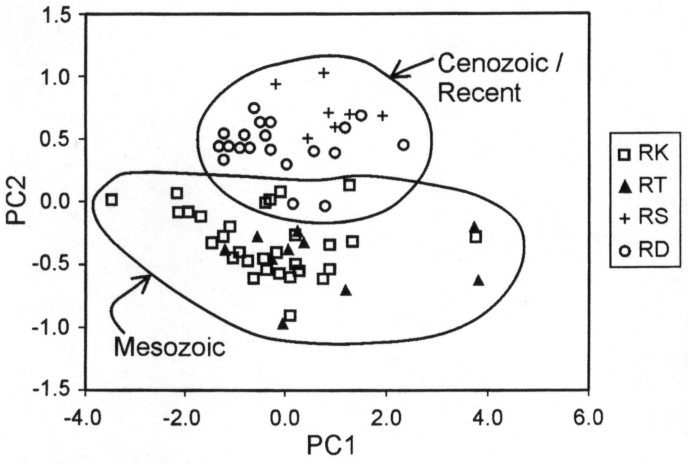

FIGURE 6—Principal component analysis using the height and diameter for four neomphalid microgastropod species, including *Retiskenea*? *kieli* n. sp. (RK), *R.*? *tuberculata* n. sp. (RT), *R. statura* (RS), and *R. diploura* (RD).

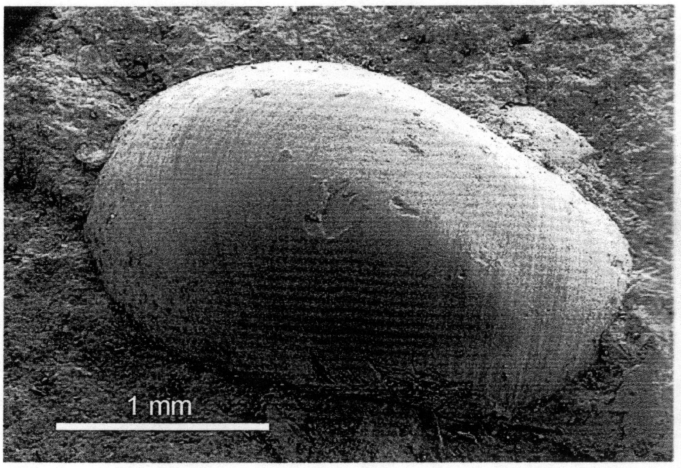

FIGURE 7—Undescribed neomphalid? (LACMIP specimen 12925) from Paskenta hydrocarbon seep-carbonate (Upper Jurassic, LACMIP locality 15917). Side view, unprepared in carbonate matrix.

the cold-seep-restricted brachiopod *Peregrinella whitneyi,* and mytilid, solemyid, lucinid and pectinid (*Pecten complexicosta* Gabb, 1869) bivalves (Gabb, 1869; Stanton, 1895; Berkland, 1973; Campbell, 1996; Campbell and Bottjer, 1995a).

Discussion.—Shell characters of this fossil species, especially the inflated, vaguely reticulate protoconch, number of shell whorls, inflated body whorl and shell sculpture, suggest inclusion within the neomphalid genus *Retiskenea. Retiskenea*? *tuberculata* has a larger mean shell diameter (3.1 mm) than the other three species of the genus (Table 2). The present species differs from *R. diploura* Warén and Bouchet, 2001 in its more compressed shell profile, more obliquely rounded aperture, and larger, granular protoconch. *Retiskenea*? *tuberculata* differs from *R. statura* (Goedert and Benham, 1999) in possessing a lower spire, a larger, granular protoconch, shallower apical angle, less globose shell profile, more deeply incised sutures, and more obliquely rounded aperture. *Retiskenea*? *tuberculata* differs from *R.*? *kieli* n. sp. in possessing a larger, tuberculate protoconch, beaded early teleoconch, slightly more circular aperture, and stronger growth lines.

NEOMPHALIDAE? sp. INDET.
Figure 7

Discussion.—A single individual fossil microgastropod (LACMIP specimen 12925) is broadly similar to the two new Mesozoic *Retiskenea*? species described herein. The specimen was recovered from the Paskenta hydrocarbon seep-carbonate (~1.85 mm high, ~2.57 mm wide; Figs. 4, 7). The white limestone lens is enclosed in Upper Jurassic (Tithonian, ~148 m.y.), Great Valley slope-turbidites of the Stony Creek Formation, adjacent to the synsedimentary Paskenta Fault (Fig. 2.2, LACMIP locality 15917, = "Keyserling's Gate"—cf. Stanton, 1895; Jones et al., 1969; Ingersoll, 1983; Moxon, 1990; Campbell et al., 1993, 2002). It is associated with Tithonian *Buchia piochii* (Gabb, 1869). The compressed globose shape, size, whorl proportions, flaring aperture, and fine growth lines suggest the specimen may be a neomphalid related to *Retiskenea.* The specimen was not prepared further because additional material has not yet been uncovered from the rock matrix of the Paskenta deposit, and the site is currently not accessible.

Occurrence.—The site is located 4.8 km northwest of Paskenta along Thomes Camp Road, on a knoll between the road and Digger Creek, southeast quarter of sec. 25, T24N, R7W, U.S. Geological Survey 7.5-minute Paskenta Quadrangle (USGS 1967), Tehama County, California.

Associated fauna.—Stanton (1895) made the first invertebrate fossil collection from the Paskenta locality (USNM 23205, 23245, 23051). Additional material acquired during Campbell's (1995) dissertation study resides in LACMIP collections (localities 15912–15928). The associated fauna enclosed in micrites includes thin worm tubes, solemyid, lucinid, nuculid, mytilid, inoceramid and astartiid bivalves, belemnites, as well as the cold-seep-affiliated brachiopod, *Cooperrhynchia schucherti* Sandy and Campbell, 1994, and several gastropods (cf. Stanton, 1895; Sandy and Campbell, 1994). Age-diagnostic taxa include ammonites. *Phyloceras*? *knoxvillensis* Stanton, 1895 and *Paradontoceras*? *storrsi* (Stanton, 1895), and the bivalves, *Buchia piochii* (Gabb, 1864) and *B. fisheriana* (d'Orbigny, 1845) (W. P. Elder, personal commun., 1992).

COMPARATIVE SIZE DATA AMONG *RETISKENEA* SPECIES

Correlation analyses of shell height and diameter data resulted in significant linear relationships for all four species attributed to *Retiskenea* and *Retiskenea*? (Fig. 4, Table 2), hence showing general isometric growth in the modern and fossil populations sampled. The height-to-diameter ratios for *R. statura* and *R. diploura* display a similar 1:1 relationship as compared to *R.*? *kieli* and *R.*? *tuberculata,* which both have a lower ratio of 0.7 ± 0.0 (Table 2). Thus, the Mesozoic microgastropods are more compressed than the Cenozoic and modern species. A principal component analysis, using the height and diameter size data for the two *Retiskenea* and two *Retiskenea*? species, resulted in a good separation between Mesozoic and the Cenozoic/Recent groups (Fig. 6). However, based on height and diameter data alone, the two Mesozoic species cannot be separated from one another, nor can the two Cenozoic/Recent species be differentiated. In the principal component analysis, the height and diameter loadings for the first component were both 0.937, and for the second component they were 0.35 and −0.35, respectively. The first component explained 87.8% of the variation while the second component explained the remaining 12.2%. In summary, the two Cretaceous *Retiskenea*? species, and the single Upper Jurassic neomphalid? microgastropod specimen, are clearly more similar to one another in these shell dimensions (Figs. 4, 6). The younger species also are similar to one another, but statistically discrete from the microgastropods of the Mesozoic localities. It is unknown why the neomphalid microgastropods from the two Eras cluster in two distinctive groupings (cf. Fig. 6).

PALEOECOLOGY AND PRESERVATION OF MESOZOIC *RETISKENEA*? FROM NORTHERN CALIFORNIA

At the northern California localities studied, *Retiskenea*? microgastropods occur in microbialites. These carbonates are typified by a "structure grumeleuse" fabric of micritic clots with indistinct margins, surrounded by more coarsely crystalline, translucent cement spar (cf. Bathurst, 1975; MacIntyre, 1985; Fig. 8.1–8.4). Similar clotted micrite fabrics are common in ancient seep-carbonates worldwide, and have been inferred as microbial in