ON THE OCCURRENCE OF THE CARIBBEAN SPECIES *HAUSTELLUM CHRYSOSTOMA* (GASTROPODA: MURICIDAE) IN THE PLIOCENE OF WESTERN ECUADOR

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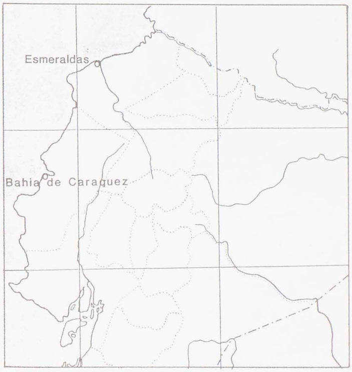
A reconnaissance trip along the coast of western Ecuador to the south of the city of Bahía de Caráquez, Manabi Province (text-fig. 1), proved to be unproductive from the perspective of fossil mollusks. The sea cliffs are very impressive (text-fig. 2), with magnificent exposures accessible at low tide by driving along the beach. Although Bristow (1976, p. 198) lists about two dozen species of mollusks from the "Borbón Formation," in the "coast section south of Bahía," we were unable to find his locality. There was a single thin lens exposed, which yielded a few poorly preserved shells and this may be his locality, now weathered and essentially gone. Or, he may have collected somewhere farther down the beach than we went. In any case, in spite of closely examining the cliffs for several kilometers to the south of Bahía, we saw only one fossiliferous lens.

This outcrop would not be worth mentioning except that among the few fossil mollusks we did collect were two examples of a muricid gastropod (pl. 1, fig. 2) that proves to be identical with the Recent Caribbean species, *Haustellum chrysostoma* (Sowerby, 1834), which lives today along the coast of Venezuela (pl. 1, fig. 1).

Although Bristow assigned the beds at Bahía to the Borbón Formation, more recently Whittaker (1988, p. 24) has erected the name Bahía Formation, based upon Olsson's (1942, p. 263, and correlation chart, p. 256) usage of the name for the beds exposed in the sea cliffs between Bahía and Punta Charapotó, beds Olsson considered to be Middle Miocene in age. Whittaker dates the beds on the basis of age of the underlying beds, there being no diagnostic foraminifers in the unit, as Early Pliocene (N 18/19) and correlates them with the Jama Formation to the north. They are also the same age as the Esmeraldas Beds of the Upper Onzole Formation in the northwestern part of Ecuador (see Vokes, 1988). From Whittaker's figure 5 (1988, p. 16) (see text-fig. 3) we assume our locality to be approximately equal to his locality number CRB 124.



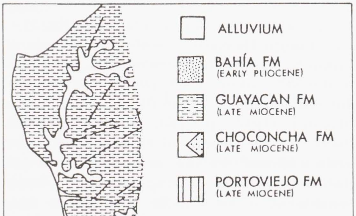
Text-figure 1. Map of western Ecuador, showing study area.

The species *Haustellum chrysostoma* has been reported from the basal beds of the Late Miocene Melajo Clay of Trinidad by Jung (1969, p. 489, pl. 49, figs. 8-10). He notes that the basal beds of the Melajo represent "a typical, tropical, near-shore fauna" (*ibid.*, p. 305) and this is corroborated by Recent specimens in my collection that are identical to Jung's figured specimens and were taken in 3 m depth, Paraguaná Peninsula, Venezuela. A typical specimen was also figured by Weisbord (1962, p. 282, pl. 25, figs. 17, 18) from the lower Mare Formation of Venezuela. These beds were considered to be Lower Pliocene by Weisbord but more recent work on the planctic foraminifera indicates an Early Pleistocene age (*Lexico Estratigrafico de Venezuela*, 1970, p. 400). The species is also abundant in the Cumaná Formation of north-central Venezuela (pl. 1, fig. 3). The age of these beds has been considered to be Pliocene by most authors but the *Lexico Estratografico de Venezuela* (1970, p. 187) moves the age up to Pleistocene on the grounds that the zone of *Globoratalia truncatulinoides* (N 21-23) has

Text-figure 2. Sea cliffs along the coast, south of Bahía de Caráquez, Manabi Province, Ecuador.

been reassigned to the Pleistocene.

Haustellum chrysostoma is closely related to *H. polynematicus* (Brown and Pilsbry, 1911), which, although described from the Gatun Formation of Panama, also occurs in the Esmeraldas Beds of northwestern Ecuador, and unnamed beds in Colombia (see Vokes, 1988, p. 17). But the species first occurs in the Angostura Formation of Ecuador (see Olsson, 1964, p. 137, pl. 29, figs. 2, 2a, and Vokes, this volume), beds that Whittaker (1988, p. 11) dates as probably Late Miocene. Thus, the two species are contemporaneous. It is assumed that *H. polynematicus* is derived from the Early Miocene species *H. gilli* (Maury, 1910), from the Chipola Formation



Text-figure 3. Geologic map of area in the vicinity of Bahía de Caráquez, taken from Whittaker, 1988, figure 5, showing his locality numbers.

PLATE 1

Figures

1–3. *Haustellum chrysostoma* (Sowerby) (X 1 1/2)

1. USNM 860471; height 74.6 mm, diameter 35.3 mm.
   Locality El Pico, Paraguaná Peninsula, Venezuela, 3 m depth.
2. USNM 445384; height (incomplete) 30.5 mm, diameter (incomplete) 32.2 mm.
   Locality: Sea cliffs approximately 5 km southwest of Bahía de Caráquez, Ecuador. Bahia Formation, Early Pliocene.
3. UCMP 38570; height 44 mm (incomplete), diameter 36.5 mm.
   Locality: Northern end Cumaná Hills, about 6 km east of the "Castillo," at Cumaná, Venezuela. Cumaná Formation, Early Pleistocene.

of northwestern Florida, and the correlative Cantaure Formation of Venezuela (see Vokes, 1988, p. 17, for further discussion of this later occurrence, originally cited by Jung, 1965, p. 520, pl. 69, fig. 6, as *Murex polynematicus)*. However, *H. chrysostoma* does not especially resemble *H. gilli*, and so the origins of the line are uncertain. Perhaps the two younger species represent parallel lines of development and *H. gilli* gave rise to both *H. polynematicus*, which did not survive the Pliocene, and to *H. chrysostoma*.

In the Recent Caribbean fauna *H. chrysostoma* occurs together with the superficially similar appearing *H. messorius* (Sowerby, 1841). It is my opinion that the two forms represent convergence, with *H. messorius* having been a Caribbean species since at least the Early Miocene. It first occurs in the Early Miocene Baitoa Formation of the Dominican Republic (Vokes, 1989, p. 26) and the Pirabas Formation of Brazil (as *Murex sutilis* White, 1887). It also occurs in a number of other Tertiary formations throughout the Caribbean, being the most abundant and widespread of the species of *Haustellum* in the western Atlantic.

In the Caribbean *H. messorius* has persisted without any great change since the Early Miocene. It is an extremely variable species and a number of names have been proposed for what I consider to be infraspecific variations. It occurs in shallow-water at localities ranging from the Greater Antilles to Venezuela. The range of *H. chrysostoma* is much more limited, occurring only along the coast of Venezuela, (including Trinidad and Tobago), as far west as the Goajira Peninsula, Colombia.* In the Dutch Antilles and as far north as approximately Guadeloupe, Lesser Antilles, *H. chrysostoma bellus* (Reeve, 1845) occurs.

There is a strong superficial resemblance between the species *H. chrysostoma* and *H. messorius*, and there is no simple way to differentiate the two. In general, *H. chrysostoma* is smoother, has a more appressed suture, one to two rows of intervarical nodes, a more inflated body whorl and, hence, a larger aperture, with a more expanded parietal shield that is at least partially yellow in color. There are no spines on the varices, only a short recurved spine at the base of the body whorl. In general, *H. messorius* is a smaller species, with more nodulose intervarical ornamentation, two to three rows of intervarical nodes, and a short spine at the shoulder (in some forms numerous short spines on the varices). But all of these characters may appear in either species. In the end, it is the overall aspect of the shell that indicates placement in one or the other species and all too often there are those enigmatic intermediate forms that defy placement. Nevertheless, I still believe that there are two valid species present – we just cannot always separate them.

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*The Brazilian shell that has been called *Murex chrysostoma* by Rios (1985, p. 81, pl. 29, fig. 354) is a different species. Rios notes that *M. chrysostoma* may be "distinguished from *messorius* by the radular teeth." This erroneous statement is based upon the illustration given by Gonzalez and Flores (1972, fig. 9-c) of a thaidine radula (probably *Thais haemastoma)* as "*Murex chrysostomus*." There is no difference in the radulae of *H. messorius* and *H. chrysostoma*, both are typically muricine. These authors also show for the radula of *Murex donmoorei* (their fig. 9-b) another thaidine radula. As a guess, the illustrations have been mixed with their fig. 2, showing as rachidian teeth of *Thais deltoidea*, *T. rustica*, and *T. haemastoma floridana*, three illustrations of muricine radulae.

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NOTES ON THE FAUNA OF THE CHIPOLA FORMATION – XXXI ON THE OCCURRENCE OF THE GENUS *CORALLIOPHAGA* (MOLLUSCA:BIVALVIA)

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In 1898, Dall published figures of a shell from the "Ballast Point silex beds" that he named *Coralliophaga elegans* (pl. 25, figs. 2, 2a). In 1903 (p. 1499) he described the species as *C. elegantula*, noting that the specific name *elegans* had been used by Deshayes in 1824, and listing the occurrences as "Upper Oligocene of the Chipola marl, Chipola River, Florida, and of the silex beds at Ballast Point, Tampa Bay." Julia Gardner, however, did not mention this name in her monograph of the fauna of the Alum Bluff Group (1926-1950) and Mansfield in his "Mollusks of the Tampa and Suwannee Limestones of Florida," states (1937, p. 228): "Although Dall reports this species in the Chipola formation, I have not seen it from that locality." Insofar as I have been able to ascertain, this erroneous citation is the only mention of the genus *Coralliophaga* in the Chipola fauna.

Examination of the extensive Chipola collections at Tulane University has yielded a number of specimens referable to *Coralliophaga coralliophaga* (Gmelin) from seven localities, plus four specimens having a *Coralliophaga*-like hinge but lacking all radial ornamentation; these come from three localities, two of which have not yielded representatives of *C. coralliophaga*.

Family TRAPEZIIDAE Lamy, 1920
Genus CORALLIOPHAGA Blainville, 1824

Coralliophaga BLAINVILLE, 1824, Man. de Malac. et Conchyl., p. 560.

Type species: *Coralliophaga carditoidea* Blainville, 1824 (= *Chama coralliophaga* Gmelin, 1791), by monotypy. Recent: Red Sea, Indian Ocean, and western Pacific Ocean northward to Japan; Bermuda, North Carolina to Florida,