

FIGURE 6—*Calilampas californiensis* n. gen. and sp., phyllode of ambulacrum I of IGM paratype 6390,  $\times 10$ .

**Occurrence.**—Middle lower Eocene (“Capay Stage”): Baja California Sur, Mexico (Bateque Formation), and in Simi Valley, southern California (Llajas Formation).

**CALILAMPAS CALIFORNIENSIS** n. gen. and sp.  
Figures 5.1–5.7, 6, 7

**Diagnosis.**—Same as for genus.

**Description.**—Medium size, reaching maximum size of 55 mm length, slightly elongate with less elongation in most specimens larger than about 48 mm length, highly inflated with less inflation in maturity, greatest width and height posterior to center, margins rounded except for slight posterior truncation; adapical surface smoothly convex; adoral surface slightly depressed at peristome; apical system monobasal, madreporic pores numerous, occurring over most of apical system; apical system anterior, with less anterior eccentricity in specimens larger than about 48 mm in length; four gonopores; petaloids well developed, broad, closing distally, extending about 80 percent of distance to ambitus, extending about 90 percent of distance to ambitus in specimens greater than about 48 mm in length; ratio of length of anterior-paired petals to posterior-paired petals 1:1.28; interporiferous zones moderately narrow and about three times wider than poriferous zones; poriferous zones of same petal of same length; pores conjugate, outer pore elongate but not slit-like, ambulacral plates beyond pores single pored; periproct marginal, slightly visible from above or below, elliptical, transverse, with small groove on adoral side; peristome transverse, anterior, large, subpentagonal; bourrelets well developed, slightly inflated, forming a low rim around peristome; phyllodes moderately broad, single pored with two series of pores in each half-ambulacrum, six to eight (usually eight) pores in each outer series, two to four (usually three) in each inner series, four to five sphaeroidal pits on each side of perradial suture in phyllode area; two buccal pores per ambulacral area; tubercles slightly larger and less crowded adorally; no naked sternal region.

**Remarks.**—Out of 250 collected specimens, only 27 are complete and without indications of crushing or weathering. The largest specimen (paratype, IGM 6389, Figure 5.6) found is 55 mm in length, 48.2 mm in width, and 29.2 mm in height. The dimensions of the type specimens are given in Table 1. The

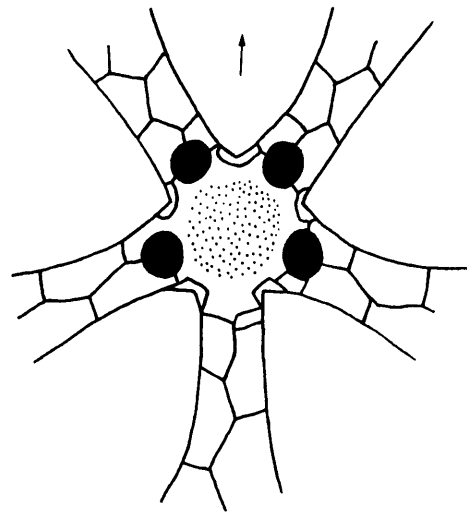


FIGURE 7—*Calilampas californiensis* n. gen. and sp., apical system of IGM paratype 6391, CSUN loc. 1576, arrow denotes anterior direction,  $\times 18$ .

phyllode of ambulacrum I of IGM paratype 6390 is shown in Figure 6. The apical system of paratype 6391 is shown in Figure 7.

**Etymology.**—The specific name is for the states of Baja California Sur, Mexico, and California, United States of America.

**Material.**—A total of 250 specimens; comprising of one specimen from UCLA loc. 6622, two specimens from CSUN loc. 1220b, and approximately 30 specimens from each of the following CSUN localities: 1544a, 1546, 1547, 1549, 1550, 1574, 1575, and 1576.

**Occurrence.**—Middle lower Eocene (“Capay Stage”): Baja California Sur, Mexico (Bateque Formation), and Simi Valley, southern California (Llajas Formation).

**Repository.**—Holotype, IGM 6387; paratypes, IGM 6388 through 6391; paratype, LACMIP 11532.

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**REFERENCES**

- AGASSIZ, L., AND P. J. E. DESOR. 1847. Catalogue raisonné des échinides. *Annals des Sciences Naturelles*, Série 3, Volumes 6–8, 167 p.
- ALMGREN, A. A., M. V. FLIEWICZ, AND H. L. HEITMAN. 1988. Lower Tertiary foraminiferal and calcareous nanofossil zonation of California: an overview and recommendation, p. 83–105. *In* M. V. Fliewicz and R. L. Squires (eds.), *Paleogene Stratigraphy*, West Coast of North America. Pacific Section, Society of Economic Paleontologists and Mineralogists, Book 58, Los Angeles.
- ANDERSON, F. M. 1905. A stratigraphic study in the Mount Diablo Range of California. *Proceedings of the California Academy of Sciences*, Series 3, 2:155–248.

- CLAUS, C. 1880. Grundzüge der Zoologie, 4th ed. Volume 1. Marburg and Leipzig, 822 p.
- CONRAD, T. A. 1850. Descriptions of one new Cretaceous and seven new Eocene fossils. *Journal of the Academy of Natural Sciences of Philadelphia*, Series 2, 2:39–41.
- COOKE, C. W. 1959. Cenozoic echinoids of eastern United States. U. S. Geological Survey Professional Paper 321, 106 p.
- CUSHMAN, J. A., AND H. H. McMASTERS. 1936. Middle Eocene foraminifera from the Lajas Formation, Ventura County, California. *Journal of Paleontology*, 10:497–517.
- FOURTAU, R. 1909. Note sur les échinides fossiles recueillis par M. Teilhard de Chardin dans l'Eocene des environs de Minieh. *Bulletin de l'Institut de Égypt*, Série 5, 1:122–155.
- GRANT, U. S., IV, AND L. G. HERTLEIN. 1938. The west American Cenozoic Echinoidea. *Publications of the University of California at Los Angeles in Mathematical and Physical Sciences*, 2:1–225.
- KAPPELER, K. A., R. L. SQUIRES, AND A. E. FRITSCH. 1984. Transgressive marginal-marine deposits of the Avenal Sandstone, Reef Ridge, central California, p. 9–27. *In* J. R. Blueford (ed.), *Kreyenhagen Formation and Related Rocks*. Pacific Section, Society of Economic Paleontologists and Mineralogists, Book 37, Los Angeles.
- KEENAN, M. F. 1932. The Eocene Sierra Blanca Limestone at the type locality in Santa Barbara County, California. *Transactions of the San Diego Society of Natural History*, 7:53–84.
- KEW, W. S. W. 1920. Cretaceous and Cenozoic Echinoidea of the Pacific coast of North America. *University of California Publications, Bulletin of the Department of Geology*, 12:23–236.
- KIER, P. M. 1962. Revision of the cassiduloid echinoids. *Smithsonian Miscellaneous Collections*, 144:1–262.
- . 1966. Cassiduloids, p. U492–U523. *In* R. C. Moore (ed.), *Treatise on Invertebrate Paleontology*, Pt. U, Volume 2, Echinodermata 3. Geological Society of America and University of Kansas Press, Lawrence.
- LAMARCK, J. B. 1801. *Système des animaux sans vertèbres*. Paris, 432 p.
- MCLEAN, H., B. P. HAUSBACK, AND J. H. KNAPP. 1985. Reconnaissance geologic map of part of the San Isidro quadrangle, Baja California Sur, Mexico. U. S. Geological Survey, Miscellaneous Field Studies Map MF-1799 (scale 1:125,000).
- MINA, F. 1956. Bosquejo geológico de la part sur de la peninsula de Baja California. Twentieth International Geological Congress, Excursion A-7:1–77.
- . 1957. Bosquejo geológico del Territorio Sur de la Baja California. *Asociación Mexicana de Geólogos Petroleros Boletín*, 9:139–269.
- PAGE, B. M., J. G. MARKS, AND G. W. WALKER. 1951. Stratigraphy and structure of mountains northeast of Santa Barbara, California. *Bulletin of the American Association of Petroleum Geologists*, 35:1727–1780.
- SANDY, M. R., R. L. SQUIRES, AND R. DEMETRION. 1995. Middle Eocene terebratulid brachiopods from the Bateque Formation, Baja California Sur, Mexico. *Journal of Paleontology* (in press).
- SEIDEN, H. 1972. *Geology of Las Lajas Canyon*, Ventura County, California. Unpubl. M.S. thesis, University of California at Los Angeles, 33 p.
- SQUIRES, R. L. 1983. Geologic map of the Simi Valley area, southern California (scale 1:24,000). *In* R. L. Squires and M. V. Filewicz (eds.), *Cenozoic Geology of the Simi Valley Area, Southern California*. Pacific Section, Society of Economic Paleontologists and Mineralogists, Volume and Guidebook.
- . 1984. Megapaleontology of the Eocene Lajas Formation, Simi Valley, California. *Natural History Museum of Los Angeles County, Contributions in Science*, 350, 76 p.
- . 1990a. New Paleogene siliquariid and vermetid gastropods from the Pacific coast of southwestern North America. *The Veliger*, 33:286–292.
- . 1990b. First occurrence of the Tethyan bivalve *Nayadina* (*Exputens*) in Mexico, and a review of all species of this North American subgenus. *The Veliger*, 33:305–316.
- . 1990c. New Paleogene *Fimbria* (Mollusca: Bivalvia) from the Pacific coast of southwestern North America. *Journal of Paleontology*, 64:552–556.
- SQUIRES, R. L., AND R. DEMETRION. 1989. An early Eocene pharetronid sponge from the Bateque Formation, Baja California Sur, Mexico. *Journal of Paleontology*, 63:440–442.
- , AND —. 1990a. New early Eocene marine gastropods from Baja California Sur, Mexico. *Journal of Paleontology*, 64:99–103.
- , AND —. 1990b. New Eocene bivalves from Baja California Sur, Mexico. *Journal of Paleontology*, 64:382–391.
- , AND —. 1991. Early Eocene macrofaunal comparisons between the Tepetate and Bateque Formations, Baja California Sur, Mexico. *Geological Society of America, Program with Abstracts, Annual Meeting*, 23:A194.
- , AND —. 1992. Paleontology of the Eocene Bateque Formation, Baja California Sur, Mexico. *Natural History Museum of Los Angeles County, Contributions in Science*, 430, 55 p.
- , AND —. 1994a. New reports of Eocene mollusks from the Bateque Formation, Baja California Sur, Mexico. *The Veliger*, 37(2):125–135.
- , AND —. 1994b. A new species of the oligopygoid echinoid *Haimea* from the lower Eocene of Baja California Sur, Mexico. *Journal of Paleontology*, 68:846–851.
- SUTER, S. J. 1994. Cladistic analysis of cassiduloid echinoids: trying to see the phylogeny for the trees. *Biological Journal of the Linnean Society*, 53:31–72.
- VEDDER, J. G. 1972. Revision of stratigraphic names for some Eocene formations in Santa Barbara and Ventura Counties, California. U. S. Geological Survey, Bulletin 1354-D:1–12.

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## APPENDIX

## LOCALITIES

Unless otherwise noted, all localities are in the Bateque Formation, of middle early Eocene ("Capay Stage") age, collected by R. L. Squires and R. A. Demetron. Coordinates for these localities are given below in brackets and are from the Mexican government 1:50,000 topographic quadrangle map, 1983, San Jose de Gracia (number G12A64), Baja California Sur, Mexico.

CSUN loc. 1220b. Along a prominent ridge, north side of a minor canyon on the west side of Mesa La Salina, 84–130 m above the bottom of the exposures of the Bateque Formation in this area, approximately 1.25 km southeast of the intersection of 113°00'W and 26°45'N [coordinates 1.6 and 59.4].

CSUN loc. 1544a. Along east side of re-entrant on west side of Mesa La Salina, approximately 70 m above the bottom of the exposures of the Bateque Formation in this area [coordinates 4.35 and 55.70].

CSUN loc. 1546. 120-m elevation, near middle of east-facing cliff along canyon wall, near north end of Mesa La Azufrera, west side of Arroyo La Tortuga, about 1 km south of abandoned village site El Cuarenta, 112°53'13"W, 26°38'55"N [coordinates 12.45 and 48.80].

CSUN loc. 1547. Immediate vicinity of CSUN loc. 1546 and approximately 5 m stratigraphically upsection.

CSUN loc. 1549. 90-m elevation, just west of dirt road, near base of east-facing cliff along canyon wall, northeast side of Mesa La Azufrera, west side of Arroyo La Tortuga, 112°51'45"W, 26°38'30"N [coordinates 14.75 and 48.10].

CSUN loc. 1550. 140-m elevation, just west of dirt road, lower part of east-facing cliff along canyon wall, northeast side of Mesa La Azufrera, west side of Arroyo La Tortuga, 112°51'00"W, 26°37'55"N [coordinates 15.95 and 47.05].

CSUN loc. 1574. On east bank of Arroyo El Cantil Blanco adjacent to south end of Mesa La Ladera, in vicinity of abandoned village site El Cuarenta, 112°52'55"W, 26°39'32"N [coordinates 12.80 and 50.10].

CSUN loc. 1575. 90-m elevation, on south-facing cliff, south end of Mesa La Ladera, 112°53'00"W, 26°39'45"N [coordinates 12.60 and 50.40].

CSUN loc. 1576. 80-m elevation, on southeast-facing cliff, south end of Mesa La Ladera, 112°52'45"W, 26°39'53"N [coordinates 13.20 and 50.75].

UCLA 6622. 1,975-ft elevation, north side of ridge along east side of Las Lajas Canyon, 274 m (900 ft) north and 482 m (1,580 ft) east of the southeast corner of section 29, T3N, R17W, U. S. Geological Survey Santa Susana quadrangle, 7.5 minute, 1951, photorevised 1969, Ventura County, southern California. Lajas Formation. Age: Middle early Eocene ("Capay Stage"). Collector: H. Seiden. [Locality = field loc. 4 of Seiden (1972).]