LACMIP cat. no. 11564 from LACMIP loc. 10735 (= CIT loc. 1212), Little Cow Creek; LACMIP cat. no. 11565 from LACMIP loc. 10769 (= CIT loc. 1203), Dry Creek, Shasta Co., California; LACMIP cat. no. 11566 from LACMIP loc. 10903 (= CIT loc. 1622), south of Ashland, Jackson Co., Oregon; UW cat. no. 91830 from UW loc. B5900, Sidney Island, British Columbia.

Type locality: CASG loc. 445, Forty-nine mine, two miles (3.2 km) south of Phoenix, Jackson Co., Oregon.

Dimensions: See Table 9.

Distribution: Unnamed formation, Sidney Island (coll. Peter Ward, 3 September 1992), British Columbia; Hornbrook Formation, near Phoenix, Jackson Co., Oregon; Redding Formation, Bellavista Sandstone Member, Frazier Siltstone Member, and Melton Sandstone Member, Redding area, Shasta Co., California.

Geologic age: Turonian.

Remarks: *Drilluta* ***sicca*** resembles *D. distans* (Conrad, 1860) from the Ripley Formation of the Gulf Coast, but the West Coast form is more strongly shouldered. *Drilluta* ***sicca*** is lower spired, has a more prominent shoulder, has fewer, stronger, straighter collabral ribs, and has stronger spiral riblets than *D. jacksonensis*. *Drilluta* ***sicca*** resembles ***Varens anae*** sp. nov. in overall shape, but ***V. anae*** lacks spiral sculpture and has a broad, straight anterior canal whereas that of *D.* ***sicca*** is slender and twisted.

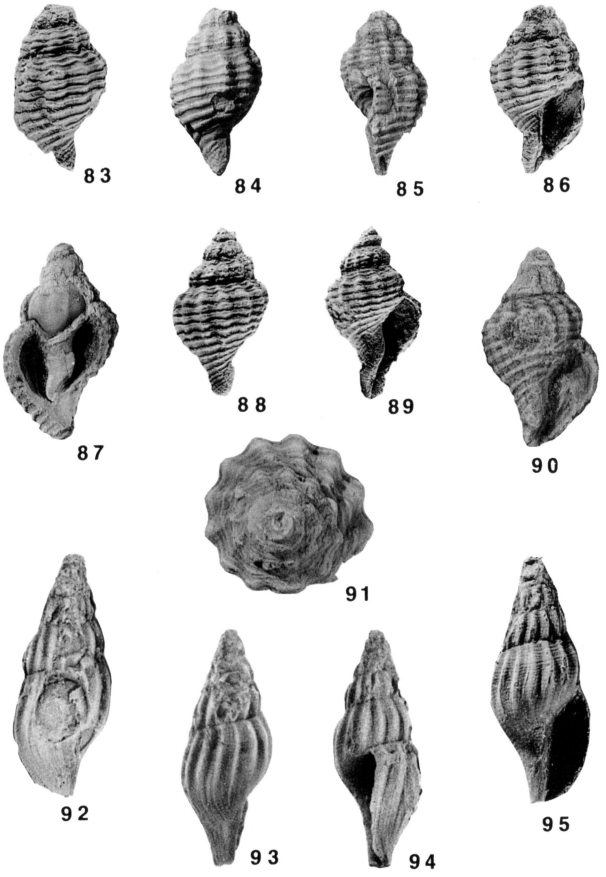
Both *Drilluta* ***sicca*** and *D. jacksonensis* are of late Turonian age at their type locality (MATSUMOTO, 1960:77), but both are also found in the slightly older Bellavista Sandstone Member of the Redding Formation.

Etymology: The specific name refers to the type locality on Dry Creek, ***siccus,*** Latin, meaning dry.

Genus ***Skyles*** Saul & Popenoe, gen. nov.

Type species: ***Skyles salsus*** Saul & Popenoe, sp. nov.

Diagnosis: A medium-sized, broadly fusiform fasciolarid with a moderate spire and broad apical angle; suture impressed and sinuous; last whorl longer than the spire, roundly convex from posterior suture to neck of siphonal canal, constricted basally to form siphonal neck; growth lines and labral profile gently sigmoid, antecurrent at suture, concave aperturally below suture. Sculpture of raised spiral straps and low strong, nearly straight, rounded axial ribs, well developed on posterior half of last whorl. Aperture elliptical with a short, parallel-sided, leftward-bent anterior sinus; inner lip thin, oblique and twisted to the left siphonally, bearing one oblique inconspicuous fold at juncture of canal and aperture; columella twisted to left distally; outer lip thin, transversely lirate at its edge; siphonal fasciole low, broad, enclosing a minute umbilical chink.



Explanation of Figures 83–95

Unless otherwise indicated, figures are ×1; all specimens coated with ammonium chloride.

Figures 83–91. ***Skyles salsus*** sp. nov. Figures 83–86: LACMIP cat. no. 11568 from LACMIP loc. 10735, paratype; Figure 83, aperture; Figure 84, left side; Figure 85, right side; Figure 86, aperture. Figures 87, 90: LACMIP cat. no. 11569 from LACMIP loc. 10735, paratype; back cut away to show columellar fold; Figure 90, aperture. Figures 88, 89, 91: LACMIP cat. no. 11567 from LACMIP loc. 10735, holotype; back view; Figure 89, aperture; Figure 91, apical view, ×2.

Figures 92–94. *Remera* ***vacca*** sp. nov., LACMIP cat. no. 11570 from LACMIP loc. 1446, holotype; Figure 92, back, ×3.5; Figure 93, left side, ×3.5; Figure 94, right side. ×3.5; Figure 95, aperture, ×3.5. Photographs 83, 86, 88, 89, 95 by Susuki; 84, 85, 87, 90–94 by De Leon.

Discussion: ***Skyles*** is similar to *Ornopsis* Wade, 1926 (type species *O. glenni* Wade, 1916, Maastrichtian, Gulf Coast), from which ***Skyles*** differs in having the axial ribs more persistent posteriorly, lacking a concave subsutural band, having coarser, more widely spaced spiral sculpture, and having a shorter siphonal canal. Although the columellar fold of ***Skyles*** is similar to that of *Ornopsis,* the absence of a concave subsutural band in ***Skyles*** gives it a more bucciniform whorl profile.

Table 10

Measurements (mm) of ***Skyles salsus*** sp. nov.

	H	D	Hp	Dp	Ha	A	R	Dp/ Hp
LACMIP 11567	22.4*	12.0	4.0	10.0	9.3	52°	12	2.5
LACMIP 11568	22.0	12.5	4.8	9.8	9.1	62°	11	2.0
LACMIP 11569	26.4	16.0	6.4	11.2	13.0	60°	—	1.8

* Specimen incomplete. Abbreviations decrypted in Introduction.

The genus is named for Scyles, a Scythian king who was beheaded by his brother, and is of masculine gender.

Skyles salsus Saul & Popenoe, sp. nov.

(Figures 83–95)

Diagnosis: As for the genus.

Description: Shell medium sized, broadly fusiform; spire about two-fifths the height of the shell, apical angle 55°; whorls five, evenly convex, about twice as wide as high; suture linear, impressed, and sinuous; last whorl about half as long again as spire, broadly convex from posterior suture to approximately beginning of siphonal canal, thence shallowly concave to anterior tip; growth lines and labral profile gently sigmoid, antecurrent at suture, concave aperturally below suture. Sculpture of evenly spaced, distinct, raised spiral straps separated by interspaces as wide as spirals, numbering 13 or 14 on last whorl, and about 10 low strong nearly straight, rounded axial ribs, well developed on posterior half of whorl, but obsolete on siphonal neck. Aperture elliptical; inner lip covered with a thin callus wash, unevenly excavated parietally, oblique and gently twisted to the left in its siphonal part, bearing one oblique, inconspicuous, laterally compressed fold at juncture of canal and aperture; outer lip incomplete in all specimens at hand, but apparently thin, transversely lirate internally at apertural margin but smooth farther within; columella rather short and twisted to the left distally; siphonal fasciole low, broad, rounded, smooth, enclosing minute umbilical chink.

Holotype: LACMIP cat. no. 11567.

Paratypes: LACMIP cat. nos. 11568–11569 from LACMIP loc. 10735 (= CIT loc. 1212).

Dimensions: See Table 10.

Type locality: LACMIP loc. 10735 (= CIT loc. 1212), Little Cow Creek, two miles (3.2 km) NE of Frazier Corners, Shasta Co., California.

Distribution: Known only from the type locality.

Geologic age: Turonian.

Remarks: ***Skyles salsus*** is described from three specimens. It resembles *Ornopsis glenni* Wade, 1926, the type species of *Ornopsis,* but differs in having the axial ribs persist to the posterior suture, lacking a concave subsutural band, having coarser, more widely spaced and fewer spiral ribs, and having a shorter siphonal canal.

Etymology: The species is named for its type locality on Salt Creek, Latin, ***salsus,*** meaning salted, salty, witty.

Subfamily FUSININAE Wrigley, 1927

Genus *Remera* Stephenson, 1941

Type species: *Remera microstriata* Stephenson, 1941, from the Maastrichtian of the Gulf Coast.

Diagnosis: Medium-sized fusiform shells with the spire more than half total shell height. Whorls flat sided, ornamented by strong collabral ribs and subdued overriding spiral ribbons. Aperture lenticular, angulated posteriorly; siphonal canal moderately long and straight; columella smooth (SOHL, 1964:226).

Discussion: *Remera* is represented by several species from the Gulf and Atlantic coastal plains *Exogyra ponderosa* and *Exogyra cancellata* zones. Specific differentiation within the genus is based, for the most part, on relatively minor differences in convexity of the whorl sides and sinuosity of the collabral ribs, and some species are based upon so little material that comparison is difficult. Some of these species may, with further study, prove to be synonyms (SOHL, 1964:226). *Remera* has not been reported hitherto from the Pacific Coast Cretaceous nor from beds as old as the Turonian.

ERICKSON (1974:207) suggests that *Remera* may be a synonym of *Exilia* Conrad, 1860, type species *Exilia pergracilis* Conrad, 1860, by monotypy, Paleocene, Gulf Coast. STEWART (1927) indicated that *Exilia* has a shallow posterior siphonal notch and placed *Exilia* in the Turridae, where most subsequent workers have left it. BENTSON (1940: 202) was unable to find any indication of a posterior notch and placed it in the Fusininae, but *Exilia* continues to be classed as a brachytomine turrid (*e.g.,* GIVENS, 1974:91). The growth line of *Remera* has a broad posterior sinus like that of other Fusininae. *Remera* has the spire equal to more than half the total shell height, whereas in *Exilia* the spire is relatively shorter, and the aperture is equal to or longer than the spire.

Remera ***vacca*** Saul & Popenoe, sp. nov.

(Figures 92–95)

Diagnosis: A small, short *Remera* with 15 collabral ribs.

Description: Shell small, slender, subfusiform, with rounded whorls and an acute spire; apical angle about 35°;

whorls about six (spire incomplete), gently and evenly convex, wider than high; suture linear and impressed; last whorl slightly less than one-half the height of the shell, evenly but broadly convex, rounding abapically into a straight and rather short anterior canal; growth lines forming a gentle parasigmoid curve, concave on posterior part of body whorl, convex toward aperture anteriorly, aligned nearly with the shell axis. Sculpture of about 15 low, sinuous, round-crested collabral ribs, and numerous, fine, irregularly spaced, incised spiral lines; collabral sculpture dying out at base of body whorl, but spiral lines persisting to anterior end of shell. Aperture elongate-fusiform, pointed posteriorly; inner lip smooth without visible columellar plications or callus, excavated at base of parietal wall; outer lip thin.

Holotype: LACMIP cat. no. 11570.

Type locality: LACMIP loc. 10764 (= CIT loc. 1446), south side Woodman Creek, Millville Quadrangle, Shasta Co., California.

Dimensions: See Table 11.

Distribution: Known only from the type locality approximately 152 m above the base of the Bellavista Sandstone Member of the Redding Formation.

Geologic age: Turonian.

Remarks: *Remera* ***vacca*** differs from all species previously assigned to this genus in being shorter. The spire does, however, make up more than half of the total shell height. This species is described from one well-preserved, nearly complete specimen, lacking only the apical and anterior sinus tips. If it is an adult, it is decidedly small for the genus.

Etymology: The species is named for its type locality in Little Cow Creek valley, Latin, ***vacca,*** meaning cow.

Table 11

Measurements (mm) of *Remera* ***vacca*** sp. nov.

	H	D	Hp	Dp	Ha	A	La	Dp/Hp
LACMIP 11570	9.4*	4.0	1.9	2.8	4.9*	35°	4.2	1.5

* Specimen incomplete. Abbreviations decrypted in Introduction.

Superfamily VOLUTACEA Rafinesque, 1815

Family VOLUTIDAE Rafinesque, 1815

The Late Cretaceous seems to have been marked by an efflorescense of related large volutes in all parts of the world (DALL, 1907). In Dall's view, certain morphological types are repeated among the species making up the volute group in each fauna. The disparate morphologies of each local group are thus more closely related than they are to the forms they mimic of other areas. Dall, therefore, proposed taxa and generic groupings with strong geographic control, but others have chosen to group the species by morphological similarities. Although such incompatible methods have resulted in a classification of Cretaceous volutes that needs thorough revision, such is not attempted in this paper. Modern volutes have been reviewed by WEAVER & DU PONT (1970), who followed the classification of PILSBRY & OLSSON (1954), which divides the Volutidae into 12 subfamilies. PONDER & WARÉN (1988) combined some of the subfamilies of Pilsbry & Olsson, but added others and divided the Volutidae into 10 subfamilies. The least satisfactory of these is the Pholidotominae Cossmann, 1896, queried by Ponder & Warén, in which they questionably submerge Volutoderminae Pilsbry & Olsson, 1954. The four genera of Cossmann's Pholidotominae—*Pholidotoma* Cossmann, 1896, *Beisselia* Holzapfel, 1889, *Rostellites* Conrad, 1855, and *Gosavia* Stoliczka, 1866—have only the posterior growth-line sinus in common. *Pholidotoma* and *Beisselia* have a smooth columella and are probably not volutes. Cossmann's *Rostellites* includes *Volutoderma* Gabb, 1877, *Volutomorpha* Gabb, 1877, and *Longiconcha* Stephenson, 1941, among others that PILSBRY & OLSSON (1954) place in Volutoderminae. PILSBRY & OLSSON (1954:29) suggest that *Gosavia* may be a turrid, but except for its growth line, its adult shell is similar to that of *Volutocristata* Gardner & Bowles, 1934, which Pilsbry & Olsson have included in Atheletinae Pilsbry & Olsson, 1954. *Volutocristata* has been shown to be a junior synonym of *Lyrischapa* Aldrich, 1911 (GIVENS, 1979), which is usually classed in the subfamily Fulgorarinae Pilsbry & Olsson, 1954.

Subfamily VOLUTODERMINAE Pilsbry & Olsson, 1954

The geologically oldest members of this subfamily have a marked posterior sinus to the growth line. The sinus is commonly on the shoulder in Cenomanian forms, but is generally broader, shallower, and closer to the suture in Maastrichtian forms. Sculpture may be strongly cancellate or *Ficus*-like, formed by the intersection of strong ribs and spirals.

Genus *Carota* Stephenson, 1952

Type species: By original designation, *Carota robusta* Stephenson, 1952, Cenomanian, from Woodbine Formation, Texas.

Diagnosis: Medium to large volutids with medium height spire; relatively large, strongly tilted protoconch; elongated, gracefully curved body whorl; coarsely noded shoulder angle; a deep notch at intersection of shoulder angle with outer lip; two or three coarse folds on columella; and a relatively fine pattern of spiral ornamentation.

Discussion: *Carota, Gosavia,* and *Rostellaca* Dall, 1907, have similar sculpture and growth line. *Gosavia* was assigned by STOLICZKA (1867) to the Conidae because of its shape and by COSSMANN (1896) and PILSBRY & OLSSON (1954) to the Turridae, presumably because of its growth line, but it has been accepted as a volute by many (*e.g.,* DALL, 1907; WENZ, 1943). *Gosavia* has five to six columellar folds rather than the two or three of *Carota. Rostellaca* has three columellar folds, is shaped more like *Carota,* and has similar but rougher sculpture (DALL, 1907). *Rostellaca* differs mainly in having the posterior notch nearer the suture, a thicker, wider inner lip, and a strong twist to the end of the anterior siphon.

In *Carota,* STEPHENSON (1952) included, in addition to four species from the Woodbine Formation of Texas, *Volutoderma? venusta* Stephenson, 1936, from Banquereau Bank, off the east coast of Nova Scotia, and *Rostellites dalli* Stanton, 1893, from the "*Pugnellus* sandstone" of Turonian age, Huerfano Park, Colorado. The following two Pacific Slope species, *Scobinella dilleri* and *Cordiera mitraeformis,* herein placed in *Carota,* have a posterior notch in the outer lip at the shoulder similar to that of *Carota.* This characteristic may prove to be an evolving trait. The relatively deep posterior notch distant from the suture is present in Cenomanian and Turonian volutes, a shallower notch closer to the posterior suture is common in later Cretaceous volutes, and most Cenozoic volutes have no more than a vestige of a notch against the suture.

The pattern of the columellar folds differs on the two Pacific Slope species: *Carota dilleri* (White, 1889) has three nearly equal, equally spaced folds as in the type species, *Carota robusta*; but in *C.? mitraeformis* (Gabb, 1869) the two posterior folds are closer together and the two anterior folds are stronger. Although fold number, placing, and strength vary among species assigned to *Carota* by STEPHENSON (1952), none has the same pattern as *C.? mitraeformis.*

Carota dilleri (White, 1889)

(Figures 96–101, 106, 107)

Scobinella dilleri WHITE, 1889:25, pl. 4, figs. 1–3; STANTON, 1895:19.
Volutoderma (Rostellinda) dilleri (White): DALL, 1907:10.
"*Scobinella dilleri*" White: STEWART, 1927:410.
Volutoderma dilleri (White): ANDERSON, 1958:175.
Rostellinda dilleri (White): JONES, SLITER & POPENOE, 1978: xxii.9, pl. 1, fig. 7.

Diagnosis: A slender, high-spired *Carota* with strongly shouldered, straight axial ribs, regular straplike spiral cords, and a relatively shallow growth-line notch at the shoulder.

Description: Shell of medium size, fusiform, with about seven volutions; whorls of the spire angulately convex; last whorl elongate, shouldered posteriorly, its greatest diameter near its shoulder, concave posterior to shoulder and broadly convex anterior to it, tapering anteriorly to a short siphonal canal; growth line opisthocline on ramp, strongly notched at shoulder, barely convex across flank. Spiral sculpture of coarse, raised, revolving lines or small ridges, about 17 or 18 on the last whorl, broader about middle of whorl, narrower anteriorly and on the siphonal neck, and obsolete on subsutural ramp; axial ribs present on all whorls, strongest at shoulder, usually nine on last whorl. Aperture narrow, nearly parallel-sided; anterior canal narrow, curved, flexed gently to the left; outer lip thin, with a broad sinus between suture and shoulder, broadly convex between shoulder and anterior siphon; columella with three strong folds of approximately equal size and spacing, strengthening interiorly; inner lip with pad of callus at posterior margin, adjacent to the anal gutter.

Syntypes: USNM cat. no. 20123 (3 specimens).

Hypotypes: LACMIP cat. nos. 10806 (= UCLA 59444, JONES *et al.,* 1978:fig. 7), 11571–11572, 11616; all from

→

Explanation of Figures 96 to 120

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

Figures 96–101, 103–107. *Carota dilleri* (White, 1889). Figures 96–98, 107: LACMIP cat. no. 11571 from LACMIP loc. 10735, hypotype; Figure 96, aperture; Figure 97, back; Figure 98, right side; Figure 107, posterior growth line sinus at the shoulder, ×2. Figure 99: LACMIP cat. no. 11616 from LACMIP loc. 10735, hypotype, aperture. Figures 100, 101: LACMIP cat. no. 10806 from LACMIP loc. 10735, hypotype; Figure 100, outer lip broken back, showing columellar folds; Figure 101, back. Figure 106: LACMIP cat. no. 11572 from LACMIP loc. 10735, hypotype, showing columellar folds, back view, uncoated.

Figures 102–105, 108–113: *Carota? mitraeformis* (Gabb, 1869). Figures 102–104, 113: LACMIP cat. no. 11573 from LACMIP loc. 10769, hypotype; Figure 102, aperture; Figure 103, back; Figure 104, right side; Figure 113, apical view. Figures 105, 108: LACMIP cat. no. 11618 from LACMIP loc. 10789, hypotype; Figure 105, left side; Figure 108, aperture. Figure 109: LACMIP cat. no. 11617 from LACMIP loc. 10789, hypotype, posterior growth line sinus at the shoulder, ×2. Figure 110: LACMIP cat. no. 11574 from LACMIP loc. 10769, hypotype, section showing columellar folds, uncoated. Figures 111, 112: LACMIP cat. no. 10805 from LACMIP loc. 10789, hypotype; Figure 111, back; Figure 112, aperture.

Figures 114–120. ***Konistra*** *biconica* (Anderson, 1958). Figures 114–116, 120: CAS cat. no. 61935.01 from CAS loc. 61935, holotype; Figure 114, apical view; Figure 115, left side; Figure 116, right side; Figure 120, aperture. Figures 117–119: LACMIP cat. no. 11619 from LACMIP loc. 10789, hypotype; Figure 117, left side; Figure 118, aperture; Figure 119, posterior portion of growth line, ×2. Photographs 96, 97, 100–103, 106, 110–112 by Susuki; 98, 99, 104, 105, 107–109, 113–120 by De Leon.

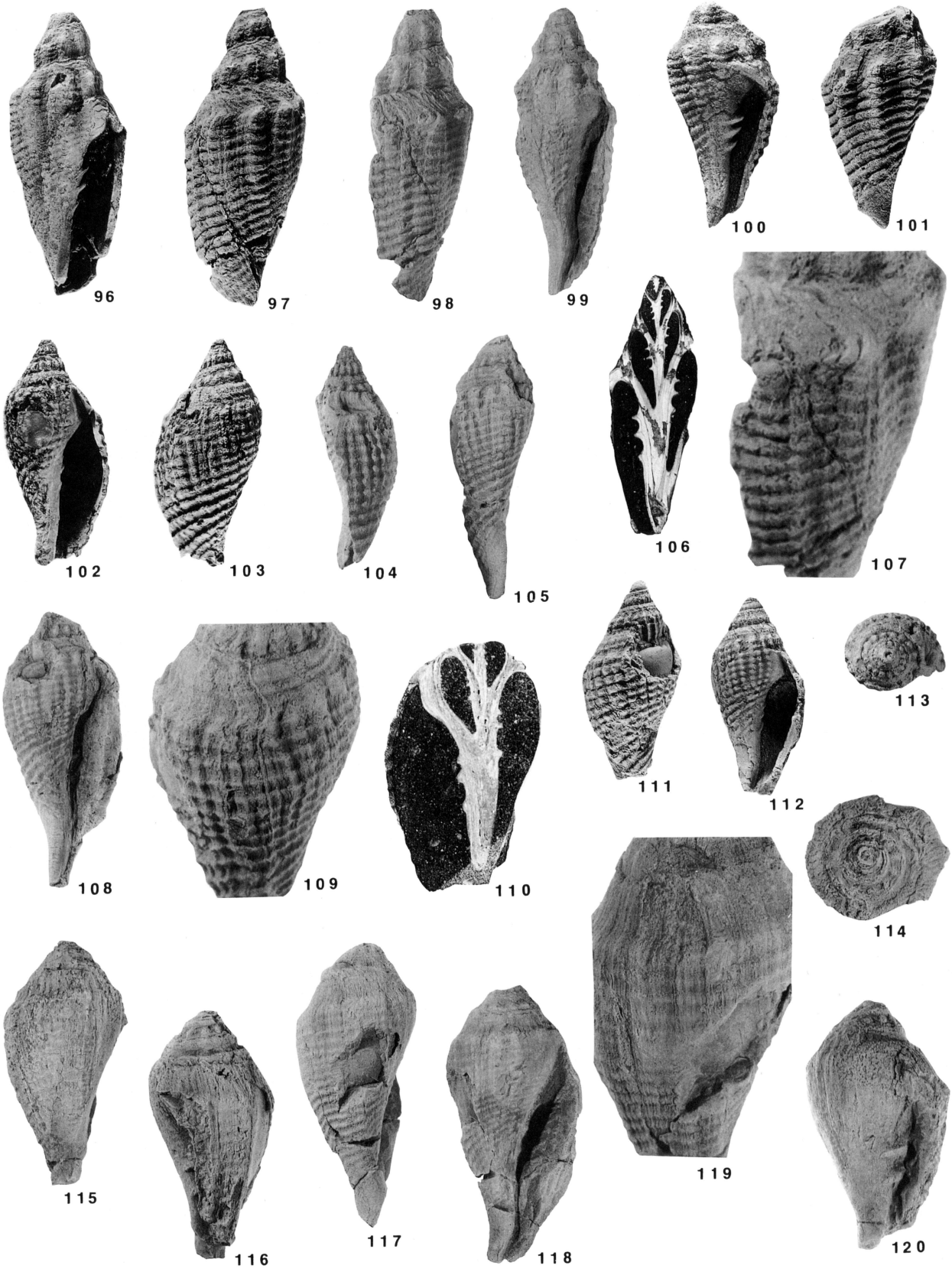

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Table 12

Measurements (mm) of *Carota dilleri* (White, 1889) and *Carota? mitraeformis* (Gabb, 1869).

	H	D	Hp	Dp	Ha	Hs	A	R	Dp/Hp	Hp/Hs
Carota dilleri										
LACMIP 11571	49.0*	20.5	7.3	13.0	15.0*	3.0	49°	9	1.8	2.9
LACMIP 11572	45.0	—	6.7	—	—	3.3	41°	—	—	2.0
LACMIP 11616†	49.0*	18.8	7.2	12.6	13.5	3.4	53°	8	1.8	2.1
UCLA 59444	37.8*	20.4	—	—	—	—	—	8	—	—
Carota? mitraeformis										
MCZ 21856**	17.0*	9.5	—	—	—	—	—	—	—	—
LACMIP 11573	38.2	18.2	4.2	10.0	10.0	1.6	61°	23	2.4	2.6
LACMIP 11574	41.5*	27.0	—	—	—	—	—	—	—	—
LACMIP 11617	36.0*	18.0	4.7	10.0	7.0*	1.7	67°	19	1.9	2.8
LACMIP 11618	46.8*	20.4	4.5	12.0	8.0*	1.8	68°	16	2.7	2.5
UCLA 58445	34.0	16.4	4.9	9.4	10.0	2.8	59°	23	1.9	1.8

* Specimen incomplete; † specimen crushed; ** measurements *fide* STEWART, 1927. Abbreviations decrypted in Introduction.

LACMIP loc. 10735 (= CIT 1212), Little Cow Creek, 2 miles (3.2 km) NE of Frazier Corners, Shasta Co., California.

Dimensions: See Table 12.

Type locality: "Little Cow Creek valley, 18 miles (29 km) east of Redding, Shasta Co." (White, 1889).

Distribution: Nanaimo Group, unnamed formation of Sydney Island (Canada Geol. Surv. loc. 85511 and UW loc. 85900), British Columbia; Hornbrook Formation, Osburger Gulch Sandstone Member, Jackson Co., Oregon, and Siskiyou Co., California; Redding Formation, Frazier Siltstone Member above the horizon of *Romaniceras* (*Yubariceras*) *deverioide* (de Grossouvre, 1889), vicinity of Little Cow Creek, Shasta Co.; Gas Point Formation, Ono area, Shasta Co., California; Valle Formation, Upper Member, Cedros Island, Baja California, Mexico.

Geologic age: Early to late Turonian.

Remarks: DALL (1907) referred this species to *Rostellinda* Dall, 1907 (type species *Volutoderma* (*Rostellinda*) *stoliczkana* Dall, 1907, from the Trichinopoly Group of Southern India), a subgenus of *Volutoderma* Gabb, 1877. However, in characterizing *Rostellinda,* DALL (1907:6) says "the sinus near the suture," and neither he nor STOLICZKA (1867:87) mentions a notch at the shoulder that would produce a posterior emargination to the growth line similar to the posterior sinus of turrids. DALL (1907) based the type species of *Rostellinda, V.* (*R.*) *stoliczkana* Dall, 1907, upon figures of STOLICZKA (1867:pl. 7, figs. 6, 7 as *Fulgoraria elongata* d'Orbigny, 1843), and he assigned the nine specimens figured by STOLIZCKA (1867:pl. 7) as *F. elongata* to five new species of *Rostellinda.* On none of these figures is a posterior growth-line emargination indicated at or near the shoulder. Stoliczka also figured and described *Gosavia indica* Stoliczka, 1867, a species which like the type species of *Gosavia* Stoliczka, 1865, *Gosavia squamosa* (Zekeli, 1852), has a posterior notch at the shoulder and a resultant emargination of the growth line. WHITE (1889) had originally described *Carota dilleri* as a *Scobinella* Conrad, 1848, family Pleurotomidae, a placement doubtless suggested by the posterior growth line emargination. Dall either overlooked this characteristic of the growth line or did not consider it of systematic importance in reassigning *C. dilleri* to *Rostellinda.*

Figures of *Rostellaca zitteliana* (Holzapfel, 1888), type species of *Rostellaca* Dall, 1907, clearly show a posterior notch and emarginated growth line, but the notch and emargination are closer to the suture than in *C. dilleri.* DALL (1907) included four species from the Aachen chalk in *Rostellaca* which he characterized as having a "rougher sculpture, with nodulation of the intersections, the axial and spiral ridges more nearly equal in strength, the shell smaller, the shoulder less emphasized, and the posterior sinus less conspicuous."

Carota dilleri is similar to the type species *C. robusta* Stephenson, 1952, in overall shape and sculpture. *Carota dilleri* has a slightly higher spire, more regular spiral ribs, and a slightly shallower posterior siphonal notch than does *C. robusta. Carota dilleri* bears a greater resemblance to *C. robusta* than it does to *C. mitraeformis. Carota dilleri* differs from *C. dalli* STANTON, 1893 (p. 156, pl. 33, figs. 11–13), which is also of Turonian age, in having higher whorls and fewer axial ribs.

The growth line of *Volutoderma* (*Rostellinda*) sp. of YABE & NAGAO, 1928 (p. 95, pl. 17, fig. 16) Cenomanian or Turonian, from the Mikasa Formation, Horomui area of Hokkaido, is not illustrated. The specimen is incomplete, and may not be a volute. But the growth line on *Volutoderma* (*Rostellinda*) sp. of YABE & NAGAO, 1925 (p. 122, pl. 29, fig. 13, 13a, b) Late Cretaceous (*fide* HAYAMI & KASE, 1977:65, stage unknown), Cape Khoi beds in Alexandrovsk area of north Saghalin is described as being sinused on the shoulder, and the illustrated growth line

(pl. 29, fig. 13b) is similar to that of *C. dilleri* and *C.? mitraeformis*. Unfortunately although suggestive of *Carota*, the specimen of YABE & NAGAO, 1925, is incomplete and the presence of columellar folds undetermined.

Both STANTON (1895) and STEWART (1927) considered *C. dilleri* to be similar to *Carota mitraeformis* (Gabb, 1869), and Stewart suggested that the latter species is the immature form of "*Scobinella*" *dilleri*. The two species are distinct, even in immature individuals, and apparently had different substrate preferences. At Redding, *C. dilleri* is common in the sandier facies of the Frazier Siltstone, but *C. mitraeformis* is found in the Bellavista Sandstone Member. *Carota dilleri* has fewer and stronger axial ribs, a higher and more strongly stepped spire, straighter inner lip, less strongly convex outer lip, stronger more equally developed and spaced columellar folds, a broader and more wrinkled whorl shoulder, and a callus pad on the posterior inner lip that is lacking in *C. mitraeformis*.

HAGGART (1991:A161) reports *Tragodesmoceras ashlandicum* Anderson, 1902, from Hamley Point, Sydney Island, British Columbia, and infers an early or mid-Turonian age for these deposits. *Carota dilleri* occurs above *Romaniceras* (*Yubariceras*) *deverioide* in the Redding area and thus probably ranges through most of the Turonian.

Carota? mitraeformis (Gabb, 1869)

(Figures 102–105, 108–113)

Cordiera mitraeformis GABB, 1869:153, pl. 26, fig. 32.
Volutoderma mitraeformis (Gabb): STEWART, 1927:410, pl. 22, fig. 7; ANDERSON, 1958:174.
Volutomorpha mitraeformis (Gabb): JONES, SLITER & POPENOE, 1978:xxii.9, pl. 1, fig. 6 (*Volutoderma mitraeformis* on plate explanation).

Diagnosis: An almost pyriform *Carota* with about 15 axial ribs on the spire; axial ribs more numerous but reduced in strength to that of the spiral cords on body whorl.

Description: Shell medium sized, rather small for a volute; pleural angle about 65°; spire low, about ¼ the total length of the shell, with about four or five low angulately shouldered whorls; suture slightly impressed; ramp very steep, narrow, with concave band just posterior to shoulder; last whorl rounded, pyriform, with greatest diameter of whorl approximately one-third distance from suture to tip of anterior canal, and with narrow swollen subsutural band, narrow concave ramp, barely noticeable shoulder, and well-arched flank curving convexly to anterior tip of shell; last whorl of mature specimens encroaching posteriorly across preceding whorls giving a more obtuse apical angle to shell. Spiral and axial sculpture nearly equal on body whorl; spiral cords flat-topped, numbering 16 or 17 on body whorl, separated by interspaces approximately equal to cords in width; axial sculpture strongest on spire, about 16 ribs per whorl, variably developed, weaker on body whorl, strongest at shoulder; ribs about equal to cords posteriorly, diminishing anteriorly, and usually faint or absent on anterior half of whorl. Growth line with nearly straight trend perpendicular to suture but notched adjacent to suture and more deeply immediately posterior to shoulder at concave subsutural band, and having a slight retrocurrent deflection near columellar tip. Aperture elongate, ovoid with well-developed posterior groove at suture, terminating posteriorly in a narrow pointed siphonal canal; outer lip thin, smooth within, inner lip covered by a thin wash of enamel, shallowly excavated on parietal wall; columella gently flexed to the left at its tip, columellar folds three, posterior to middle of aperture, anterior and middle folds stronger and more distant, middle and posterior folds closer; no siphonal fasciole.

Holotype: MCZ cat. no. 21856.

Hypotypes: LACMIP cat. nos. 10805 (= UCLA 58445), 11617–11618 from LACMIP loc. 10789 (= CIT 1001), U.S. Highway 99, 4 miles (6.4 km) north of Redding, Shasta Co.; LACMIP cat. nos. 11573–11574 from LACMIP loc. 10769 (= CIT 1203), Dry Creek, Shasta Co., California.

Type locality: "Colusa Co., near the Hot Springs" (GABB, 1869).

Dimensions: See Table 12.

Distribution: Redding Formation, Bellavista Sandstone east of Redding, Shasta Co.; Great Valley Series near the Hot Springs, Colusa Co., California.

Geologic age: Early? Turonian, with *Tragodesmoceras*.

Remarks: Immature specimens of this species from the Redding area accord exactly with the figure and description of the holotype as given by STEWART (1927), and the Redding specimens are undoubtedly of the same species as the individual described by GABB (1869). Gabb reported this form from the "Shasta Group" (Early Cretaceous), but this age reference has been strongly questioned by STANTON (1895), STEWART (1927), and ANDERSON (1958), who considered the species to be of much younger age. Its occurrence in beds of Turonian age in the Redding area supports their opinion, and there is no evidence of its being collected from beds of Early Cretaceous age.

STANTON (1895) considered that *Carota? mitraeformis* resembled *C. dilleri* (White) from the Late Cretaceous of Redding, and STEWART (1927) suggested that Gabb's species might be an immature individual of the latter. Both species occur abundantly at Redding, but *C.? mitraeformis* is more common in the Bellavista Sandstone Member, and *C. dilleri* occurs in the Frazier Siltstone Member. *Carota? mitraeformis* differs from *C. dilleri* in greater obliquity of columellar folds, which are unequally spaced and set deeper within the aperture, lower spire, weaker shoulder, and weaker axial ribs.

Among the forms from India illustrated by STOLICZKA (1867) as *Fulgoraria elongata* and named by DALL (1907), *Carota? mitraeformis* most resembles *Rostellinda media* Dall,