J. Paleont., 67(6), 1993, pp. 965–979

0022-3360/93/0067-0965$03.00

PACIFIC SLOPE CRETACEOUS BIVALVES: EIGHT VENERID SPECIES

L. R. SAUL
Natural History Museum of Los Angeles County, 900 Exposition Blvd.,
Los Angeles, California 90007

ABSTRACT—Four new venerid species from the Cretaceous of the North American Pacific Slope are described and four previously described species are reassigned. Of the new species, two are allotted to new genera: *Rhaiphiale* based upon *Rhaiphiale pharota* n. sp. and *Egrona* based upon *Egrona fallax* n. sp., both Turonian in age and from southern California. The other new species are *Loxo quintense* n. sp., of late Maastrichtian age from California, and *Paraesa cedrina* n. sp., late Albian in age from Baja California, Mexico. The previously described species "*Meretrix*" *arata* Gabb, 1864, Turonian, and "?*Meretrix*" *fragilis* Gabb, 1869, late Maastrichtian, are placed in the new genus *Callistalox*; "*Meretrix*" *lens* (Gabb, 1864), Campanian age, and *Flaventia zeta* Popenoe, 1937, Turonian, are provisionally assigned to *Paraesa* Casey, 1952. This is the first identification of *Paraesa* from the Pacific Slope of North America. No species of *Flaventia* Jukes-Brown, 1908, is now known in Pacific Slope faunas.

INTRODUCTION

THE VENERIDAE is one of the largest and most advanced of bivalve families. Its early evolution and increasing diversity in the Cretaceous remain too little known. Descriptions of new species and new genera and generic reallocations of Cretaceous venerid bivalve species discussed here result from a study of the Pacific Slope genus *Calva* Popenoe, 1937 (Saul and Popenoe, 1992). Specimens of these reassigned taxa had been misidentified as species now included in *Calva,* or, as in the case of *Callistalox arata,* specimens of a species of *Calva* were misidentified as, for instance, *Meretrix arata,* a species not assignable to *Calva.* Their allocation to taxa not previously recorded from Pacific Slope Cretaceous deposits increases the recognized diversity within the Veneridae. Of the five genera discussed, four have anterior lateral teeth and are included in the Pitarinae. The remaining genus, *Paraesa,* may belong in the Clementiinae. If so, the geologic range of this subfamily is extended back to the Early Cretaceous.

Reallocation of the taxa has resulted mainly from careful cleaning of the specimens, especially of the hinge areas, so that generic and specific characters could be seen. Some morphological characteristics useful in discriminating between these five Pacific Slope genera and *Calva* are shown in Table 1.

Specimens of *Loxo quintense* n. sp., late Maastrichtian in age, have been confounded with *Calva varians* (Gabb, 1864), but *L. quintense* has the angled anterior lateral tooth of *Loxo* and a better demarked escutcheon than *C. varians.* Specimens of *Egrona fallax* n. gen. and sp., of Turonian age, have been confounded with *Calva regina* Popenoe, 1937, but these specimens lack the posterior lateral teeth of *Calva* and have a better defined escutcheon. "?*Meretrix*" *fragilis* Gabb, 1869, late Maastrichtian in age, was referred to *Loxo* by Saul (1983), but this species lacks the posterior lateral teeth present in *Loxo* and it is here placed in the new genus *Callistalox,* as is *Meretrix arata* Gabb, 1864. Popenoe (1937) questionably assigned Turonian age *M. arata* to *Aphrodina* Conrad, 1869, but *M. arata* does not have the bifid cardinal tooth 2a of *Aphrodina. Callistalox arata* and *C. fragilis* retain a groove on cardinal 4b that suggests derivation of *Callistalox* from *Resatrix* Casey, 1952. Except for this grooved 4b, their hinges resemble that of *Microcallista* Stewart, 1930, a widespread early Tertiary subgenus. Specimens of *Rhaiphiale pharota* n. gen. and sp. have been confused with *Callistalox arata* (Gabb, 1864), but *R. pharota* has an abruptly margined and depressed escutcheon. Specimens of *Paraesa cedrina* n. sp. have been mistaken for *Calva* (*Egelicalva*) *nitida* (Gabb, 1864), but *P. cedrina* lacks lateral teeth. Neither *Flaventia lens* (Gabb, 1864) nor *F. zeta* Popenoe, 1937, the two North American Pacific Slope species previously assigned to *Flaventia* Jukes-Brown, 1908, have the inscribed lunule and demarked escutcheon of *Flaventia.* They do have the excavated hinge areas in front of the anterior cardinals that are characteristic of *Paraesa* Casey, 1952, but these two species are more lenticular than other species of *Paraesa* and are placed in this genus with reservation.

Figure 1 is an index map to areas mentioned in the text, from which Cretaceous venerids have been reported. Localities and place names are keyed to the map by bracketed numbers.

Institutional acronyms used in this paper are: ANSP = Academy of Natural Sciences of Philadelphia; CIT = California Institute of Technology, collections now housed at LACMIP; GSC = Geological Survey of Canada; LACMIP = Natural History Museum of Los Angeles County, Invertebrate Paleontology Section; UCBMP = University of California, Berkeley, Museum

TABLE 1—Some features characteristic of genera discussed.

Characteristics	*Calva*	*Loxo*	*Callistalox*	*Egrona*	*Rhaphiale*	*Paraesa*
Posterior laterals	X	X				
Anterior laterals	X	X	X	X	X	
Grooved cardinal 4b			X			
Demarked escutcheon				X	X	
Inscribed lunule	X	X	X	X	X	
Anterior lateral AII hooked	X					
Anterior lateral AII not parallel to lunular margin		X	X			
Anterior hinge area excavated						X
Shell surface smooth	X†			X		X
Shell surface ribbed	X‡				X	
Shell surface grooved		X	X			

† Subgenera *Calva, Egelicalva,* and *Penecallista.*
‡ Subgenus *Microcalva.*

of Paleontology; UCLA = University of California, Los Angeles, collections now housed at LACMIP; USGS = United States Geological Survey; USNM = United States National Museum.

Abbreviations used for measurements of specimens are: H = height, L = length, I = inflation of one valve, B = distance from beak to anterior end of valve, LL = length of lunule, LW = width of lunule, LTA = angle formed by a line through laterals AII and PII or through their sockets.

In the following descriptions a small shell is less than 10 mm long. Medium-sized shells range between 10 mm and 59 mm in length. No species described in this paper is large.

SYSTEMATIC PALEONTOLOGY

Phylum MOLLUSCA Linnaeus, 1758
Class BIVALVIA Linnaeus, 1758
Order VENEROIDA H. and A. Adams, 1856
Superfamily VENERACEA Rafinesque, 1815
Family VENERIDAE Rafinesque, 1815
Subfamily PITARINAE Stewart, 1930
Genus LOXO Dailey and Popenoe, 1966

Type species.—By original designation *Loxo decore* Dailey and Popenoe, 1966, from the late Campanian and early Maastrichtian of California and Baja California.

Discussion.—*Loxo* and *Calva* Popenoe, 1937, have very similar hinges. In *Loxo* the anterior lateral AII is not hooked, does not parallel the lunular margin but is at an angle to it, and is relatively shorter than the anterior lateral of *Calva. Loxo* is less inflated than *Calva,* has lower umbos, a less depressed lunule, and a more elongate oval, rather than trigonal shape. It resembles the subgenus *Calva* (*Microcalva*) Saul and Popenoe, 1992, in having concentric sculpture and may be derived from *Microcalva.*

Tashiro (1976) placed *Callistina* (*Larma*) *japonica* Amano, 1957, in *Loxo* and suggested that *Cytherea* (*Callista*) *sculpturata* Stoliczka, 1870, from the Arrialoor Group of India belonged to the same genus. Stoliczka did not mention the presence of posterior lateral teeth nor did Tashiro; but as Stoliczka did not describe the hinge of the right valve, in which posterior laterals are apparent, he may have had only a left valve hinge and been unaware that laterals were present. Thus, whether or not *C.* (*C.*) *sculpturata* is a *Loxo* remains uncertain. *Loxo japonicum* is late Campanian to early Maastrichtian in age; *C.* (*C.*) *sculpturata* is apparently of Senonian age; thus, both are more nearly contemporaneous with *Loxo decore* than with *L. quintense* n. sp. *Loxo japonicum* is much smaller and more roundly inflated than *L. quintense*; *C.* (*C.*) *sculpturata* is more elongate and has coarser sculpture than *L. quintense.*

LOXO QUINTENSE n. sp.
Figure 2.1–2.13

Calva varians (Gabb). SAUL, 1986, p. 26, figs. 7–9. Not *Calva varians* (Gabb, 1864).

Diagnosis.—A relatively large, inflated *Loxo* with rather broad hinge plate.

Description.—Shell medium-sized, ovoid, flatly inflated medially; beaks low, near anterior quarter-length of shell, prosogyrous; lunular margin slightly concave to straight; anterior end well-rounded; ventral border broadly arched; posterior end roundly truncated; posterior dorsal slope long, barely arched; lunule narrowly lanceolate, moderately depressed, circumscribed by a line; shell surface ornamented by closely and evenly spaced concentric grooves and irregularly spaced, impressed growth checks.

Ligament groove long, arched, behind long, narrow, smooth nymphae. Hinge of right valve with cardinals 3a and 1 slightly divergent, beneath beak, 1 longer than 3a; cardinal 3b twice as long as 1, bifid; anterior laterals obscure, enclosing a moderately deep, oblique socket for AII; posterior lateral PI low, bordering an elongate, narrow socket. Hinge of left valve with cardinals 2a and 2b nearly equal in length, divergent; 2a slender; 2b stout, trigonal, posteriorly directed; cardinal 4b long, slender, separated from nymph by a groove; anterior lateral AII short, oblique to lunular and lower hinge plate margins; posterior lateral PII a barely projecting salient of valve edge. Pallial sinus broadly linguiform, extending nearly one-third of shell length across valve. Adductor muscle scars lightly impressed.

TABLE 2—Measurements (in mm) of *Loxo quintense* n. sp.

Museum no.	H	L	I	B	LL	LW	LTA	L/H	H/I	L/B	LL/LW
LACMIP 8254	44.8	—	17.7	—	15.0	3.4	100°	—	2.5	—	4.4
LACMIP 8255	41.3	49.5	15.6	21.4	12.5	3.0	108°	1.2	2.6	2.3	4.2
LACMIP 8256	42.5	—	19.5	25.0	11.3	4.0	103°	—	2.2	—	2.8
LACMIP 8257	43.0	52.3	15.1	23.0	12.3	2.7	106°	1.2	2.8	2.3	4.6
UCBMP 38029*	45.0	—	18.8	12.4	11.6	3.2	101°	—	2.4	—	3.6
UCBMP 38030*	—	—	—	—	—	—	107°	—	—	—	—

* Measurements made on LACMIP plaster casts 7567, 7568.

Holotype.—LACMIP 8254.

Paratypes.—LACMIP 8169 from LACMIP loc. 10664 (=CIT loc. 1576), south of Laguna Seca [10], Merced County; 8255–8256 from UCLA loc. 6501, Garza Creek [9], Stanislaus County; 8257 from UCLA loc. 7174, Orestimba Creek [9], Stanislaus County; 8258–8260 from LACMIP loc. 9196, Cantinas Creek [11], San Luis Obispo County, California. UCBMP 38029–38030 from UCBMP loc. A-3369, Cantinas Creek [11], San Luis Obispo County, California.

Type locality.—UCLA 6501, Garzas Creek [9], Stanislaus County, California.

Geologic age.—Late Maastrichtian.

Distribution.—Moreno Formation, Quinto silt, east side Diablo Range [9 and 10], Stanislaus and Merced Counties, El Piojo Formation, near Lake Nacimiento [11], San Luis Obispo County, California.

Measured specimens.—See Table 2.

Remarks.—The shell surface is not adequately preserved in any available specimen. *Loxo decore* has a polished surface with inscribed concentric lines, and *L. quintense* may have had a similar surface, but all examined specimens are etched rough, and the best preserved specimens of *L. quintense* retain only a suggestion of concentric sculpture, which may have been inscribed lines. *Loxo quintense* differs from *L. decore* Dailey and Popenoe, 1966, of early Maastrichtian age, in being larger and more inflated. Because of its inflation, it is more readily confused with *Calva varians* than is *L. decore*. It differs from *Calva varians* (Gabb, 1864) in being more elongate, less inflated, and having lower, less prominent beaks.

Etymology.—The species name is given with reference to Quinto Creek and the Quinto silt.

Genus CALLISTALOX n. gen.

Type species.—*Meretrix arata* Gabb, 1864.

Diagnosis.—Concentrically grooved pitarine venerids with an inscribed lunule; three cardinals in each valve; right posterior cardinal 3b bifid; left posterior cardinal 4b with a longitudinal groove; posterior laterals lacking.

Discussion.—Two Late Cretaceous venerids described by Gabb, *Meretrix arata* and ?*M. fragilis,* resemble in sculpture and hinge the type species of *Microcallista, Cytherea proxima* Deshayes, 1860, from the Eocene (Ypresian), of France (Figure 3.1–3.5). Compared to *Callista* (*Microcallista*) *proxima* (Deshayes), both Cretaceous species are shorter, and have a shorter and less linguiform pallial sinus than *Callista* (*Microcallista*) *proxima.* However, other Early Tertiary species, *Callista* (*Microcallista*) *conradiana meganosensis* (Clark and Woodford, 1927) for instance, are nearly as short as these Cretaceous species, suggesting that in shape and pallial sinus length "*M.*" *arata* and "?*M.*" *fragilis* may fall within the bounds of *Microcallista.* Like "*M.*" *arata* and "?*M.*" *fragilis,* species of *Microcallista* are small to medium in size. Among the largest venerids are species belonging to three other genera with similar hinges: *Callista* Poli, 1791 (type species *Venus chione* Linnaeus, 1758, Holocene, Mediterranean); *Macrocallista* Meek, 1876 (type species *Venus nimbosa* Lightfoot, 1786, Holocene, Caribbean); and *Megapitaria* Grant and Gale, 1931 (type species *Cytherea aurantica* Sowerby, 1831, Holocene, Pacific Panamic fauna). The hinges of *Microcallista, Callista* and *Macrocallista* are essentially similar. *Microcallista* differs from *Callista* and *Macrocallista* only in being of smaller size and in having concentric sculpture rather than being smooth. The type species of these three supraspecific taxa all have right valve hinges with 3a slender, 1 high and moderately slender, 3b narrow, elongate and grooved, AIII and AI shorter than the socket for AII, and the shell margin grooved posterior to the ligament groove. They all have left valve hinges

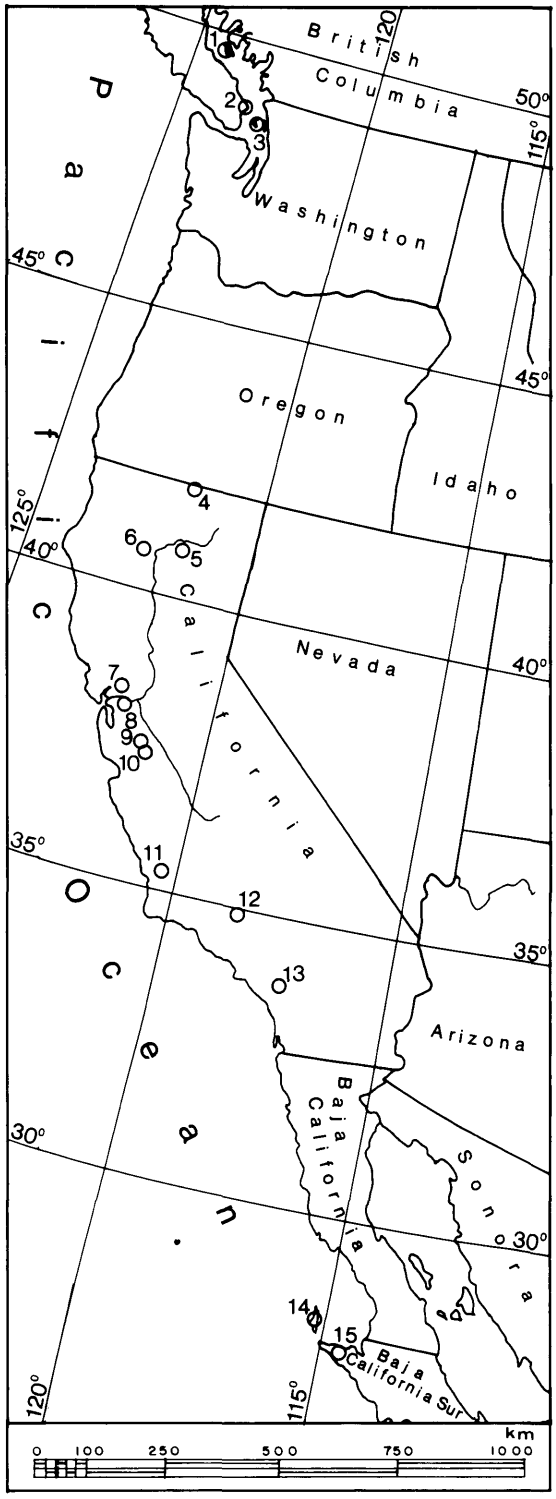

FIGURE 1—Index map to areas mentioned in text. 1, Hornby and Denman Islands; 2, vicinity of Nanaimo; 3, Sucia Island; 4, Siskiyou Mountains; 5, Redding area, Shasta County; 6, Ono area, Shasta County; 7, Thompson Creek, Yolo County; 8, Martinez, Contra Costa County; 9, eastern Diablo Range, Stanislaus County; 10, eastern Diablo Range, Merced County; 11, Nacimiento area, San Luis Obispo County; 12, Warm Springs Mountain, Los Angeles County; 13, Santa Ana Mountains, Orange and Riverside Counties; 14, Cedros Island; 15, Vizcaino Peninsula.

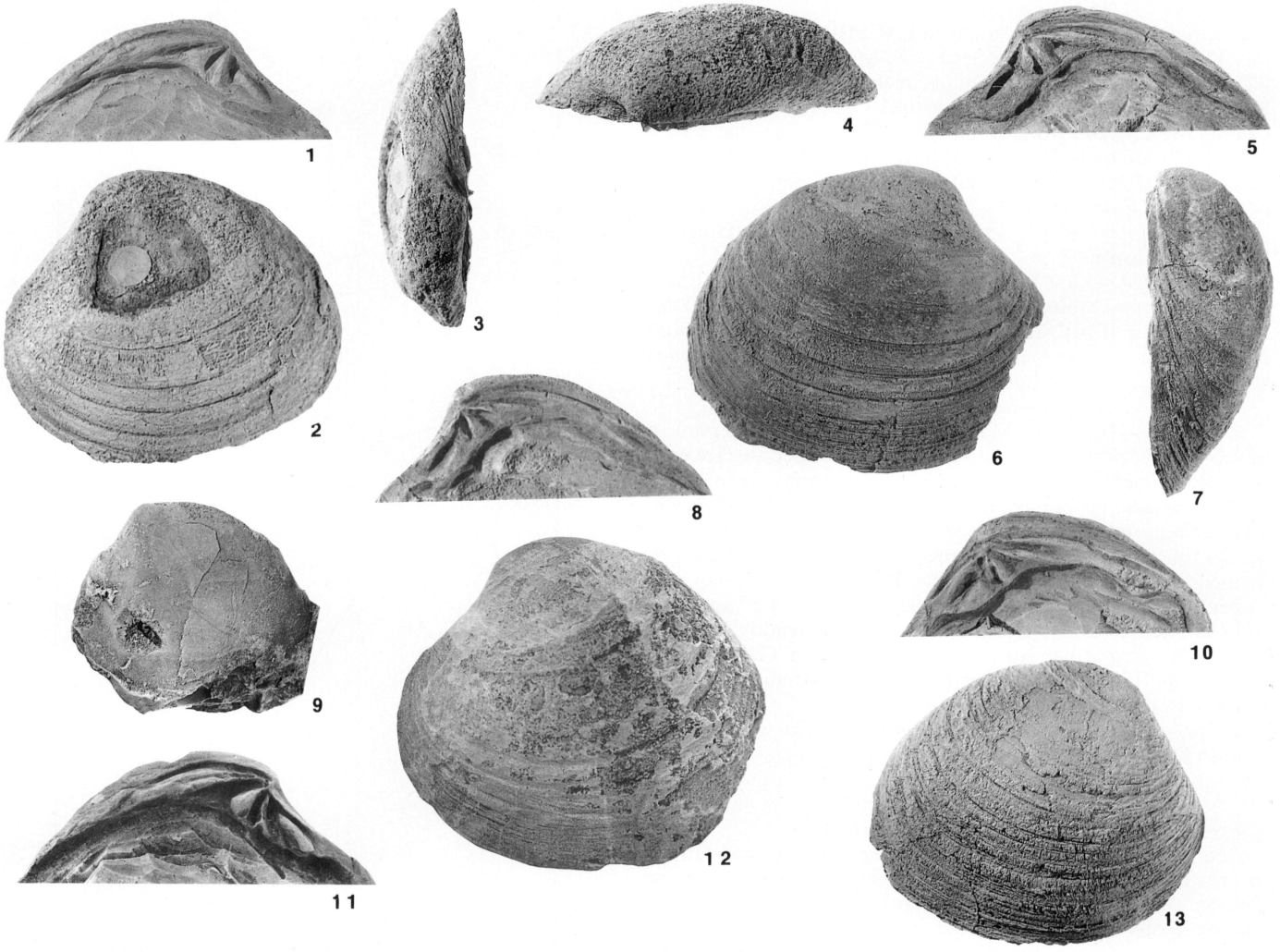

FIGURE 2—*Loxo quintense* n. sp., late Maastrichtian, all × 1, all except *9* coated with ammonium chloride, photos by De Leon except as otherwise noted. *1–3,* LACMIP 8257, paratype, from UCLA loc. 7174, left valve. *1,* hinge; *2,* exterior; *3,* anterior view. *4, 8,* LACMIP 8256, paratype, from UCLA loc. 6501, right valve. *4,* dorsal view; *8,* hinge. *5–7,* LACMIP 8254, holotype, from UCLA loc. 6501, right valve. *5,* hinge; *6,* exterior; *7,* posterior view. *9,* LACMIP 8169, paratype, from LACMIP loc. 10664, left valve, pallial sinus. *10, 13,* LACMIP 8255, paratype, from UCLA loc. 6501, right valve. *10,* hinge; *13,* exterior. *11, 12,* UCBMP 38029, paratype, from UCB loc. A-3369, left valve, photos by Saul. *11,* hinge; *12,* exterior.

with 2a slender, joined to 2b, 2b narrowly triangular, 4b slender and high on the nymph, AII elongate and subparallel to lunular margin. *Macrocallista nimbosa* has a delicate hinge with 3b narrow, perhaps misleading Keen (1969) into characterizing *Macrocallista* as having 3b not grooved. This tooth is actually just a narrower version of the 3b in *Callista chione* and is similarly grooved but on a more delicate scale.

Keen (1969) characterized *Megapitaria* as being like *Pitar* Römer, 1857 (type species *Venus tumens* Gmelin, 1791, Holocene, Senegal); but *Megapitaria* does not have 2a and 2b looped into an inverted ∨ as does *Pitar,* nor 3a and 3b joined into an arch dorsal to 1; its hinge and shape are actually more similar to *Callista,* from which it differs in having a heavier hinge with the dorsal ends of 2a and 2b tucked under the subumbonal margin, having 4b longer, sturdier, and further from the nymph, and the anterior laterals shorter and sturdier. In the type species of *Callista, Macrocallista, Microcallista,* and *Megapitaria* the lunular margin of the right valve is a little thickened and raised so that it just overlaps the left valve margin. The right valve lunule is slightly wider than that of the left valve. Along the thickened margin of the right valve is a low welt extending from the beak to the anterior end of the lunule. This welt fits into a corresponding shallow groove in the left valve margin. Only its elongate shape separates *Macrocallista* from *Callista,* and were it not present in the Eocene and thus possessed of considerable geological range, *Callista* and *Macrocallista* should be synonymized as morphologic reasons to separate these taxa are fewer than commonly considered necessary for a supraspecific division. *Microcallista,* because of its concentric sculpture, and *Megapitaria,* because of its heavier hinge with 4b more distant from the nymph, can also be retained as subgenera although the morphological differences are slighter than are commonly used to differentiate subgenera.

Although "*Meretrix*" *arata* and "?*Meretrix*" *fragilis* are similar to *Callista* (*Microcallista*) *proxima,* the grooved 4b and shorter valve length constitute greater differences than those separating the four taxa discussed above, and *Callistalox* is proposed as a genus despite its similarity to *Microcallista.*

The groove along cardinal 4b recalls that of *Resatrix* Casey, 1952 (type species, *R. dolabra* Casey, 1952, Aptian, England),

but *Resatrix* has posterior lateral teeth. *Resatrix* is a genus of wide distribution in the Early Cretaceous (Casey, 1952); these Late Cretaceous Pacific Slope species may be derived from it by loss of the posterior laterals, the retention of the groove on 4b being evidence of this derivation.

Etymology.—The name is compounded of *Callista* and *alox,* Greek, a furrow, with reference to the groove on 4b, and is of feminine gender.

CALLISTALOX ARATA (Gabb, 1864)
Figure 3.6–3.19

Meretrix arata GABB, 1864, p. 166, Pl. 30, fig. 250; STEWART, 1930, p. 247, Pl. 1, fig. 4. Not *Cytherea arata* (Gabb). WHITEAVES, 1896, p. 125; nor *Meretrix arata* Gabb. WHITEAVES, 1903, p. 378 = *Calva* (*Microcalva*) *haggarti* Saul and Popenoe, 1992. Probably not *Callista* (?) cf. *arata* (Gabb). NAGAO, 1932, p. 39, Pl. 6, fig. 6, 6a = *Callista*? sp. HAYAMI, 1975, p. 145.

Aphrodina? *arata* (Gabb, 1864). POPENOE, 1937, p. 397, Pl. 48, figs. 15, 16. STADUM, 1973, Pl. I, fig. 4.

Diagnosis.—An oval *Callistalox* ornamented with well-impressed concentric grooves.

Description.—Shell small, oval, roundly inflated medially; beaks prosogyrous, not prominent, at anterior third-length of shell; lunular margin concave; anterior end well rounded; ventral border broadly arched; posterior end rounded; posterior dorsal slope long, barely arched; lunule plumply lanceolate, moderately depressed, circumscribed by a line; shell surface ornamented by closely and evenly spaced, concentric grooves and irregularly spaced, impressed growth checks.

Ligament groove long, barely arched, behind long, narrow, smooth nymphae; nymphae slightly salient posteriorly. Hinge of right valve with cardinals 3a and 1 divergent, beneath beak, 1 longer than 3a; cardinal 3b twice as long as 1, bifid; anterior laterals short, obscure, enclosing moderately deep socket for AII; posterior valve margin grooved. Hinge of left valve with cardinals 2a and 2b sturdy, nearly equal, divergent; cardinal 4b longer, slender, longitudinally grooved, separated from nymph by deep groove; anterior lateral AII short, at slight angle to lunular margin. Pallial line distant from shell margin; pallial sinus broad, angulate, short, extending nearly one-third of shell length across valve; dorsal arm convex, slightly ascending; ventral arm steeply ascending at nearly 70° to pallial line. Muscle scars lightly impressed.

Lectotype.—Herein designated, ANSP 4388. Stewart (1930) found only this one of Gabb's specimens, which is from Orestimba Canyon [9], and figured it. Because he was unable to find the specimen figured by Gabb (1864, Pl. 30, fig. 250), which Stewart suggested was probably from Cottonwood Creek [6], Shasta County, he did not designate ANSP 4388 as lectotype in the hope that Gabb's figured specimen might be found. Richards (1968, p. 33) lists ANSP 4388 as Cotype of *Meretrix arata* Gabb, 1864; it is the only California Geological Survey specimen of *Meretrix arata* at the Academy (Elana Benamy, personal commun.).

Hypotypes.—UCLA 40662 from LACMIP loc. 8197 (=CIT loc. 1068), Santa Ana Mts. [13]; 40663 and 49501 from LACMIP loc. 10079 (=CIT loc. 1164), Santa Ana Mts. [13], Orange County, California. LACMIP 8189 from LACMIP loc. 10744 (=CIT loc. 1442), Swede Basin [5], Shasta County; 8190 from LACMIP loc. 8198 (=CIT loc. 1069), Santa Ana Mts. [13], Orange County; 8191 from LACMIP loc. 8195 (=CIT loc. 82), Santa Ana Mts. [13], Orange County; 8236 from LACMIP loc. 10079 (=CIT loc. 1164), Santa Ana Mts. [13], Orange County; 8237 from LACMIP loc. 8197 (=CIT loc. 1068), Santa Ana Mts. [13], Orange County, California.

Type locality.—"Orestimba Cañon" [9], Stanislaus County, California.

Geologic age.—Turonian.

Distribution.—Redding Formation, Bellavista Sandstone Member, Little Cow Creek area [5], Shasta County; Panoche Formation, Orestimba Canyon [9], Stanislaus County; near base of Yolo Shale, Thompson Creek [7], Yolo County; Ladd Formation, top of the Baker Canyon Conglomerate Member and lowermost Holz Shale Member, Santa Ana Mountains [13], Orange County, California. Whiteaves (1903, p. 378) said that Stanton had sent him a specimen of *Meretrix arata* from the Chico Group of Tehama County, California, identical to specimens from Sucia Island [3], San Juan County, Washington. Whiteaves' specimens from Sucia Island are undoubtedly *Calva* (*Microcalva*) *haggarti* Saul and Popenoe, 1992, but during this study no specimen similar to either species has been found in collections from Tehama County, and the identity of Stanton's specimen remains unknown as does its horizon and more precise locality.

Measured specimens.—See Table 3.

Remarks.—Gabb (1864) listed three localities for "*Meretrix*" *arata,* Cottonwood Creek [6], Shasta County, Siskiyou Mountains [4], and Orestimba Canyon [9], Stanislaus County, California. Popenoe (1937, p. 397) followed Stewart (1930) in suggesting that the species was originally described from Cottonwood Creek [6], Shasta County. The upper member of the Budden Canyon Formation along Cottonwood Creek, the Gas Point Member, ranges in age from Cenomanian to late Turonian (Murphy et al., 1969) and would be, therefore, the most likely source for "*M.*" *arata.* However, no specimens have been relocated from there, and Rodda (1959) did not list it from that area. Additionally, he characterized the sediments as having been deposited in moderately deep water, an unlikely environment for this otherwise apparently relatively nearshore taxon. If *Callistalox arata* occurs on Cottonwood Creek, Shasta County, it is rare. Cottonwood Creek [4], Siskiyou County, also flows across rocks of Turonian age. These, the lower beds of the Hornbrook Formation, have yielded specimens of *C. arata.*

The designated lectotype is a small specimen, and its size and fragility unfortunately argue against attempting to expose the hinge. The ventral and posterior margins appear to be a little broken, and the concentric ribs are wider than on many of the other specimens inferred to be conspecific. It resembles *Calva* (*Microcalva*) *elderi* Saul and Popenoe, 1992, in rib width, but the ribs are more flat-topped than those of *C.* (*M.*) *elderi,* and they are more arcuate ventrally. In *C.* (*M.*) *elderi* the ribs are straightened ventrally and bent subangulately along the posterior flexure. Nonetheless, the small size of the lectotype makes difficult the unequivocal identification of other specimens with it.

Popenoe (1937) questionably assigned *Meretrix arata* to *Aphrodina,* but *M. arata* lacks two hinge characteristics of *Aphrodina* Conrad, 1869: its laterals are not striated, and cardinal tooth 2a is not bifid. Externally *Callistalox arata* resembles *Calva* (*Microcalva*) *elderi* Saul and Popenoe, 1992, of Coniacian age, but lacks the posterior laterals, its anterior laterals are shorter, and AII on the left valve is not hooked. The concentric sculpture differs in that *Calva* (*M.*) *elderi* has round-topped ribs, but the surface of *Callistalox arata* is grooved. *Callistalox arata* resembles *Loxo decore* Dailey and Popenoe, 1966, in its shape and sculpture, but differs from *L. decore* in being smaller, more roundly inflated, slightly shorter, and lacking posterior lateral teeth. *Callistalox arata* is much more common than *Rhaiphiale pharota* n. sp., which is also a small, concentrically ribbed venerid of Turonian age that also occurs in the northern Santa Ana Mountains [13]. *Callistalox arata* is more elongate than