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A LATE MIOCENE RECORD OF
LEPAS LINNAEUS (CIRRIPEDIA, LEPADIDAE)
FROM SOUTHERN CALIFORNIA

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CONTRIBUTIONS IN SCIENCE



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A LATE MIOCENE RECORD OF *LEPAS* LINNAEUS (CIRRIPEDIA, LEPADIDAE) FROM SOUTHERN CALIFORNIA¹

By VICTOR A. ZULLO²

ABSTRACT: Scuta of one species, and scuta and carinae of a second species of *Lepas* Linnaeus (Cirripedia, Lepadidae) are locally abundant in late Miocene fish-bearing diatomaceous shales of the Yorba Member, Puente Formation in Los Angeles County, California. These fossils, preserved primarily as impressions on bedding planes, constitute the second recorded fossil occurrence of Lepadomorph ('goose') barnacles from the eastern margins of the Pacific basin. The majority of scuta are similar to those of the extant species *L. (Dosima) fascicularis* Spengler, but are regarded as a new species, *L. (D.) latiscutis*. The remainder, with associated carinae, resemble those of the extant species *L. (Lepas) anserifera* Linnaeus. The previous record, from the late Pliocene San Diego Formation in southern California, was of a single scutum similar to that of the extant species *L. (L.) pectinata* Spengler.

INTRODUCTION

Although balanomorph ('acorn') barnacles are common in rocks of Cenozoic age on the Pacific coast of North America, lepadomorphs ('goose' barnacles) are rarely encountered. The single previous record (Zullo, 1969:4) was of a solitary scutum resembling that of the extant cosmopolitan species *Lepas (Lepas) pectinata* Spengler from the late Pliocene San Diego Formation, southern California. The material described herein adds a pre-Pliocene record for two species to the southern California Cenozoic fauna.

The family Lepadidae has a meager fossil record that is limited to remains assigned to the genus *Lepas*. Extant members of the genus, comprising seven species and two varieties in three subgenera, are pelagic, and several are virtually cosmopolitan in their distribution. Most species attach to floating objects such as seaweed and drifting wood, but *L. fascicularis* Spengler can construct its own float by enlargement of its stalk after initially attaching to floating materials. The scarcity of fossil lepads is attributable to their pelagic habit and to the fragility of their preservable hard parts. Withers (1953) in his monographic study of Tertiary cirripeds recognized the following extinct species, ranging in age from middle Eocene to Pliocene:

Lepas (Lepas) stenzeli Withers (1953), middle Eocene, Weches Formation, Claiborne Group, Texas.

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- L. (L.) reflexa* Withers (1953), upper Eocene (Bartonian), Lower Barton Beds, England.
- L. (L.) aquitanica* Fischer (1886), lower Miocene (Aquitanian-Burdigalian), France.
- L. (L.) orbignyi* Fischer (1886), lower Miocene (Burdigalian), France.
- L. (L.) harringtoni* Laws (1948), lower Miocene (Altonian), Southland Series, New Zealand.
- L. (L.) pritchardi* Hall (1902), lower Miocene (Janjukian), Australia.
- L. (L.) mallandriniana* Seguenza (1876), upper Miocene (Tortonian), Messina, Sicily.
- L. (Dosima) rovasendai* De Alessandri (1895), lower and middle Miocene (Aquitanian—Helvetian), northern Italy.
- L. (D.) delicatula* Withers (1953), Pliocene (Plaisancian), Coralline Crag, England.

Identification of extant specimens based solely on capitular plate (i.e., shell) morphology can be difficult. Shape, ornamentation and structure vary markedly from individual to individual, and in many cases ultimate identification rests on characteristics of the soft body. Many of the above-named fossil species are based on single plate types, and only two are known from terga, scuta and carinae. Given the variation in plate morphology and the widespread occurrence of extant species, it is quite likely that our knowledge of diversity within *Lepas* during the Cenozoic is less than that suggested by the list of nominate species presented above.

Among the new California Miocene specimens, the subgenus *Lepas* is represented by numerous scuta and two carinae that are not sufficiently diagnostic to identify with or distinguish from known species. The subgenus *Dosima* Gray is represented by numerous scuta and a fragmentary impression of what might be a tergum. Scuta have been described for only two of the three known species of *Dosima*, and the new specimens are readily distinguished from these. The late Pliocene species *L. delicatula* is known only from two incomplete carinae. However, the shape and thickness of these carinae appear to preclude their association with the type of scutum represented in the California Miocene. This conclusion, supported by the disparity in ages of the two occurrences, has prompted my decision to regard the California *Dosima* as a distinct species.

LOCALITY

The new specimens are from diatomaceous shale of the Yorba member of the Puente Formation. The locality (no. 1209, Natural History Museum of Los Angeles County, Invertebrate Paleontology collection) is at longitude 117° 54' 41" W, latitude 33° 59' 28" N, ½ mi west of the intersection of Los Palacios and Fullerton roads, Rowland Heights, City of Industry, USGS, La Habra 7.5 min topographic quadrangle, 1950 edition, Los Angeles County, California.

AGE AND PALEOECOLOGY

The Rowland Heights locality, notable for abundant marine fish remains, has yielded few invertebrate megafossils. Age determination, based upon corre-

lation with Foraminifera-bearing rocks at similar stratigraphic levels in the eastern Puente Hills indicates a late Mohnian (late Miocene) age (Durham and Yerkes, 1964). Preservation of the fragile and readily scattered plates of *Lepas* appears to have been facilitated by unusual depositional circumstances suggested by the fossils and sediments of the Yorba Member.

The abundance of pelagic remains, the scarcity of benthic invertebrates, the excellent preservation exhibited by the fish, and the kinds of foraminifers and fish present suggest a low energy, low productivity environment at bathyal depths. Presumably the lepads, floating in surface waters, sank to the bottom where they remained in a relatively undisturbed state until burial.

SYSTEMATICS

Suborder Lepadomorpha Pilsbry, 1916

Family Lepadidae Darwin, 1851

Genus *Lepas* Linnaeus, 1758

Subgenus *Dosima* Gray, 1825

Lepas (Dosima) latiscutis, new species

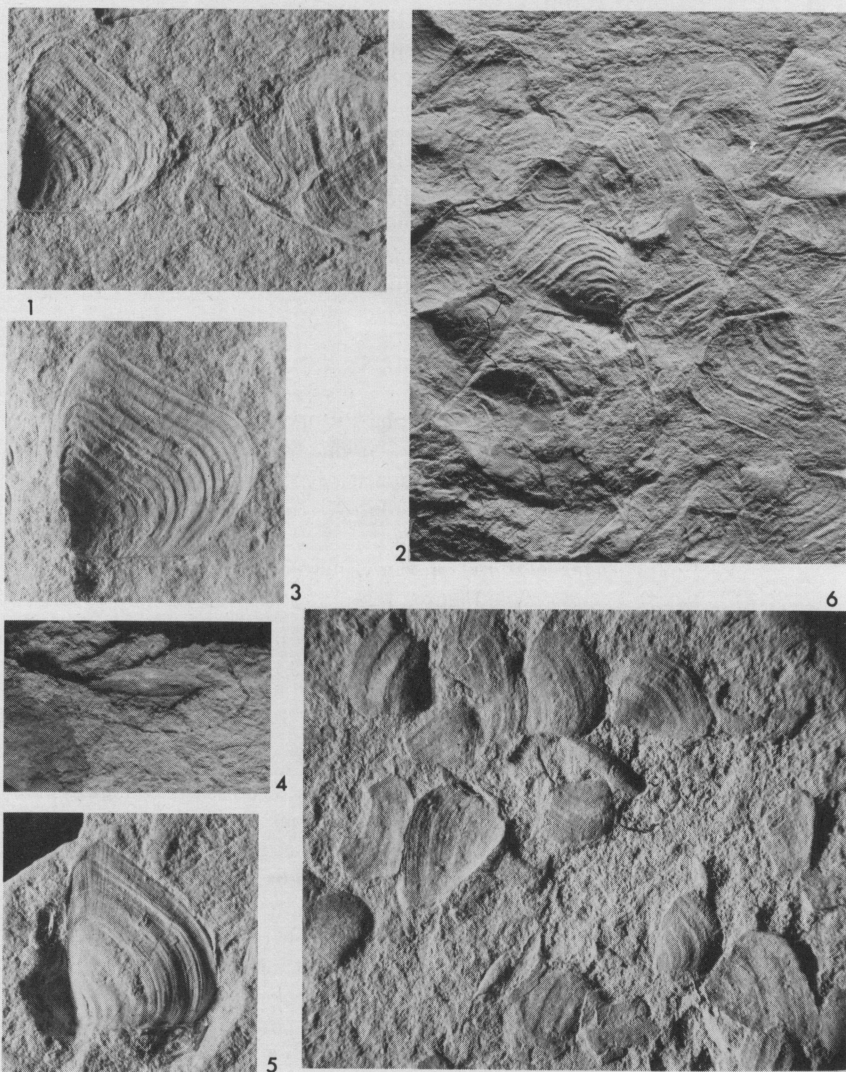
Figures 1-3

Diagnosis. Scutum subquadrate, broader than tall, with fine radial striae, and lacking both an apico-umbonal ridge and growth below the short, straight basal ridge.

Description. Scutum thin, papery, subquadrate in shape, usually broader than high; occludent margin nearly straight at base, becoming broadly convex towards rounded apex; tergo-lateral margin produced, straight to slightly concave in upper half, broadly convex in lower half; basal margin short, straight, thickened and inflexed; apico-umbonal ridge lacking; growth ridges broad and prominent, crossed by distinct but not prominent radial striae.

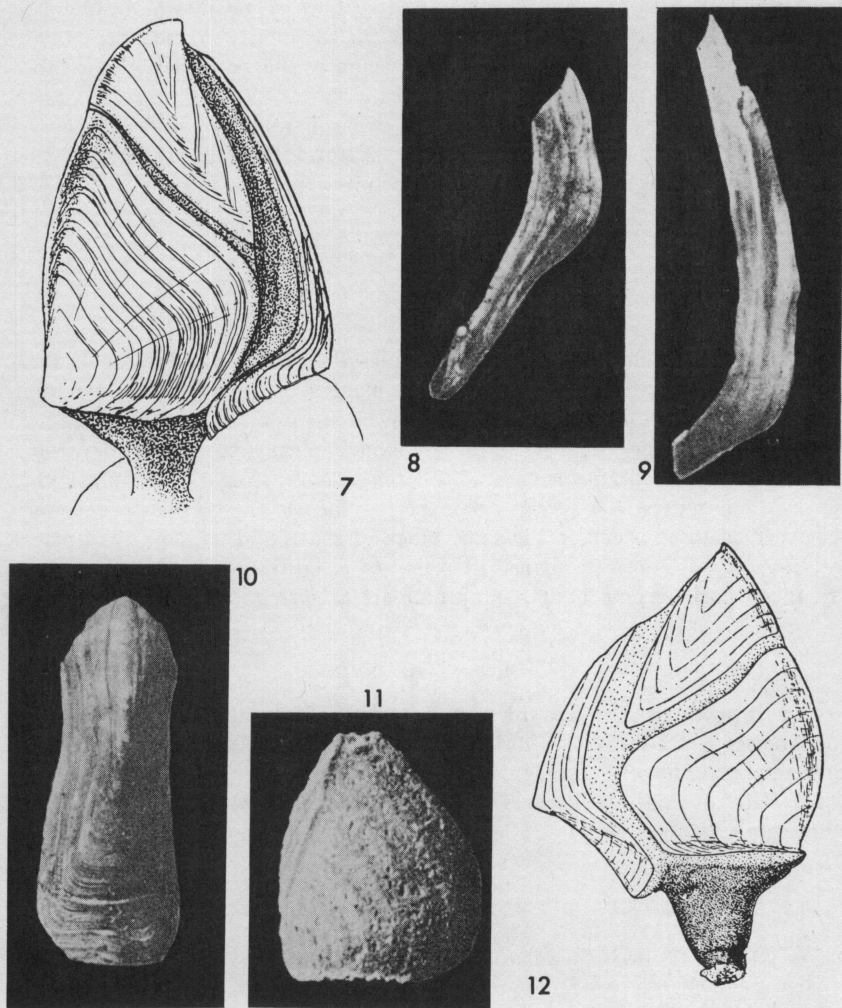
Remarks. The specimens available consist of a dense aggregation of scuta. Most of these are preserved as impressions, but a few retain original shell material. No carinae, and only a fragment of what might be a tergum were observed (Fig. 1). The density of aggregation and the selectivity in plate types preserved suggests post depositional concentration, possibly coupled with selective winnowing of the smaller plates during settlement through the water column.

The scutum of *L. latiscutis* differs from that of *L. fascicularis* Spengler (Figs. 7, 12) in its broader proportions, its blunt apex, its straight basal margin, the development of external radial striation, and the lack of growth below the basal ridge. The scutum of the Miocene species *L. rovasendai* (Fig. 11) is higher than wide, with indistinct growth ridges, an angular apex, and a distinct apico-umbonal ridge. The carina of the late Pliocene species *L. delicatula* (Figs. 8-10) is not readily associated with the type of scutum exhibited by *L. latiscutis*. As the carina of *L. delicatula* is less angulate than that of *L. fascicularis*, and as the lower part of the tergo-lateral margin of the scutum tends to parallel the lower margin of the carina, then the tergo-lateral margin of the scutum of *L. delicatula* should be less angulate and its lower half should more nearly parallel the occludent margin. The tergo-lateral margin of the scutum of *L. latiscutis* is similar in



FIGURES 1-3. *Lepas (Dosima) latiscutis*, new species. (1) scutum and partial impression of a plate suggestive of a tergum, *t*, height of scutum, 15 mm; (2) scuta on bedding plane of diatomaceous shale, width of block in photograph, 55 mm; (3) scutum, holotype, length of basal margin, 11 mm.

FIGURES 4-6. *Lepas (Lepas)* sp.. (4) partial carina, length 8 mm; (5) scutum?, height, 14 mm; (6) scuta and partial carina, *c*, length of carina, 9 mm.



FIGURES 7, 12. *Lepas fascicularis* Spengler, showing extreme variations in plate shape. (7) 'typical' form, from Pilsbry, 1907, U.S. Nat. Mus. Bull. 60, pl. 9, fig. 6, capitular height, 20 mm; (12) rarer broad form, from Broch, 1959, Conseil Intern. Explor. de la Mer, Zooplankton 83, fig. 5a, capitular height, 33 mm.

FIGURES 8-10. *Lepas delicatula* Withers, from Withers (1953:pl. 58, figs. 13-14). (8) basal part of carina, greatest length, 6.8 mm; (9) apical part of carina (incomplete), greatest length, 8.8 mm; (10) outer view of basal part of carina shown in fig. 8.

FIGURE 11. *Lepas rovasendai* De Alessandri, from Withers (1953, pl. 58, fig. 4a), height, 4.5 mm.

shape to that of *L. fascicularis*, suggesting that its carina was more angulate than that known for *L. delicatula*. Also, the carinae of *L. delicatula* are heavily calcified, and it is unlikely that associated scuta would be as delicate as those representing *L. latiscutis*.

Type disposition. The type and only known lot from the Yorba Member of the Puente Formation is deposited in the Natural History Museum of Los Angeles County, Invertebrate Paleontology collection.

Subgenus *LEPAS* Linnaeus, 1758

Lepas (Lepas) sp.

Figures 4-6

Description. Scutum subtriangular, taller than broad; umbo basal, apex acute, basal margin straight; exterior ornamented by growth lines and faint radial striae; apico-umbonal ridge indistinct, close to occludent margin. Carina short, convex, broadest in lower third, attenuated apically; basal part unknown.

Remarks. The specimens referred to *Lepas (Lepas)* sp. are poorly preserved, but definitely represent a species other than *L. latiscutis*. The two species were not observed to co-occur on the same block of shale, and the density of plates of *Lepas* sp. was considerably less than that of *L. latiscutis*. Among extant species, these specimens most closely approximate *L. anserifera* Linnaeus.

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