1907 (STOLICZKA, 1867:pl. 7, figs. 4, 8, 9), but the illustrations of *R. media* do not indicate the presence of a posterior sinus at the shoulder, and its spiral sculpture is more widely spaced. As in the case of *C. dilleri,* the presence of the sinus in *C.? mitraeformis* suggests that it should not be assigned to *Rostellinda.* STEWART (1927) placed *C.? mitraeformis* in *Volutoderma* Gabb, 1877, but that genus also lacks the posterior sinus at the shoulder and additionally has considerably more widely spaced spiral sculpture.

Carota? mitraeformis is of smaller average size (although if complete, LACMIP cat. no. 11574 would probably be more than 50 mm high) and has a much less noticeable shoulder than species of *Carota* described by Stephenson from the Woodbine Formation of Texas. Although some adult specimens of *C.? mitraeformis* approach *Conus* in shape, *C.? mitraeformis* is more commonly shaped like a *Volutomorpha* Gabb, 1877, which lacks the posterior growth line sinus of *Carota.* The sculpture of *C.? mitraeformis* resembles that of a *Volutomorpha* of SOHL's (1964) group B and has three oblique folds on the columella, the middle one of which is slightly the stronger. However, whereas *Volutomorpha* group B species have from one to three folds that are generally not all visible in the unbroken shell, the three well-developed folds of *C.? mitraeformis* are visible, and the exterior of the shell shows no evidence of the total glaze coating that Sohl considers typical of *Volutomorpha.* All species assigned to *Volutomorpha* by Sohl are of geologically younger age than is *C.? mitraeformis*; the placement of the columellar folds and the lack of glazing and posterior growth line sinus may be evolving features, and *C.? mitraeformis* may be an early *Volutomorpha.* A more complete study of Cretaceous Volutidae is needed to clarify the generic placement of *C.? mitraeformis.*

Varens Saul & Popenoe, gen. nov.

Type species: ***Varens formosus*** Saul & Popenoe, sp. nov.

Diagnosis: Medium sized to moderately large volutes with moderately high spire; having shouldered whorls, a concave ramp, and a well-developed subsutural welt or collar, shoulder formed by posterior ends of axial ribs; last whorl broadly convex about periphery, gently concave anteriorly, tapering gracefully to a relatively long canal. Axial sculpture of ribs, pronounced and swollen at their posterior ends, diminishing anteriorly on last whorl, more strongly developed on earlier whorls, becoming shorter and knob-like on more mature whorls, diminished or obsolete on last whorl of large adults; spiral sculpture absent; exterior surface apparently coated with thin glaze. Growth lines gently retrocurrent at suture, forming a narrow posterior notch against previous whorl, nearly parallel to axis over mid whorl, gently antecurrent on siphonal neck. Aperture long and moderately narrow, outer lip thin; inner lip expanded parietally, nearly straight in columellar region; columella flexed to the left at anterior tip, bearing near base of previous whorl, three oblique spiral folds; folds progressively stronger anteriorly.

Discussion: *Rostellites gracilis* STANTON (1893:157, pl. 34, figs. 1–3) from the "*Pugnellus* sandstone" of Huerfano Park and Poison Canyon, Colorado, may belong to this genus.

No previously described volute genus shares the characteristics of three folds, the anterior strong, posterior weak, lack of spiral sculpture, and exterior apparently coated by a glaze. *Volutomorpha* Gabb, 1877 (type species *Volutolithes conradi* Gabb, 1860, from Maastrichtian of New Jersey) is exteriorly glazed but has a low to moderate spire and is sculptured by spiral ribs. Like *Rostellana* Dall, 1907 (type species *Voluta bronni* Zekeli, 1852), ***Varens*** is relatively high spired, but *Rostellana* has the shoulder less well developed and lacks a glazed coating. *Carota* is of similar shape to ***Varens*** but has a growth line that is strongly sinused at the shoulder, lacks a glazed coating, and has spiral sculpture. *Fulgoraria* Schumacher, 1817 (type species *Voluta rupestris* Gmelin, 1791, Recent from Japan) is of similar shape to ***Varens*** but has four to eight folds on the columella, apparently a larger protoconch, and is spirally grooved.

Despite its scant spiral sculpture, ***Varens*** is placed in Volutoderminae because of its shape, number of columellar folds, and growth line. It resembles genera placed in Volutilithinae Pilsbry & Olsson, 1954, but has three columellar folds rather than the one fold of Volutilithinae. PONDER & WARÉN (1988) combined these two subfamilies as Volutoderminae.

Carota? nodosa STEPHENSON, 1952 (p. 186, pl. 42, figs. 19–21) resembles ***Varens*** in shape, but it has spiral sculpture and a strong bend to the columella at the folds, and Stephenson mentions no external callus wash.

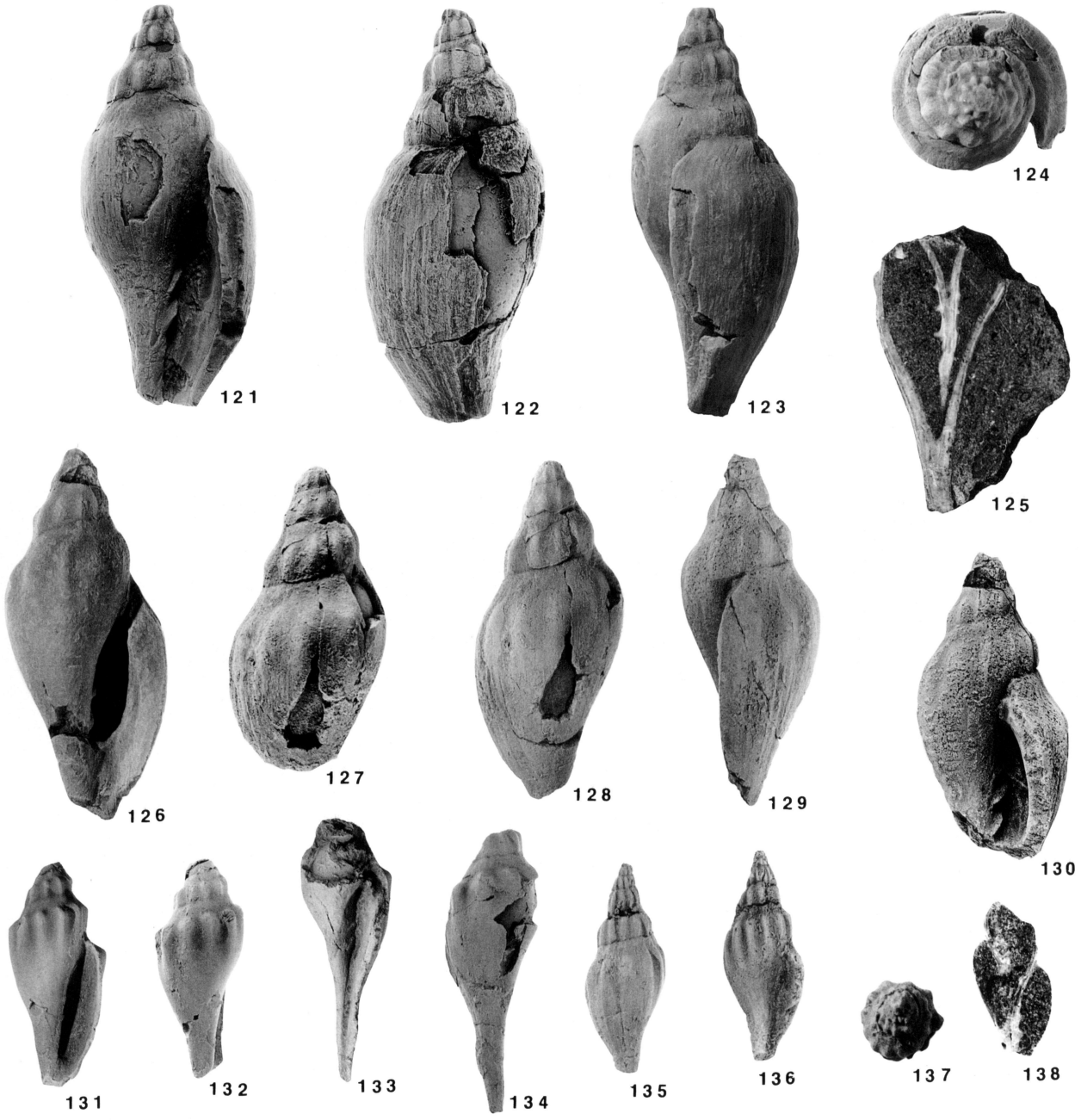
The generic name is derived from the name of a centurian in Caesar's army, Varenus, who was noted for a daring act of bravery. ***Varens*** is of masculine gender.

Varens anae Saul & Popenoe, sp. nov.

(Figures 121–130)

Diagnosis: A large ***Varens*** having about ten axial ribs per whorl on spire, with rounded flank, and obsolete sculpture on mature whorls.

Description: Shell moderately large, broadly fusiform; apical angle about 49°; protoconch unknown; spire of five or six whorls, having a well-developed, narrow, subsutural collar, and concave ramp, expanding sharply to angulate shoulder; last whorl nearly smooth, broadly convex medially, gently concave anteriorly, tapering gracefully to nearly straight anterior siphonal canal. Growth lines gently retrocurrent at suture forming a narrow V-shaped posterior notch, nearly parallel to axis medially, gently antecurrent on siphonal neck. Sculpture of about ten axial ribs, pronounced and swollen on their posterior ends, di-



Explanation of Figures 121 to 138

Unless otherwise indicated, figures are ×1; specimens coated with ammonium chloride except as noted.

Figures 121–130. ***Varens anae*** sp. nov. Figures 121–124: LACMIP cat. no. 11575 from LACMIP loc. 8195, holotype; Figure 121, aperture; Figure 122, back; Figure 123, right side; Figure 124, apical view. Figure 125: LACMIP cat. no. 11577 from LACMIP loc. 10886, paratype, section, showing columellar folds, uncoated. Figures 126–130: LACMIP cat. no. 11576 from LACMIP loc. 10886, paratype; Figure 126, aperture; Figure 127, back, anterior segment removed; Figure 128, back; Figure 129, right side; Figure 130, segment removed to show columellar folds.

Figures 131–138. ***Varens formosus*** sp. nov. Figures 131, 132: LACMIP cat. no. 11579 from LACMIP loc. 10891, holotype; Figure 131, aperture; Figure 132, left side. Figures 133, 134: LACMIP cat. no. 11580 from LACMIP loc. 10891, paratype; Figure 133, outer lip broken back, showing folds on columella and long anterior siphon; Figure 134, back. Figures 135–137: LACMIP cat. no. 11581 from LACMIP loc. 10891, paratype; Figure 135, back, ×2; Figure 136, aperture, ×2; Figure 137, apical view, ×2. Figure 138: LACMIP cat. no. 11583 from LACMIP loc. 10891, paratype, section showing columellar folds, uncoated. Photographs 121, 122, 125, 127, 130 by Susuki; 123, 124, 126, 128, 129, 131–138 by De Leon.

Table 13

Measurements (mm) of ***Varens anae*** sp. nov. and ***Varens formosus*** sp. nov.

	H	D	Hp	Dp	Ha	Hs	A	R	Dp/Hp	Hp/Hs
Varens anae										
LACMIP 11575	62.0*	27.4	8.8	18.7	22.0*	4.4	49°	10	2.1	2.0
LACMIP 11576	56.4*	24.0	9.6	15.3	18.7*	5.5	47°	12	1.6	1.7
LACMIP 11577	42.0*	—	—	—	—	—	—	—	—	—
Varens formosus										
LACMIP 11579	36.0*	16.0	7.9	10.0	12.7*	5.0	46°	11	1.3	3.6
LACMIP 11578	26.2*	11.8	7.0	9.8	11.1*	4.5	43°	12	1.4	1.5
LACMIP 11580	43.0*	11.8	—	—	—	—	—	—	—	—
LACMIP 11581	16.6*	6.8	3.5	4.8	8.0*	2.3	40°	12	1.4	1.5
LACMIP 11582	16.5*	6.4	2.0	4.3	4.6*	1.4	42°	12	2.2	1.4
LACMIP 11583	23.8	—	—	—	—	—	—	—	—	—

*Specimen incomplete. Abbreviations decrypted in Introduction.

minishing anteriorly; ribs longer, narrower, and more strongly developed on earlier whorls, becoming progressively reduced, shorter and knoblike on later whorls and diminished on penultimate whorl and obsolete on last whorl. Aperture long, pinched posteriorly, expanded medially, contracted to the anterior siphon, outer lip thin, broadly and nearly evenly convex in outline; inner lip thin, parietal portion expanded, narrow on the columella; columella with three equally spaced, very oblique folds well within the aperture; anterior fold strongest.

Holotype: LACMIP cat. no. 11575.

Paratypes: LACMIP cat. no. 11558 from UCLA loc. 2325, Silverado Canyon; LACMIP cat. nos. 11576–11577 from LACMIP loc. 10886 (= CIT loc. 84), Santiago-Trabuco divide, Santa Ana Mts., Orange Co., California.

Type locality: LACMIP loc. 8195 (= CIT loc. 82), Silverado Canyon, Santa Ana Mts., Orange Co., California.

Dimensions: See Table 13.

Distribution: Ladd Formation, Baker Canyon Sandstone, Santa Ana Mountains, Orange Co., California.

Remarks: ***Varens anae*** differs from ***Varens formosus*** in having more rounded flanks especially in mature adults, which are considerably larger than any specimen of ***V. formosus***. In specimens of ***V. anae*** and ***V. formosus*** that are of equivalent size, the shoulder of ***V. anae*** is less pronounced, the axial ribs are not as nodular at the shoulder, and the exterior seems less glazed, although this last may be a result of preservation. ***Varens anae*** differs from *Carota gracilis* (Stanton, 1893) of the *Pugnellus* sandstone, near Malachite and in Poison Canyon, Huerfano Park, Colorado, in being more slender.

Etymology: The specific name refers to the occurrence of this species in the Santa Ana Mountains.

Varens formosus Saul & Popenoe, sp. nov.

(Figures 131–138)

Diagnosis: A medium-sized, elongate, angulately shouldered ***Varens*** with about 11 axial ribs per whorl. Surface of shell apparently coated by glaze.

Description: Shell medium sized, elongately volutiform; apical angle about 46°; spire of about five whorls, having narrow subsutural welt, concave ramp, and angulate shoulder, and nearly straight flank constricted gently about base to form a broad siphonal neck. Growth line obscured by glaze, apparently nearly parallel to axis medially, slightly antecurrent on siphonal neck. Sculpture of about 11 axial ribs, strongest at shoulder, dying out anteriorly at about mid whorl; no spiral sculpture; shell surface apparently glazed. Aperture elongate; outer lip thin; inner lip thin, narrow, rounded posteriorly; columellar folds very oblique, anterior fold strongest, posterior very weak.

Holotype: LACMIP cat. no. 11579.

Paratypes: LACMIP cat. nos. 11578 from LACMIP loc. 10946, north side Silverado Canyon at the narrows; 11580–11583 from LACMIP loc. 10891 (= CIT loc. 1065), Ladd Canyon, just north of Silverado Canyon, Santa Ana Mts., Orange Co., California.

Type locality: LACMIP loc. 10891 (= CIT loc. 1065), Ladd Canyon, Santa Ana Mts., Orange Co., California.

Dimensions: See Table 13.

Distribution: Ladd Formation, Baker Canyon Sandstone, Santa Ana Mts., Orange Co., California.

Remarks: Specimens of ***Varens formosus*** are noteable for their beautifully polished appearance. ***Varens formosus*** resembles *Carota dilleri* in shape but lacks spiral sculpture and the posterior sinus at the shoulder. ***Varens formosus***

resembles young *V. anae* in which the bulbus adult whorls have not been formed. ***Varens formosus*** differs from *V. anae* in being smaller and more slender, in having a stronger shoulder, a less convex body whorl, and the posterior columellar plait barely present.

Carota? *nodosa* Stephenson, 1952, is similar in shape to ***Varens formosus,*** but *V. formosus* lacks spiral sculpture and has straighter axial ribs.

Etymology: The specific name is from Latin, ***formosus,*** meaning beautifully formed, comely, handsome.

Subfamily ATHLETINAE Pilsbry & Olsson, 1954

As adults, several Athletinae have a shell that becomes *Cassis*-like or strombiform. The body whorl may have a rounded or angled shoulder that may be unarmed or bear nodes or spines. The sculpture is more or less cancellate in the young, becoming partly or wholly smooth in adults.

Konistra Saul & Popenoe, gen. nov.

Type species: Gosavia biconica ANDERSON, 1958.

Diagnosis: A medium-sized, elongate pyriform volute with subsutural band, concave ramp, rounded shoulder, and rounded body whorl tapering to a broad anterior canal. Both axial and spiral sculpture present; axial sculpture strongest on early whorls, decreasing with maturity, and anteriorly over-ridden by spiral cords. Growth lines prominent, retrocurrent on subsutural band, scarcely flexed across flank. Aperture elliptical, outer lip thin; inner lip thin, expanded posteriorly; columella bearing about midway two well-developed, slightly oblique folds, flexed left and backward near its tip to form a well-developed anterior fasciole.

Discussion: Despite the number of middle Cretaceous volute genera already described, ***Konistra*** has a combination of features not found in any of them. In shape and sculpture ***Konistra*** resembles *Carota, Gosavia, Retipirula, Rostellaca, Rostellinda, Volutomorpha,* and *Volutoderma.* ***Konistra*** is most similar to *Gosavia* but has only two columellar folds, whereas *Gosavia* has five or six columellar folds and a deeply sinused growth line. ***Konistra*** tends to be shorter spired and more round shouldered than *Carota,* which has three columellar folds and a deeply sinused growth line. The sculpture of ***Konistra*** is not pustulose like that of *Retipirula,* which has two oblique folds and the trace of a third, and an anterior end to the siphon that is not strongly bent back and to the left. *Rostellaca* and *Rostellinda* are both higher spired than ***Konistra*** and have three folds on the columella. *Volutomorpha* has an overall surface glaze, a growth line that is strongly sinused adjacent to the suture, and one prominent fold on the columella rather than the two of ***Konistra***. *Volutoderma* has three oblique columellar folds and a nearly straight tip to the anterior siphon.

The generic name is derived from Greek, ***Konistra,*** a dusty rolling place. It refers to the presence of this genus at Sand Flat, Shasta Co., California, and is of feminine gender.

Konistra *biconica* (Anderson, 1958)

(Figures 114–120)

Gosavia biconica ANDERSON, 1958:175, pl. 75, figs. 3, 3a.

Description: Shell medium sized; pleural angle about 66°; spire low, about one-fifth the total length of the shell, with about five or six low angulately shouldered whorls; suture at or covering shoulder; ramp broad and shallowly sloping; last whorl pyriform, with greatest diameter of whorl just anterior to shoulder and approximately one-fourth the distance from suture to tip of anterior canal, with a relatively broad flat ramp, a subangulate shoulder, and well-arched flank curving convexly to constricted anterior siphonal neck; neck angled backward and to the left near its tip. Rough spiral and axial sculpture on body whorl; spiral cords unevenly spaced, numbering about 20 on body whorl, separated by interspaces of somewhat variable width but approximately equal to cord width; axial sculpture strongest on spire and at shoulder; ribs stronger than cords on fifth whorl, progressively weaker on subsequent whorls, about equal to cords posteriorly, diminishing anteriorly, usually faint or absent on anterior half of whorl, about 12 on fifth whorl, 10 on sixth, variably developed, weakest on body whorl. Growth lines prominent, with nearly straight trend perpendicular to suture but notched adjacent to suture and having a strong bend at anterior fasciole. Aperture elongate, ovoid with well-developed posterior groove at suture; outer lip thin, smooth within; inner lip expanded roundly onto body whorl, commonly encroaching above shoulder and exposed as a frill adjacent to suture; columella flexed backward and to the left near its tip; columellar folds two, just posterior to middle of aperture; siphonal fasciole moderately developed.

Holotype: CASG cat. no 61935.01.

Hypotype: LACMIP cat. no. 11619 from LACMIP loc. 10789 (= CIT 1001), sec. 7, T32N, R4W, Redding (1946) quadrangle, Shasta Co., Caldifornia.

Type locality: CASG loc. 61935 [*ex* CASG 1294-A], "near the State highway, on Sand Flat," north of Redding, Shasta Co., California.

Dimensions: See Table 14.

Distribution: Known only from the vicinity of "Sand Flat." On 1913 U.S.G.S. Redding 30′ Quadrangle, Sand Flat is between Buckeye and Salt creeks along U.S. highway 99, but is not designated on 1946 Redding 15′ Quadrangle.

Geologic age: Turonian.

Remarks: In overall shape and sculpture ***Konistra*** *biconica*

Table 14

Measurements (mm) of **Konistra** *biconica* (Anderson, 1958).

	H	D	Hp	Dp	Ha	Hs	A	Dp/Hp	Hp/Hs
CAS 61935.01	43.7*	8.4	3.4	16.7	9.7	2.0	66°	4.9	1.7
LACMIP 11619	49.0*	21.4	5.2	5.0	6.9*	1.8	75°	0.97	2.9

* Specimen incomplete. Abbreviations decrypted in Introduction.

does resemble a *Gosavia,* but ***K.*** *biconica* has only two columellar folds rather than the five or six of *Gosavia* and lacks the growth line sinus present at the shoulder of *Gosavia squamosa* (Zekeli, 1852). ***Konistra*** *biconica* is superficially so similar to *Carota? mitraeformis* that the two are commonly mixed in collections, but ***K.*** *biconica* has one less fold on the columella, weaker sculpture, a nearly straight growth line, and a better developed anterior fasciole.

The specimen, CASG cat. no. 1552.03, referred to *Palaeatractus crassus* by ANDERSON (1958:42) has two columellar folds and resembles ***Konistra*** *biconica* except that the shoulder is well rounded and without angularity. Unfortunately the anterior end is broken and the shape of the anterior canal unknown. Specimen CASG cat. no. 1552.03 occurs with ammonites considered by MATSUMOTO (1960: 80) to suggest late Campanian or early Maastrichtian age. The specimen is considerably larger than any other referred to *P. crassus.*

ACKNOWLEDGMENTS

We are grateful for the loan of specimens by P. U. Rodda, California Academy of Sciences; D. L. Jones, U.S. Geological Survey, Menlo Park; H. G. Richards, Academy of Natural Sciences of Philadelphia; D. R. Lindberg and the late J. H. Peck, Museum of Paleontology, University of California, Berkeley; the late J. A. Jeletzky, Geological Survey of Canada; Marilyn Kooser, University of California, Riverside; and P. D. Ward, Universtiy of Washington, Seattle. Several elusive references were uncovered by Lindsey Groves, Natural History Museum of Los Angeles County. The paper has been critically read by N. F. Sohl, U.S. Geological Survey; R. L. Squires, California State University, Northridge; and E. C. Wilson, Natural History Museum of Los Angeles County. We appreciate their assistance in improving this paper. Photographs by Takeo Susuki were taken between 1958 and 1974 at the University of California, Los Angeles, Department of Earth and Space Sciences; photographs by John De Leon were taken in 1991 and 1992 at the Natural History Museum of Los Angeles County.

LITERATURE CITED

ADAMS, H. & A. ADAMS. 1853. The genera of Recent Mollusca arranged according to their organization. London: John Van Voorst; Vol. 1, 484 pp.; Vol. 2, 661 pp.; Vol. 3, 138 pl. [Dating of parts, Vol. 2, p. 661].

ALDRICH, T. H. 1911. New Eocene fossils from the southern Gulf States. Bulletins of American Paleontology 5:1–24, pl. 1–4.

ANDERSON, F. M. 1902. Cretaceous deposits of the Pacific Coast. California Academy of Sciences, Proceedings, Series 3, 2:1–154, pl. 1–12.

ANDERSON, F. M. 1938. Lower Cretaceous deposits in California and Oregon. Geological Society of America, Special Papers 16:339 pp., 84 pl.

ANDERSON, F. M. 1958. Upper Cretaceous of the Pacific Coast. Geological Society of America, Memoir 71:378 pp., 75 pl.

BENTSON, H. 1940. A systematic study of the fossil gastropod *Exilia.* University of California Publications, Department of Geological Sciences, Bulletin 25:199–238, pl. 1–3.

BERRY, S. S. 1910. Review of: Report on a collection of shells from Peru, with a summary of the littoral marine Mollusca of the Peruvian Zoological province. By W. H. Dall. The Nautilus 23:130–132.

BOURY, E. DE. 1909. Catalogue des sou-genres de Scalidae. Journal de Conchyliologie 57:255–258.

CONRAD, T. A. 1848. Observations on the Eocene Formation, and descriptions of one hundred and five new fossils of that period, from the vicinity of Vicksburg, Mississippi. Academy of Natural Sciences of Philadelphia, Journal, Series 2, 1 (pt. 2):111–134, pl. 11–14.

CONRAD, T. A. 1855. Description of one Tertiary and eight new Cretaceous fossils from Texas. Academy of Natural Sciences of Philadelphia, Proceedings 7:268–269.

CONRAD, T. A. 1858. Observations on a group of Cretaceous fossil shells, found in Tippah County, Mississippi, with descriptions of fifty-six new species. Academy of Natural Sciences of Philadelphia, Journal, Series 2, 3:323–336, pl. 34–35.

CONRAD, T. A. 1860. Descriptions of new species of Cretaceous and Eocene fossils of Mississippi and Alabama. Academy of Natural Sciences of Philadelphia, Journal, Series 2, 4:275–298, 2 pl.

COSSMANN, MAURICE. 1896. Essais de Paléoconchologie Comparée. Paris. Vol. 2, 176 pp., 8 pl.

COSSMANN, MAURICE. 1901. Essais de Paléoconchologie Comparée. Paris. Vol. 4, 293 pp., 10 pl.

COSSMANN, MAURICE. 1904. Essais de Paléoconchologie Comparée. Paris. Vol. 6, 151 pp., 9 pl.

COSSMANN, MAURICE. 1912. Essais de Paléoconchologie Comparée. Paris. Vol. 9, 215 pp., 10 pl.

COX, L. R. 1931. *Sycostoma,* a renamed genus of lower Tertiary Gastropoda. Malacological Society of London, Proceedings 19:291.

CUVIER, GEORGES. 1797. Tableau élémentaire de l'histoire naturelle des animaux. Paris. 710 pp., 13 pl.

DA COSTA, E. M. 1778. Historia naturalis testaceorum Britanniae, or, the British Conchology. London. 254 pp., 17 pl.

DAILEY, D. H. & W. P. POPENOE. 1966. Mollusca from the Upper Cretaceous Jalama Formation, Santa Barbara County, California. University of California Publications in Geological Sciences, Vol. 65:41 pp., 6 pl., 3 text-fig.

DALL, W. H. 1907. Notes on some Upper Cretaceous Volutidae, with descriptions of new species and a revision of the groups to which they belong. Smithsonian Miscellaneous Collections, Vol. 50, No. 1704, 22 pp., 10 fig.

DALL, W. H. 1919. Descriptions of new species of mollusks of the family Turritidae from the west coast of America and adjacent regions. United States National Museum, Proceedings 56(2288):86 pp., 24 pl.

DURHAM, J. W. 1937. Gastropods of the family Epitoniidae from Mesozoic and Cenozoic rocks of the West Coast of North America, including one new species by F. E. Turner and one by R. A. Bramkamp. Journal of Paleontology 11: 479–512, pl. 56–57.

ERICKSON, J. M. 1974. Revision of the Gastropoda of the Fox Hills Formation, Upper Cretaceous (Maestrichtian) of North Dakota. Bulletins of American Paleontology 66:131–253, pl. 14–20.

FORBES, E. 1852. On the marine Mollusca discovered during the voyages of the *Herald* and the *Pandora,* by Capt. Kellett, R.N., and Lieut. Wood, R.N. Zoological Society of London, Proceedings for 1850, pp. 270–274, pl. 9, 11.

GABB, W. M. 1860. Descriptions of some new species of Cretaceous fossils. Academy of Natural Sciences of Philadelphia, Journal, Series 2, 4:299–305, pl. 47–48.

GABB, W. M. 1864. Description of the Cretaceous fossils. California Geological Survey, Palæontology 1:57–243, pl. 9–32.

GABB, W. M. 1868. An attempt at a revision of the two families Strombidae and Aporrhaidae. American Journal of Conchology 4:137–149, pl. 13–14.

GABB, W. M. 1869. Cretaceous and Tertiary fossils. California Geological Survey, Palæontology, Vol. 2, 299 pp., 36 pl.

GABB, W. M. 1877. Notes on American Cretaceous fossils, with descriptions of some new species. Academy of Natural Sciences of Philadelphia, Proceedings 28:276–324, pl. 17.

GARDNER, J. A. 1916. Systematic paleontology, Mollusca. Pp. 371–733, pl. 12–35. *In*: W. B. Clark, Upper Cretaceous. Maryland Geological Survey.

GARDNER, J. A. & E. BOWLES. 1934. Early Tertiary species of gastropods from the Isthmus of Tehuantepec. Washington Academy of Sciences, Journal 24:241–248.

GARDNER, J. S. 1875. On the Gault Aporrhaidae. The Geological Magazine, New Series, Decade II, 2:49–56, pl. 3; 124–130, pl. 5; 198–203, pl. 6; 291–298, pl. 7; 392–400, pl. 12.

GARDNER, J. S. 1876. On Cretaceous Gasteropoda.—Family Scalidae. The Geological Magazine, New Series, Decade II, 3:105–114, pl. 3–4.

GARVIE, C. L. 1991. Two new species of Muricinae from the Cretaceous and Paleocene of the Gulf Coastal Plain, with comments on the genus *Odontopolys* Gabb, 1860. Tulane Studies in Geology and Paleontology 24:87–92, 1 pl.

GARVIE, C. L. 1992. A second Cretaceous muricid from the Gulf Coastal Plain. Tulane Studies in Geology and Paleontology 25:187–190, 1 text-fig.

GEINITZ, H. B. 1849. Das Quadersandstein oder Kreidegebirge in Deutschland. Freiburg. 293 pp., 12 pl.

GILL, T. 1871. Arrangement of the families of mollusks. Prepared for the Smithsonian Institution. Smithsonian Miscellaneous Collections 227, xvi + 49 pp.

GIVENS, C. R. 1974. Eocene molluscan biostratigraphy of the Pine Mountain area, Ventura County, California. University of California Publications in Geological Sciences 109: 107 pp., 11 pl., 7 text-fig.

GIVENS, C. R. 1979. The Gastropoda genus *Volutocristata* Gardner and Bowles (Eocene; California, Mexico): a synonym of *Lyrischapa* Aldrich (Eocene; Gulf Coast). Tulane Studies in Geology and Paleontology 15(4):117–127, 4 pl.

GMELIN, J. F. 1791. Caroli a Linné Systema naturae per regna tria naturae. Editio decima tertia. Leipzig ("Lipsiæ"), Germany, Vol. 1, pt. 6, cl. 6, Vermes, pp. 3021–3910.

GOLDFUSS, G. A. 1844. Petrefacta Germiniae. Düsseldorf, Vol. III (8):i–iv + 1–128, pl. 166–200.

GRAY, J. E. 1850. Systematic arrangement of the figures. Pp. 63–124. *In:* M. E. Gray, 1850. Figures of molluscous animals selected from various authors; etched for the use of students. London: Longman, Brown, etc., Vol. 4:219 pp.

GRAY, J. E. 1853. On the division of ctenobranchous gasteropodous Mollusca into larger groups and families. Annals and Magazine of Natural History, Series 2, 11:124–133, 10 figs.

GROSSOUVRE, A. DE. 1889. Sur le terraine Crétacé dans le Sud-Ouest du basin de Paris. Société Géologique de France, Bulletin, Series 3, 17(1888–1889):475–525, pl. 11–12.

HAGGART, J. W. 1986. Stratigraphy of the Redding Formation of North-central California and its bearing on Late Cretaceous paleogeography. Pp. 161–178, 6 figs. *In:* P. L. Abbott (ed.), Cretaceous stratigraphy western North America. Society of Economic Paleontologists and Mineralogists, Pacific Section, Book 46.

HAGGART, J. W. 1991. A new lower Turonian (Cretaceous) Mollusc fauna from the Nanaimo Group of southwestern British Columbia, Canada. Geological Society of America, Abstracts with Programs 1991 Annual Meeting, p. A161.

HALL, J. & F. B. MEEK. 1856. Descriptions of new species of fossils, from the Cretaceous formations of Nebraska, with observations upon *Baculites ovatus* and *B. compressus,* and the progressive development of the septa in baculites, ammonites, and scaphites. American Academy of Arts and Sciences, Memoir 5(5):379–411, pl. 1–8.

HARBISON, ANNE. 1945. Upper Cretaceous mollusks of the Ripley Formation near Dumas, Mississippi. Academy of Natural Sciences of Philadelphia, Proceedings 97:75–92, pl. 1–6.

HARRIS, G. F. & H. W. BURROWS. 1891. The Eocene and Oligocene beds of the Paris Basin. Geologist's Association. 129 pp.

HAYAMI, I. & T. KASE. 1977. A systematic survey of the Paleozoic and Mesozoic Gastropoda and Paleozoic Bivalvia from Japan. University of Tokyo, University Museum Bulletin 13:156 pp., 11 pl.

HOLZAPFEL, G. H. E. 1887–1889. Die Mollusken der Aachener Kriede. Palaeontographica 34:29–180, pl. 4–21 (1887–1888); 35:139–268, pl. 8–29 (1889).

JONES, D. L., W. V. SLITER & W. P. POPENOE. 1978. Mid-Cretaceous (Albian to Turonian) biostratigraphy of northern California. Muséum d'Histoire Naturelle de Nice, Annales, Tome IV-1976:xxii.1–xxii.13, 2 pl., 7 fig.

LAMARCK, J. B. P. A. DE M. DE. 1812. Extrait de cours de zoologie de Muséum d'Histoire naturelle sur les animaux, invertébrés, présentant la distribution et la classification de ces animaux, les caractères des principales divisions, et une simple list des genres, à l'usage de ceux qui suivent ce cours. Paris. 127 pp.

LAMARCK, J. B. P. A. DE M. DE. 1822. Histoire naturelle des Animaux sans vertèbres. Paris. Vol. 6, pt. 2, 232 pp.

LINNAEUS, C. 1758. Systema naturae per regna tria naturae.

Editio decima, refornata. Stockholm, Vol. 1, Regnum animale. 824 pp.

MATSUMOTO. T. 1960. Upper Cretaceous ammonites of California, Part III. Kyushu University, Faculty of Science, Memoirs, Series D, Geology, Special Volume 2:204 pp., 2 pl., 20 text-fig.

MEEK, F. B. 1864. Check list of the invertebrate fossils of North America. Cretaceous and Jurassic. Smithsonian Miscellaneous Collection, 7(177):40 pp.

MERRIAM, C. W. 1941. Fossil turritellas from the Pacific Coast region of North America. University of California Publications, Department of Geological Sciences, Bulletin 26:1–214, pl. 1–41, 19 text-fig., 1 map.

D'ORBIGNY, A. 1842–1847. Description des animaux invertébrés; 2 Gastéropodes. Paléontologie française, terrain Crétacé, Series 1, 2:456 pp., pl. 149–236.

PACKARD, E. L. 1916. Faunal studies in the Cretaceous of the Santa Ana Mountains of Southern California. University of California Publications, Department of Geology, Bulletin 9:137–159.

PACKARD, E. L. 1922. New species from the Cretaceous of the Santa Ana Mountains, California. University of California Publications, Department of Geological Science, Bulletin 13: 413–462, pl. 24–38.

PILSBRY, H. A. & A. A. OLSSON. 1954. Systems of the Volutidae. Bulletins of American Paleontology 35:276–306, pl. 25–28.

PONDER, W. F. & A. WARÉN. 1988. Appendix. Classification of the Caenogastropoda and Heterostropha—a list of the family-group names and higher taxa. Pp. 288–328. *In:* W. F. Ponder (ed.), Prosobranch Phylogeny. Malacological Review, Supplement 4.

POPENOE, W. P. 1942. Upper Cretaceous formations and faunas of Southern California, American Association of Petroleum Geologists, Bulletin 26:162–187, 4 text-fig.

POPENOE, W. P. & L. R. SAUL. 1987. Evolution and classification of the Late Cretaceous-Early Tertiary gastropod *Perissitys*. Los Angeles County Natural History Museum, Contributions in Science 380:37 pp., 182 fig.

POPENOE, W. P., L. R. SAUL & T. SUSUKI. 1987. Gyrodiform gastropods from the Pacific Coast Cretaceous and Paleocene. Journal of Paleontology 61:70–100, 7 fig.

RAFINESQUE, C. S. 1815. Analyses de la nature ou tableau de l'universe et des corps organises. Palermo. 224 pp.

RENNIE, J. V. L. 1930. New Lamellibranchia and Gastropoda from the Upper Cretaceous of Pondoland, with an appendix on some species from the Cretaceous of Zululand. South African Museum, Annals 28:159–260, pl. 16–31.

RÖDING, P. F. 1798. Museum Boltenianum sive Catalogus cimeliorum e tribus regnis naturæ: Pars secunda continens Conchylia sive Testacea univalvia, bivalvia & multivalvia. Hamburg, Johan Christi Trappii, i–vii + 109 pp. (Reprint of 1986 by American Malacological Union, Inc.)

ROLLE, F. 1861. Über einige neue oder wenig gekannte Mollusken-Arten aus Sekundär-Ablagerungen. Kaiserlichen Akademie Wissenschaften, Vienna, Mathematisch-Naturwissenschaftliche Classe, Sitzungsberichte. 42:261–279, 1 pl.

SAUL, L. R. 1987. New Late Cretaceous and early Tertiary Perissityidae (Gastropoda) from the Pacific Slope of North America. Los Angeles County Natural History Museum, Contributions in Science 400:25 pp., 128 fig.

SAUL, L. R. 1988. Latest Cretaceous and Early Tertiary Tudiclidae and Melongenidae (Gastropoda) from the Pacific Slope of North America. Journal of Paleontology 62:880–889, 4 fig.

SAUL, L. R. & D. J. BOTTJER. 1982. Late Cretaceous megafossil locality map, northern Santa Ana Mountains, California. Pp. 77–79, 3 maps. *In:* D. J. Bottjer, I. P. Colburn & J. D. Cooper (eds.), Late Cretaceous Depositional Environments and Paleogeography, Santa Ana Mountains, Southern California. Society of Economic Paleontologists & Mineralogists, Pacific Section, Annual Convention field guidebook & volume.

SMITH, J. P. 1900. The development and phylogeny of *Placenticeras*. California Academy of Sciences, Proceedings, Series 3, 1:181–240, pl. 24–28.

SOHL, N. F. 1960. Archaeogastropoda, Mesogastropoda, and stratigraphy of the Ripley, Owl Creek, and Prairie Bluff Formations. United States Geological Survey, Professional Paper 331A:1–152, pl. 1–18.

SOHL, N. F. 1964. Neogastropoda, Opisthobranchia, and Basommatophora from the Ripley, Owl Creek, and Prairie Bluff Formations. United States Geological Survey, Professional Paper 331B:iv + 153–344, pl. 19–52, fig. 12–18.

SOHL, N. F. 1967. Upper Cretaceous gastropods from the Pierre Shale at Red Bird, Wyoming. United States Geological Survey, Professional Paper 393B:46 pp., 11 pl.

SOHL, N. F. & H. A. KOLLMANN. 1985. Cretaceous actaeonellid gastropods from the Western Hemisphere. United States Geological Survey, Professional Paper 1304:104 pp., 23 pl., 45 fig.

STADUM, C. J. 1973. A student guide to Orange County fossils. Chapman College Press: Orange, California. 64 pp., 7 pl.

STANTON, T. W. 1893. The Colorado Formation and its invertebrate fauna. United States Geological Survey, Bulletin 106:288 pp., 45 pl.

STANTON, T. W. 1895. Contributions to the Cretaceous paleontology of the Pacific Coast. The faunas of the Knoxville beds. United States Geological Survey, Bulletin 133:132 pp., 20 pl.

STEPHENSON, L. W. 1923. The Cretaceous Formations of North Carolina. Part I. Invertebrate fossils of the Upper Cretaceous Formations. North Carolina Geological and Economic Survey 5:xii + 604 pp., 102 pl., 6 fig.

STEPHENSON, L. W. 1936. Geology and paleontology of the Georges Bank canyons; Pt. 2, Upper Cretaceous fossils from Georges Bank (including species from Banquereau, Nova Scotia). Geological Society of America, Bulletin 47:367–410, 5 pl.

STEPHENSON, L. W. 1941. The larger invertebrate fossils of the Navarro Group of Texas. University of Texas Publication 4101:641 pp., 95 pl.

STEPHENSON, L. W. 1952. Larger Invertebrate fossils of the Woodbine Formation (Cenomanian) of Texas. United States Geological Survey, Professional Paper 242:226 pp., 59 pl.

STEWART, R. B. 1927. Gabb's California fossil type gastropods. Academy of Natural Sciences of Philadelphia, Proceedings 78 (for 1926):287–447, pl. 20–32.

STOLICZKA, F. 1866. Eine Revision der Gastropoden der Gosauschichten en den Ostalpen. Königlich Akademie der Wissenschaften, Vienna, Mathematisch-Naturwissenschaftliche Klasse, Sitzungsberichte, Vol. 52, Abteilung 1 (Jahrg. 1865, No. 7):104–223, 1 pl.

STOLICZKA, F. 1867–1868. The Gastropoda. Geological Survey of India, Memoirs, Palæontologia Indica, Series V, Cretaceous fauna of southern India 2:497 pp., 28 pl.

THIELE, J. 1929–1931. Handbuch der Systematischen Weichtierkunde, Vol. 1. Jena: Gustav Fischer. 778 pp., 783 text-fig.

VERMEIJ, G. J. 1991. Generic identity and relationships of the northeastern Pacific buccinid gastropod *Searlesia dira* (Reeve, 1846). The Veliger 34:264–271, 1 fig.

WADE, B. 1916. New genera and species of Gastropoda from the Upper Cretaceous. Academy of Natural Sciences, Philadelphia, Proceedings 68:455–471, pl. 23–24.

WADE, B. 1926. The fauna of the Ripley Formation on Coon Creek, Tennessee. United States Geological Survey, Professional Paper 137:272 pp., 72 pls., 2 text-fig.

WEAVER, C. S. & J. E. DU PONT. 1970. Living volutes. A monograph of the Recent Volutidae of the world. Delaware Museum of Natural History. Monograph 1:375 pp., 79 pl.

WEBSTER, M. L. 1983. New species of *Xenophora* and *Anchura* (Mollusca: Gastropoda) from the Cretaceous of Baja California Norte, Mexico. Journal of Paleontology 57:1090–1097, 3 figs.

WELLER, S. 1907. A report on the Cretaceous Paleontology of New Jersey. New Jersey Geological Survey, Paleontology Series, 4:871 pp., 111 pls.

WENZ, W. 1938–1944. Gastropoda. Handbuch der Paläozoologie, O. H. Schindewolf (ed.), Band 6:1639 pp., 4311 figs.

WHITE, C. A. 1889. On invertebrate fossils from the Pacific Coast. United States Geological Survey, Bulletin 51:102 pp., 14 pl.

WHITEAVES, J. F. 1903. On some additional fossils from the Vancouver Cretaceous, with a revised list of species therefrom. Canada Geological Survey, Mesozoic Fossils, 1:309–415, pl. 40–51.

WRIGLEY, A. 1927. Notes on English Eocene Mollusca with descriptions of new species. Malacological Society of London, Proceedings 17:216–249, pl. 33–35, fig. 1–27.

YABE, H. & T. NAGAO. 1925. New or little-known Cretaceous fossils from north Saghalin (Lamellibranchiata and Gastropoda). Tohoku Imperial University, Science Reports, Series 2, 7:111–124, pl. 28–29.

YABE, H. & T. NAGAO. 1928. Cretaceous fossils from Hokkaidô: Annelida, Gastropoda and Lamellibranchiata. Tôhoku Imperial University, Science Reports, Series 2 (Geology), 9:77–96, pl. 16–17.

ZEKELI, F. 1852. Die Gastropoden der Gosaugebilde. Kaiserlichen Geologischen Reichsanstalt, Vienna, Abhandlungen 1, Abtheilung 2, No. 2:124 pp., 24 pl.

ZINSMEISTER, W. J. 1977. First occurrence of *Volutocorbis* Dall in the Tertiary of western North America and a review of the subgenus *Retipirula* Dall (Mollusca: Gastropoda). Journal of Paleontology 51:177–180, 2 text-figs.

ZINSMEISTER, W. J. 1983. New late Paleocene molluscs from the Simi Hills, Ventura County, California. Journal of Paleontology 57:1282–1304, 4 fig.

LOCALITIES CITED

CIT and UCLA localities have been given LACMIP numbers. Most of the CIT localities of Turonian age in the Redding area were plotted on JONES *et al.* (1978:fig. 5). Most of the CIT localities of the northern Santa Ana Mountains were plotted on POPENOE (1942:fig. 2); these and UCLA localities were plotted on SAUL & BOTTJER (1982:maps 1–3). Many of the localities discussed in MATSUMOTO (1960) are also plotted therein.

Frazier Corners was almost a mile (1.6 km) northwest of Bella Vista on the Redding (30′) quadrangle, 1901 edition, reprinted 1913 and 1928, and also on the Shasta National Forest, California map of 1948. The Frazier Siltstone Member derives its name from Frazier Corners (HAGGART, 1986), and it serves as a reference point in several locality descriptions. However, on the Millville (15′) quadrangle, 1953, and the Bella Vista (7.5′) quadrangle, 1965, Bella Vista has been moved and replaces Frazier Corners.

82 CIT: = LACMIP 8195.

84 CIT: = LACMIP 10886.

92 CIT: = LACMIP 10100.

445 CASG: Fossils from Forty-nine mine, 2 miles (3.2 km) south of Phoenix, Jackson Co., Oregon. Hornbrook Formation. Late Turonian. (MATSUMOTO, 1960:77).

1001 CIT: = LACMIP 10789.

1032 CIT: = LACMIP 10726.

1042 CIT: = LACMIP 10876.

1065 CIT: = LACMIP 10891.

1164 CIT: = LACMIP 10079.

1195 CIT: (= UCLA 4416; LACMIP 10778) In bed of Stinking Creek, about midway between two north–south wire fences across creek, 2600′N, 1100′E of SE cor. sec. 6, T32N, R3W, Redding (1946) Quadrangle, Shasta Co., California. Coll.: Popenoe and Ahlroth, 21 June 1936. Redding Formation, Bellavista Sandstone Member. Early Turonian. (MATSUMOTO, 1960:104; POPENOE *et al.*, 1987:99).

1197 CIT: (= LACMIP 10776) Block of sandstone crowded with *Pugnellus manubriatus* picked up from stream bed of Stinking Creek, just downstream from first fence across creek upstream from the creek mouth, 4050′N, 44°W of SE cor. [2250′S, 2000′E of NW cor.] sec. 6, T32N, R3W, Redding (1946) Quadrangle, Shasta Co., California. Coll.: Popenoe & Ahlroth, 21 June 1936. Redding Formation, Bellavista Sandstone Member. Turonian. (JONES *et al.*, 1978:fig.5).

1203 CIT: (= LACMIP 10769) lens in sandstone cropping out in bed of Dry Creek, 700′S, 300′W of NE cor. sec. 6, T32N, R3W, Millville Quadrangle, Shasta Co., California. Coll.: Popenoe and Ahlroth, 23 June 1936. Redding Formation, near middle of Bellavista Sandstone Member. Turonian.

1207 CIT: = LACMIP 10810.

1209 CIT: = LACMIP 10771.

1212 CIT: (= LACMIP 10735) Little Cow Creek, Millville Quadrangle, Shasta Co., California.

1255 CIT: (= LACMIP 10744) French Creek north of Swede Basin.

1264 CIT: (= LACMIP 10759) Massive brown sandstone cropping out in bed of small gully tributary

to Little Cow Creek, approx. 1805'S, 2250'E of NW cor. sec. 9, T32N, R3W, Millville Quadrangle, Shasta Co., California. Coll.: W. P. Popenoe, 12 April 1937. Redding Formation, base of Melton Sandstone Member. Turonian. (MATSUMOTO, 1960:105).

1293D CASG: = CASG 61934.

1346 CIT: = LACMIP 10754.

1438 CIT: Highest sandstone bed under lava in gully on N side of Little Cow Creek, about ¼ mile (0.4 km) NE of Wilsey Ranch House, near NE cor. SW ¼ sec. 31, T33N, R2W, Millville Quadrangle, Shasta Co., California. Coll.: W. P. Popenoe, 19 March 1940. Redding Formation, Bellavista Sandstone Member. Turonian.

1446 CIT: (= LACMIP 10764) Near top of N slope of hillside SE of Alturas-Redding Hwy, S side Woodman Creek, 2250'S, 500'W of NE cor. sec. 35, T33N, R3W, Millville Quadrangle, Shasta Co., California. Coll.: W. P. Popenoe, 23 March 1940. Redding Formation, Bellavista Sandstone Member. Turonian. (POPENOE *et al.,* 1987:99).

1552 CASG: South side of Antelope Valley, north end of Shale Hills, 500'W of center sec. 28, T26S, R18E, Kern Co., California. Coll.: G. D. Hanna and S. H. Shaw, April 1929. Panoche Formation. Late Campanian-early Maastrichtian. (MATSUMOTO, 1960:80).

1622 CIT: = LACMIP 10903.

2209 UCBMP: ?Sucia Island, San Juan Co., Washington. Cedar District Formation. Campanian.

2325 UCLA: Small gully entering Silverado Canyon from S, just W of the narrows, directly S of Holz Ranch house, about 1025'N, 150'E of SW cor. sec. 8, T5S, R7W, El Toro Quadrangle, Santa Ana Mts., Orange Co., California. Coll.: W. P. Popenoe, 1946. Ladd Formation, top of Baker Canyon Sandstone. Turonian.

2360 CASG: "Devils Gate" on Berryessa Creek, 12,000 feet (3700 m) below top of Chico Group on Hamilton Ranch, near top of big conglomerate, Napa Co.?, California. Possibly Venado Formation. Turonian.

2757 USGS: Silverado Canyon, near mouth of Ladd Canyon, Santa Ana Mts., Orange Co., California. Coll.: S. Bowers, 23 April 1903. Ladd Formation, upper Baker Canyon Sandstone Member. Turonian.

2759 USGS: Near Silverado Canyon, in lower part of Ladd Canyon, Santa Ana Mts., Orange Co., California. Coll.: S. Bowers, 24 April 1903. Ladd Formation, upper Baker Canyon Sandstone Member. Turonian.

4214 UCLA: Soft thin-bedded sandstone exposed in channel of Little Cow Creek, SE cor. sec. 35, T33N, R3W, Millville Quadrangle, Shasta Co., California. Coll.: W. P. Popenoe, 2 September 1959. Redding Formation, Frazier Siltstone Member. Turonian.

4235 UCLA: Dip slope of Baker Canyon Sandstone on Black Star Quadrangle, cropping out about 0.3 mile (0.5 km) NW of old Holz Ranch house, 2600'N, 700'W of SE cor. sec. 7, T5S, R7W, El Toro Quadrangle, Santa Ana Mts., Orange Co., California. Ladd Formation, Baker Canyon Sandstone Member. Late Turonian.

4252 UCLA: Banks of irrigation ditch at about 2450 foot (750 m) elev., W of and above SP RR tracks, W side of Bear Creek Valley, 2.8 mile (4.5 km) SE of Normal School Campus at Ashland, approx. 3100'N, 500'E of SW cor. sec. 24, T39S, R1E, Ashland Quadrangle, Jackson Co., Oregon. Coll.: W. P. Popenoe, 19 May 1944. Hornbrook Formation. Turonian.

5422 UCLA: Rancheria Gulch, about 1 mile (1.6 km) W of Henley, and approx. 400'N, 2000'W of SE cor. sec. 19, T47N, R6W, Yreka 30' Quadrangle (1939), Siskiyou Co., California. Coll.: W. P. Popenoe, summer 1951. Hornbrook Formation, Osburger Gulch Member. Turonian.

7199 UCLA: between Fremont Canyon and Oak Flat along a south fork of Fremont Canyon at about 1860 foot (570 m) elev., 350'N, 1050'E of SW cor. sec. 7, T4S, R7W, Black Star Canyon Quadrangle, northern Santa Ana Mts., Orange Co., California. Coll.: W. P. Popenoe and J. E. Schoelhammer, 28 November 1952. Willams Formation, Pleasants Sandstone Member. Campanian.

7233 UCLA: Sulphur Creek, hard sandstone about 500 feet (150 m) upstream from abandoned cabin on east side of creek, NE ¼, SW ¼ (2500'N, 1750'E of SW cor.) sec. 23, T32N, R5W, Redding Quadrangle (1946), Shasta Co., California. Coll.: P. U. Rodda, summer 1956. Redding Formation, Bellavista Sandstone Member. Turonian.

7787 UCR: South side Silverado Canyon, elev. approx. 1340 feet (400 m), stream drainage directly below UCR loc. 7785, SW ¼, SW ¼ sec. 8, T5S, R7W, El Toro Quadrangle (1949), Santa Ana Mts., Orange Co., California. Coll.: Geol. 110 class, 8 November 1975. Ladd Formation, lower Holz Shale. Turonian.

7788 UCR: South side Silverado Canyon, elev. approx. 1370 feet (420 m), concretions in next stream drainage to south of UCR 7787 that leads to Silverado Creek, SW ¼, SW ¼ sec. 8, T5S, R7W, El Toro Quadrangle (1949), Santa Ana Mts., Orange Co., California. Coll.: Geol. 110 class, 8 November 1975. Ladd Formation, lower Holz Shale. Turonian.

8195 LACMIP: (= CIT 82) Limey sandstone bed near base of shale, S of roadcut at Holz Ranch

(locality may become obscured by slides), Silverado Canyon [E edge SE ¼, SE ¼ sec. 7, T5S, R7W, El Toro Quadrangle], Santa Ana Mts., Orange Co., California. Coll.: B. N. Moore, 1927. Ladd Formation, Holz-Baker Canyon transition. Turonian.

10079 LACMIP: (= CIT 1164) S side Silverado Canyon near mouth of small N-flowing gully, and at top of lower fossiliferous sandstone series, about 400 feet (120 m) SE of Holz Ranch house in SE cor. sec. 7, T5S, R7W [1025'N, 150'E of SW cor. sec. 8], T5S, R7W, El Toro Quadrangle, Santa Ana Mts., Orange Co., California. Coll.: W. P. Popenoe, 15 May 1935. Ladd Formation, Baker Canyon Sandstone Member. Turonian.

10100 LACMIP: (= CIT 92) Concretions in shale 100 feet (30 m) above stream and near fence on N side of Harding canyon, about ¼ mile (0.4 km) N of road fork in Santiago Canyon at Modjeska Canyon junction [near section line NW ¼, NW ¼ sec. 28, T5S, R7W, Santiago Peak Quadrangle] Santa Ana Mts., Orange Co., California. Coll.: B. N. Moore, 1928. Ladd Formation, basal Holz Shale Member. Turonian.

10726 LACMIP: (= CIT 1032) Shale outcrop on left bank of Dry Creek, E of road, 1.3 mile (2 km) N of Frazier's Corners, 1500'N of SE corner sec. 5, T32N, R3W, Millville Quadrangle, Shasta Co., California. Coll.: W. P. Popenoe, 1933. Redding Formation, Frazier Silt. Turonian.

10735 LACMIP: (= CIT 1212) Little Cow Creek, approx. 2 mile (3.2 km) NE of Frazier's Corners, hard sandy concretions in shale, banks of gullies in pasture about 2500'N, 750'W of SE cor. sec. 4, T32N, R3W, Millville Quadrangle, Shasta Co., California. Coll.: Popenoe and Ahlroth, 7 July 1936. Redding Formation, Frazier Siltstone Member. Turonian. JONES *et al.* (1978:fig. 5).

10744 LACMIP: (= CIT 1255) W bank French Creek about ½ mile (0.8 km) N of Swede Basin, 600'N, 600'E of SW cor. sec. 33, T33N, R2W, Millville Quadrangle, Shasta Co., California. Coll.: W. P. Popenoe, 12 April 1937. Redding Formation, Bellavista Sandstone Member. Turonian.

10754 LACMIP: (= CIT 1346) Sandstone nodules in shale, left bank of Little Cow Creek, about 75 yards (70 m) NE (upstream) from intersection of creek bed with S line of sec. 9, and about ¼ mile (0.4 km) downstream from Walter Melton farmhouse, 10 mile (16 km) NE of Redding, 1500'N, 2200'E of SE cor. sec. 9, T32N, R3W, Millville Quadrangle, Shasta Co., California. Coll.: W. P. Popenoe and Jane Hoel, 8 July 1937. Redding Formation, Melton Sandstone Member. Turonian.

10771 LACMIP: (= CIT 1209) Oyster bed on left bank Salt Creek, about ½ mile (0.8 km) N of gravel pits N of Alturas-Redding Hwy (U.S. 299), 1650'S, 1200'W of NE cor. sec. 34, T33N, R3W, Millville Quadrangle, Shasta Co., California. Coll.: Popenoe and Ahlroth, 27 June 1936. Redding Formation, Bellavista Sandstone Member. Turonian.

10789 LACMIP: (= CIT 1001) West side of U.S. 99, 4.0 mile (6.4 km) by road N of Hwy 99 bridge just N of Redding over Sacramento River, sec. 7, T32N, R4W, Redding (1946) Quadrangle, Shasta Co., California. Coll.: W. P. Popenoe and D. W. Scharf, 15 July 1931. Redding Formation, Bellavista Sandstone Member. Turonian.

10810 LACMIP: (= CIT 1207) Right side of Dry Creek, at Bellavista-Sherman Rd. crossing and 2.3 road miles (3.7 km) N of Redding-Alturas Hwy (U.S. 299) 2700'N, 50'W of SE cor. sec. 31, T33N, R3W, Millville Quadrangle, Shasta Co., California. Coll.: Popenoe and Ahlroth, 26 June 1936. Redding Formation, Bellavista Sandstone Member. Turonian.

10876 LACMIP: (= CIT 1042) Limey lenses in sandstone cropping out on N bank of Rancheria Gulch, about 1.5 mile (2.4 km) W of Henley, 210'S, 800'E of NW cor. sec. 30, T47N, R6W, Hornbrook Quadrangle, Siskiyou Co., California. Coll.: Popenoe and Findlay, 8 September 1933. Hornbrook Formation, Osburger Gulch Sandstone Member. Turonian.

10886 LACMIP: (= CIT 84) Sandstone above basal conglomerate. SW cor. of NE ¼ sec. 34, T5S, R7W, Santiago-Trabuco divide, Santa Ana Mts., Orange Co., California. Coll.: B. N. Moore, 1926. Ladd Formation, Baker Canyon Sandstone Member. Turonian.

10891 LACMIP: (= CIT 1065) Sandstone overlying basal Upper K conglomerate, from crest of scarp on W side of Ladd Canyon, about 0.6 mile (1 km) N of juncture of Ladd and Silverado canyons [1300'S, 300'E of NW cor. sec. 8, T5S, R7W, Black Star Canyon Quadrangle], Santa Ana Mts., Orange Co., California. Coll.: W. P. Popenoe, 3 March 1933. Ladd Formation, Baker Canyon Sandstone Member. Turonian.

10903 LACMIP (= CIT 1622): Soft gray sandstones cropping out along irrigation ditch 150–200 feet (46–61 m) above and to SW of Southern Pacific RR tracks about 4.0 mile (6.4 km) SE of U.S. Hwy 99 bridge over Ashland Creek, near midpoint of W boundary sec. 24, T39S, R1E, Ashland Quadrangle, Ashland, Jackson Co., Oregon. Coll.: W. P. Popenoe and W. A. Findley, 12 September 1933. Hornbrook Formation, Osburger Gulch Sandstone Member. Turonian.

15295 LACMIP: South side of Silverado Canyon near mouth of small N-flowing gully, about 400 feet

(120 m) SE of Holz ranch house, 1025'N, 150'E of SW cor. sec. 8, T5S, R7W, El Toro Quadrangle, Santa Ana Mts., Orange Co., California. Coll.: Robert Drachuk, 1979. Ladd Formation, top of Baker Canyon Sandstone Member. Turonian.

61934 CASG: (= CASG 1293D) Near Frazier Corners, SW ¼ sec. 4, T32N R3W, Millville Quadrangle, Shasta Co., California. Coll.: C. M. Cross. Redding Formation, Frazier Siltstone Member. Turonian.

61935 CASG: (= CASG 1294-A): 4.6 miles (7.4 km) north of bridge at Redding, near the State highway, on "Sand Flat," Shasta Co., California. Coll.: F. M. Anderson. Redding Formation, Bellavista Sandstone Member. Turonian.

66549 CASG: Hagerdorn Ranch, 4 mile (6.4 km) NW of Montague, Siskiyou Co., California. Hornbrook Formation, probably Osburger Gulch Sandstone Member. Turonian.

85511 GSC: Hamley Point, Sydney Island, lat. 48°36'05"N, long. 123°16'05"W, British Columbia. Coll.: J. E. Muller, 21 August 1970. Nanaimo Group, near base. Turonian. (POPENOE *et al.*, 1987:100).