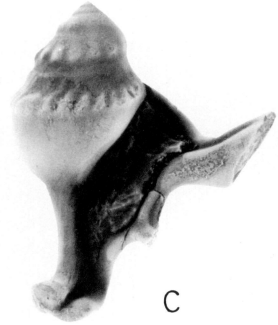




A



B



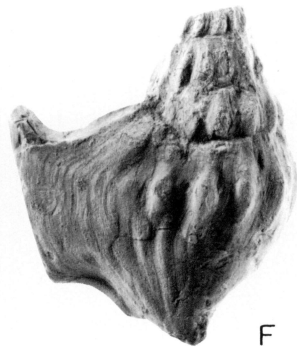
C



D



E



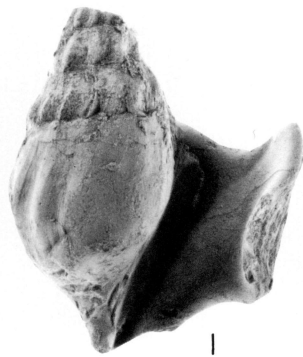
F



G



H



I

Distribution.—Bald Hills Formation (Murphy and Rodda, 1960) = Budden Canyon Formation (Murphy, Rodda and Morton, 1969) west side and north end of the Sacramento Valley—specimens generally with somewhat coarser ribbing on the spire than is present on the typical form; Member II = Frazier Silt, and Member III = Melton Sandstone, Redding region, Shasta Co.; Hornbrook Formation, Siskiyou Co.; Ladd Fm., upper Baker Canyon Sandstone Member (*Cucullaea gravida* division), Santa Ana Mountains, Orange Co., California.

Age.—?Cenomanian—early Turonian (Murphy and Rodda, 1960; late Turonian, associated with the horizon of *Subprionocyclus*).

Discussion.—*Arrhoges californicus* (Gabb) is found in fine-grained, muddy sandstone and siltstone. At Redding and near Hornbrook, it occurs in the same section as *Gymnarus manubriatus*, but not in the same beds; in the Santa Ana Mountains, it is found in the same beds as *Pyktes daiphron*. This suggests that *P. daiphron* is of deeper, quieter water habitat in the Turonian and that the genus migrated into shallower water in Senonian and Maestrichtian time.

The subgenus *Latiala* was proposed by Sohl (1960, p. 101) for forms similar to *A. occidentalis* (type-species of *Arrhoges*) but is discriminated by an angulate outer lip, extended at both anterior and posterior lateral corners, with a longer and more pronounced anterior rostrum, and with fewer axial ribs in general. The time-range of *Latiala* is at least Turo-

nian-Maestrichtian; its geographic distribution includes both Indo-Pacific and Atlantic provinces (Sohl, 1960).

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FIGURE 6—All figures printed at height of 5-6 cm to facilitate comparison of common features. A, B, *Aporrhais pespelicani* (Linnaeus, 1766). Hypotype, UCLA 59070 from Mediterranean Sea, Recent. Height 48.6 mm; diameter including hooks 36.0 mm; diameter of last whorl 17.4 mm. Apertural and abapertural views. C, *Pyktes triphyllon* Popenoe n. sp. Paratype. Duplication of Figure 5C to show similarities and differences with Figure 6A, B. D, G, *Arrhoges occidentalis* (Beck, 1836). Hypotype, UCLA 26896 from coast of Newfoundland, Recent. Height 59.6 mm; diameter including hook 42.7 mm; diameter of last whorl 24.2 mm. To show relationships with *Arrhoges californicus* Gabb and *Pugnellus densatus* (Conrad). E, H, *Pugnellus densatus* (Conrad, 1858). Hypotype, USNM 325026 from USGS loc. 10198, Coon Creek, McNairy Co., Tenn., Maestrichtian. Height 47.8 mm; diameter including hook 32.5 mm; diameter of last whorl ca. 17.8 mm. To show relationship with *Arrhoges occidentalis* (Beck) and *Arrhoges californicus* (Gabb). F, I, *Arrhoges (Latiala) californicus* (Gabb, 1864). Hypotype, UCLA 58438 from CIT loc. 1212, Little Cow Creek valley, Millville Quad., Calif., Turonian. Height (incomplete) 30.5 mm; diameter including hook 26.5 mm; diameter of last whorl 14.9 mm. To show relationships with *Arrhoges occidentalis* (Beck) and *Pugnellus densatus* (Conrad).

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APPENDIX: LOCALITIES CITED

- 92 CIT: Santiago Canyon, Santiago Peak Quad., Santa Ana Mts., Orange Co., Calif. Concretions in shale 100 ft above stream and near fence on north side of canyon. About ½ mile north of road fork in Santiago Canyon at Harding Canyon junction. Ladd Fm., Baker Canyon Member. Turonian.
- 1197 CIT: Little Cow Creek, Redding (1946) Quad., Shasta Co., Calif. Block of sandstone crowded with *Gymnarus manubriatus* found in stream bed of Stinking Creek just downstream from first fence across creek upstream from stream mouth, 4,050 ft N 44°W of SE corner sec. 6, T32N, R3W. Member I (Bellavista Sandstone). Turonian.
- 1164 CIT: South side of Silverado Canyon, El Toro Quad., Santa Ana Mts., Orange Co., Calif. Near mouth of small north-flowing gully and at top of lower fossiliferous sandstone series. About 400 ft SE of Holz ranch house in the SE corner of sec. 7, T5S, R7W. Ladd Fm., top of Baker Canyon Member. Turonian.
- 1212 CIT: Little Cow Creek Valley, Redding (1901) Quad., Shasta Co., Calif. About ¾ mi west of Alturas-Redding highway bridge (US 299) above Salt Creek and ¼ mi south of the highway, approximately 2 mi northeast of Frazier's Corners. Hard sandy concretions in shale banks of gullies in pasture, 3,870 S 49°W from the NE corner sec. 7, T32N, R3W. Frazier Siltstone. Late Turonian.
- 1225 CIT: North side Oak Run Valley, Redding Quad., Shasta Co., Calif. ½ mi north of Hathaway Bros. farmhouse. Just over the hill, north about 300-450 ft from CIT 1007. 3,635 ft N 20°35'E from NE corner of sec. 20, T32N, R2W. Member IV. Coniacian.
- 1572 CIT: Laguna Seca Quad., Merced Co., Calif. (Probable equivalent of USGS loc. 7006). 2,400 ft N and 6,400 ft W of SE corner of sec. 19, T12S, R11E. On north bank of canyon. Moreno Formation, Tierra Loma Member. Middle Maestrichtian.
- 3314 UCLA: Deer Valley, Mt. Diablo Quad., Contra Costa Co., Calif. Fine-grained slabby sandstone, float in bed of gully. About 2,100 ft S 28°W of NE corner of sec. 24, T1N, R1E, south side of valley. Deer Valley Formation. Maestrichtian.
- 3618 UCLA: Chico Creek, Paradise Quad., Butte Co., Calif. Concretion from west side Chico Creek about 10 ft up in sandstone cliff, 50 ft S of first fence line to south of bridge below Mickey's Place, approx. 425 ft S, 1,650 ft E of NW corner of sec. 12, T23N, R2E. Chico Formation. Santonian.
- 4104 UCLA: Valley of Oak Run, Millville Quad., Shasta Co., Calif. Hard-cemented sandstone slabs weathering out of siltstone in pasture a little west of north of the Hathaway ranch house and about 1,500 feet S and 600 ft E of the NW corner of sec. 16, T32N, R2W. Member IV. Coniacian.
- 4106 UCLA: Clover Creek valley, Millville Quad., Shasta Co., Calif. Fossiliferous sandstone slabs on hillside north of Clover Creek in small gully flowing south to creek. About 2,200 ft W of the NE corner of sec. 23, T32N, R3W. Member VI? Santonian.