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PLEUROCERIDAE OF THE SMALL STREAMS OF  
THE ALABAMA RIVER SYSTEM\*

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ATTEMPT is made in this paper to distinguish between mollusks of main streams and their headwaters and tributaries. The line is, of course, wanting in sharp definition, inasmuch as certain riverine shells go far into headstreams and certain others invade creeks for short distances; small stream forms are washed by flood or normal current into the rivers and maintain existence there for a period. On the whole, a differentiation between the two types of molluscan fauna is recognizable in spite of the overlapping.

The Pleuroceridae of the Alabama River basin is restricted to four genera: *Pleurocera*, *Goniobasis*, *Anculosa* (as at present understood), and *Gyrotoma*. Further, *Pleurocera* is restricted to one subgenus or section. *Gyrotoma* is an endemic genus of the Coosa River and keeps closely to areas of heavy current. No species of *Anculosa* of the system occurs outside of the basin, and in each of the three main rivers making up the Alabama is a form of the genus, or there are forms, peculiar to it. *Goniobasis* is at once the most widespread of the genera, the most variable, and the most difficult of classification. It will require careful anatomical examinations,

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impracticable at this distance from fresh material, to draw the specific lines with complete certainty, so whatever is recorded here as regards some of the goniobases, their distinctions from one another and their grouping, must be understood as tentative. In the lower part of the basin are two or three species of *Goniobasis* whose affinities are with the fauna of the Atlantic flood plain rather than with that which can be termed Alabaman. These have been left for treatment in a later paper.

#### GONIOBASIS

The species of this genus can be arranged in a number of groups on the basis of shell characters, opercula, and what is known of their radulae. The relationships, thus recognized, may prove to be different in instances where means are available for comparative anatomical studies. The grouping is begun here with extreme headwaters forms.

#### GROUP OF *Goniobasis carinifera*

*Goniobasis carinifera* (Lamarek), 1822. Springs, brooks, creeks, and occasionally in rivers of Alabama River system, north Georgia to Monroe County, Alabama; parts of Tennessee River system in vicinity of Chattanooga, Hamilton County, Tennessee.

##### Synonyms:

<i>Melania bella</i> Conrad, 1836	<i>Melania vittata</i> Anthony, 1854
<i>Melania perangulata</i> Conrad, 1849	<i>Melania imbricata</i> Anthony, 1854
<i>Melania percarinata</i> Conrad, 1849	<i>Melania Conradi</i> Brot, 1862
<i>Melania nebulosa</i> Conrad, 1849	<i>Goniobasis anthonyi</i> Lea, 1862
<i>Melania symmetrica</i> Conrad, 1849	

*Goniobasis bella-crenata* (Haldeman), 1841. Springs and spring brooks in the basin of Cahaba River.

##### Synonym:

*Goniobasis macella* Lea, 1862

#### GROUP OF *Goniobasis catenaria*

*Goniobasis crenatella* (Lea), 1860. Taken mostly in Coosa River, and known from Big Will's Creek, Etowah County;

Kelly's Creek, St. Clair County; Choccolocco and Tallaseehatchee creeks, Talladega County, all in Alabama. A pleurocerid of distinctly small stream faces which has adapted itself without shell alteration to large stream conditions.

*Goniobasis cochilaris* Lea, 1868. Springs and spring branches of the Cahaba River basin.

*Goniobasis striatula* (Lea), 1841. Certain very slender and highly sculptured shells of Coahulla Creek, Whitfield County, Georgia, are referable to this species. The headwaters of the stream are divided by only a low ridge from waters of the Tennessee River system in which *G. striatula* is the commonest pleurocerid.

GROUP OF *Goniobasis gerhardtii*

*Goniobasis gerhardtii* Lea, 1862. Ordinarily unsculptured, but having plicate and subplicate forms. North Georgia to lower tributaries of the Coosa River, Alabama.

Synonyms:

<i>Goniobasis etowahensis</i> Lea, 1862 (preoccupied)	<i>Goniobasis quadricincta</i> Lea, 1864 (in part)
<i>Goniobasis whitei</i> Lea, 1862	<i>Goniobasis subrhombica</i> Lea, 1864
<i>Goniobasis parva</i> Lea, 1862	<i>Goniobasis murrayensis</i> Lea, 1868
<i>Goniobasis elliotii</i> Lea, 1862 (in part)	<i>Goniobasis venusta</i> Lea, 1868
	<i>Goniobasis canbyi</i> Tryon, 1873

*Goniobasis cahawbensis* (Lea), 1861. Especially common in headwaters and small streams and creeks of Cahaba River; in a few streams of Black Warrior River; Waxahatchee Creek and branches of the Coosa River basin.

Synonyms:

<i>Melania tenera</i> Anthony, 1861 (pre-occupied)	<i>Goniobasis intercedens</i> Lea, 1862
<i>Melania paula</i> Lea, 1861	<i>Goniobasis quadricincta</i> Lea, 1864 (in part)

*Goniobasis cahawbensis fraterna* (Lea), 1864. Taken by Schowalter in a tributary of Cahaba River, Bibb County, Alabama, and probably become extinct there. Somewhat larger shells of a branch of the Black Warrior River in Blount County, Alabama, might be assigned to this subspecies.

*Goniobasis flava* Lea, 1862. Of the same simple character-

istics as *G. gerhardtii*, but differing from it particularly in the forms assumed by local races. Apparently confined to Tallapoosa River and its tributaries.

GROUP OF *Goniobasis carinocostata*

*Goniobasis carinocostata* (Lea), 1848. Small streams of north Georgia to vicinity of Wetumpka, Elmore County, Alabama; upper Cahaba River and branches; tributaries of Black Warrior River.

Synonyms:

<i>Melania textilosa</i> Anthony, 1848	<i>Goniobasis strenua</i> Lea, 1862
<i>Melania scrabella</i> Anthony, 1861	<i>Goniobasis Leidyana</i> Lea, 1862

*Goniobasis bentoniensis* Lea, 1862. Small streams and spring discharges, St. Clair, Calhoun, and Talladega counties, Alabama.

GROUP OF *Goniobasis acuta*

*Goniobasis comma* (Conrad), 1834. A relatively rare inhabitant of springs and spring branches of the Black Warrior River in Jefferson and Blount counties, Alabama. It appears to be closely related to *G. acuta* Lea, which is widespread in tributaries of the Tennessee River in North Alabama.

GROUP OF *Goniobasis vanuxemiana*

*Goniobasis vanuxemiana* (Lea), 1842. A pleurocerid of Coosa River faces which has established itself in a few creeks of eastern Alabama.

Synonyms:

<i>Melania arctata</i> Lea, 1845 (in part)	<i>Melania purpurea</i> Lea, 1861
<i>Melania harpa</i> Lea, 1845 (in part)	<i>Melania pergrata</i> Lea, 1861
<i>Melania rubicunda</i> Lea, 1861	<i>Goniobasis negata</i> Lea, 1862

*Goniobasis bullula* (Lea), 1861. Known from Yellowleaf and Kelly's creeks, St. Clair County; Waxahatchee Creek, Chilton County, all in Alabama.

Synonyms:

<i>Melania elliptica</i> Lea, 1861	<i>Melania suavis</i> Lea, 1861
<i>Melania propria</i> Lea, 1861	<i>Melania gracilior</i> Lea, 1861, preoccupied

*Melania virgulata* Lea, 1861 (in part)      *Goniobasis ellipsoides* Lea, 1862 (in part)

*Melania shelbyensis* Lea, 1861 (in part)

*Goniobasis fascinans* (Lea), 1861. Creeks of Coosa River in eastern Alabama.

Synonyms:

*Goniobasis tenebrovittata* Lea, 1862      *Goniobasis baculoides* Lea, 1869  
*Goniobasis infuscata* Lea, 1862 (in part)

*Goniobasis caelatura* (Conrad), 1849. This species goes through several ecological modifications, some of which are easily seen to be closely related to it, some appear to be merely end products and are reduced to the simplest conchological characters. Headwaters of Coosa River in north Georgia and downstream to Talladega County, Alabama.

Synonyms:

?*Melania casta* Anthony, 1854      *Goniobasis granata* Lea, 1862  
*Melania decorata* Anthony, 1860      *Eurycaelon leai* Tryon, 1866  
*Goniobasis binneyana* Lea, 1862      *Goniobasis similis* Lea, 1868  
*Goniobasis flavescens* Lea, 1862      *Goniobasis connesaugaensis* Lea,  
*Goniobasis cadus* Lea, 1862      1868  
*Goniobasis tryoniana* Lea, 1862      *Goniobasis granitoides* Lea, 1868

*Goniobasis caelatura stearnsiana* (Call), 1886. Of irregular occurrence from north Georgia to Calhoun, Shelby, and Talladega counties, Alabama.

*Goniobasis caelatura excellens* Goodrich, 1935. Known from three streams of northwest Georgia and northeast Alabama.

*Goniobasis caelatura luteocella* (Lea), 1868. Northwest Georgia, northeast Alabama, Talladega County, Alabama.

Synonyms:

*Goniobasis tenebrosa* Lea, 1862      *Goniobasis whitfieldensis* Lea, 1868  
(preoccupied)

*Goniobasis caelatura lecontiana* (Lea), 1841. Creeks of northwest Georgia and northeast Alabama.

Synonym:

*Melania semigradata* Reeve, 1861

*Goniobasis caelatura infuscata* (Lea), 1862. Named by Lea from two specimens, one from Georgia the other from Coosa River, Alabama. The Georgia form appears to be this subspecies and is here designated as type. It has been found in Bartow, Floyd, Gordon, and Murray counties, Georgia; Cherokee, Etowah, and St. Clair counties, Alabama.

Synonym:

*Goniobasis Smithsoniana* Lea, 1864.

*Goniobasis caelatura georgiana* (Lea), 1862. This is a depauperate mollusk which occurs in small numbers in Chattooga River, Georgia. The only clue to its relationship or derivation is the operculum, which, except in the matter of size, is close to that of *G. caelatura*. There are numbers of other greatly simplified forms of the same general area and seemingly of the same biological connection. Whether they should be thrown under *georgiana* or separately described and designated is perhaps a matter of individual judgment.

#### GROUP OF *Goniobasis hydei*

*Goniobasis hydei* (Conrad), 1834. Confined to Black Warrior River and branches. The conspicuously sculptured and the nearly cylindrical shells inhabit the main river, the least sculptured and the more conic forms the smaller streams.

#### GONIOBASES POSSIBLY HYBRIDS

Lea's *Goniobasis ornata*, 1868, is irregular or erratic in the matter of characters, although it is confined to a part of Conasauga River that is entirely within Whitfield County, Georgia. For example, shells at hand that are from the uppermost station of the occurrence of *ornata* are all distinctively plicate, whereas those from the next to the lowermost station are without plicae; shells of one station are all striate, of another entirely lacking in striae; the same aberration is observable in the occurrence of revolving color bands. The operculum is small, and as regards its spiral lines it could be described as midway between paleo- and neomelanian. If a hybrid, *ornata* is one of *G. gerhardtii* Lea and *caelatura* (Conrad).

Occurring with *G. gerhardtii* and *caelatura* in Little River, Cherokee County, Alabama, are certain elongate pleurocerids that bear resemblance to both these species. They are noticeable principally for unusually rounded, sometimes slightly constricted, whorls; tightly-coiled spires, small apertures, and small opercula.

In Tallaseehatchee Creek, Talladega County, Alabama, are conic to cylindrical shells which are smooth or boldly plicate, striate or without striae. Apertures are small or large, and the same thing is true of the opercula, although not correlated with size of aperture. The hybridization, assuming this as an explanation for the anomalies, is of *G. gerhardtii* with a member of the goniobases especially characteristic of the Coosa River.

#### PLEUROCERA

The members of this genus in the Alabama River system are closely allied. Upstream and tributary forms grade by small increases in relative diameter into large stream forms. Loosely coiled spires are common to all. Plicae are absent in all except one species, whereof the nodulous sculpture is a reversion to what was probably a universal ancestral plication. Striae are usually a marked feature in localized races or among individuals of a colony for the most part smooth. About thirty species assigned entirely or in part to the Alabama system have been described. These can be reduced to four or five, or even less if convenience in classification is ignored. In the text which follows are listed those species (or forms) that occur in small streams as though in a restricted habitat and those others of large-stream faces which are known to invade tributaries at mouths and for a short distance above the discharges.

*Pleurocera vestitum* (Conrad), 1834. This may be taken to include the slender shells of headwaters, creeks, and springs occurring from northern Georgia and Alabama to small streams as far south as the first county above Mobile.

Synonyms:

<i>Melania mucronata</i> Lea, 1861	<i>Trypanostoma Spillmanii</i> Lea, 1862
<i>Trypanostoma Whitei</i> Lea, 1862	<i>Trypanostoma Chakasaense</i> Lea, 1862
<i>Trypanostoma attenuatum</i> Lea, 1862	<i>Trypanostoma venustum</i> Lea, 1864
<i>Trypanostoma lativittatum</i> Lea, 1862	

*Pleurocera showalterii* (Lea), 1862. A transition form of the lower parts of headstreams of the Coosa River and of creeks and rivers near the beginning of the Coosa proper.

Synonym:

*Trypanostoma moriforme* Lea, 1862 (in part)

*Pleurocera prasinatum* (Conrad), 1834. The large stream form of the system. It enters a few tributaries.

Synonyms:

<i>Io viridula</i> Lea, 1861	<i>Trypanostoma dignum</i> Lea, 1862
<i>Io gracilis</i> Lea, 1861	<i>Trypanostoma dux</i> Lea, 1862 (in part)
<i>Trypanostoma trivittatum</i> Lea, 1862	<i>Trypanostoma Troostii</i> Lea, 1862 (in part)
<i>Trypanostoma olivaceum</i> Lea, 1862	<i>Trypanostoma Anthonyi</i> Lea, 1862 (in part)
<i>Trypanostoma canalitium</i> Lea, 1862	<i>Trypanostoma univittatum</i> Lea, 1864
<i>Trypanostoma Clarkii</i> Lea, 1862 (in part)	<i>Trypanostoma Wheatleyi</i> Lea, 1868
<i>Trypanostoma Hartmanii</i> Lea, 1862 (in part)	<i>Trypanostoma castaneum</i> Lea, 1868
<i>Trypanostoma bivittatum</i> Lea, 1862	<i>Trypanostoma Leaii</i> Tryon, 1873
<i>Trypanostoma Jaji</i> Lea, 1862	

*Pleurocera Forsmanii* Lea, 1842. A large stream form which is known to occur also in three small tributaries of the Coosa River for short distances above their mouths.

*Pleurocera annuliferum* (Conrad), 1834. A heavily striate form of upper and middle parts of the Black Warrior River, merging into *P. prasinatum*. It is known also from Village Creek, Jefferson County, Alabama.

Synonym:

*Melania Ordiana* Lea, 1842

Four forms of *Pleurocera*, *lugubris*, 1845, *spurca*, 1845, *abruptum*, 1845, and *spinalis*, have been described by Lea and assigned to Alabama without specification as to whether they were taken in the Tennessee or the Alabama drainage basin.



I have not seen the types. A specimen labeled *abruptum* is in the Museum of Comparative Zoology with the notation in J. G. Anthony's handwriting: "Rec'd from him at his house," meaning Lea's. The shell is a young example of *Goniobasis carinocostata*, feebly sculptured.

#### ANCULOSA

A paper on the Anculosae of the Alabama River basin was published by me in 1922. In going over the material with which that study was carried out, and making use of the additional experience of eighteen years, it has seemed important here to suggest changes in that earlier classification. The majority of the species are confined strictly to the middle and lower parts of the Coosa River. These will not be considered in the present paper, but only those species or forms which occupy headwaters and tributaries.

*Anculosa downei* Lea, 1868. Perhaps more closely related to *A. formosa* than was indicated in 1922. *A. modesta* H. H. Smith is a depauperate phase of it. Head streams of the Coosa River and Terrapin Creek, Cherokee County, Alabama.

Synonym:

*Anculosa modesta* H. H. Smith, 1922

*Anculosa formosa* Lea, 1860. Known from Talladega Creek, Talladega County, and Yellowleaf Creek, Shelby County, Alabama, as well as the Coosa River.

*Anculosa choccoloccoensis* H. H. Smith, 1922. Originally set down as restricted to Choccolocco Creek, Talladega County, Alabama. It should include those creek forms of the Coosa basin which in 1922 were assigned to *A. ampla*.

*Anculosa ampla* Anthony, 1855. Upstream parts of Cahaba River and some Cahaba tributaries.

Synonym:

*Anculosa elegans* Anthony, 1860

*Anculosa ampla mimica* (H. H. Smith), 1922. Little Cahaba River, Bibb County, Alabama; occasionally in the main Cahaba River. Probably only an ecological form.

*Anculosa plicata* (Conrad), 1834. Headwaters of Black Warrior River.

Synonyms:

*Anculosa bella* Lea, 1841

*Anculosa tintinnabulum* Lea, 1845

*Anculosa tuberculata* Lea, 1841

(in part)

*Anculosa rubiginosa* Lea, 1841

*Anculotus smaragdinus* Reeve, 1860

*Anculosa smithi* Goodrich, 1922. Valley Creek, Jefferson County, Alabama. Probably a creek form of *A. plicata*.

*Anculosa melanooides* (Conrad), 1834. In shell characters, this species resembles certain mollusks of more northern distribution which have been transferred to the genus *Nitocris* because of the un-*Anculosa*-like character of their radulae. It may be that the present position of *melanooides* will also be changed when its radula is obtainable.

Synonym:

*Anculosa turgida* Haldeman, 1840

*Anculosa compacta* (Anthony), 1854. As indicated by its radula the true position of this species is probably not with *Anculosa*, yet where it properly belongs is not clear. Mostly confined to middle parts of the Cahaba River, but taken at two upstream localities and in Buck Creek, Shelby County, Alabama.

Synonym:

*Lithasia nuclea* Lea, 1860



