A NEW SUBGENUS AND NEW SPECIES OF MIOCENE CALLIOSTOMA (ARCHAEOGASTROPODA—TROCHIDAE)

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ABSTRACT

This paper describes a new subgenus of Calliostoma: (Archaeogastropoda—Trochidae), Tropidotrochus characterized by unbeaded spiral sculpture, concave whorls, and double peripheral carinae. Type-species is Calliostoma virginicum (Conrad) which, with other Miocene species of the eastern United States—C. carolinense Gardner, C. labrosum (Conrad), and C. cyclum (Conrad)—differs from the living subgenera Calliostoma Swainson, 1840, s.s.; Elmerlinia Clench and Turner, 1960; Kombologion Clench and Turner, 1960, all of which have convex whorls and beaded sculpture. A new species, C. (Tropidotrochus) jayae, is here described, from the Miocene of Virginia.

INTRODUCTION

In October, 1975, during a collecting excursion to the marine Miocene deposits in Virginia, Mrs. Jay J. Trippe obtained a unique specimen of Trochidae. Mrs. Tripp consulted the Section of Invertebrates for identification, and the specimen proved to be not only an undescribed species, but a member of a new subgenus of Calliostoma, herewith described, different from the ones now living.

Genus Calliostoma Swainson, 1840.

Tropidotrochus1, new subgenus.

TYPE-SPECIES: Zizyphinus virginicus Conrad, 1875. From Suffolk, Virginia, upper section of Yorktown Formation, late Miocene. This, the first species described, now belongs to the new group.

1Tropida, Gr. = keel + trochus = top shell.
Submitted for publication August 27, 1976.
diagnosis: Calliostoma with double peripheral keel or carinae. The two carinae, dividing the top cone of the shell from the base, are separated by a deep transverse sulcus. The sulcus, correspondingly narrower, is repeated above, at the base of each whorl. Sides of the whorls are concave in the type-species, and more so in C. (T.) jayae. In other species like C. carolinense Gardner and C. labrosum (Conrad), the sides of the whorls are concave to a lesser degree, but never convex, as in C. (Calliostoma) or in C. (Leiotrochus). The sculpture consists of spiral cords, very regular in C. virginicum, and less regular in C. carolinense and C. jayae, but never beaded. The umbilicus is closed in adults, except in C. cyclum Dall, which might be an immature specimen because of its small size and other characteristics of its group.

Discussion: Tropidotrochus is apparently an extinct Miocene group. The only two known living species of Calliostoma, s.l., with strong keels are C. cubanum Clench & Aguayo, and C. schroederi C. & A. They have beaded sculpture and do not correspond to the group typified by C. virginicum.

Calliostoma (Calliostoma), as defined by its type-species C. zizyphinum (L.), is a flat-sided trochoid shell, the sculpture consisting of very fine, regular, transversal flattened cords. Other species are practically smooth, like C. conulum (L.), which by an error of Herrmannsen (1846) was also made the type-species of the genus.

The conspicuously beaded species of Calliostoma were placed by Clench and Turner (1960) in the new subgenera Elmerlinia and Kombologen. In the first, the shells are perforate, and in the second, generally imperforate. The two are also differentiated by radular characteristics. Some of these species as well as others that remain in Calliostoma, s.l., without subgeneric definition, might belong to the subgenus Eucasta Dall, 1889.

The subgenus Leiotrochus Conrad, 1862, is characterized by convex whorls, numerous and regular spiral cords, and an angulated, instead of keeled, periphery. All the known species are from the Miocene: C. distans Conrad (type-species), C. armillatum Conrad, C. herrisi Dall, C. nottowayense Gardner, and C. conradi Gardner.

The following species and subspecies should be included in the new subgenus Tropidotrochus: Calliostoma virginicum gizehi Gardner, C. carolinense Gardner, C. cyclum Dall, C. labrosum (Conrad).

Calliostoma (Tropidotrochus) jayae, new species

diagnosis: Shell not umbilicate, wider than high, whorls concave, sculpture with unbeaded spiral cords, with double carinae and sulcus at the periphery and base of each whorl. Aperture produced to the right with basal lip festooned, Protoconch smooth, globular.

description: Shell with almost six whorls (5-4/5 or 5 + 248°); those corresponding to the spire, concave. The protoconch has 1-1/2 globose and polished whorls, and these, up to the end of the second whorl, are iridescent. Starting at the middle of the second whorl is a spiral cord, which is doubled in the third and successively increases in number to the last whorl, which has six. The spaces between are deep and as wide as the cords. In the penultimate whorl there are also traces of thread-like spirals between the cords. The cords
and the rest of the shell surface are not beaded. Beginning at the third whorl, the sutural area is margined with a strong, rounded keel, very prominent at the periphery between cone and base. This keel, or carina, continues to the distal end of the outer lip. A similar carina is repeated below, leaving a wide, deep canal between them. Although the sutural area in the upper whorls is marked by the carinae, the suture is rather indistinct. The aperture is subquadrate, 1/5 wider than high, and falls obliquely to the base. The base is horizontal, but conspicuously crenulated by a festoon that corresponds to the ends of the cords on the outer and basal lips. Viewed from its base, the umbilical area is closed, and around it there are 16 spiral cords, finer toward the periphery. The last two, at the center, are very wide and strong. The columellar area is triangular, very wide above, and thick. At its basal end it has a tooth-like protuberance.

**DIMENSIONS OF HOLOTYPE:** Height 9.2 mm, width 10.1 mm. Aperture almost 4 mm wide. Diameter of the last whorl above the carina, 7.5 mm (this accounts for a low spire in relation to the total width of the shell). Spire angle in relation to axis, 80°. Divergence of sutural line from base, 5°. Obliquity of left side of base in relation to basal line, 35°.

**TYPE LOCALITY:** Rice's Pit, Hampton, Virginia. Collected by Mrs. Jay J. Tripp, October 6, 1975, together with other fossils including *Conus stearnsi* Conrad and *Polinices catenoides* (Wood), in deposits of upper Yorktown Formation, late Miocene.

**HOLOTYPE:** Section of Invertebrates, CM 43647.

**REMARKS:** The upper (conic) part of the shell is shorter, and correspondingly, the full diameter is wider than the same features in *C. virginicum* (Conrad). The columellar plate in *C. jayae* is also wider than that of *C. virginicum*, with a protuberance that the latter does not have. In both *C. jayae* and *C. carolinense*, the peripheral canal between the carinae is larger than that of *C. virginicum*, but the spiral cords in *C. jayae* are stronger and more numerous on the base than in *C. virginicum*. In *C. jayae* the sides of the whorls are more concave than in *C. virginicum*, and the apertural outline is more angulated and projected to the right. Crenulation of the peristome is regular. *C. virginicum gizehi* Gardner has more regular sculpture and less prominent carinae than *C. jayae*.

The species of *Tropidotrochus* are closely related, and *C. (T.) jayae* differs in the same degree as the others do in proportions and sculpture. They suggest a certain relationship with Pliocene species from Ecuador, *C. palmeri* Dall and *C. nonorum* Pilsbry & Olsson, which have slightly concave whorls. The communication that existed between the Western Atlantic and Eastern Pacific before the formation of the isthmus (between North and South America), during the Tertiary, may account for this relationship. *C. jayae* also can be compared with the distant *C. iheringi* Ortmann from the Patagonian Formation (lower Miocene) of South America. The inference is that this group of *Calliostoma* had an extensive distribution when the now colder southernmost areas of the Atlantic were subtropical.

It can be observed that in the evolution of *Calliostoma*-like genera, subgenera, or group of species, a process has been repeated in each of them (from the Triassic to Recent) in which earlier forms were generally smooth, then spirally sculptured, ending or continuing into forms with strong beaded sculpture. Viewed in this sense, *Leiotrochus* evolved into
Tropidotrechu, Calliostoma, s.s.; Elmerlinia; and Kombologion. This however, is a raw assumption, since the taxonomy of the subfamily Calliostomatinae needs a full neo-paleontological revision.

Figs. 1, 2. Calliostoma (Tropidotrechus) jayae, new species, holotype. 1. Front view. 2. Apical view. (Scale represents 2 mm.)
Figs. 3, 4. *Calliostoma (Tropidotrochus) jayae*, new species, holotype. 3. Dorsal view. 4. Basal view. (Scale represents 2 mm.)
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