

NEW SPECIES OF CANCELLARIOIDEA (MOLLUSCA:GASTROPODA) FROM THE LOWER MIOCENE CANTAURE FORMATION OF VENEZUELA

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INTRODUCTION

The neogastropod superfamily Cancellarioidea is well represented in the Cantaure Formation, exposed in a series of arroyos about 500 meters south of "Casa Cantaure," 14 km west of Pueblo Nuevo, Paraguaná Peninsula, Falcón, Venezuela. Eight species of the superfamily were reported and figured by Jung (1965), two of which are here described as new. Three additional new species and one previously unrecorded from the Cantaure Formation, collected by one of us (BML) on two field trips in 1992 and 1995, brings the total number of Cancellariidae known from the Cantaure Formation to twelve. These are placed in eight genus-group taxa, of which three are previously unreported from this formation (Table 1). With the exceptions of *Cancellaria* (*Charcolleria*) *terryi* Olsson, 1942, described from the Pliocene Charco Azul beds of Panama and later recorded from the Pliocene Esmeraldas beds of Ecuador (Olsson, 1964, p. 124) and *Narona barystoma* Woodring, 1970, described from the Pliocene Gatun Formation of Panama, the other ten species are endemic to the Miocene of Venezuela.

SYSTEMATIC PALEONTOLOGY

Class GASTROPODA

Superfamily CANCELLARIOIDEA

Family CANCELLARIIDAE Forbes and

Hanley, 1851

Genus CANCELLARIA Lamarck

Cancellaria LAMARCK, 1799, Soc. Hist. Nat.
Paris, Mem. 1, p. 71.

Type species: *Voluta reticulata* Linné, 1767,
by monotypy.

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Subgenus CANCELLARIA sensu stricto

CANCELLARIA (CANCELLARIA) HODSONAE
Landau and Petit, n. sp.

Cancellaria (*Cancellaria*) aff. *rowelli* Dall.
JUNG, 1965, Bulls. Amer. Paleontology, v. 49,
no. 223, p. 551, pl. 75, figs. 7, 8.

Description: Protoconch smooth, of about three volutions. Teleoconch of about five whorls. Sculpture beginning with rather strong axials soon crossed by four or five spiral cords weaker than ribs. On body whorl some axial ribs thickened like varices. On teleoconch whorls two spiral cords at shoulder more prominent. Suture impressed. Outer lip thickened, with about eight lirae within. Siphonal fasciole well-developed, rounded and forming a small umbilicus partially covered by a thin columellar callus. Columella with three folds, adapical one largest and abapical one forming edge of short, slightly recurved siphonal canal.

Holotype: Naturhistorisches Museum Basel H 13761; height 21.3 mm, diameter 10.5 mm (Jung, 1965, pl. 75, fig. 7).

Type locality: NMB 17516, Cantaure Formation; series of arroyos about 500 meters south of "Casa Cantaure," which is 14 km (by road) west of Pueblo Nuevo, Paraguaná Peninsula, Falcón, Venezuela.

Paratype: Naturhistorisches Museum Basel H 13762; height 19.3 mm, diameter 10.2 mm (Jung, 1965, pl. 75, fig. 8). Locality NMB 17516, Cantaure Formation, Paraguaná Peninsula, Falcón, Venezuela.

Etymology: Named for Helen King Hodson, in recognition of her work on the Cantaure Formation.

Discussion: This species was fully described and discussed by Jung (1965, p. 551). He compared *Cancellaria* aff. *rowelli* with *C. rowelli* Dall, 1896, from the Baitoa Formation of the Dominican Republic, but pointed out consistent differences between the two. Jung and Petit (1990, p. 99) also did not accept the Cantaure specimens as being *C. rowelli*. *Cancellaria hodsonae* is smaller and proportionally narrower than

C. rowelli and has much stronger sculpture at the shoulders formed by very heavy spiral cords. The opportunity to study additional specimens from both Venezuela and the Dominican Republic has convinced us that the two species are distinct.

Subgenus BIVETIELLA Wenz

Bivetiella WENZ, 1943, Handbuch der Paläozoologie, v. 6, Gastropoda, pt. 6, p. 1356.

Type species: *Cancellaria similis* Sowerby, 1833, by original designation.

CANCELLARIA (BIVETIELLA) JUNG Landau and Petit, n. sp.

Cancellaria (Cancellaria) epistomifera Guppy.
JUNG, 1965, Bulls. Amer. Paleontology, v. 49, no. 223, p. 548, pl. 75, figs. 1, 2. Not of Guppy, 1876.

Description: Protoconch smooth, of about two and one-half volutions. Postnuclear whorls about six in number. Sculpture beginning with weak spiral cords soon crossed by heavier axial ribs. On later whorls spiral cords and axial ribs about equal in strength. Varices developed as teleoconch increases in size, usually with three per whorl. On body whorl a few secondary spiral cords appearing in interspaces between primary cords. Suture very deep for subgenus. Outer lip prosocline, slightly everted at stromboid notch, with about a dozen lirae within. Parietal callus weak. Columella with three folds, center one sometimes slightly bifurcate, anterior one forming edge of recurved siphonal canal.

Holotype: Naturhistorisches Museum Basel H 13757; height 30.1 mm, diameter 18.4 mm

(Jung, 1965, pl. 75, figs. 1, 2).

Type locality: NMB 17516, Cantaure Formation; series of arroyos about 500 meters south of "Casa Cantaure," which is 14 km (by road) west of Pueblo Nuevo, Paraguaná Peninsula, Falcón, Venezuela.

Etymology: Named for Peter Jung of Basel, Switzerland, in recognition of his work on the Cantaure Formation.

Discussion: This species was fully described by Jung (1965, p. 548-550), who had only one adult specimen and nine juveniles. In his remarks, Jung mentioned that the Cantaure specimens differed from the Dominican Republic specimens of *Cancellaria epistomifera* Guppy, 1876, which have more inflated body whorls, less conspicuous varices, no secondary spirals on the body whorl and a slightly thicker parietal callus. A larger series collected by one of us (BML) confirms that these differences are consistent. Jung and Petit (1990, p. 103) removed Jung's 1965 reference from the synonymy of *C. epistomifera* and placed both *C. epistomifera* and the Venezuelan species in the subgenus *Bivetiella*.

Cancellaria jungi differs from *C. bajoensis* Jung and Petit, 1990, in being more attenuate and possessing less angular features.

Subgenus CHARCOLLERIA Olsson

Charcolleria OLSSON, 1942, Bulls. Amer. Paleontology, v. 27, no. 106, p. 61.

Type species: *Cancellaria (Charcolleria) perdiciana* Olsson, 1942, by original designation.

Table 1. Cancellariidae occurring in the Cantaure Formation, Venezuela.

Cancellaria (Cancellaria) hodsonae, n. sp.
Cancellaria (Cancellaria) lavelana H.K. Hodson, 1931
Cancellaria (Bivetiella) beata Jung, 1965
Cancellaria (Bivetiella) jungi, n. sp.
Cancellaria (Bivetiella) paraguanensis H.K. Hodson, 1931
Cancellaria (Euclia) werenfelsi Jung, 1965
Cancellaria (Charcolleria) terryi Olsson, 1942
Cancellaria (Charcolleria) emilyvokesae, n. sp.
Cancellaria (Massyla) cantaurana, n. sp.
Trigonostoma woodringi Jung, 1965
Axelella yara, n. sp.
Narona barystoma Woodring, 1970

CANCELLARIA (CHARCOLLERIA) EMILYVOKESAE
Landau and Petit, n. sp.
Plate 1, figure 1

Description: Protoconch eroded, of about two volutions. Four teleoconch whorls, well-rounded with deeply impressed suture. Shell fusiform, solid, with a high spire. Body whorl slightly angled at periphery. Spiral sculpture of numerous fine, evenly spaced cords. Axial sculpture consisting of rounded ribs, about 20 in number on penultimate whorl, becoming obsolete on body whorl, being gradually replaced by broad axial folds increasing in strength towards outer lip. Outer lip prosocline, lirate within. Columella with three folds, adapical one largest and extending to edge of weak parietal callus, having behind it a small umbilicus. Oblique anterior fold forming edge of pronounced siphonal canal.

Holotype: Naturhistorisches Museum Basel H 17787; height 26 mm, diameter 18.4 mm (Plate 1, fig. 1).

Type locality: NMB 17516, Cantaure Formation; series of arroyos about 500 meters south of "Casa Cantaure," which is 14 km (by road) west of Pueblo Nuevo, Paraguaná Peninsula, Falcón, Venezuela.

Etymology: Named for Emily H. Vokes of Tulane University, New Orleans, Louisiana, for her help and encouragement.

Discussion: *Cancellaria emilyvokesae* is closest to *Charcolleria distinguenda* Petit, 1970, from the Chipola Formation of northern Florida but differs from that species in having a sharply angled periphery, weaker and more numerous spiral cords, and more pronounced axial sculpture. Jung (1969, p. 542-543, pl. 58, fig. 3) described, but did not name, a *Cancellaria* (*Charcolleria*) sp., from the Melajo Clay, Late Miocene of Trinidad. That species is closest to the Late Pliocene *Cancellaria* (*Massyla*) *venusta* Tuomey and Holmes, 1856. The distinction between *Massyla* and *Charcolleria* lessens, as our knowledge of the Cancellariidae of the Caribbean area increases.

Subgenus MASSYLA Adams and Adams

Massyla H. ADAMS and A. ADAMS, 1854, Gen. Rec. Moll., v. 1, p. 278.

Type species: *Cancellaria corrugata* Hinds, 1854, by monotypy.

CANCELLARIA (MASSYLA) CANTAURANA
Landau and Petit, n. sp.
Plate 1, figure 2

Description: Protoconch smooth, of about two to two and one-half volutions. Shell small for subgenus. Four well-rounded teleoconch whorls with deeply impressed suture. Body whorl with 14 to 18 irregularly spaced spiral cords, single weaker cord in some interspaces. Axial sculpture of prosocline growth lines and seven to eleven rounded ribs increasing in prominence with age. Outer lip prosocline, strongly and deeply lirate within. Columella vertical, with three folds, adapical one largest and extending to edge of parietal callus, having behind it a small but deep umbilicus. Anterior fold oblique and forming edge of short siphonal canal. Adapical portion of outer lip bearing a weak fold, having within a small, shallow posterior canal.

Holotype: Naturhistorisches Museum Basel H 17788; height 21 mm, diameter 15.5 mm (Plate 1, fig. 2).

Type locality: NMB 17516, Cantaure Formation; series of arroyos about 500 meters south of "Casa Cantaure," which is 14 km (by road) west of Pueblo Nuevo, Paraguaná Peninsula, Falcón, Venezuela.

Unfigured paratype 1: Bernard Landau collection; height 20.5 mm, diameter 13 mm. Locality NMB 17516, Cantaure Formation, Paraguaná Peninsula, Falcón, Venezuela.

Unfigured paratype 2: Bernard Landau collection; height 19 mm, diameter 11.5 mm. Locality NMB 17516, Cantaure Formation, Paraguaná Peninsula, Falcón, Venezuela.

Etymology: Named after the Cantaure Formation.

Discussion: Although this attractive little shell lacks the rapid enlargement in the early growth stages that is characteristic of *Massyla* from later formations, it possesses the other features of the subgenus. This Cantaure species has a more elevated spire than most representatives of the subgenus and has a third very weak columellar fold. It is most similar to *Cancellaria* (*Massyla*) *lopezana* Jung and Petit, 1990, from the late Early to early Middle Miocene Baitoa Formation of the Dominican Republic, and *C. (M.) jadesi* Olsson, 1964, from the Late Miocene Angostura Formation of northwestern Ecuador. However, both of those species

have more depressed spires, a greater whorl expansion rate, weaker axial folds on the body whorl and more pronounced constriction behind the siphonal fasciole. This new species is not common in the Cantaure Formation, being known at present from only six specimens (the holotype and five paratypes in the collections of the authors).

Genus AXELELLA Petit

Axelella PETIT, 1988, The Nautilus, v. 102, p. 130.

Type species: *Cancellaria smithii* Dall, 1888, by original designation.

AXELELLA YARA Landau and Petit, n. sp. Plate 1, figure 3

Description: Protoconch eroded. Teleoconch scalate, large for genus. Whorls rounded, five in number, with spiral sculpture of about eleven primary spiral cords, four or five of these visible on spire whorls, with secondary and tertiary spiral threads in interspaces. Axial sculpture of seven or eight distinct collabral axial ribs on penultimate whorl, decreasing to six or seven on body whorl, the latter becoming narrowly rounded with age. Aperture roughly trigonal, rounded at shoulder. Suture deeply impressed. Outer lip with about twelve interior lirations, not extending to lip, but extending well into aperture. Columella vertical, with three distinct folds, adapical one being largest. Anterior canal shallow and elongated. Inner lip reflected over parietal wall as a thin callus, having behind it a deep umbilicus of variable width, with a tendency in some specimens for final portion of body whorl to become disjunct.

Holotype: Naturhistorisches Museum Basel H 17785; height 25 mm, diameter 13 mm (Plate 1, fig. 3).

Type locality: NMB 17516, Cantaure Formation; series of arroyos about 500 meters south of "Casa Cantaure," which is 14 km (by road) west of Pueblo Nuevo, Paraguaná Peninsula, Falcón, Venezuela.

Unfigured paratype 1: Bernard Landau collection; height 21 mm, diameter 11 mm. Locality NMB 17516, Cantaure Formation, Paraguaná Peninsula, Falcón, Venezuela.

Unfigured paratype 2: Bernard Landau collection; height (incomplete) 21 mm, diameter 12 mm. Locality NMB 17516, Cantaure Formation,

Paraguaná Peninsula, Falcón, Venezuela.

Etymology: After Yara, a siren in Amazonian mythology.

Discussion: These Cantaure specimens appear to be closest to two species from the correlative Chipola Formation of northern Florida, *Axelella firma* Petit and Schmelz, 1991, and *A. axiologa* Petit and Schmelz, 1991. The Cantaure species is easily distinguished from the former by its more elongate shape and the presence of an umbilicus. It is more nearly allied to the latter by the presence of an umbilicus and in having similar spiral sculpture but may be differentiated by the greater strength of the columellar folds, the more elongated anterior canal and more marked constriction of the body whorl behind the siphonal fasciole. *Axelella williamsi* (Petit, 1976), from the Pliocene Yorktown Formation of Virginia, has a similar shape but only has two columellar folds and differs in details of sculpture.

Axelella yara is rare in the Cantaure Formation, known only from the holotype and two paratypes.

Genus NARONA Adams and Adams

Narona H. ADAMS and A. ADAMS, 1854, Gen. Rec. Moll., v. 1, p. 277.

Type species: *Cancellaria clavatula* Sowerby, 1832, by subsequent designation (Jousseume, 1887, Le Naturaliste, Ann. 9, p. 222).

NARONA BARYSTOMA Woodring Plate 1, figure 4

Cancellaria (Narona) barystoma WOODRING, 1970, U.S. Geol. Survey, Prof. Paper 306-D, p. 342, pl. 53, figs. 5, 6.

Figured specimen: Naturhistorisches Museum Basel H 17786; height 19.5 mm, diameter 10 mm. Locality: NMB 17516, Cantaure Formation; Paraguaná Peninsula, Falcón, Venezuela.

Discussion: The specimen figured by Woodring from the Early Pliocene Gatun Formation of Panama is more elongated, has a stronger posterior columellar fold and has a narrower aperture than specimens from Venezuela. However, the Cantaure lot of eight adults and six juve-

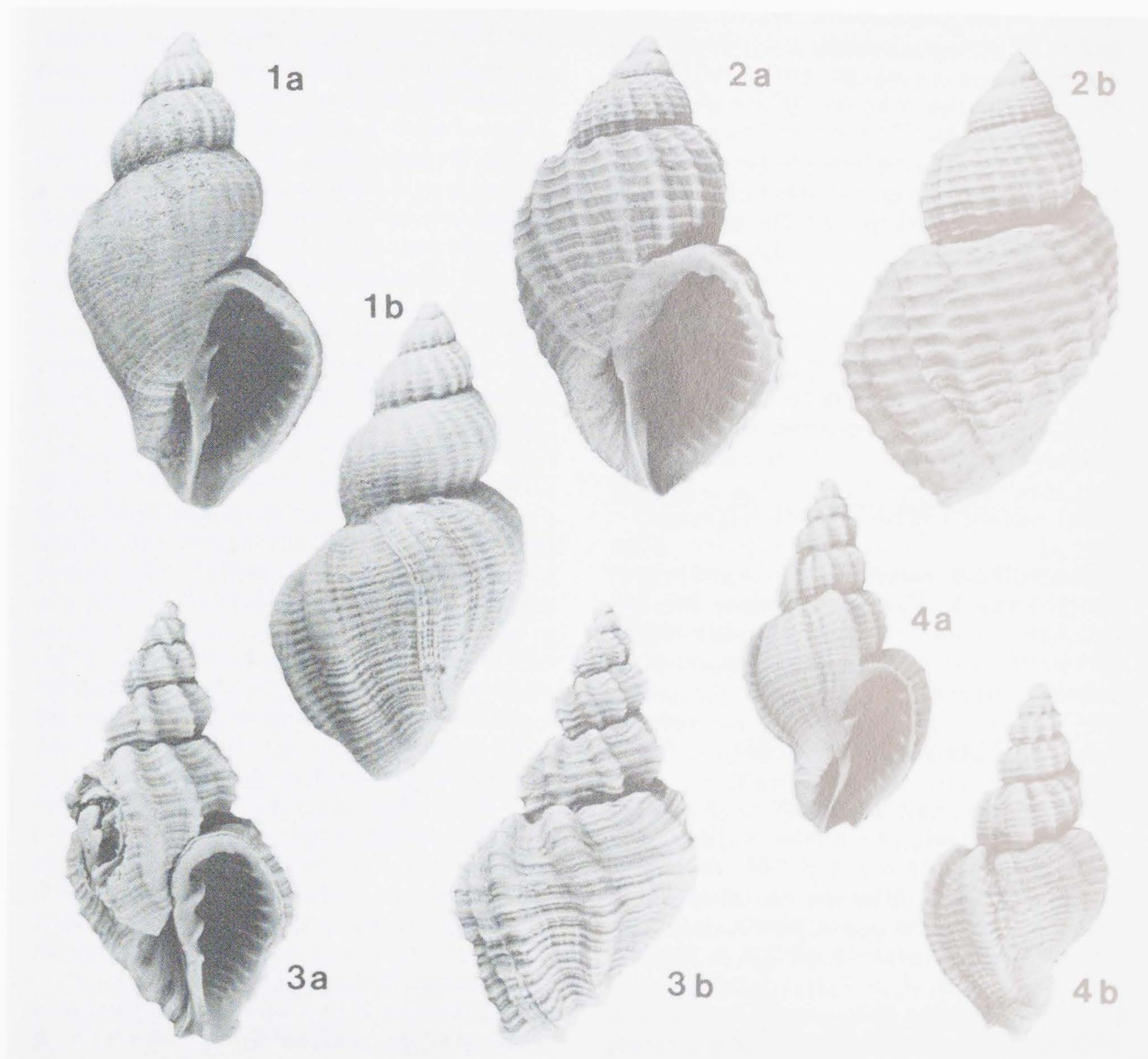


PLATE 1

Figures

1. *Cancellaria (Charcolleria) emilyvokesae* Landau and Petit, n. sp.
(x 2) NMB H 17787 (holotype): height 26 mm, diameter 18.4 mm.
2. *Cancellaria (Massyla) cantaurana* Landau and Petit, n. sp.
(x 2) NMB H 17788 (holotype): height 21 mm, diameter 15.5 mm.
3. *Axelella yara* Landau and Petit, n. sp.
(x 2) NMB H 17785 (holotype): height 25 mm, diameter 13 mm.
4. *Narona barystoma* Woodring, 1970
(x 2) NMB H 17786; height 19.5 mm, diameter 10 mm.

Locality of all: NMB 17516, Paraguaná Peninsula, Falcón, Venezuela;
Cantaure Formation.

niles represent a fairly variable species. The mean height of adults is 20 mm and width 9 mm (maximum height 21 mm, width 10 mm) suggesting that Woodring's specimens were all juveniles with the exception of the holotype, which is probably sub-adult. The sculpture of the *Cantaure* specimens tends to become obsolete on the body whorl in most of the adult specimens. One of the adults retains the sculpture of strong axial ribs and spiral threads throughout as does Woodring's holotype, which is elongated with a narrower aperture. Apart from these variable characters, the protoconch, the angled shoulder on the early whorls, the details of sculpture and the structure of the columella are identical.

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