

TABLE 2.—Measurements (in mm) and ratios of *Propeamussium (Parvamussium) robinsonense* n. sp. Spec = LACMIP specimen number, Val = valve, L = left valve, R = right valve, PR = primary internal rib count, SR = secondary internal rib count. See Figure 2 for other abbreviations.

Spec	Val	HI	H	W	A	A'	RH	PR	SR	H/W	RH/H	AD	AW	PD	PW	Locality
7209	L	4.1	10.6	10.4	100	3	7.7	9*	0*	1.02	73%	4.4	4.7	6.2	5.7	CSUF 68
7210	L	—	—	—	—	—	—	8	2	—	—	—	—	—	—	CSUF 68
7211	L	—	—	—	—	—	—	12*	0*	—	—	—	—	—	—	CSUF 68
7209	R	3.9	7.9	7.6	110	—	7.1	9	0*	1.04	90%	3.5	3.9	4.5	3.7	CSUF 68
7222	R	8.4	19.9	18.6	111	24	19.2	11*	0*	1.11	96%	12.2	9.8	7.1	10.1	UCLA 7074

* All internal ribs may not be visible.

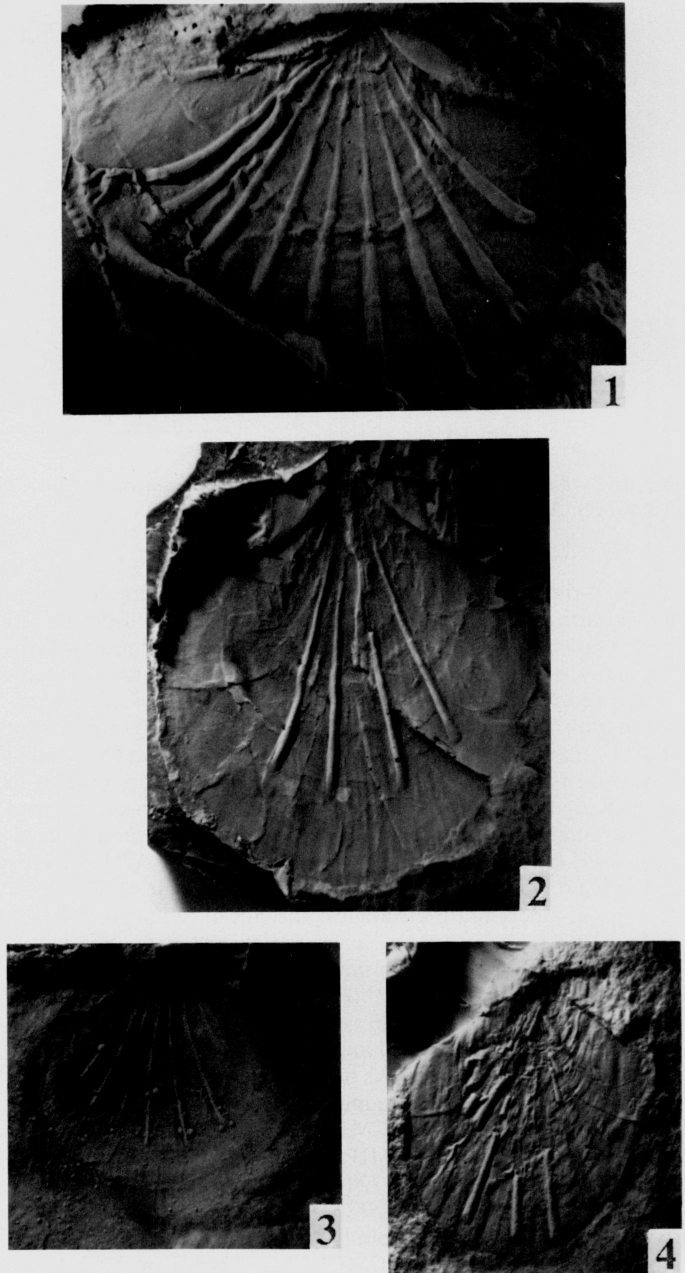


FIGURE 8—*Propeamussium (Parvamussium) cowperi* (Waring) from the Simi Hills. All specimens coated with magnesium ribbon smoke. 1, latex cast of paralectotype (CAS 61644.01), right valve interior, auricles broken and ventral margin missing, $\times 2.9$; 2, latex cast of lectotype (CAS 61644.02), left valve interior, $\times 2.9$; 3, latex cast of paralectotype (CAS 61644.04), left valve interior, auricles broken, $\times 3.3$; 4, latex cast of paralectotype (CAS 61644.03), right valve interior with anterior auricle broken, $\times 2.9$.

kattoi (Tashiro and Matsuda, 1986) differs from *P. (P.) robinsonense* in having coarser concentric costae on right valve, 8–9 internal ribs, straight hinge line, small umbonal angle (85°), and coarser radial costae on left valve.

Etymology.—The species is named after its type locality at Robinson Ranch.

Material.—Holotype, LACMIP 7222, right valve from UCLA loc. 7074; paratypes, LACMIP 7209–7211 from CSUF loc. 68.

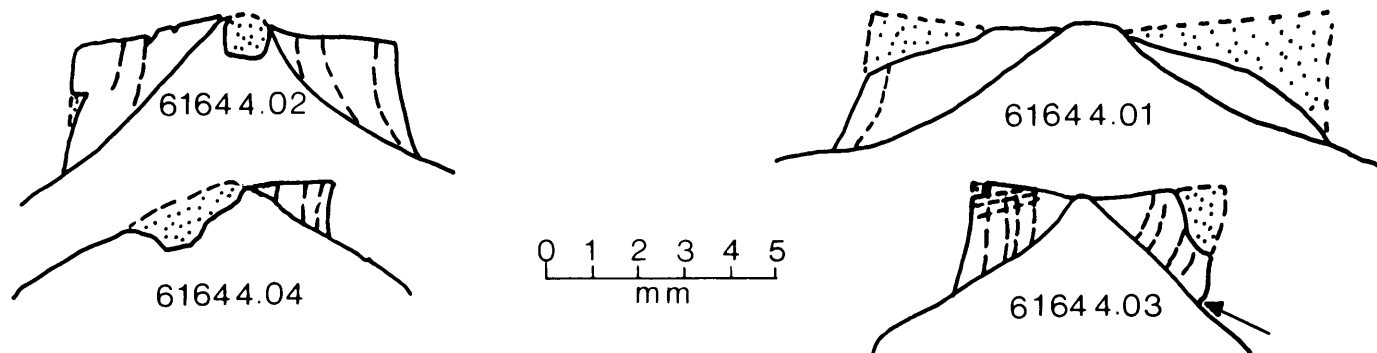


FIGURE 9—Auricles of right and left valves of *Propeamussium (Parvamussium) cowperi* (Waring). Numbers in umbo region are CAS type numbers. Arrow points to slight byssal notch.

Age.—Late medial Santonian, *Bostrychoceras elongatum* Biozone.

Occurrence.—Holz Shale Member of the Ladd Formation at the Robinson Ranch, Plano Trabuco (UCLA loc. 7074); Silverado Canyon (CSUF loc. 68), Santa Ana Mountains, Orange County, California.

PROPEAMUSSIUM (PARVAMUSSIUM) COWPERI Waring, 1917
Figures 8, 9

Pecten (Propeamussium) cowperi WARING, 1917, p. 63–64, Pl. 7, figs. 1, 2.

Diagnosis.—*Propeamussium (Parvamussium)* with subcircular valve outline; very slight byssal notch; 0–3 radial costellae on right posterior auricle; nine primary internal ribs on right valve and 4–8 primary internal ribs on left valve; no secondary internal ribs; dorsal lateral margin of right valve auricles projecting above umbo.

Description.—Valves subcircular in outline, approximately as wide as high (height/width = 1.06); auricles relatively large, equal; average umbonal angle 125°; average maximum internal rib height 80 percent of shell height; secondary internal ribs absent.

Exterior of right valves covered with several fine submarginal lirae of moderate relief that do not extend to lateral margins; ventral margin fragile beyond distal ends of internal ribs; posterior auricles with fine growth lines, 0–3 faint radial costellae, and 90° to obtuse auricle angles; anterior auricle with fine growth lines, very slight byssal notches, acute to 90° auricle angles; dorsal lateral margin of auricles projecting above umbo; interior of right valve with nine primary ribs; lateral internal ribs slightly curved or straight; internal ribs not swollen at termination.

Exterior of left valves covered with several fine radial costae; radial costae variable in height; growth lines not preserved; exterior surface of auricles not preserved; posterior auricle with 90° auricle angles; anterior auricle with slightly obtuse auricle angles; interior of left valve with 4–8 primary ribs; lateral internal ribs straight or slightly curved, internal ribs not swollen at termination.

Measurements.—See Table 3.

Discussion.—Waring (1917) named *Propeamussium (Parvamussium) cowperi* without establishing a type specimen. The original? label that indicated “type spec.” was housed with specimens CAS 61644.01 and CAS 61644.02, which are the two figured specimens of Waring (M. G. Kellogg, personal commun.). Stanford University cataloged these specimens as syntypes and an additional specimen (CAS 61644.03) as a topotype, which CAS later catalogued as a paratype. Specimens CAS

61644.04 and CAS 61644.05 (counterpart of CAS 61644.01) are plaster casts; the location of the original specimens is unknown. Although the author prefers to designate right valves as holotypes, the fragmentary nature of Waring’s figured right valve (CAS 61644.01; Pl. 7, fig. 2) makes a poor candidate for a lectotype. The left valve figured by Waring (1917, Pl. 7, fig. 1; CAS 61644.02) is more complete and is designated here as the lectotype. The specimens CAS 61644.01 and CAS 61644.03 are designated as paralectotypes.

Propeamussium (Parvamussium) cowperi is known from four specimens. Two of these specimens are probably deformed. Specimen CAS 61644.01 and counterpart CAS 61644.05 have expansion cracks and may be flattened, and specimen CAS 61644.03 has structural lineations and may be tectonically elongated. As a result, the measured variables for these specimens are probably unreliable (although ratios of distances taken in the same axis are probably reliable (i.e., RH/H)), and valve outline of the species cannot be determined. In addition, some morphological features are not preserved or poorly preserved on the specimens, thus preventing a complete description of the species.

Propeamussium (Parvamussium) robinsonense differs from *P. (P.) cowperi* in having 9–12 internal ribs on the left and right valves, an average maximum internal rib height 66 percent of the left valve height, radial costellae on the anterior auricle of the right valve, and terminal swellings on the internal ribs. *Propeamussium (Parvamussium) yubareense* (Yabe and Nagao, 1928) differs from *P. (P.) cowperi* in having faint radial costae on the right valve, a pronounced byssal notch in some specimens (Tamura, 1976, Pl. 1, figs. 10, 11; probably a new species), and unequal auricles (Yabe and Nagao, 1928; Tashiro, 1976). *Propeamussium (Parvamussium?) awajense* Ichikawa and Maeda (1958) differs from *P. (P.) cowperi* in having coarse submarginal lirae and fine radial costae on the left valve (if Ichikawa and Maeda are correct in identifying the valves as left valves, no right valves are known), straight hinge line, and a smaller umbonal angle (90°). *Propeamussium (Parvamussium) kimurai* (Hayami, 1965) differs from *P. (P.) cowperi* in having unequal auricles, smaller umbonal angle (100°), different auricle angles on right valve, radial costellae on left valve auricles, and coarser radial costae on left valve. *Propeamussium (Parvamussium?) kattoi* (Tashiro and Matsuda, 1986) differs from *P. (P.) cowperi* in having coarser concentric costae on right valve, straight hinge line, small umbonal angle (85°), and coarser radial costae on left valve.

Material.—Lectotype, herein designated, CAS 61644.02, left valve from CAS loc. 61644; paralectotypes, CAS 61644.01 (counter part = CAS 61644.05) and 61644.03 from CAS loc.

TABLE 3.—Measurements (in mm) and ratios of *Propeamussium (Parvamussium) covperi* Waring. Spec = CAS specimen number, Val = valve, L = left valve, R = right valve, PR = primary internal rib count, SR = secondary internal rib count. See Figure 2 for other abbreviations.

Spec	Val	HI	H	W	A	A'	RH	PR	SR	H/W	RH/H	AD	AW	PD	PW	Locality
61644.02	L	7.1	18.7	16.7	110	8	14.5	4	0	1.19	78%	7.8	6.7	10.0	10.4	CAS 61644
61644.04	L	—	9.1	9.8	131	25	7.3	8	0	0.93	80%	5.3	4.6	4.6	4.4	CAS 61644
61644.01	R	9.8	18.1	24.6	143	—	17.2	9	0	0.76	95%	5.8	12.4	7.5	11.9	CAS 61644
61644.03	R	5.4	12.8	11.0	115	10	12.2	9	0	1.16	95%	7.7	6.1	4.8	5.2	CAS 61644

61644; other specimens (plaster casts), CAS 61644.04 and 61644.05 from CAS loc. 61644.

Age.—Late medial Campanian.

Occurrence.—Lower Chatsworth Formation, Bell Canyon (CAS loc. 61644), Simi Hills, Ventura County, California.

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APPENDIX

LOCALITIES

- 68 CSUF, Silverado Canyon, El Toro 7.5' quadrangle (1949), Santa Ana Mountains, Orange County, California. Dark to medium-gray mudstone at southwestward bend in Silverado Creek south of the Holz Ranch (=loc. 8 of Sundberg, 1980), elevation 354 m, NE $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$, sec. 7, T5S, R7W SBBM. Holz Shale, Ladd Formation. Santonian, *Bostrychoceras elongatum* Biozone.
- 61644 CAS, Bell Canyon, Calabasas 7.5' quadrangle (1957), Simi Hills, Ventura County, California. Medium-gray mudstone in lower portion of Bell Canyon, T2N, R17W SBBM. Exact location unknown. Chatsworth Formation. Late medial Campanian (Colburn et al., 1981; Saul and Anderson 1981).
- 8087 LACMIP, Silverado Canyon, El Toro 7.5' quadrangle (1949), Santa Ana Mountains, Orange County, California. From moderately well indurated, sandy mudstone float blocks from Silverado Creek near CSUF loc. 68 and downstream. Holz Shale, Ladd Formation. Santonian, *Bostrychoceras elongatum* Biozone.
- *7057 UCLA, Plano Trabuco, Santiago Peak 7.5' quadrangle (1954), Santa Ana Mountains, Orange County, California. Medium to light-brown to grayish-brown mudstone with minor siltstone, sandstone, and limestone beds in the south side of "Y" in northeast trending canyon on east fork, south-southeast of UCLA loc. 7059, NW $\frac{1}{4}$, SW $\frac{1}{4}$, NW $\frac{1}{4}$, NE $\frac{1}{4}$, sec. 13, T6S, R7W SBBM. Holz Shale, Ladd Formation. Santonian, *Bostrychoceras elongatum* Biozone.
- *7058 UCLA, Plano Trabuco, Santiago Peak 7.5' quadrangle (1954), Santa Ana Mountains, Orange County, California. Medium to light-brown to grayish-brown mudstone with minor sandstone and limestone lenses in the southeast side of northeast trending canyon south of canyon's "Y," W $\frac{1}{2}$, SW $\frac{1}{4}$, NW $\frac{1}{4}$, NE $\frac{1}{4}$, NE $\frac{1}{4}$, sec. 13, T6S, R7W SBBM. Area of UCLA loc. 7057 after construction grading. Holz Shale, Ladd Formation. Santonian, *Bostrychoceras elongatum* Biozone.
- *7059 UCLA, Plano Trabuco, Santiago Peak 7.5' quadrangle (1954), Santa Ana Mountains, Orange County, California. Medium to light-brown to grayish-brown mudstone with minor beds of friable siltstone and sandstone, 1 to 2 m level in measured section, in "Y" of northeast trending canyon, SW $\frac{1}{4}$, NW $\frac{1}{4}$, NE $\frac{1}{4}$, sec. 13, T6S, R7W SBBM. Holz Shale, Ladd Formation. Santonian, *Bostrychoceras elongatum* Biozone.
- *7061 UCLA, Plano Trabuco, Santiago Peak 7.5' quadrangle (1954), Santa Ana Mountains, Orange County, California. Light to medium-gray to brownish-gray mudstone with minor sandstone beds, 18 to 19 m level in measured section, west side of northeast trending canyon, NE $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$, NW $\frac{1}{4}$, NE $\frac{1}{4}$, sec. 13, T6S, R7W SBBM. Holz Shale, Ladd Formation. Santonian, *Bostrychoceras elongatum* Biozone.
- *7062 UCLA, Plano Trabuco, Santiago Peak 7.5' quadrangle (1954), Santa Ana Mountains, Orange County, California. Light to medium-gray to brownish-gray mudstone with minor sandstone beds, 21 to 22 m level in measured section, west side of northeast trending canyon, NE $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$, NW $\frac{1}{4}$, NE $\frac{1}{4}$, sec. 13, T6S, R7W SBBM. Holz Shale, Ladd Formation. Santonian, *Bostrychoceras elongatum* Biozone.
- *7074 UCLA, Plano Trabuco, Santiago Peak 7.5' quadrangle (1954), Santa Ana Mountains, Orange County, California. Locality includes material collected from the northeast trending canyon that has no specific locality or known stratigraphic position (area encompassing UCLA locs. 7057, 7058, 7059, 7061, and 7062), on dividing line between NW $\frac{1}{4}$ and NE $\frac{1}{4}$, N $\frac{1}{2}$, NE $\frac{1}{4}$, sec. 13, T6S, R7W SBBM. Holz Shale, Ladd Formation. Santonian, *Bostrychoceras elongatum* Biozone.

* Locality destroyed by construction activities.