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deal of variation in the inflation and spire height even in specimens from a single locality, but the growth line characteristics are the same in all specimens. Anderson (1958, p. 156) has recognized "*Acteonina*" *californica* Gabb from Thompson Creek, Yolo Co., and chose a specimen from this locality as the "neotype" of *A. californica* Gabb. Anderson (1958, p. 152-159) has also described seven new species: *A. ursula* and *A. ursulagorda* from the same locality on Bear Creek, on the east side of the Sacramento Valley; *A. bellavistana* from one mile North of Frazier Corners East of Redding; *A. berreyessaensis* from the same locality as *A. californica* above; *A. roguensis* from Phoenix, Oregon; *A. colusaensis* from the Peterson Ranch near Sites in Colusa County; *A. yrekensis* from Hagerdorn Ranch, Siskiyou County. It would probably be too much to expect that all these can be considered as one species as the lower occurrence is upper Albian for specimens from the Bald Hills formation, and probably Senonian (?) for *A. ursula* or *A. ursulagorda*. Yet examination of the collections fails to show any obvious reason for the separation of two or more species. The amount of variation between specimens from a single locality is as much as the variation among specimens of all localities.

Trajanella californica (Gabb) closely resembles the figure of *T. amphora* (d'Or-

bigny), the type of *Trajanella* (Cossmann, 1909, pl. 2, figs. 16-18), but is more inflated and has a lower spire. Some specimens of "*Acteonina*" *bellavistana* Anderson and "*A.*" *berreyessaensis* Anderson appear to be very similar to the genotype.

Large, accurately located stratigraphic collections will be necessary to obtain a more satisfactory solution to the taxonomic problem in this group. At present we do not feel that any of the described species can be used as an indication of stratigraphic position except in a broad sense.

Family APORRHAIIDAE

Genus ARRHOGES Gabb, 1868

ARRHOGES CALIFORNICUS (Gabb)

Pl. 102, figs. 6,7

Aporrhais californica Gabb, 1864, p. 128, pl. 29, figs. 230 a,b.

Arrhoges californicus (Gabb), Stewart, 1926, p. 363, pl. 21, fig. 15.

Anchura (*Arrhoges*) *californica* (Gabb) Stewart, Anderson, 1958, p. 165.

Shell small, spire about $\frac{1}{2}$ height of shell; number of whorls about 8; ornamentation consists of narrow longitudinal ribs shallowly concave toward the aperture and extending from just below the suture to the widest portion of the whorl, they number about 20 per whorl except on the body whorl where the number is reduced to 3 more pronounced ribs on the back of the whorl with the apertural side covered by

EXPLANATION OF PLATE 102

- FIGS. 1—*Cantharus occidentalis* (Gabb) Apertural view of specimen 28637 U.C.L.A. Invert. Paleo. Cat. $\times 1$.
 2—*Acteon sullivanae* n. sp. Apertural view of the holotype, 28642 U.C.L.A. Invert. Paleo. Cat. $\times 2$.
 3,4—*Cylichna andersoni* n. sp. 3, view of specimen 28653 U.C.L.A. Invert. Paleo. Cat. showing the shape of the shell; 4, apertural view of the holotype, 28652 U.C.L.A. Invert. Paleo. Cat. $\times 2$.
 5—*Clinura anassa* n. sp. Apertural view of the holotype, 28641 U.C.L.A. Invert. Paleo. Cat. $\times 1$.
 6,7—*Arrhoges californicus* (Gabb). 6, apertural view of a small specimen, 28626 U.C.L.A. Invert. Paleo. Cat., showing spire and ornamentation of early whorls; 7, adult specimen, 28625 U.C.L.A. Invert. Paleo. Cat., showing body whorl and partially preserved wing, $\times 2$.
 8,9—*Paleosephaea sacramentica* n. sp. 8, oblique view of aperture of holotype, 28638 U.C.L.A. Invert. Paleo. Cat., showing the three columellar plications; 9, view of specimen 28640 U.C.L.A. Invert. Paleo. Cat. showing ornamentation of shell. $\times 1$.
 10—*Mesopuzosia colusaense* (Anderson). Lateral view of specimen 28658 U.C.L.A. Invert. Paleo. Cat. Slightly less than natural size.

callus, shell surface covered by fine spiral lines with the two or three just below the suture much stronger than the others; on some specimens the longitudinal ribs are so reduced as to form a reticulate sculpture; growth lines are obscure on most of the shell, but the outer lip is ornamented only by growth lines; the first three whorls are unornamented; wing large, as wide as body whorl, with posterior rostrum nearly as high as spire; outer portion of wing thickened; anterior canal moderately long and rapidly tapering from body whorl; inner lip smooth with light callus.

Hypotypes.—The hypotypes, U.C.L.A. Invert. Paleo. Cat. nos. 28625 and 28626, were collected from locality 3465 on the North Fork of Cottonwood Creek. Dimensions of adult specimen: height 21 mm. (incomplete—lacks first whorl and top of anterior canal), height of spire 11 mm.; maximum thickness of last whorl (not including outer lip) 8 mm. (including outer lip) 16 mm.

Remarks.—The specimen figured by Stewart (1926, p. 363, pl. 21, fig. 15) is here designated as the lectotype of *Arrhoges californicus* (Gabb). The hypotypes have been compared with this specimen through the courtesy of H. Richards, of the Academy of Natural Sciences of Philadelphia who loaned us the type lot. The lectotype is "probably from the Siskiyou Mountains" (Stewart, 1926, p. 363). This species is very similar to specimens in the U.C.L.A. collection of *A. occidentalis* (Beck), the genotype, a Recent shell from the North Atlantic. This Cretaceous species is much smaller, has shorter longitudinal ribs, fewer spiral lirae, possesses two to three strong spiral ribs just below the suture, and has a slightly longer anterior canal.

Genus *TESSAROLAX* Gabb, 1864

TESSAROLAX TRINALIS n. sp.

Pl. 103, figs. 1,2,3

Shell small, moderately thick, spire about $\frac{1}{2}$ height of shell; body whorl biangulate with two rounded carina-like spiral ribs at the angulations and a third midway between; the upper rib is slightly stronger than the lower ribs and all may be slightly beaded; a single secondary rib may be developed between the posterior suture and the upper

angulation; one or two secondaries may be developed below the lower angulation; the surface of young specimens is covered by fine lirae, in the adult the ornamentation is mostly covered with callus; number of whorls is greater than 5; suture linear, faint; aperture narrow above, widening below (anterior part unknown); in adult specimens the posterior digitation rises along the upper part of the shell obliquely and attached to the spire for about $\frac{2}{3}$ the length of spire and then is free of spire and directed away from aperture; anterior digitations not preserved; adult possesses tubercule-like knob $\frac{2}{3}$ of a turn back from the aperture, apparently a callus deposit.

Holotype.—The holotype, U.C.L.A. Invert. Paleo. Cat. no. 28627 was collected from locality 3763. Dimensions: height (incomplete) 19 mm., spire height 9 mm. (incomplete), greatest width (less apertural canals) 12 mm. Paratype: U.C.L.A. Invert. Paleo. Cat. no. 28628.

Remarks.—This species differs from the genotype, *T. distorta* Gabb (1864, pl. 20, figs. 82,82a,b), in having three primary ribs on the body whorl and a much smaller tubercule-like process. *T. bicarinata* (Gabb) (Gabb, 1869, pl. 27, fig. 47; Stewart, 1926, pl. 23, fig. 6) is shorter, wider and has two heavy carinae with no intermediate rib.

The trivial name is from Latin, three.

Genus *GYRODES* Conrad, 1860

GYRODES ALLISONI n. sp.

Pl. 101, figs. 18,19,20

Shell thin, small to medium size; spire about $\frac{1}{3}$ the height of the shell; number of whorls about 4; subangular shoulder and wide posterior tabulation; tabulation flat to very shallowly grooved; ornamentation of spiral lines, very fine on most of the whorl, and strongly developed on the posterior tabulation; growth lines fine but distinct; sharp double angulation at the edge of the umbilicus, band between angulations flat to depressed and nearly as wide at the umbilical opening; suture impressed; aperture elongate oval.

Holotype.—The holotype and paratype, U.C.L.A. Invert. Paleo. Cat. nos. 28629 and 28639, respectively, were collected at locality 3464 near the Gas Point road. Dimensions of the holotype: height 13 mm., height

of spire $2\frac{1}{2}$ mm.; maximum width of last whorl 12 mm.

Remarks.—This species most nearly resembles "*Gyrodès*" *siskiyouensis* Anderson (1958, p. 150, pl. 21, figs. 6,7) in ornamentation, but has a more prominent shoulder, and a flattened or slightly concave flank below the shoulder. The umbilical characteristics of *G. siskiyouensis* are not known. This species differs from other California forms in the ornamentation of the tabulation.

This species is named for Edwin Allison, Department of Paleontology at the University of California, Berkeley.

GYRODES GREENI n. sp.
Pl. 101, figs. 27,28,29

Shell medium to large, heavy; spire about $\frac{1}{2}$ the height of the shell; number of whorls 4-5; angular shoulder with narrow tabulation; suture impressed; ornamented only by growth lines; very sharp single angulation along the umbilical edge; umbilicus wide, open; aperture broadly comma-shaped.

Holotype.—The holotype, U.C.L.A. Invert. Paleo. Cat. no. 28630 was collected from locality 3465 near the North Fork of Cottonwood Creek. Dimensions; height, 30 mm.; height of spire 5 mm.; maximum width of last whorl 31 mm.

Remarks.—*Gyrodès greeni* resembles *Gyrodès expansa* (Gabb) (Stewart, 1926, pl. 22, figs. 1,1a), but the latter species has a much wider tabulation, a broader spire and a rounded angulation at the umbilical edge. Small specimens of *G. greeni* n. sp. resemble topotypes of *G. canadensis* Whiteaves (1879, pl. 16, figs. 2,2a), but lack the sub-shoulder constriction, the groove in the tabulation, and the double angulation of the umbilical edge that are present on the latter species.

The species is named for A. L. Green, Ono, California.

Genus AMPULLINA Bowdich, 1822

AMPULLINA STANTONI n. sp.
Pl. 101, figs. 9,10,11

Shell thick, medium-sized; spire about $\frac{3}{8}$ height of the shell; ornamentation is of prominent growth lines on last whorl, occasional specimens with very faint spiral striation; number of whorls about 5; whorl profile gently rounded with a tendency for the

last volution to be slightly flattened on the posterior half of the whorl; aperture similar to the genotype but more elongate and columellar wall more curved; umbilicus elongate, narrow, eye-shaped slit; moderate callus on the inner lip.

Holotype.—The holotype and paratypes, U.C.L.A. Invert. Paleo. Cat. nos. 28631, 28632, 28633, respectively, were collected at U.C.L.A. locality 3763. Dimensions of holotype: height of shell 24 mm.; width of body whorl 17 mm.; height of spire 9 mm.

Remarks.—*A. stantoni* n. sp. resembles *Lunatia avellana* Gabb (1864, pl. 19, fig. 60) but does not resemble the plate of Stewart's lectotype of *Ampullina avellana* (Gabb) (1926, pl. 21, fig. 9). Gabb's figure shows the slight bending of the inner lip which is characteristic of *A. stantoni* n. sp. and Stewart's does not. Stewart's lectotype appears to be more globose. The umbilicus of *A. stantoni*, while small, is not as Gabb states for *A. avellana*, "barely visible."

A. stantoni n. sp. was found abundantly at localities 3473 and 3765 in the Bald Hills formation and also with the *Brewericerus hulenense* fauna near Clear Creek near the site of the old mining camp of Horsetown.

The species is named for T. W. Stanton, pioneer worker in California Mesozoic paleontology.

AMPULLINA MONA n. sp.
Pl. 101, figs. 12,13

Shell globose, thick, medium-sized; spire $\frac{3}{8}$ height of shell; faint spiral lines at shoulder, rest of shell smooth except for growth lines; number of whorls 4; suture impressed; aperture comma-shaped, widest just above the base (anterior end missing); umbilicus a short narrow depressed area; moderate callus on the inner lip.

Holotype.—The holotype and only specimen, U.C.L.A. Invert. Paleo. Cat. no. 28634 was collected from locality 3778 on Huling Creek about 5 feet above the conglomerate at the base of the Bald Hills formation. Dimensions: height (incomplete) 21 mm.; greatest diameter of body whorl 20 mm.; height of spire (incomplete) 6 mm.

Remarks.—This species is not as tall as *A. stantoni*, is more inflated and has a lower spire. The umbilicus is not open as it is in *A. stantoni* and the callus on the inner lip is

much heavier. *A. avellana* (Gabb) has a smaller, thinner shell with a higher spire and a lighter callus than *A. mona* n. sp.

This species is named for Mrs. Ramona Rodda.

Genus *EUSPIRA* Agassiz, 1839

EUSPIRA POPENOEI n. sp.

Pl. 101, figs. 21, 22, 23

Shell moderately thick, medium-sized; spire about $\frac{1}{4}$ the height of the shell; smooth except for growth lines and very fine spiral striae that are most often preserved on the younger whorls; number of whorls about 5; body whorl slightly flattened above the middle; junction between umbilical wall and whorl flank angulate; suture impressed; aperture nearly semicircular with very slight notch or gutter at the posterior suture; umbilicus moderate size; callus restricted to inner lip.

Holotype.—The holotype, U.C.L.A. Invert. Paleo. Cat. no. 28635, was collected at locality 3464 near the Gas Point road. Dimensions: height 26 mm.; spire height 6 mm.; greatest width 24 mm.

Remarks.—*Euspira popenoei* n. sp. differs from *Euspira marianus* n. sp. in having a smaller umbilicus, an angulation between the umbilical wall and the flank, and an impressed suture. *Euspira popenoei* n. sp. differs from the lectotype of *Polinices shumardianus* (Gabb) Stewart (1926, pl. 21, fig. 11) in lacking the partially closed umbilicus, in being taller, in having a more elongate aperture and in having an angulation at the umbilical edge.

This species is named for W. P. Popenoe of the University of California, Los Angeles.

EUSPIRA MARIANUS n. sp.

Pl. 101, figs. 24, 25, 26

Shell moderately thick, medium-sized; spire about $\frac{1}{3}$ height of the shell, number of whorls about five; body whorl flattened above the middle; faint shoulder and tabulation near the posterior suture; shell smooth except for growth lines and fine spiral striae faintly developed on the shoulder; suture impressed; aperture nearly semicircular; umbilicus large, open; narrow flattened area between true umbilical depression and flank, somewhat like the double angulation of *Gyrodes allisoni* n. sp., but set

off from flank and umbilicus by abrupt change in the curvature of the shell rather than by distinct angulations; callus restricted to inner lip.

Holotype.—The holotype, U.C.L.A. Invert. Paleo. Cat. no. 28636, was collected at locality 3465 near the North Fork of Cottonwood Creek. Dimensions: height 25 mm.; spire height 5 mm.; greatest width 25 mm.

Remarks.—Differs from *E. popenoei* in having faint tabulation and shoulder near the posterior suture and a larger umbilicus and in lacking an angulate umbilical edge. Differs from *Polinices shumardianus* (Gabb) in having an open umbilicus.

It is very difficult to give generic assignments to *E. popenoei* and *E. marianus*. The type specimens are so close that one would certainly not separate them generically, yet each resembles a different genus. *E. popenoei* most resembles the type of *Euspira*, *Euspira labellata* (Lamarck), in general shape, but has a more impressed suture, a more retracted growth line, a more open umbilicus (slightly), bounded by an angulation, and the callus does not extend across and above the umbilicus as in *Euspira*. *E. marianus* resembles the type of *Gyrodes* (*Sigaretopsis*), *G. (S.) infundibulum* (Walette), but has a more channeled suture, the growth lines are not inclined forward so strongly, possesses definite, but weak, double angulation at the edge of the umbilicus (somewhat like *Gyrodes* s.s.), and the callus does not extend across above the umbilicus. *E. marianus* very closely resembles specimens in the U.C.L.A. collection from the Gault of Folkestone, England labeled, *Gyrodes genti* (Sowerby), but these specimens have a more impressed suture and a wider, but less angulate umbilicus. *E. marianus* would seem to be closely allied to *Gyrodes* while one would hesitate to put *E. popenoei* in *Gyrodes*. Assignment to *Euspira* is questionable.

Gyrodes pluviianus Stephenson (1952, p. 152, pl. 36, p. 20–23) is similar to this species, but appears to have a larger umbilicus with a more pronounced angulation, and a lower spire.

The species is named for Andrew Marianos, micro-paleontologist for the Humble Oil and Refining Company, Chico, California.

Family BUCCINIDAE

Genus CANTHARUS Roding, 1798

CANTHARUS OCCIDENTALIS (Gabb)

Pl. 102, fig. 1

Fusus occidentalis Gabb, 1869, p. 146, 215, pl. 26, fig. 23.*Pseudoperissolax (?) occidentalis* (Gabb), Stewart, 1926, p. 430, pl. 21, fig. 1.

One incomplete but well preserved specimen from the Bald Hills formation has been compared to the holotype (Stewart, 1926, pl. 21, fig. 8) and is believed to be conspecific. However, our specimen has a single strong varix along the outer margin of the aperture and another weakly formed about $\frac{2}{3}$ of a revolution behind. The possession of a varix is probably a variable feature as neither Stewart's nor Gabb's figures show varices, nor does either author mention them, and they are not present on other specimens in our collections referred to this species.

Holotype.—The type specimen is reported to come from Martinez, but this has not been confirmed.

Figured specimen.—The figured specimen, U.C.L.A. Invert. Paleo. Cat. no. 28637 was collected from locality 3465 near the North Fork of Cottonwood Creek. The species also occurs at U.C.L.A. locality 3816 above the Bald Hills formation. Dimensions: height 18.5 mm.; height of spire (incomplete) 8.5 mm.; maximum width of last whorl 13 mm.

Family VOLUTIDAE

Genus PALEOPSEPHAEA Wade, 1926

PALEOPSEPHAEA SACRAMENTICA n. sp.

Pl. 102, figs. 8,9

Shell medium sized, heavy, fusiform; spire height about $\frac{1}{2}$ height of shell; number of whorls about 5; axial ornamentation of elongate ribs extending from suture to suture except on body whorl where ribs die out on the anterior slope, 12 ribs on last whorl, 11 on penultimate whorl, concave aperturally; spiral sculpture of fine spiral lines most prominent on posterior slope; faint growth lines parallel the axial ribs; aperture elongate, narrowly rounded posteriorly; outer lip simple, broadly convex; inner lip concave posteriorly, broadly convex anteriorly, with a thin callus; columella bears three oblique folds; the anterior fold

is slightly stronger and the posterior slightly weaker than the median fold.

Holotype.—The holotype, U.C.L.A. Invert. Paleo. Cat. no. 28638, was collected at locality 3474 on Coyote Creek. Dimensions: height of the whorl (incomplete) 35 mm.; height of spire (incomplete) 18 mm.; maximum width of last whorl 14 mm. Fig. 9 is a larger specimen collected above the Bald Hills formation at locality 3817, and is the paratype, U.C.L.A. Invert. Paleo. Cat. no. 28640.

Remarks.—This is the first record of this genus in the California Cretaceous. The specimens agree with the description and figures of the genotype, *P. mutabilis* Wade (Wade, 1926, p. 123, pl. 40, figs. 4,5,8). *P. sacramentica* n. sp. is slenderer and has smaller and more abundant axial ribs than the genotype, and the anterior columellar fold is not as strong. *P. sacramentica* n. sp. differs from *P. decorosa* Stephenson and *P. patens* Stephenson (1952, pl. 41, figs. 23-26) from the Woodbine formation of Texas in being a smaller shell and having the anterior columellar fold the largest of the three.

The species derives its name from its occurrence in the Sacramento Valley.

Family TURRIDAE

Genus CLINURA Bellardi, 1875

CLINURA ANASSA n. sp.

Pl. 102, fig. 5

Shell medium-sized, moderately thick, fusiform; spire elevated and acute, about $\frac{1}{2}$ the height of the shell; number of whorls (incomplete) almost 5; suture impressed; axial sculpture of 10-12 strong nodes per whorl on the angulation; irregular, narrow axial ribs extend below the angulation and form beads where they cross the primary spiral ribs; spiral ornamentation of 3 evenly spaced coarsely beaded, primary spiral ribs in the upper half of the lower flank below the angulation; surface covered by spiral lirae; growth lines prominent and reflect broad shallow notch on the upper flank of the whorl above the angulation; columella smooth, twisted, with light callus on inner lip; anterior incomplete on all specimens.

Holotype.—The holotype, U.C.L.A. Invert. Paleo. Cat. no. 28641, was collected at locality 3476 on Coyote Creek. Dimensions: height (incomplete) 23.5 mm.; height

of spire (incomplete) 11.5 mm.; maximum width of last whorl 12 mm.

Remarks.—This species is similar to *Clinura io* (Gabb) (Gabb, 1864, pl. 28, fig. 214) from the Eocene (Tejon) of California, but differs in the following ways: *Clinura anassa* n. sp. is slightly taller and slimmer, has more abundant and slightly more subdued nodes on the angulation, fewer primary spiral ribs on the lower flank (3–4 as compared to 10–12 for *C. io*), a convex whorl profile on the upper half of the lower whorl, and no sutural collar.

This is apparently the oldest record of the family Turridae as defined by Wenz (1943, p. 1380). Previously described species of *Clinura* are Eocene or younger.

The trivial name is from Greek, queen.

Family ACTEONIDAE

Genus ACTEON Monfort, 1810

ACTEON SULLIVANAE n. sp.

Pl. 102, fig. 2

Shell, small, high spired; spire about $\frac{1}{2}$ height of shell; number of whorls about 6; suture impressed; ornamentation consists of spiral grooves which are strongest near the anterior and become weaker posteriorly except for three just below the suture; surface covered by fine lines of growth; aperture elongate, narrowest posteriorly; inner lip with a light callus; columella with a single small fold situated at the juncture of the columellar and parietal lips.

Holotype.—The holotype and only specimen, U.C.L.A. Invert. Paleo. Cat. no. 28642, was collected at locality 3768 east of the old Gas Point Road. Dimensions: height 8.5 mm.; height of spire 4.2 mm.; maximum width of last whorl 3.7 mm.

Remarks.—*Acteon sullivanae* n. sp. is similar to *A. politus* (Gabb), but differs from the lectotype (Stewart, 1926, p. 341, pl. 24, fig. 18) of the latter in being narrower and in having a higher spire and more numerous spiral ribs with a wide smooth band on the posterior $\frac{1}{3}$ of the whorl.

The species is named for Mrs. Catherine Sullivan on whose ranch it was found.

Genus TORNATELLAEA Conrad, 1860

TORNATELLAEA sp. aff. *T. IMPRESSA* (Gabb)

Pl. 101, figs. 5, 6, 7, 8

Acteon impressus Gabb, 1864, p. 142, pl. 21, fig. 106.

Specimens very close to *T. impressa* Gabb have been found at several localities in the Bald Hills formation. These agree well with Stewart's figured specimens (1926, pl. 24, figs. 7, 8) in size and shape, but have smaller more abundant spiral ribs, and the ornamentation is not subdued or absent on the upper third of the whorl. This species occurs throughout the Bald Hills formation and in the formation immediately above as well.

The figured specimens are, U.C.L.A. Invert. Paleo. Cat. nos. 28643, 28644, 28645, 28646 and were collected at U.C.L.A. locality 3476.

Genus BIPLICA Popenoe, 1957

BIPLICA ISOPLICATA Popenoe

Pl. 101, figs. 14, 15, 16, 17

Biplica isoplicata Popenoe, 1957, p. 434–435, pl. 50, figs. 12–17.

Specimens from eleven localities in the Bald Hills formation have been assigned to this recently described species (Popenoe, 1957, p. 434–35, pl. 50, figs. 12–17). Stratigraphically these specimens occur between the listed occurrences of *Biplica michaeli*, a lower Albian species, and *B. isoplicata*, a Turonian form. Some of the specimens from locality 3476 are notably larger than any specimen of *B. isoplicata* previously reported but are otherwise similar. The species is abundant throughout the Bald Hills formation.

Types.—The holotype, U.C.L.A. Invert. Paleo. Cat. no. 27742, was collected at U.C.L.A. locality 3287. The hypotypes, U.C.L.A. Invert. Paleo. Cat. nos. 28647, 28648, 28649, are from U.C.L.A. locality 3476.

BIPLICA aff. *B. MICHAELI* Popenoe

Pl. 101, figs. 1, 2, 3, 4

Biplica michaeli Popenoe, 1957, p. 433–434, pl. 50, figs. 9–11.

Specimens of the genus *Biplica* from locality 3763 in the Bald Hills formation are considered to have affinities for *B. michaeli* Popenoe. Small specimens at this locality (altitude 4.0–5.4 mm.) agree with this species in essential details except that they have a slightly lower spire. At the same locality large specimens (altitude 7.5–11.0 mm.) have proportions similar to *B. michaeli*, but are much larger. In fact, these specimens are larger than any representa-

tives of *Biplica* known below the uppermost Santonian (?) or lowermost Campanian (?) (Popenoe, 1957, fig. 1). These large specimens lack the third tooth-like projection on the posterior end of the inner lip of *B. michaeli*. This feature, however, is not considered as diagnostic as shape and spire height (Popenoe, oral communication, 1958). The third tooth-like projection is known only from the holotype of *B. michaeli*. It is to be expected that the limits of variation of *B. michaeli* may be greatly extended as its hypodigm consists of only four specimens.

The difference in stratigraphic position and size of *B. michaeli* and *B. aff. michaeli* is such that it seems best to reserve judgment on the specific identification of these specimens until the variability of *B. michaeli* is better known.

Figured specimens.—U.C.L.A. Invert. Paleo. Cat. nos. 28650 and 28651.

Family SCAPHANDRIDAE
Genus CYLICHNA Loven, 1846
CYLICHNA ANDERSONI n. sp.
Pl. 102, figs. 3,4

Shell very small, elongate, cylindrical; spire ~~at~~ sunken in pit in top of shell; number of whorls about 3; apex truncated and very flat; spire pit about $\frac{1}{2}$ diameter of the truncated apex; ornamentation of fine spiral lines widely spaced and prominent on the anterior half of the whorl with a few closely spaced spiral lines immediately above and below the posterior angulation; very fine spirals occasionally present on the rest of the whorl; fine growth lines. Small crenulation immediately below the posterior angulation; aperture narrow linear, outer lip vertical, inner lip appears to be without callus; basal portion of aperture evenly rounded, projects slightly below base of columella.

Types.—The holotype and paratype, U.C.L.A. Invert. Paleo. Cat. nos. 28652 and 28653, respectively, were collected at locality number 3476 on Coyote Creek. Dimensions of the holotype: height $3\frac{1}{2}$ mm., maximum width 2 mm.

Remarks.—No species close to this has been previously described from the California Cretaceous. Stewart's choice of a lectotype from Martinez for *Cyllichna costata* Gabb places that species in *Scaphander*. Gabb mentions other Cretaceous localities

under *C. costata*, but the specimens have not been found (Stewart, 1926, p. 440).

The species is named for F. M. Anderson, former curator of the California Academy of Sciences.

Class CEPHALOPODA
Order AMMONOIDEA Zittel, 1884
Family TURRILITIDAE Meek, 1876
Genus PSEUDHELICOCERAS Spath, 1921
PSEUDHELICOCERAS PETERSONI (Anderson)
Pl. 107, figs. 1,2,3

Turrilites petersoni Anderson, 1958, p. 193, pl. 12, fig. 6, pl. 75, fig. 4.

Pseudohelicoceras petersoni (Anderson), Matsu-moto, 1958, p. 651.

Coiling dextral, loose, successive whorls not in contact; ornamentation of light ribs and tubercles; ribs rursiradiate, inflected slightly posteriorly on the posterior side of the whorl, interrupted on the flanks in part by four spiral rows of tubercles; tubercles broad, low blister-like, arranged in four spiral rows and placed in echelon one above the other on the flanks and anterior part of the shell so that they parallel the ribs; two or three ribs are interrupted by each tubercle and two or three ribs pass across the flank uninterrupted between the tubercles; suture complex, L narrow, deep, bifid, undercutting the first lateral saddle and E, E about $\frac{2}{3}$ as deeply incised as L (Pl. 107, fig. 3).

Hypotype.—The hypotype is specimen number 28722 U.C.L.A. Invert. Paleo. Cat. It was collected at U.C.L.A. locality 3775 in the lowest conglomerate unit of the Bald Hills formation on the North Fork of Cottonwood Creek. The specimen was in a limy sandstone clast in the conglomerate.

Remarks.—The suture differs markedly from that of the genotype, *P. robertianum* (d'Orbigny), as figured by d'Orbigny (1842, pl. 142) in that L is much larger than and undercuts E. The reverse is true in the genotype.

Range.—The true stratigraphic occurrence of the species is probably not later than upper Albian, the highest known occurrence of the genus.

PSEUDHELICOCERAS sp.

A single specimen of *Pseudohelicoceras* was found at U.C.L.A. locality 3778 about 5 feet stratigraphically above the lowest conglomerate of the Bald Hills formation exposed on

Huling Creek. The specimen is sinistrally coiled and half again as large as the specimen described under *Pseudhelicoceras peter-soni* (Anderson) and probably represents a different species. It is noted here because it is the only specimen found above the lowest conglomerate unit of the Bald Hills formation that is the member of a taxonomic group restricted to the Albian. It is, therefore, on the evidence of this single specimen that we date the lowermost unit of the Bald Hills formation on the North Fork of Cottonwood Creek and Huling Creek as uppermost Albian.

The specimen was found in nodular limestone in mudstone matrix. It is number 28723 U.C.L.A. Invert. Paleo. Cat.

Genus MARIELLA Nowak, 1916

MARIELLA (MARIELLA) FRICKI n. sp.

Pl. 103, fig. 7

Turrilites bergeri Brongniart, Anderson, 1958, p. 193, pl. 11, fig. 2.

Apical angle 34°; the whorl is ribbed from umbilical edge to the upper whorl suture; ribs are less well defined on the posterior quarter of the whorl; each rib has four prominences with the lower three approximately equal in size and somewhat smaller than the upper; the upper prominence is bullate, the middle two are more tuberculate than bullate, while the lower tends to be slightly bullate; the upper three rib prominences are equidistant whereas the lower is

slightly more closely spaced; in the younger states of growth the prominences are sharper and more spiny; cross-section of the whorl is egg-shaped.

Holotype.—The holotype, specimen number 28654 U.C.L.A. Invert. Paleo. Cat., was collected at locality 3467 from the lowest conglomerate bed of the Bald Hills formation exposed on the North Fork of Cottonwood Creek. The specimen was enclosed in nodular limestone, probably a clast in the conglomerate. Dimensions: height (incomplete) 45 mm., maximum width 33 mm., height of whorl 20 mm., width 16 mm., apical angle 34°.

Remarks.—This is the first species of the genus described from California. It differs from the genotype *M. bergeri* Brongniart, in having a much larger apical angle.

M. (M.) fricki resembles *Turrilites bergeri* Brongniart (Sharpe, 1856, pl. 26, fig. 10) (= *Paraturrilites lewesiensis* Spath, Wright and Wright, 1951, p. 40), but in Sharpe's figure the posterior portion of the whorl appears to be smooth, unlike *M. (M.) fricki* which possesses posterior ribs.

The specimen figured by Anderson (1958, pl. 11, fig. 2) is crushed but apparently represents the same species although found somewhat higher in the section.

The species is named for Master John Frick of Chico, California, who found the holotype while in the company of the writers.

EXPLANATION OF PLATE 103

- FIGS. 1-3—*Tessarolax trinalis* n. sp. 1, holotype, 28627 U.C.L.A. Invert. Paleo. Cat., showing the character of posterior canal; 2,3, two views of a smaller specimen, 28628 U.C.L.A. Invert. Paleo. Cat., showing the ornamentation of the spire, $\times 2$.
- 4,5—*Solariella stewarti* n. sp. 4, apertural view of the holotype, 28622 U.C.L.A. Invert. Paleo. Cat.; 5, oblique view of the spire of specimen 28623 U.C.L.A. Invert. Paleo. Cat. showing the ornamentation of the shoulder, $\times 2$.
- 6—*Turrilites dilleri* n. sp. Holotype, 28655 U.C.L.A. Invert. Paleo. Cat., $\times 1$.
- 7—*Mariella fricki* n. sp. Holotype, 28654 U.C.L.A. Invert. Paleo. Cat., $\times 1$.
- 8—*Mortoniceras gainesana* (Anderson). Lateral view of specimen 28674 U.C.L.A. Invert. Paleo. Cat., approximately $\frac{1}{3}$ natural size.