

EOCENE MOLLUSKS FROM THE TEPETATE FORMATION, BAJA CALIFORNIA SUR, MEXICO

by Richard L. Squires

During the past five years, my colleague Robert A. Demetron and I have been conducting research on previously unstudied assemblages of shallow-marine Eocene mollusks from Baja Sur, Mexico. Most of our work has been on the Bateque Formation south of San Ignacio Lagoon (Fig. 1). In 1989, I received a COA research grant to help defray field expenses for this work. In the December, 1991, issue of *American Conchologist*, I presented an overview of this work (Squires, 1990a).

We have written several articles on new mollusks and other invertebrates from the Bateque Formation and are presently awaiting the publication of our monograph on the stratigraphy, paleontology, and depositional environments of this formation (Squires and Demetron, in press).

Although we continue to collect the Bateque Formation for additional new taxa, we also have been studying similar Eocene formations in Baja California in order to determine how widespread the faunas were during that time. One of these formations is the Tepetate Formation, which crops out about 155 miles (250 km) south of the Bateque Formation in the vicinity of La Paz (Fig. 1). In 1991, we received a COA research grant that helped defray expenses for work on the Tepetate Formation. Our field work has been of a reconnaissance nature, but we were successful in finding some macrofossils in the upper part of the formation at Arroyo Conejo (Fig. 2). Table 1 is a list of the mollusks that we found there. Two of these species are shown in Figure 3. In addition to the listed mollusks, we also found several species of large benthic foraminifera [*Pseudophragmina clarki* (Cushman, 1920), *P. avena* (Cushman, 1921), *Actinocyclus* aff. *A. aster* Woodring, 1930], a calcareous sponge [*Elasmotoma bajanensis* Squires and Demetron, 1989], a gorgonian [*Parisis* n.sp.], a colonial coral [*Actinacis?* sp.], a crab [*Lophoranina* n.sp.], and an echinoid [*Schizaster* (*Paraster*) aff. *S. (P.) lecontei* (Squires and Demetron, 1991)].

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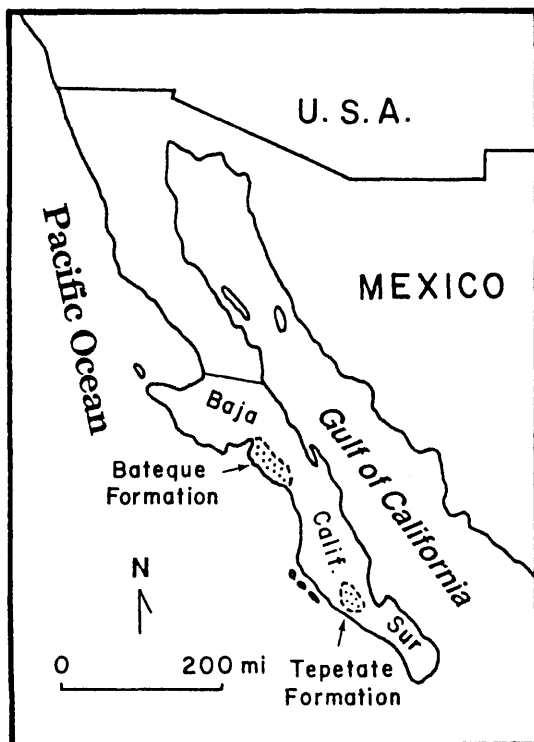


Fig. 1. Location map of the Tepetate and Bateque Formations, Baja California Sur, Mexico.

The macrofossils in the upper part of the Tepetate Formation at Arroyo Conejo are widely scattered, unabraded fragments in calcareous sandstones abundantly rich in large benthic foraminifers (especially *Pseudophragmina clarki*). Locally, the rock type is white calcarenite. The depositional environment of the upper Tepetate Formation at Arroyo Conejo was shallow marine.

The strata in the middle part of the Bateque Formation are also shallow marine, but they were coral-reef influenced. Although the two formations show some differences in rock type, all of the identifiable species of mollusks listed in Table 1, as well as all the other Tepetate Formation fossils species listed above, are present in the middle part of the Bateque Formation. The co-occurrence of all these species proves that the upper part of the Tepetate Formation and the Bateque are time equivalents and correspond to the middle lower Eocene "Capay Stage" (about 53 million years ago) (Squires and Demetron, 1991).

The time of deposition of the upper part of the Tepetate Formation and the middle part of the Bateque Formation coincided with the early Eocene, which was the interval of peak warming during the last 65 million years. The Atlantic Ocean was narrower during the early Eocene, and there was a strong equatorial current that extended from the Tethys Ocean (an area now represented by the Middle East and India) westward toward the New World. Central America was submerged, and this equatorial current flowed unimpeded toward the western part of North America. The upper Tepetate Formation fossils, like those in the middle part of the Bateque Formation, indicate a warm-water biota closely related to what lived in the ancient tropical Tethyan Ocean and in the Tethyan-influenced waters now represented by the Paris Basin (France), Cuba, and Jamaica (Squires, 1990b; 1992).

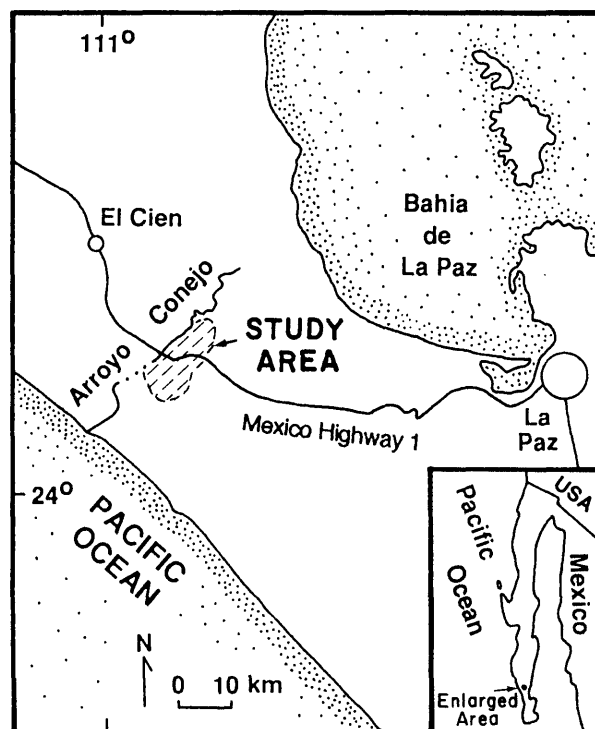


Fig. 2. Location map of the Tepetate Formation at Arroyo Conejo, Baja California Sur, Mexico.

Table 1. Mollusks of the Upper Part of the Tepetate Formation at Arroyo Conejo.

GASTROPODA

- Velates perversus* (Gmelin, 1791)
- Velates batequensis* Squires and Demetron, 1990
- Bittium?* sp.
- Campanile* sp.
- Paraseraphs erraticus* (Cooper, 1894)

BIVALVIA

- Nayadina (Exputens) batequensis* Squires, 1990
- Spondylus batequensis* Squires and Demetron, 1990
- Lima* n.sp.
- ?*Pycnodontes (Phygraea) pacifica* Squires and Demetron, 1990
- Fimbria pacifica* Squires, 1990
- Venericardia?* sp.

REFERENCES

Squires, R.L. 1990a. New Eocene mollusks from Baja California Sur, Mexico. *American Conchologist* 18(4):11.
 ———. 1990b. The early Eocene: arrival of Old World Tethyan (Tropical) gastropods into California: *Bulletin of the Southern California Society of Paleontology* 22(7-8):78-81.
 ———. 1992. New occurrences of the malleid bivalve *Nayadina (Exputens)* from the Eocene of Jamaica, Mexico, and Washington. *The Veliger* 35(2):133-136.

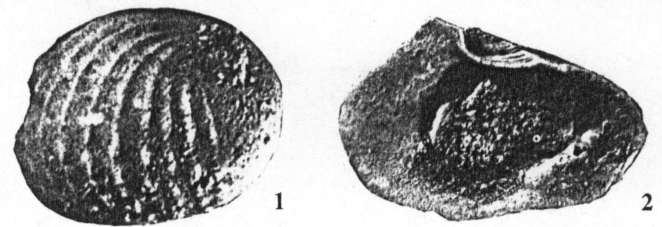


Fig. 3. Examples of mollusks from the Tepetate Formation at Arroyo Conejo, Baja California Sur, Mexico. 3.1, the neritid gastropod *Velates batequensis* Squires & Demetron, 1990, hypotype, LACMIP 11668, abapertural view, height 5 mm., width 5.5 mm. 3.2, the malleid bivalve *Nayadina (Exputens) batequensis* Squires, 1990, hypotype, LAC MIP11669, interior view of left valve, length 19.6mm., height 13mm.

Squires, R.L., and R.A. Demetron. 1991. Early Eocene macrofaunal comparisons between the Tepetate and Bateque Formations, Baja California Sur, Mexico. *Geological Society of America, Annual Meeting, Abstracts with Programs* 23(5):194.
 ———. In press. Paleontology of the Eocene Bateque Formation, Baja California Sur, Mexico. Los Angeles County Natural History Museum, Contributions in Science.

INDEX TO AMERICAN CONCHOLOGIST

The new 20th Anniversary Index to *American Conchologist* is a reality. The massive project indexes *COA Bulletins* from their inception in 1973, down through the years to the last *American Conchologist* of 1991. All articles are indexed; every species mention is included; every contributor, every COA Trophy winner, every individual mentioned is in the index.

The Index is a group effort. Winston Barney, a COA member from Texas, did the indexing, with guidance and advice from the COA Publications Board. Walter Sage did a complete check of the index entries, Lynn Scheu did proofreading, the formatting, and the input of corrections, and Richard Goldberg did the cover. We're all very proud of our Special Publication #1, and we hope you will find it as useful as we do.

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1992 COA GRANT AWARDS ANNOUNCED

COA Grants and Scholarships Director R. Tucker Abbott has announced the recipients of grant awards for the coming year. \$5,000.00 has been awarded, bringing the total of awards for the program since its inception eight years ago to \$24,060.00. COA is very proud of the help we have been able to offer to deserving scholars.

The 1992 recipients and their research are as follows:

- Ami E. Wilbur, College of Marine Studies, University of Delaware — \$500 for Studies in DNA types in the Bay Scallop.
- Katy Metzner, Grice Marine Biological Lab, Charleston, SC — \$500 for her studies in Gene flow in the hard shell clam, *Mercenaria*.
- Dr. Mark E. Gordon, Fisheries Research Unit, Tennessee Technological University — \$1,000, Survey of disappearing mollusks of the Upper Tennessee River.

DEAR EDITORS:

Every time I hear pensive, puzzled shell collectors wonder why shelling in favored areas isn't as good as it once was, I want to yell "Overcollecting!" at them.

Thank you for the "Conservation's the Word" box on page 8 of the June 1992 edition of *American Conchologist*. Please run it in every editon as a reminder to those who are spendthrifts with our ocean treasures.

Fay Washington
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Thanks, Fay, for your interest, and your stewardship of our oceans — they need all the advocates they can get! As for publishing the June box in each issue: people tend to ignore what becomes familiar; we'd really rather use the space to put old salt water into new bottles, so to speak. If any of you readers has a good idea for a fresh way to phrase a conservation message — a cartoon, a bumper sticker motto, even an essay — send it to us. We'll publish the best of them. Maybe that way we can have a conservation feature in every issue.

- Dr. Charles N. D'Asaro, Department of Biology, University of West Florida — \$1,000, Gunnar Thorson's egg capsule project.
- Professor Matthew J. James, Department of Geology, Sonoma State University — \$750, Galapagos Pleistocene mollusks.
- Ms. Sharon Kobayashi, Zoology Department, Universtiy of Hawaii — \$500, Fecundity studies in Hawaii Tree Snails, Achatinellidae.
- Dr. Jose H. Leal, Rosensteil School of Marine Sciences — \$750, Taxonomy of Brazilian Volutidae.

These recipients will be requested to submit a short, popular account of their completed research to *American Conchologist* for publication at some future date.

For information about the COA Grants and Scholarships Program, please contact Dr. R. Tucker Abbott, P.O. Box 2255, Melbourne, FL 32902.

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