

# THE NAUTILUS.

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VOL. XXXI.

JULY, 1917.

No. 1

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## A REVISION OF THE CLASSIFICATION OF THE NORTH AMERICAN PATELLIFORM ANCYLIDAE, WITH DESCRIPTIONS OF NEW SPECIES.

BY BRYANT WALKER.

The North American patelliform species of *Ancylidae* can be conveniently and naturally arranged in eight genera and subgenera according to their shell characters. These can again be grouped into three subfamilies characterized by the peculiarities of the radula and jaw.

It was hoped that a study of the soft anatomy might reveal other peculiarities co-ordinating with those of the radulae, and for that purpose with the kind assistance of correspondents in England, South Africa and this country a very considerable amount of alcoholic material, representing nearly all of the characteristic groups, was collected, some of which will be very difficult to replace. This material was placed in the hands of a distinguished zoologist, who undertook to work it up. After appropriating and using the material thus obtained, it was a matter of bitter disappointment, after having waited for three years for the completion of the work, reported from time to time to be in progress, to be informed by the gentleman that he should not proceed further with the work as he did not think that it would "pay for the trouble considering the more important anatomical details that await study among other families of mollusks."

Under these circumstances the subfamilies represented in our



fauna must for the present be based wholly upon the peculiarities of the radula and jaw.

The arrangement of the *Ancylidae* proposed by Hannibal, (Pr. Mal. Soc. Lond., vol. x, 1912, p. 147), is not based upon any distinctions of systematic value. The genera and subgenera arranged under the different subfamilies are entirely heterogeneous and in several instances genera and their subgenera appear in different subfamilies. The whole arrangement is absolutely futile and must be entirely disregarded.

The arrangement that I would propose is as follows:—

#### I. Subfamily LANCINÆ, Hannibal.

Jaw as in *Lymnaea* with two accessory plates. Radula also Lymnaeid in character. Central tooth unicuspid or tricuspid, laterals bicuspid with large quadrate bases, marginals comb-like, the cusps extending beyond the base.

This group was proposed, but without any definition, by Hannibal (NAUT., vol. xxviii, 1914, p. 24).

##### Genus LANX Clessin.

*Lanx* Clessin, Con. Cab., Ancylinen, 1880, p. 10.

Type, *Ancylus newberryi* Lea. Example, *Lanx patelloides* (Lea). Pl. 2, fig. 1.

##### Subgenus *Walkerola* Hannibal.

*Walkerola* Hannibal, Pr. Mal. Soc. Lond., X, 1912, p. 149.

Type, *Lanx* (*Walkerola*) *klamathensis* Hannibal, Pl. 2, fig. 2.

Conchologically *Walkerola* appears to bear the same relation to *Lanx* that *Lævapex* does to *Ferrissia*.

##### Genus FISHEROLA Hannibal.

*Fisherola* Hannibal, Pr. Mal. Soc. Lond., X, 1912, p. 151.

Type, *Fisherola lancides* Hannibal.

Nothing has been published on the soft anatomy. It is placed here on account of its size, shape and habitat.

#### II. Subfamily FERRISSINÆ, n. subf.

Jaw segmented in plates. Radula with a bicuspid central, laterals obliquely reflected with from two to five small cusps.



arranged somewhat like the teeth of a comb, marginals also comb-like, cusps not (usually) extending to the basal line.

Genus *FERRISSIA* Walker.

*Ferrissia* Walker, NAUT., XVII, 1903, p. 15.

Type, *Ancylus rivularis* Say. Pl. 2, fig. 3.

Subgenus *Lævapex* Walker.

*Lævapex* Walker, NAUT., XVII, 1903, p. 15.

Type, *Ancylus fuscus* C. B. Adams. Example, *Ferrissia* (*Lævapex*) *diaphana* (Hald.). Pl. 2, fig. 4.

For reasons stated elsewhere (NAUT., XXVI, p. 117), I can not follow Hannibal in subordinating *Ferrissia* to *Lævapex*. I agree fully with Gwatkin (J. of Con., XIV, 1914, p. 147), that *Ferrissia* represents the most primitive type of radula, so far as yet known, in the *Ancylidæ*. The world-wide distribution of the genus is evidence tending in the same direction. *Lævapex* is restricted to America and is, to my mind, clearly an offshoot from the more ancient *Ferrissia* stock. In addition to its peculiar shell characters, there is some evidence tending to show a slight divergence also in the character of the lateral teeth, but hardly sufficient to justify its generic distinction.

Genus *GUNDLACHIA* Pfeiffer.

*Gundlachia* Pfeiffer, Zeitschr. für Malak., VI, 1849, p. 98.

Type, *Gundlachia ancyliformis* Pfr. Pl. 3, fig. 1.

*Poeyia* Bgt., (1862), and *Kincaidella* Hann., (1912), are synonyms, being based on immature or non-septate stages, but the latter name may be retained for the group with striate apices.

*Gundlachia*, like *Ferrissia*, includes two groups characterized by the presence or absence of radial sculpture on the apex.

I have examined all of the described species except *G. crepidulina* Guppy from Trinidad and *G. lucasi* Suter from New Zealand.

Sub-genus *Gundlachia* s. s.

Apex smooth, except for light concentric wrinkles. Type, *Gundlachia ancyliformis* Pfr., Cuba.

The following species also belong in this group:



*G. bakeri* Pils., Brazil; *hinkleyi* Walker, Guatemala and *hjalmarsoni* Pfr., Honduras and Texas.

Sub-genus *Kincaidella* Hannibal.

Apex radially striate.

*Kincaidella* Hannibal, Pr. Mal. Soc., London, XII, 1912, p. 143. Type, *Ancylus fragilis* Tryon—*Gundlachia californica* Row.

*Californica* Rowell, (March, 1863), has priority over *fragilis* Try., (June, 1863), if the date given by Binney, (L. and F. W. Sh., II, p. 149), is correct.

*Kincaidella* also includes the following species:

*G. beddomei* Pett. (MSS.), and *petterdi* John. from Tasmania; *neozelanica* Suter from New Zealand; *l'hotelleriei* "Bgt." Walker from Egypt; a species as yet undescribed from Cape Colony, S. Africa; *californica* Rowell, *meekiana* Stimpson, *stimpsoniana* S. Smith and undetermined species from Starved Rock, Ill. and Mobile, Ala., from the United States.

The generic position of *Ancylus woodsi* John. from Tasmania would seem to be somewhat uncertain, (see Hedley, NAUT., IX, p. 66), but, if not a *Kincaidella*, it is a *Ferrissia*, as the apex is radially striate.

It is interesting to notice that *Gundlachia* s. s. is apparently restricted to the countries bordering the Gulf of Mexico and seems to be a purely American group, similar to *Lævapex*, while *Kincaidella*, like *Ferrissia* s. s., has a range extending quite around the globe. If a natural rather than an artificial system of nomenclature could be used, *Kincaidella* would represent the older and really typical group and *Gundlachia* s. s., as a more recent off-shoot from the original race, would become a sub-genus.

I have not seen Troschel's description of the radula of *G. ancyliformis* mentioned by Hedley, (NAUT., IX, p. 62). The radulae of the three American species that have been figured, *californica*, *meekiana* and *hinkleyi*, are all very similar to each other and quite different from that of either *Ferrissia* or *Lævapex*. That of *G. neozelanica* Suter as figured in T. N. Z., XXVI, pl. 14, fig. 5 is similar in the small number of cusps on the



side teeth, but differs in having them longer and sharper, those of the marginals extending beyond the base. This characteristic difference in the radula would seem to definitely establish the generic validity of the group.

### III. Subfamily RHODACMEINÆ, n. subf.

Jaw composed of numerous segmented plates. Radula with a long, slender central, unicuspid or faintly bicuspid, and with the base widely expanded in some species: the first lateral very large with an enormous mesocone, the blade-like cusp extending beyond the base, the ectocone is back of the mesocone, entirely separated from it and has several small cusps; there is no endocone. The four laterals are similar in shape but diminish rapidly in size toward the margin, these are succeeded by two or three transition teeth, smaller and with more or less imperfect cusps. The marginals are very small, rapidly decreasing in size toward the outer edge, with large quadrate bases, wider than high, vestigial, the cusps being nearly, if not quite, obsolete.

The rows of teeth are more or less V-shaped and with the immense laterals and minute marginals present a remarkable appearance quite unlike any other group belonging to the family.

Gwatkin, (J. of Con., XIV, 1914, p. 147), has already commented upon the resemblance of the radula to that of *Brachypodella*.

All of the species known to belong to this group have the apex of the shell tinged with pink.

### Genus RHODACMEA, n. g.

Shell patelliform, conical, elevated or depressed, apex tinged with pink. Radula and jaw as in the subfamily. Soft anatomy otherwise unknown.

Type, *Ancylus filiosus* Conrad. Pl. 3, fig. 2.

The species belonging to this genus are not confined to the Coosa drainage as Gwatkin supposed, but are also found in both the Tennessee and Ohio systems.

As in *Lanx* and *Ferrissia*, two well marked groups are repre-



sented in this genus, the one with an elevated and the other with a depressed shell.

Section *Rhodacmea*, s. s.

Shell elevated. Radula with a unicuspid central, which has the base triangularly expanded; laterals with the cusp of the mesocone extending but little beyond the base and not overlapping the base of the central tooth.

Type, *Ancylus filiosus* Conrad.

I. RHODACMEA FILOSA (Conrad).

*Ancylus filosa* Conrad, F. W. Shells, 1834, p. 57.

When I wrote of this species in 1904, (NAUT., XVIII, p. 75) I had not seen any specimens from the Black Warrior River, Conrad's original locality. The specimens then before me as was stated, were not typical in that they lacked the "numerous, radiating, prominent lines" described by Conrad. Since that time a considerable amount of additional material has been received from Mr. H. H. Smith, which fully confirms the original diagnosis. One set from the Black Rock Shoals of the Black Warrior River are rather thin, of a light translucent green color with the apex tinged with rose and are very strongly radiately striate, the ribs extending from the apex to the periphery. The largest specimen measures 4.25 x 3 x 2 mm. These shells are undoubtedly typical.

Similar specimens are before me from the Coosa River from several localities, viz., two miles above Coosa Valley, St. Clair Co.; Ten Island Shoal near Lock no. 2; Leota Shoal; Three Island Shoal, Wilsonville, Shelby Co.; and Vincent Shoal, two miles above Upper Clear Creek. Also from Tallassahatchee Creek, four miles east of Childersburg; Beaver Creek at Greensport and Canoe Creek.

All the shells from these localities are quite typical in form, but are uniformly thicker and more heavily striated than the Black Warrior specimens. This heavily striated form seems to be the characteristic expression of the species in the Coosa and its tributaries. The Cahawba River specimens from Lewis and Call mentioned in my former paper, while lacking the strong



radial striae, are in texture and shape like the typical shells from the Black Warrior. While this smoother form quite probably represents a local race worthy of recognition, as it has not been found by more recent collectors and no exact localities for it are known, it hardly seems advisable to do more than to call attention to its peculiarities until more definite information as to its precise range can be had.

RHODACMEA CAHAWBENSIS, n. sp. Pl. I, figs. 4-6.

*Ancylus filusus* Walker, NAUT., XVIII, 1904, p. 76, pl. vi, figs. 1-6.

Shell elevated, obtusely conical, broad oval, somewhat wider behind the apex than before it; apex obtuse, slightly behind the longitudinal centre of the shell, scarcely, if at all, turned toward the right side, apical sculpture entirely eroded in all specimens seen; yellow horn color slightly tinged with green, apex rose color; anterior slope convex toward the apex, straighter below; posterior slope nearly rectilinear; lateral slopes slightly convex, the left being more oblique than the right; lines of growth strong and irregular, slightly rippled by radial lines, which sometimes become obsolete radial striae.

Length 4.5; width 3.5; alt. 2.5 mm.

Types, (no. 43453 Coll. Walker), from the Cahawba River, Gurnee, Shelby Co., Ala., collected by H. H. Smith. Cotypes in the collections of the Acad. of Nat. Science, Philadelphia, George H. Clapp and John B. Henderson. Also from Cahatchee Creek and Yellowleaf Creek, Shelby Co., Ala. The single specimen from the latter locality shows subobsolete radial striation very much like the "Coosa River" specimens in the Lewis collection which in my former paper I referred to *filosa*, but which I now think belong to this species. The fact that the heavily striated *filosa* is quite characteristic of the Coosa, where this species has not been found by Mr. Smith in his extensive collections, makes me doubt whether the Lewis shells really did come from the Coosa itself. Unfortunately no exact locality is given by Lewis and the question must remain undetermined.

This species is more closely related to the *elatio*r Anth. of the Tennessee drainage than to any of the known species of the



Alabama system. Compared with that, it is smaller, narrower, with a more obtuse apex, the posterior slope is straight and not convex and the lateral slopes less oblique than in that species. The tinted apical area seems smaller than in the other species of the genus and is frequently lost entirely from erosion. The radula has not yet been examined.

RHODACMEA ELATIOR (Anthony).

*Ancylus elatior* Anthony, Ann. N. Y. Lyc., VI, 1855, p. 158, pl. v, fig. 20.

No additional information in regard to this species can be given at this time except that the radula of a specimen from the Tennessee River at Florence, Ala., collected by Hinkley agrees with that of *filosa* in the characters of the central and lateral teeth. A very considerable collection from the Tennessee made by Mr. H. H. Smith has not yet been worked over and may add materially to our knowledge of the species when critically examined.

RHODACMEA HINKLEYI (Walker).

*Ancylus (Ferrissia) hinkleyi* Walker, NAUT., XXI, 1908, p. 139, pl. lx, figs. 11-13.

The species listed from the Tennessee River at Florence, Ala., as "*Ancylus rhodaceus* Walker" by Hinkley in 1906, (NAUT. XX, p. 40), but not described, is the same as that subsequently described under this name in 1908. The radula of the Tennessee River specimens agrees with those of *filosa* and *elatior* in sectional characters.

Section *Rhodocephala*, n. sect.

Shell depressed. Radula with a faintly bicuspid central which has the sides of the base straight and not expanded; laterals with the cusp of the mesocone extending far beyond the base and overlapping the base of the central tooth.

Type *Rhodacmea rhodacme* Walker.

RHODACMEA RHODACME, n. sp. Pl. I, figs. 1, 2 and 8.

Shell depressed, conical, obovate, the greatest width being



just behind the apex, apex subcentral, only slightly behind the centre, obliquely elevated, acute, spine-like, somewhat turned toward the right side, finely radially striate, apical depression small, oval and situated on the left side of the tip of the apex; pale green with the apical region deeply tinged with rose color; anterior slope very slightly convex; posterior slope oblique and nearly rectilinear below the base of the apex; lateral slopes slightly convex and about equally oblique; growth lines regular, fine and distinct, the apical striae extend down over the upper part of the shell giving a shagreened appearance to the surface as they intersect the growth lines, but become mere ripples toward the margin.

Length 5.25, width 4, alt. 1.25 mm.

Types, (No. 20371 Coll. Walker), from the Coosa River at Williamsville, Shelby Co., Ala., collected by A. A. Hinkley. Cotypes in the collection of Mr. Hinkley. Also from the Coosa River above Wetumpka (Hinkley) and at Leota Shoals; Fort William Shoals; Shoal two miles above Coosa Valley; Vincent Shoal two miles above Upper Clear Creek and Peckerwood Shoals (H. H. Smith).

All of the Smith shells were found on or under stones, which is apparently the usual habitat of the species, differing in this respect from *filosa*, which is almost invariably found on living *Pleuroceridæ*.

I have adopted for this species the very appropriate name suggested by Dr. Pilsbry soon after its discovery.

The peculiar depressed shell of *rhodacme* with its spine-like apex and characteristic radula differentiate it very sharply from the species included under *Rhodacmea* s. s. and justifies the establishment of a special section for it and similar species.

*RHODACMEA GWATKINIANA*, n. sp. Pl. I, figs. 3, 7 and 9.

Shell rather small, depressed conic, oval; apex nearly central, somewhat turned to the right, acute and spine-like, finely radially striate; apple-green with the apex tinted with old-rose color; anterior slope slightly convex; posterior slope oblique and nearly straight below the projecting apex; lateral slopes straight below the base of the apex and equally oblique; growth



lines rather coarse and irregular, the entire surface covered with low, coarse, rather distant radial striae extending to the edges.

Length 3.5, width 2.5, alt. 1 mm.

Types, (No. 43454 Coll. Walker), from Butting Ram Shoals, Coosa Co., Ala., collected by H. H. Smith. Cotypes in the collections of T. H. Aldrich, George H. Clapp and John B. Henderson.

All of the specimens were found on living *Pleuroceridæ*.

This beautiful little species, which groups with *rhodacme* in its depressed shape and spine-like apex as well as in its radular characteristics, differs from it in its small size, more regularly oval shape and the greater development of radial striae over the surface.

It is named in remembrance of the late Rev. Prof. H. M. Gwatkin of Cambridge, England, to whom I am indebted for practically all of the radula preparations used in this paper and who was the first to observe and point out the remarkable character of the radula in the different species of the genus.

I am indebted to Dr. Pilsbry for the slide representing the radula of *Lanx patelloides*. All of the other radulae figured were prepared by Prof. Gwatkin, and all of the figures were drawn by Mrs. Lydia M. H. Green formerly connected with the U. S. National Museum.

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#### A NEW SPECIES OF ASTARTE FROM ALASKA.

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BY WILLIAM HEALEY DALL.

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In 1865 Dr. Philip Carpenter described from a single specimen a species of *Astarte* from Puget Sound, to which he gave the specific name of *compacta*. This type remains in the collection of the National Museum as number 4509.

This species has remained extremely rare, only three or four others, some eroded and doubtful, have come to hand during the half-century which has passed. This is probably due to the fact that the right locality had not been dredged, for the





1917. "A revision of the classification of the North American Patelliform Ancyliidae, with descriptions of new species." *The Nautilus* 31, 1–10.

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