THE VELIGER
© CMS, Inc., 1993

The Veliger 36(4):399-404 (October 1, 1993)

The Gastropod *Terebra santana* Loel & Corey, 1932, from the Lower Miocene Vaqueros Formation, Southern California, Belongs in the Cerithiid Genus *Clavocerithium* s.s.

by

RICHARD L. SQUIRES

Department of Geological Sciences, California State University, Northridge, California 91330, USA

Abstract. Re-examination of the primary type material and numerous other specimens of the gastropod *Terebra santana* Loel & Corey, 1932, which is locally very abundant in the lower Miocene Vaqueros Formation of California, reveals that the species is a cerithiid belonging to the genus *Clavocerithium sensu stricto*. This is the first report of *Clavocerithium* s.s. in the New World and its first record in rocks younger than Eocene. *Clavocerthium* (*Clavocerithium*) *santanum* is reported for the first time from the Vaqueros Formation in the upper Sespe Creek area, Ventura County, southern California.

INTRODUCTION

LOEL & COREY (1932), in their monographic study of the lower Miocene Vaqueros Formation in California, named and briefly described the gastropod *Terebra* (Subgenus = ?) *santana* LOEL & COREY (1932:236–237, pl. 47, figs. 8a, 8b, 9, 10, 11). They reported that this Vaqueros Formation species is very abundant wherever present. SCHOELLHAMER *et al.* (1981), BLUNDELL (1983) and DANIEL (1989) also reported very abundant specimens of this gastropod from various outcrops in the southern California area. These reports of such great abundance of a *Terebra* suggested that it had been misidentified as to genus, because modern *Terebra* is a predatory gastropod and makes up a small part of the populations of modern molluscan communities; one would expect it to be similarly uncommon in the fossil record. John G. Vedder and Wendell P. Woodring *in* SCHOELLHAMER *et al.* (1981) put the genus name in quotation marks when referring to "*Terebra*" *santana* because they had reservations about using this genus name.

The purpose of this report is to show that Loel & Corey's *Terebra santana* is a cerithiid and not a terebrid. Examination of the holotype and three paratypes of *T. santana*, as well as numerous other specimens from southern California, revealed that this species belongs to the cerithiid genus *Clavocerithium* Cossmann, 1920.

The locally great abundance of Loel & Corey's species fits in well with what is known about cerithiids. Modern species are very abundant in places like tidal flats. For example, I have observed scattered, densely packed patches of *Certhium stercusmuscarum* Valenciennes, 1832, on the tidal sandflat at San Felipe, Baja California, Mexico. BRUSCA (1980) and SCHMIDT (1987) reported that this species is extremely common on tidal flats in the northern Gulf of California, and specimens aggregate in gigantic clumps wherever a semihard sandy substrate is available. The specimens of *Clavocerithium* (*C.*) *santanum* (Loel & Corey) in the Vaqueros Formation are always in the nearshore-marine lower part of the formation, where there is gradation with the coastal-plain deposits of the underlying Sespe Formation. The specimens of *C.* (*C.*) *santanum* in the lower Vaqueros Formation are probably associated with tidal flats and nearshore storm-related lag deposits that developed in this zone of gradational nonmarine and marine environments. One of the paratypes of this species was reported by LOEL & COREY (1932:79) as possibly coming from an estuarine deposit.

Abbreviations used for catalog and/or localities are: CSUN, California State University, Northridge; LACMIP, Natural History Museum of Los Angeles County, Invertebrate Paleontology Section, UCMP, University of California Museum of Paleontology (Berkeley). Localities cited in this report are described under "Localities Cited."

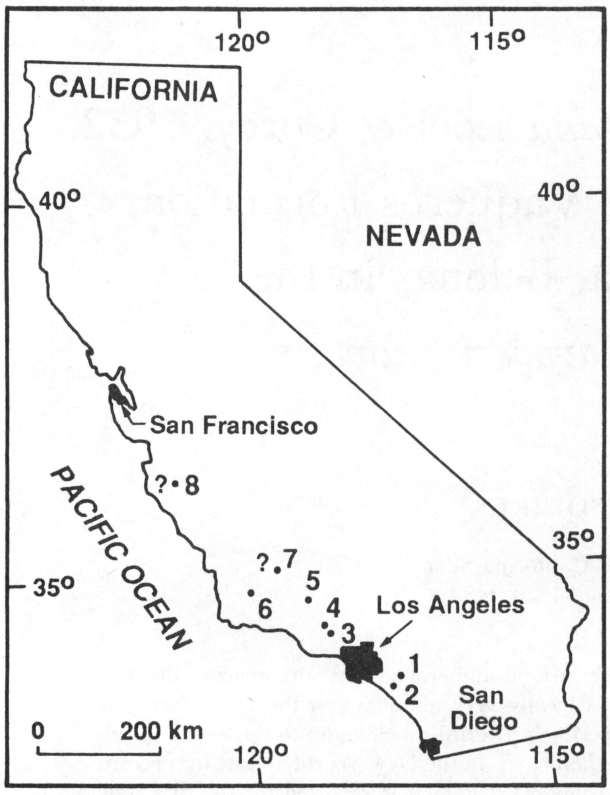

Figure 1

Geographic distribution of *Clavocerithium* (*C.*) *santanum* (Loel & Corey, 1932). Localities are numbered from south to north. (1) Santa Ana Mountains, Orange County; (2) San Joaquin Hills, Orange County; (3) Big Mountain, north side of Simi Valley, Ventura County; (4) Oak Ridge area, Ventura County; (5) Upper Sespe Creek, Ventura County; (6) Near Buellton, Santa Barbara County; (7) Eagle Rest Peak area, Kern County; (8) Junipero Serra Peak region, Monterey County. Question mark ("?") denotes tentative identification by LOEL & COREY (1932). The upper Sespe Creek area (No. 5) is a new report for this species.

COMMENTS ON GEOGRAPHIC DISTRIBUTION

LOEL & COREY (1932) reported that this species, *Clavocerithium* (*C.*) *santanum,* ranged from Orange County to Santa Barbara County, southern California. They also reported that the species may be present in central California, as far north as Monterey County (Figure 1). The type locality (locality UCMP 6128) is in Arroyo Trabuco in the southern part of Plano Trabuco, southern Santa Ana Mountains, Orange County. The exact location of this UCMP 6128 is not known, but I visited the general area and found specimens of *C.* (*C.*) *santanum* in greenish-gray to reddish-gray exposures of very fine-grained sandstone that apparently are in the zone of intergradation between the lower part of the Vaqueros Formation and the upper part of the Sespe Formation.

Other workers (SCHOELLHAMER *et al.*, 1981; DANIEL, 1989) have confirmed the presence of *Clavocerithium* (*C.*) *santanum* in the Santa Ana Mountains. DANIEL (1989) found several beds in Hicks Canyon in the Santa Ana Mountains, where specimens constitute as much as 50% of the rock. I visited this area and also found scattered, densely packed concentrations at locality CSUN 1185 (Figure 2).

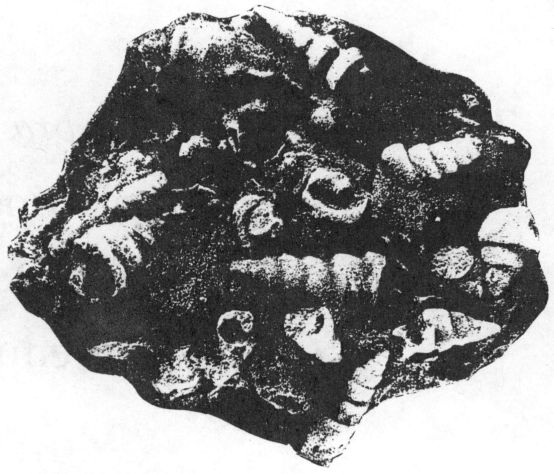

Figure 2

A hand specimen (hypotype LACMIP 12102) showing the dense packing of *Clavocerithium* (*C.*) *santanum* (Loel & Corey, 1932) at locality CSUN 1185, Hicks Canyon, northern Santa Ana Mountains, Orange County, southern California. Magnification is ×1.1.

BLUNDELL (1983) reported this species from several localities in the Big Mountain area, north side of Simi Valley, southern California. His specimens are stored in the CSUN collection. Only at locality CSUN 555 are the specimens sufficiently well preserved to be identified as *Clavocerithium* (*C.*) *santanum.* All of the specimens that Blundell collected from other localities in the area are poorly preserved and could only be identified as certhiaceans. LOEL & COREY (1932) did not report their species from the Big Mountain area.

REID (1978) and SQUIRES & FRITSCHE (1978) reported abundant specimens of the potamidid gastropod *Potamides sespeenis* Loel & Corey, 1932, from numerous CSUN localities in the Vaqueros Formation, upper Sespe Creek area, Ventura County, southern California, but upon reexamination the specimens from CSUN 428 proved to be *Clavocerithium* (*C.*) *santanum.* This is the first documented report of this species from this area. At most of the other localities, specimens are poorly preserved and could only be identified as certhiacean. *Potamides sespeensis,* with its distinctive noded ornamentation and spiral ribbing, was collected from localities CSUN 159 and 401. BADGER (1957) tentatively reported this species from the Sespe Creek area. His collections are now stored at LACMIP; the specimens are poorly preserved but appear to be *C.* (*C.*) *santanum.*

SYSTEMATIC PALEONTOLOGY

Family CERITHIIDAE Fleming, 1822

Subfamily CERITHIINAE Fleming, 1822

Genus *Clavocerithium* s.s. Cossmann, 1920

Type species: By original designation *Cerithium lacazei* "Vasseur" Cossmann, 1897, 1898, upper? Eocene of the Lower Loire River area, Brittany, northwestern France. See HOUBRICK (1978) for a discussion of the authorship of this species.

Clavocerithium (*Clavocerithium*) *santanum* (Loel & Corey, 1932)

(Figures 3–12)

Terebra (Subgenus = ?) *santana* LOEL & COREY, 1932:236–237, pl. 47, figs. 8a, 8b, 9, 10, 11).
Terebra santana Loel & Corey, 1932: KEEN & BENTSON, 1944:200.

Supplementary description: Shell small in size (up to 26.5 mm height), elongate, high-spired, approximately 11 whorls, solid. Suture distinct, slightly channeled. Protoconch low, conical? shape. Upper spire whorls straight sided to slightly convex for the first 3 to 15 mm in height (usually just the first 6 mm), grading into tabulate whorls, lower spire whorls and body whorl prominently tabulate, rarely convex; each whorl taller than the previous whorl. Upper and middle spire whorls with 4 to 5 moderately heavy, equidistant spiral ribs (rarely preseved), anteriormost spiral rib situated in sutural area. Penultimate and body whorls smooth. Aperture oblique, small, approximately 1/6 to 1/4 of shell length. Columella concave with central oblique plait that coincides in position with columellar side of anterior canal; thin to moderately thick columellar callus detached along outer side. Outer lip sinous, and growth lines on body whorl sinuous. Anterior canal short but distinct, slightly reflexed backward.

Type material and type locality: Holotype, UCMP 31608 and paratypes, UCMP 31609 and 31610, all three from locality UCMP 6128, Trabuco Canyon, Santa Ana Mountains, Orange County, southern California; paratype, UCMP 31611, locality UCMP A-253, Wiley Canyon, Oak Ridge area, Ventura County, southern California.

Geologic range: Early Miocene.

Distribution: Vaqueros Formation, southern California, and tentatively central California: Santa Ana Mountains, Orange County (LOEL & COREY, 1932; SCHOELLHAMER *et al.*, 1981; DANIEL, 1989); San Joaquin Hills, Orange County (LOEL & COREY, 1932); Wiley Canyon in Oak Ridge area and near mouth of Grimes Canyon, eastern Ventura County (LOEL & COREY, 1932); Big Mountain, northern Simi Hills (BLUNDELL, 1983); upper Sespe Creek, Ventura County (herein); western Santa Ynez Mountains, Santa Barbara County (LOEL & COREY, 1932); tentatively the Eagle Rest Peak area, San Emigdio region, southern Kern County, south-central California (LOEL & COREY, 1932); and tentatively the Vaqueros Creek area, Junipero Serra Peak region, Monterey County, north-central California (LOEL & COREY, 1932).

Remarks: A total of 340 specimens were seen during the course of this study. The holotype (Figures 3–6) is the best preserved specimen, but it is the only specimen that has a body whorl narrower than the penultimate whorl. The holotype also shows the central plait in the aperture better than any other specimen. Figure 4 illustrates the coincidence of this central plait with the columellar side of the anterior canal. The columellar callus is fairly well developed on the holotype, but the specimen illustrated in Figure 7 shows how pronounced this callus can be. The presence of a detached columellar callus helps to determine that this species is a certhiid rather than a terebrid. In addition, the lack of a siphonal fasciole on *Clavocerithium* (*C.*) *santanum* further underscores that the species is not a terebrid, as all members of family Terebridae have a siphonal fasciole (BRATCHER & CERNOHORSKY, 1987).

The holotype is the only specimen that shows growth lines. These are readily discernible in Figures 3–5, and Figure 5 illustrates the sinuous outer lip. The whorls on the holotype are tabulate. A few specimens have convex whorls (Figure 7), and others are transitional (Figure 8) between convex whorls and prominently tabulate whorls (Figure 9). Variation in shell form is common in species of cerithiids (HOUBRICK, 1978; KAY, 1979), and well-illustrated examples are shown in HOUBRICK (1978:pls. 2, 13, 16, 94). His plate 94 shows examples of variation of shell form in *Clavocerthium*.

Nearly every observed specimen of *Clavocerithium* (*C.*) *santanum* is smooth over the entire shell. At locality LACMIP 7700, however, several partial specimens that consist of the middle part of the spire show faint traces of spiral ribbing on the spire whorls. One of these specimens (Figure 10) shows four spiral ribs. The spiral rib in the sutural area is, in most cases, the only spiral rib that is preserved (Figure 11). Abrasion of shell sculpture, therefore, is a major factor in the studied specimens. The abrasion may have taken place during post-mortem transport by waves and/or currents.

No specimens of *Clavocerithium* (*C.*) *santanum* were found that show any traces of spiral or axial ribbing on the exteriors of the more anterior spire whorls or on the body whorl. These whorls are judged to have originally been smooth. The presence of growth lines on the penultimate and body whorls of the holotype suggest that this particular specimen underwent minimal post-mortem transport, otherwise the growth lines would have been worn off. The whorls of this specimen show no spiral ribbing or other external ornamentation.

It is also possible that hermit crabs could have lived in the shells. Modern certhiid shells commonly serve as homes for hermit crabs. For example, dead specimens of *Ceri-*