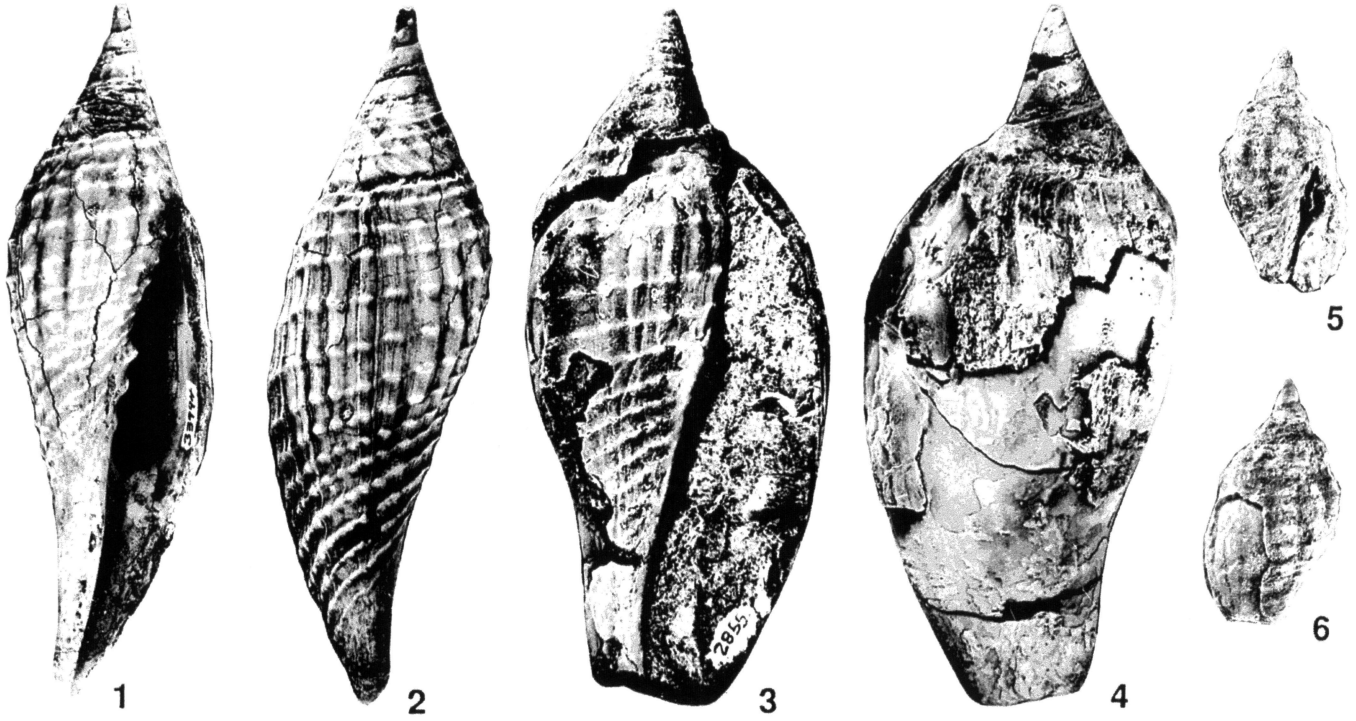

FIGURE 7—*Volutoderma* spp. from the Pacific slope of North America. *1–4*, *Volutoderma perissa* n. sp.; *1, 2*, holotype, SDNHM 33994, ×1. *3, 4*, Paratype, LACMIP 13185, ×0.75. *5, 6*, *Volutoderma* ? n. sp., hypotype, LACMIP 13217, ×1.

in three features: growth line, development of a parietal shield, and width and spacing of spiral cords. The growth line of *Carota* has a well-defined sinus immediately rampward of the shoulder. Growth lines in *Volutoderma querna* n. sp. (Fig. 4.9), the geologically oldest species, have a broader, more adapical sinus on the ramp than in *Carota* (Fig. 4.2), but geologically younger species of *Volutoderma* (Fig. 5.14) have a sinus at the suture. Both *Carota dilleri* (White, 1889) and *C.*? *mitraeformis* (Gabb, 1869) have a parietal callus, but neither have *Volutoderma*'s distinctive callus deposits that obscure the sculpture on the spire whorls, especially near the suture. On *Carota* the spiral cords and interspaces are of similar width, as are the cords and interspaces of juvenile *V. querna* and *V. averillii*, but the cords of geologically younger *Volutoderma* spp. are a third or less as wide as the interspaces. Additionally, in mature *Volutoderma* the cords are of three types: the ramp cords are fine and unnoded; the cords between shoulder and siphonal neck are largest, noded across the axial costae, and have widest interspaces; and the cords of the siphonal neck are unnoded. The sculpture of *C.*? *mitraeformis*, which has incipient differentiation of the spiral sculpture, is slightly more similar to the sculpture of *Volutoderma* than that of *C. dilleri*. A few, unfortunately incomplete, specimens of *Carota* cf. *C. dilleri* (e.g., Fig. 4.1, 4.2) of late Turonian age from southern California also show minor differentiation of the spiral cords.

In considering *Volutoderma* "characteristic of" and "peculiar to" Cretaceous rocks, Gabb (1877, p. 289) included species from Europe, North America, and India. Dall (1907) also defined *Volutoderma* broadly, gave it a global distribution, and provided local supraspecific names for locally speciated but similar forms that arose at geographically separated centers. He separated from typical *Volutoderma*, at least subgenerically, *Rostellinda* Dall, 1907 from India, *Rostellana* Dall, 1907 and *Rostellaca* Dall, 1907 from Europe, and *Volutomorpha* Gabb, 1877 from America. *Volutomorpha* differs from *Volutoderma* in being fully glazed by a callus coat, and Sohl (1964) found it to be mainly from Gulf and Atlantic Coastal Plain deposits. *Volutoderma* has at least three columellar folds, although in some species they are not visible from the aperture, whereas *Volutomorpha* commonly has one dominant, very oblique fold and one or two subsidiary folds. Species later assigned to *Longoconcha*, including *Volutilithes navarroensis* Shumard, 1861, were evidently considered by Dall (1907) to be typical *Volutoderma*, as were the Pacific Slope species with the exception of *Scobinella dilleri* White, 1889, of Turonian age, which Dall (1907) listed as *Volutoderma* (*Rostellinda*) *dilleri*. Whorls of *Volutoderma* are consistently inflated posterior to midwhorl and are less slender than in *Longoconcha*, which has a body whorl conspicuously flattened on the side. Sohl (1964) gave a range of Coniacian to Maastrichtian for species of *Longoconcha*, most of which are from Atlantic and Gulf Coast, but he also included *Mitra murchisoni* Müller, 1851 from Germany and *Voluta elongata* Sowerby of d'Orbigny, 1843 from France and Africa. Kollmann (2005) found d'Orbigny's specimens to differ specifically from Sowerby's and redescribed them as *Carota megalocostata* Kollmann, 2005 (p. 139), of late Turonian age. A midde Santonian steinkern from Germany figured by Kiel and Krüger (2006, p. 688, fig. 15) as *Volutoderma elongata* is more fusiform and finely sculptured than *Volutoderma*. Two specimens, figured as *Voluta conspicua* Coquand by Pervinquière (1912, p. 74, pl. 6, figs. 10, 11) from the Coniacian of Tunisia, appear to be internal molds; their flattened whorl sides resemble those of *Longoconcha* more than those of *Volutoderma*. Two similar molds

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FIGURE 6—*Volutoderma* spp. from the Pacific slope of North America. *1–4*, *Volutoderma blakei* n. sp.; *1, 2*, paratype, LACMIP 13175, ×1.3; *3, 4*, holotype, LACMIP 13174, ×0.66. *5–13*, *Volutoderma jalama* n. sp.; *5, 6*, paratype, LACMIP 13180, ×1.4; *7, 8*, paratype, LACMIP 13181, ×1.4; *9, 10*, paratype, LACMIP 13183, ×1.02; *11*, holotype, LACMIP 13179, ×0.79; *12, 13*, paratype, LACMIP 13184, ×1.13.