfuss (1839), *U. modicus* becomes the oldest available name. (*Pl. simpsoni* Vanatta, Pr. Acad. Philad. 1915, p. 559, introduced on account of *Obovaria striata* Rafinesque [1820] is unnecessary.)

My set of shells from the Choctawhatchee drainage (Pea R.) agrees in every particular with *amabile*, except that the shells are slightly less swollen (dia. 37 to 43 per cent, average 38 per cent), thus approaching the *striatum*-type. Thus there remains only one distinguishing character from the Chattahootchee shells, color of nacre. But since the whitish color (*amabile*-type) is also originally from the Chattahoochee drainage, it is safe to place also *amabile* in the synonymy of *modicum*.

In my specimens from Pea River the epidermis is, in the younger ones, tawny or greenish brown, sometimes obscurely rayed. In older ones it is darker, brownish, shading to blackish toward the beaks. Nacre whitish, often stained yellowish in the beak cavity.

According to the soft parts, this seems to be a *Pleurobema*, possessing the structure of this genus, as far as we can judge in the absence of gravid females. But its position within the genus is not yet clear. It is a small species, so far restricted to the Appalachicola and Choctawhatchee systems in S. W. Georgia, S. E. Alabama and probably also West Florida.

9. LASMIGONA (ALASMINOTA) HOLSTONIA (Lea) (1839).

Alasmidonta holstonia (Lea) and *Al. georgiana* (Lea), Simpson, 1914 pp. 502, 503.

See also: *L. (Sulcularia) badia* (Raf.), Ortmann, Nautilus Proc. Amer. Philos. Soc. 57, 1918 p. 557; *L. (Alasminota) holstonia*, Ortmann, Naut. 28, 1914 p. 43, and 34, 1921 p. 87.

This species, common in small streams in the upper Tennessee, has also been reported from the headwaters of the Coosa River, and undoubtedly is present there. This fact again indicates a close connection of the upper Coosa drainage with that of the upper Tennessee. According to material before me, it is widely distributed also in the Coosa drainage, from northern

Georgia down to Talladega and Shelby Cos. in Alabama, and also here it avoids the larger rivers, preferring smaller streams. It should be pointed out that the two ranges are in close contact, since, in the Tennessee drainage, this species is known from South Chickamauga Creek in Catoosa Co., Ga., and from the Hiwassee drainage in Polk Co., Tenn.

I have examined specimens with soft parts from the following localities in the Coosa drainage.

Chattooga River, Trion, Chattooga Co., Ga. Three males and two females. A. E. Ortman coll., May 19, 1915.

Little River (trib. to Chattooga), Cherokee Co., Ala. One male and one female (without shells). H. H. Smith coll.

The structure of these is entirely normal, as described previously.

(*To be continued*)

PROSERPINIDAE.

BY H. BURRINGTON BAKER.

Proserpina Gray (1840). Nude name.

Odontostoma d'Orbigny (1841), not Turton (1829), etc., etc. Type *O. depressa* d'Orbigny (1841), Cuba.

Proserpina "Gray" Sowerby (1842). Type (monotype) *P. nitida* "Gray" Sowerby (1842), Jamaica, Not *Proserpinus* Hübner (1816), Lepidoptera (Verz. bek. Schmet., p. 132).

Ceres Gray (1856). Type *Carocolla eolina* Duclos (1834), Vera Cruz, Mexico.

Proserpinella Bland (1865). Type (monotype) *P. berendti* Bland (1865), Mirador, Mexico.

Cyane H. Adams (1870). Type (monotype) *C. blandiana* H. Adams (1870), Eastern Peru.

Linidiella Jousseaume (1889). Type *Proserpina swifti* Bland (1863), Puerto Cabello, Venezuela.

Despœna R. B. Newton (1891). Substitute for Proserpina; same type.

Chersodespœna Sykes (
Sykes (1901), between Ay
Staffola Dall (1905).
subfossil, Rio Chico, Para
A. Shell large, heavy,
and thickened be
lamella (Mexico)
A'. Shell smaller, thin
Genus *Proserpina*
B. With distinct,
Proserpina s.
C. Palatal, par
tilles). S
C'. Parietal and
tion *Despa*
C''. Columellar l
Section *Li*
B'. With heavy col
tion of colun
genus *Cyane.*
D. Parietal la
Staffola.
D'. Columella
Section *Cyane*
B''. Parietal lamel
pinella.

As will be seen from th
Proserpinus preoccupied *P*
l. c.), *Despœna* (Despœni
term without designation
than here recognized. F
Proserpinellidæ would beco

began to die, and their valves gaping, the exposed contents were eaten by birds, and the latter not being content with their daily dead, in several cases undertook to expedite the process by pecking holes through their valves. With such force was this done that, in every case noted, *both valves* were punctured at once. Whether this action of these birds is due to *instinct* or to *reason*, the writer being strictly a Naiadologist leaves it to other better equipped observers to decide; merely remarking that this process has been previously observed, and the pecked shells in the writers cabinet now number three, from widely separate localities.

THE ANATOMY AND TAXONOMY OF CERTAIN UNIONINAE AND ANODONTINAE FROM THE GULF DRAINAGE.

BY A. E. ORTMANN, PH. D.

(Continued from page 84.)

Lea and Simpson distinguished from *Lasmigona holstonia* a species, *georgiana* (originally described under the preoccupied name *etowahensis* Lea), chiefly on the ground that the beak sculpture is said to be not double-looped, but concentric, and that the pseudocardinals are single in each valve. This form has been reported from Etowah River, Ga., and also from Tennessee, but so far only the types of Lea (two, according to Simpson) are known. They have badly eroded beaks and rudimentary pseudocardinals. According to my experience such beaks are often seen in *L. holstonia*, and the development of the pseudocardinals is very variable. The posterior (interdental) tooth of the left valve often is very poorly developed, or even absent, and sometimes also the anterior one is obsolete, so that there is only one tooth in each valve, and, in extreme cases, even this tooth may become rather small. Such cases of reduction of the hinge teeth are seen chiefly in older shells, in specimens both from the Coosa and from the Tennessee drainage, but such specimens are always associated with normal ones. Thus I do not entertain the slightest doubt that the

"*Alasmidonta georgiana* (Lea)" is simply a synonym of *Lasmigona holstonia* (Lea).

10. STROPHITUS CONASAUGAENSIS (Lea).[1]

St. connasaugaënsis (Lea) (1857), *St. alabamensis* (Lea) (1861), *St. gesneri* (Lea) (1858), Simpson, 1914 pp. 351–354.

The first form is from Conasauga Creek, Gilmore Co., Ga. (only the very source of the Conasauga, for about a mile, is in Gilmore Co.); *alabamensis* comes from Talladega Creek, Talladega Co., Ala.; *gesneri* from "Uphaupee Cr., below Columbus, Ga." (surely Uphaupee Creek, Macon Co., Ala., tributary of Tallapoosa River (Alabama drainage); it is, however not "below" Columbus, but to the west of it).

In 1900, Simpson has united *alabamensis* with *conasaugaënsis*, but in 1914, he separated them again, expressly stating that the three forms are closely connected and hard to distinguish. He gives the following distribution: *conasaugaënsis*, Alabama River system; for *alabamensis* the additional locality: Shelby Co., Ala.; for *gesneri* also: Swamp Creek, Ala. (an uncertain locality, possibly Swamp Cr., Lowndes Co., Ala., trib. to Alabama River; but there is another Swamp Creek, in Escambia Co., trib. to Escambia River).

Thus these forms are found in the Alabama, Tallapoosa, and Coosa drainages, from southern central Alabama (Lowndes and Macon Cos.) northward to northern Georgia. From this region I have the following material.

Chatooga River, Trion, Chatooga Co., Ga. A dead, broken shell, A. E. Ortmann coll., May 19, 1915.

Conasauga River, Conasauga, Polk Co., Tenn. Three males, two females (with soft parts), A. E. Ortmann coll., May 24, 1915.

Coosa River, Weduska Shoals, Shelby Co., Ala. Three shells, H. H. Smith coll.

All those described shells, and also the specimens at hand, resemble the *Strophitus edentulus* (Say) of the interior basin. They differ from it, however, in the somewhat lighter color of

[1] According to the orthography accepted in the U. S. Topogr. Surv. maps I change thus the original spelling: *connasaugaensis*.

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the epidermis, in that of the nacre, which varies from whitish to dull salmon or purplish (the latter color never found in *edentulus*), and chiefly by the better development of the hinge teeth. While the pseudocardinals, in *S. edentulus*, are entirely rudimentary, represented only by gentle swellings or not at all, there is, in this Alabama-form, at least one pseudocardinal in each valve, which may be small, but is generally, well developed, triangular and compressed, or tubercular, knob-like and stumpy. The tooth in the left valve corresponds to the second tooth of the original Anodontine hinge-teeth, for, in rare cases, in front and behind this, traces of a first and third tooth are seen, the third corresponding to the interdental tooth.

M. connasaugaënsis Lea, founded upon a single individual, is of medium size, and rather elevated in the posterior part; *M. alabamensis* Lea, also founded upon a single specimen, is large, and represents the normal condition of this form: it is also somewhat thicker than young shells. *M. gesneri* Lea is founded upon five specimens; the figured one also is large, but less elongated than *alabamensis*, and a little more convex, with darker (brown) epidermis: the nacre is purplish on the margins, and, according to Simpson, the left valve has traces of three pseudocardinals (Lea describes only one).

These three forms easily fall within the range of variation as indicated by my specimens (which surely belong to one species), and I only should add, that I have no specimens as large as *alabamensis* and *gesneri*. My largest, a female from Conasauga, measures: L. 67, H. 49, D. 32 mm. Also none of my specimens has purplish tints in the nacre, but in several of them salmon color is seen.

This species should be known as *Strophitus connasaugaënsis* (Lea) (1857), and it is characterized by the presence of at least one pseudocardinal in each valve, variable in size and shape, to which, in the left valve, sometimes traces of two others (anterior and posterior) are added; by the yellowish-olive color of the epidermis, turning to brown in old shells, and the occasional presence of rays upon the posterior slope.

The same type of shell, as far as it concerns the hinge-teeth, is found in the western section of the Alabama system, in Tom-

bigbee River and its tributaries in western Alabama and eastern Mississippi. These shells are larger, thicker, and more swollen and have a blackish epidermis (in young ones, however, this is lighter, yellowish to greenish olive, but mostly with dark rays and dark concentric bands). They go by the names of *St. spillmani* (Lea) (1858) and *St. tombigbeensis* (Lea) (1858). They undoubtedly represent *conasaugaënsis* in this region, but I cannot tell whether they intergrade with it or not. *S. spillmani* is a longer spell, dark brown, with concentric bands, while *S. tombigeensis* is shorter, with dark epidermis and lighter rays, characters which surely are only individual.

CORRECTION OF THE NAME OF DRILLIA ROSEOBASIS P. AND V.

BY H. A. PILSBRY AND E. G. VANATTA.

Drillia roseobasis, from Tagus Cove, Albemarle, Island, Galapagos, was defined by us in Proc. Washington Academy of Sciences IV, 1902, p. 560, pl. 35, fig. 2. We did not know that there was a prior *Pleurotoma (Drillia) roseobasis* of E. A. Smith.* Neither of these species would be a *Drillia* in the modern sense, and as genera are now understood in this family, they would probably not be considered congeneric; but Smith's species has not been figured and is little known. Dr. W. H. Dall, considering the names homonymous, renamed the Galapagos species *Pleurotoma roseotincta.*† Unfortunately, this name cannot be used on account of the prior *Pleurotoma (Clathurella) roseotincta* Montrouzier, 1872.‡ We propose, therefore to rename our Galapagos species *Pleurotoma testudinis.*

* Ann. Mag. Nat. Hist. (6), II, 1888, p. 301. Habitat unknown.

† "*Pleurotoma roseotincta* new name for *roseobasis* Pilsbry, 1902, not of E. A. Smith, 1888." Proc. U. S. Nat. Mus. vol. 54, 1919, p. 333.

‡ Journ. de Conchyl. XX, 1872, p. 361; XXI, 1873, p. 55, and as "*Pleurotoma roseotincta,*" t. c. pl. iv, fig. 1.