

KIRBY and SAUL, Roudairia, Veniella

Mountain specimens to *Cicatrea* is unclear, they are in shape, sculpture, internal myophoric flange, and hinge most similar to *Roudairia*. *Roudairia squiresi* is the first species of this group to be found in North America.

Roudairia sauiresi sp. nov.

Plate 1, figures 1–7; Plate 2, figure 1

1991 Roudairia peruviana? Olsson, 1934; Kirby, p. 133, pl. 3, figs 6, 7.

Derivation of name. The species is named for Richard L. Squires whose work on Eocene molluscs of the eastern Pacific has greatly improved our understanding of Tethyan migrations into California.

Holotype. LACMIP 12204; San Francisquito Formation (uppermost Maastrichtian); LACMIP locality 14312, Warm Springs Mountain, Los Angeles County, southern California, USA.

Paratypes. Five specimens: LACMIP 12205–12206 from LACMIP locality 14312; LACMIP 12207–12208 from UCLA locality 1591; LACMIP 12209 from LACMIP locality 14316; all from San Francisquito Formation (uppermost Maastrichtian); Warm Springs Mountain, Los Angeles County, southern California, USA.

Diagnosis. A large *Roudairia* of nearly equant proportions, but with the beaks curled well forward, sculptured near the beaks by ten to fourteen undulatory commarginal ribs that evanesce ventrally, with a strong posterior carina along the posterior angulation. Cardinals 3b and 2b relatively narrow and posteriorly directed (Text-fig. 5).

Description. Shell large, higher than long, subquadrate, inflated, thick; beaks strongly enrolled, strongly prosogyrous; lunular margin nearly straight; anterior end broadly rounded; ventral border nearly straight with a slight sulcus to the anterior of the posterior carination and a little rostrate at the carination; posterior border nearly straight, rounding into dorsal border; lunule large, depressed, bounded by an inscribed line; no escutcheon; posterior carination high, alate near the beaks, abruptly carinate at the ventral border; paralleled anteriorly by a shallow sulcus. External sculpture of about ten to fourteen strong, broad, undulatory, commarginal ribs on beak, diminishing in height ventrally, extending from anterior slope break to sulcus anterior to carina. Entire surface marked by uneven commarginal growth lines.

Ligament groove deep, arched behind strong alate nymphs. Hinge of right valve with short, strong 1 at the hinge border anterior to 3a (Text-fig. 5); short, ventrally directed 3a; strong, bifid, posteriorly directed 3b; anterior laterals AI and AIII low; AI short subtrigonal; AIII elongate, paralleling the valve margin; socket for AII chevron-shaped; PI and PIII elongate with PI longer; PIII paralleling the valve margin; socket for PII deep. Hinge of left valve with 2b elongate, narrowly trigonal, obscurely bifid, posteroventrally directed; 4b elongate, thin, posteriorly directed, dorsal to bifid socket for 3b; anterior lateral AII chevron-shaped around shallow socket for AI, anterior to very deep socket for 1; PII elongate, strong, with transverse striations on both sides. Adductor muscle scars strongly marked, anterior impressed and bounded by raised rim, posterior impressed and bounded along anterior side by a strongly raised myophoric flange beginning near the beak and extending to ventral edge of muscle scar.

Measurements. LACMIP 12204 height 70.0 mm, length 70.0 mm, inflation 35.0 mm; LACMIP 12205 height 69.0 mm, length 66.5 mm incomplete, inflation 29.6 mm.

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Remarks. Roudairia squiresi is similar to *Roudairia peruviana* Olsson, 1934, and to *Roudairia jamaicensis* Trechmann, 1927. These *Roudairia* are large and very trigoniiform, have strong, undulatory, commarginal sculpture on the flanks near the beaks that evanesce well before the ventral margin, have a strong posterior carina along the posterior angulation, and have an inscribed lunule. Internally, they have a strong myophoric flange bordering the anterior side of the posterior adductor muscle scar. The anterior left lateral AII is strongly hooked and forms a chevron, the right anterior lateral AI is present, and the socket for AII is chevron-shaped (Text-fig. 5).

Roudairia squiresi differs from R. peruviana (Pl. 2, figs 5–8) from the Maastrichtian of Peru in being less upright, having the beaks curled more forward, having a shallower sulcus anterior to the carina, and having commarginal ribs that are greater in number, narrower, and closer together. Roudairia squiresi contrasts with R. jamaicensis from the Campanian of Jamaica in being less elongate and having coarser and more pronounced commarginal ribbing. Trechmann figured a mature left valve and an immature right valve of R. jamaicensis (1927, pl. 2, figs 1–2). The immature right valve is more elongate than similar sized specimens of R. squiresi and has finer and less pronounced ribbing. Although Trechmann's figure (1927, pl. 2, fig. 1) of a mature left valve appears to be relatively higher, his measurements indicate that mature specimens are also more elongate than high, whereas in R. squiresi, height and length are more nearly equal.

Veniella conradi (Morton 1833) is less trigoniiform. It has distant, flanged commarginal sculpture and a strong posterior angulation that does not bear a raised carina like that of *R. squiresi*. Veniella conradi lacks the internal posterior myophore, its lunule is not inscribed, anterior lateral AII is elongate, trigonal, and the right anterior lateral AI is not present (Pl. 2, figs 2–4).

Vokes (1954, text-figs 6–9) illustrated the changes in the left cardinal 2b of V. conradi from juvenile inverted V-shaped to compressed trigonal, obscurely bifid adult. The obscurely bifid character of 2b in R. squiresi suggests that it too results from the compression of a widely bifid, inverted V-shaped, juvenile tooth.

The ligament of *R. squiresi* is enlarged below the beak similar to many large venerids (e.g. *Dosinia ponderosa* (Gray 1838)). A similar subumbonal ligamental pit may be the structure that caused Stoliczka (1870) to describe the ligament of *Cyprina* (*Cicatrea*) cordialis as lying in a double groove. In *R. squiresi*, this elongate pit encroaches on the anterior end of the nymph, notching it just behind the beak, and creating exteriorly a pattern of shell and notches similar to that seen in Stoliczka's figure 1b (1870, pl. 10).

Only a few specimens of *R. squiresi* have been found, including eight nearly complete large valves from Warm Springs Mountain. A fragment of a left valve from UCLA locality 6525 on Dip Creek, San Luis Obispo County, central California, consists only of the anterior part of the hinge, the lunule, and a suggestion of undulatory commarginal ribbing. The fragment is too incomplete to identify with certainty, but is probably *R. squiresi*.

Stratigraphical range. Uppermost Maastrichtian.

Geographical distribution. Warm Springs Mountain, Los Angeles County, and Dip Creek, south shore of Lake Nacimiento, San Luis Obispo County, central California, USA.

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APPENDIX

Cited fossil localities

- 1591UCLA: north-flowing tributary to Warm Springs Canyon; approximately 2.4 km west of Warm Springs Camp; approximately 1372 m north and 671 m west of Warm Springs Mountain; Warm Springs Mountain quadrangle, 1958, Los Angeles County, California. Collected by: R. W. Webb, G. Young, and E. H. Quayle, 6/17/1941. San Francisquito Formation, uppermost Maastrichtian.
- 5261UCLA: '*Baculites* beds' north of Tortuga, Paita Peninsula, northwestern Peru. Collected by: A. G. Fischer. Maastrichtian.
- 6525UCLA: south-side of Lake Nacimiento; poorly-sorted conglomeratic sandstone cropping out at narrows of Dip Creek; fossils collected from outcrops on east-side of Dip Creek; about elevation 232 m; 427 m south and 61 m west of the northeastern corner, Section 30, Township 25 South, Range 10 East, Lime Mountain quadrangle, 1948, San Luis Obispo County, California. Collected by: R. B. Saul and L. R. Saul, 12/31/1977. Undifferentiated Cretaceous rocks, uppermost Maastrichtian.
- 8063LACMIP: (= CIT 703) Dave Week's place, on Coon Creek; 5.6 km south of Enville; 12.1 km north of Adamsville, McNairy County, Tennessee. Collected by: W. P. Popenoe, 1929. Ripley Formation, Maastrichtian.
- 14312LACMIP: (=CSUN 1447 O) fine-grained feldspathic sandstone 45 m above nonconformity between granite-gneiss basement and overlying San Francisquito Formation; elevation 1015 m; 442 m north and 152 m west of forest lookout tower on summit of Warm Springs Mountain; Warm Springs Mountain quadrangle, 1958, Los Angeles County, California. Collected by: M. X. Kirby, 2/2/1990. San Francisquito Formation, uppermost Maastrichtian.

14316LACMIP: (= CSUN 1145) feldspathic sandstone; elevation 1061 m; 396 m north and 335 m east of forest lookout tower on summit of Warm Springs Mountain; Warm Springs Mountain quadrangle, 1958, Los Angeles County, California. Collected by: S. Connell and R. L. Squires, 1988. San Francisquito Formation, uppermost Maastrichtian.

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