



**Figures 11-28.** *Lysis* species. **11-16.** *Lysis mickeyi* new species. **11-12.** Paratype LACMIP 13375, LACMIP loc. 23617, height 21 mm, diameter 16 mm. **11.** Apertural view. **12.** Right-lateral view. **13.** Paratype LACMIP 13376, LACMIP loc. 10757, left-lateral view, height 9 mm, diameter 11 mm. **14.** Holotype LACMIP 13374, LACMIP loc. 10757, abapertural view, height 13 mm, diameter 9.5 mm. **15-16.** Paratype LACMIP 13377, LACMIP loc. 10757, height 5 mm, diameter 9 mm. **15.** Left-lateral view. **16.** Apical view. **17-28.** *Lysis duplicosta* Gabb, 1864. **17.** Plasto-lectotype of *Stomatia suciensis carinifera* Whiteaves, 1879, CGS 5772, height 10 mm, diameter 19.5 mm. **18-19.** Hypotype LACMIP 13378, LACMIP loc. 24128. **18.** Apertural view, vertical dimension 27 mm, horizontal dimension 21 mm. **19.** Abapertural view, height 22 mm, diameter 26.5 mm. **20-21.** Hypotype LACMIP 13379, LACMIP loc. 24340. **20.** Apertural view, vertical dimension 28 mm, horizontal dimension 25 mm. **21.** Lateral view, vertical dimension 13 mm, horizontal diameter 29.5 mm. **22-23.** Hypotype LACMIP 13380, LACMIP loc. 24340, height 19 mm, diameter 18 mm. **22.** Apertural view. **23.** Abapertural view. **24.** Hypotype LACMIP 13381, LACMIP loc. 24340, abapertural view, vertical dimension 28 mm, diameter 37.5 mm. **25.** Hypotype LACMIP 13382, LACMIP loc. 24349, abapertural view, height 17 mm, diameter 22 mm. **26.** Hypotype LACMIP 13383, LACMIP loc. 10095, crushed specimen, abapertural view, height 24 mm, diameter 22.5 mm. **27.** Hypotype LACMIP 13384, LACMIP loc. 26951, abapertural view, height 21 mm, diameter 25 mm. **28.** Hypotype LACMIP 13385, LACMIP loc. 24340, abapertural view, height 7.5 mm, diameter 12 mm.

**Type Locality:** LACMIP loc. 10757.

**Distribution:** Redding Formation, Bear Creek Sandstone Member of Haggart (area 3) on Bear Creek, Shasta Co.; Chico Formation, top of Ponderosa Way Member and Musty Buck Member (200 m to 650 m above the base of the section) (area 5) on Chico Creek, Butte Co.; basal Tuna Canyon Formation (area 17) at head of Garapito Creek, Santa Monica Mountains, Los Angeles Co., California.

**Geologic Age:** Early Coniacian to Santonian.

**Discussion:** The above description is based on 80 specimens; most of these are from LACMIP locs. 10846 and 23617. Most specimens are internal molds. Many show endobiont boreholes, especially on the spire whorls. Two specimens show the protoconch. The oldest specimen is from LACMIP loc. 26967 in the Santa Monica Mountains.

*Lysis mickeyi* resembles *Lysis suciensis* (Whiteaves, 1879) in height of spire but is closer to *L. duplicosta* in sculpture. *Lysis mickeyi* differs from *L. duplicosta* in having a higher spire, less expanding last whorl, much less expanded shelf, more oval aperture, and thinner spiral cords. *Lysis mickeyi* greatly resembles *Trichotropis obstricta* (White, 1889), but on *L. mickeyi* the spiral ribs are less regular, and its spire is slightly lower. In addition, *L. mickeyi* lacks an umbilical chink and a free-standing inner lip.

*Lysis mickeyi* is the earliest known *Lysis* from anywhere in the world.

**Etymology:** Named for Mickey of Mickey's House on Chico Creek near the locality, LACMIP 23617, from which the species was first recognized.

*Lysis duplicosta* Gabb, 1864  
(Figures 17-28)

*Lysis duplicosta* Gabb, 1864: 138, pl. 21, fig. 98a-98c; Tryon, 1883: 112, pl. 44, fig. 25-26; Cossmann, 1903: 70; Stewart, 1927: 345-346, pl. 21, figs. 7, 7a; Anderson, 1958: 169.

*Stomatia suciensis* variety *carinifera* Whiteaves, 1879: 128-129, pl. 16, fig. 5.

*Lysis oppansus* White, 1889: 17, pl. 4, figs. 14-15; Anderson, 1958: 169.

*Lysis suciensis* var. *carinifera* (Whiteaves). Whiteaves, 1903: 367, pl. 45, fig. 4.

*Micreschara (Lysis) duplicosta* (Gabb). Gossmann, 1925: 173, pl. 9, figs. 6, 21.

*Lysis duplicostata* Gabb-Wenz, 1940: 880, fig. 2587 (reprint of Stewart, 1927); Elder and Saul, 1993: pl. 2, figs. 14-15.

*Lysis carinifera* (Whiteaves). Anderson, 1958: 170.

? *Lysis duplicosta carinifera* (Whiteaves). Dailey and Pope, 1966: 6.

Not *Lysis duplicosta* Gabb-Saul and Alderson, 1981: 35-36, pl. 3, figs. 3-4 [= *Lysis suciensis* (Whiteaves) *vide* Saul, 1990].

**Diagnosis:** Variably sculptured *Lysis*, with many fine cordlets or with six to eight strong cords, including prominent (often flange-like) carina on periphery; columella and inner lip depressed and expanded to form

crenate shelf, occupying at least one third of aperture in larger specimens.

**Description:** Shell medium size (height up to approximately 26 mm), neritiform to crepiduliform; spire moderately low, approximately 20% of total shell height; protoconch 1.5 whorls, low and smooth; teleoconch approximately two whorls, overall rounded, enlarging very rapidly, and medially carinate; sculpture consisting of spiral ribs, generally six to eight prominent ones, but highly variable in number, spacing, and strength; periphery always demarcated by very strong (occasionally flange-like) carina, located anteriorly of medial position on spire whorl and located medially on last whorl; remainder of whorls covered by spiral sculpture, ranging from numerous closely spaced fine cordlets to several widely spaced moderately strong (can alternate in strength) cords, with interspaces smooth or bearing many cordlets or threads; cords just anterior and, to a lesser degree, just posterior of medial carina on last whorl commonly approaching strength of medial carina, thereby imparting either a bicarinate or tricarinate appearance to whorl profile; aperture circular with a scarcely discernible anterior canal notch; abapertural edge of aperture sharply demarcated by raised edge; inner lip and columella flattened, and expanded to form shelf; shelf moderately wide (occupying at least one third of aperture in larger specimens), submerged within the aperture, wrapping far past suture and attached to inside of outer lip; medial part of outer lip digitate.

**Lectotype:** Of *Lysis duplicosta* UCMP 11975, height 10 mm, diameter 19.5 mm. Gabb (1864) did not indicate a holotype. Merriam (1895) recognized UCMP 11975 as the figured specimen. Stewart's (1927) statement that this is the type specimen is taken as designation of lectotype.

**Paralectotype:** Of *Lysis duplicosta* ANSP 4242.

**Syntypes:** *Stomatia suciensis* variety *carinifera* Whiteaves, 1879, CGS 5772, a-d (Bolton, 1965). Whiteaves (1903: pl. 16, fig. 5) figured one of the five syntypes CGS 5772.

**Holotype:** Of *Lysis oppansus* White, 1889, USNM 20115.

**Hypotypes:** Of *Stomatia suciensis carinifera*, CGS 5939 (Whiteaves, 1903); Of *Lysis duplicosta* LACMIP 13378-13385; USNM 468585, 468586.

**Type Locality:** Of *Lysis duplicosta*, Texas Flat, near Rock Corral, from a mine shaft at a depth of 12 m [40 ft.], near the Placer-Sacramento Co. line, Placer Co., northern California; Of *Stomatia suciensis carinifera*, Sucia Island, San Juan Co., Washington. Of *Lysis oppansus*, Pentz Ranch, Butte Co., northern California.

**Distribution:** Cedar District Formation, Nanaimo Basin, (area 1) Vancouver Island area, southern British Columbia and (area 2) Sucia Island, San Juan Co., Washington; Chico Formation, Ten Mile Member on (area 5)

Chico Creek and Musty Buck Member along (area 6) Dry Creek, near Pentz, Butte Co., California; Chico Formation, (area 7) Granite Bay and Texas Flat, Placer Co., California; Pigeon Point Formation, southern sequence, (area 8) north of Pigeon Point, San Mateo Co., California; Jalama Formation, (area 12) western Santa Ynez Mountains, Santa Barbara Co., California; Ladd Formation, uppermost Holz Shale Member and Williams Formation, Schulz Member, (area 18) Santa Ana Mountains, Orange Co., California.

**Geologic Age:** Campanian.

**Discussion:** The above description is based on 101 specimens; most of these are from the Pentz area (LACMIP loc. 24340). At any locality, most of the specimens are internal molds. Some show endobiont boreholes. One specimen, LACMIP 13385 (Figure 28), shows the shape of the protoconch.

The holotype of *Lysis duplicosta* is a juvenile and had not yet developed the wider deck of an adult. The largest specimens of this species thus far found are from the Musty Buck Member of the Chico Formation at LACMIP loc. 24340 near Pentz (area 6). The specimens are from a matrix-supported pebble conglomerate richly fossiliferous in places. The fauna, which includes scraps of cypraeids, suggests warm, shallow water. *Lysis duplicosta* is very rare in the coeval Ten Mile Member on Chico Creek (area 5) which probably represents deeper water than at LACMIP 24340, and the specimen from LACMIP loc. 23639 on Chico Creek may have been transported downslope.

The strength of the cords, especially of the strongest one, varies greatly between individuals. Gabb's specific name refers to a doubled appearance of each major cord, but Gabb's (1864) sharp, deep channel along the strong ribs results from the wearing or breaking off of the scales on the ribs.

Dailey and Popenoe (1966: fig. 3) listed *Lysis duplicosta carinifera* from the Jalama Formation at LACMIP loc. 24128. This somewhat distorted specimen (Figures 18, 19) has some stronger ribs as in *L. duplicosta*, but may represent a strong ribbed variant of *L. jalamaca*. If *L. duplicosta*, it is the geologically youngest specimen of this species.

Rennie (1930: 1935) described two species of *Lysis* from the Umzamba Formation of the Eastern Cape Province (formerly Pondoland), South Africa, one of which *Lysis capensis* Rennie, 1930, is very similar to *L.*

*duplicosta*. According to Klinger and Kennedy (1980), the lower Umzamba Formation at its type locality is latest Santonian or earliest Campanian in age and, therefore, similar in age to the Chico Formation near Pentz, Butte Co., California, where *L. duplicosta* is common. Rennie apparently had only two specimens of *L. capensis* which he said had six stout, sharp, spiral ribs. His holotype is small, similar in size to the holotype of *L. duplicosta*, and both apparently have a relatively narrower deck than is found in large specimens of *L. duplicosta*.

Kase's (1990) report of *L. duplicosta* in the Chatsworth Formation is based on a misidentification of *L. suciensis* in Saul and Alderson (1981).

*Lysis jalamaca* new species

(Figures 29-36)

*Lysis duplicosta* Gabb. Dailey and Popenoe, 1966: 6.  
Not *Lysis duplicosta* Gabb, 1864.

**Diagnosis:** A *Lysis* with sculpture of fine spiral cordlets of alternating strength and within the aperture the shelf wrapping considerably past suture.

**Description:** Shell medium size (height up to 26 mm), crepiduliform, with rapidly expanding whorls; spire low, and approximately 30% of total shell height; protoconch 1.5 whorls, low and smooth; teleoconch approximately two whorls, well rounded; whorls flattened adjacent to suture; periphery near mid-whorl height; suture abutting just below periphery; growth line prosocline, occasionally forming collabral wrinkles; sculpture consisting of numerous closely spaced fine spiral cordlets alternating in strength and somewhat scaly; cordlets strongest at and near periphery where two or three can be stronger becoming cords and the scales bead-like, with approximately three cordlets in interspaces; aperture ovoid, its abapertural margin sharply demarked and steeply descending; inner lip and columella flattened and expanded to form shelf; shelf narrow anteriorly becoming moderately wide medially, submerged within aperture, wrapping past suture and attached to inside of outer lip.

**Holotype:** LACMIP 13386, height approximately 35 mm, diameter 34 mm.

**Paratypes:** LACMIP 13387 (LACMIP loc. 24137) -13388 (LACMIP loc. 24122) and SDNHM 114595, 114596 (SDNHM loc. 3405).

**Type Locality:** LACMIP loc. 24137, Jalama Formation.

**Figures 29-39.** *Lysis* species. Specimens coated with ammonium chloride. **29-36.** *Lysis jalamaca* new species. **29-30.** Holotype LACMIP 13386, LACMIP loc. 24137. **29.** Apertural view, vertical dimension 34 mm, horizontal dimension 30 mm. **30.** Abapertural view, vertical dimension 27 mm, diameter 34 mm. **31-32.** Paratype LACMIP 13387, LACMIP loc. 24137. **31.** Left-lateral view, height 18 mm, horizontal dimension 19 mm. **32.** Lateral view, vertical dimension 11.5 mm, diameter 28 mm. **33.** Paratype LACMIP 13388, LACMIP loc. 24122, abapertural view, height 11 mm, diameter 13 mm. **34.** Paratypes SDNHM 114595 and 114596, SDNHM loc. 3405 on outer lip of volute gastropod *Longoconcha eumeka* Saul and Squires, 2008 (SDNHM 70974), SDNHM loc. 3405, height 133 mm, diameter 33 mm. **35-36.** Posterior-most paratype SDNHM 114596 on volute shown in previous figure. **35.** Abapertural view, height 13 mm, diameter 20 mm. **36.** Oblique apical view, vertical dimension 17 mm, diameter 20 mm. **37-39.** *Lysis lomaensis* new species, holotype SDNHM 67150, SDNHM loc. 3403, height 22 mm, diameter 23 mm. **37.** Apertural view. **38.** Abapertural view. **39.** Apical/lateral view, vertical dimension 8 mm, diameter 23 mm.