New Eastern Pacific Subgenera
of *Turbo Linnaeus*, 1758 and *Astraea Röding*, 1798

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In the course of reviewing the tropical eastern Pacific species of Turbinidae, the need for one new subgenus of *Turbo Linnaeus*, 1758, and one of *Astraea Röding*, 1798, has been recognized. Both of these genera are large cosmopolitan groups in tropical and subtropical areas of the world. Subgenera in each are based upon sculpture of the mature shell and the morphology of the calcareous opercula. In many of the available taxa, the opercular differences are striking, and no doubt some will eventually come to be treated as full genera, following review on a worldwide scale.

The available generic taxa in these two groups are diagnosed and many of the type species are illustrated in the Treatise on Invertebrate Paleontology (Moore, ed., 1960).

**Chaenoturbo McLean, subgen. nov.**
(of *Turbo Linnaeus*)

Type Species: *Turbo mazatlanicus Pilsbry & Lowe*, 1932 (p. 87; pl. 9, fig. 6).

Diagnosis: Mature shell relatively small, openly umbilicate. The two keels of the juvenile shell are weakly stellate. Surface of operculum granular, central area raised relative to the flat shelf-like area along the outer margin, the marginal area evenly sloping to the summit adjacent to the columella; a deep central pit is bordered by a broad, spirally descending cord making two turns.

Discussion: The operculum of *Turbo mazatlanicus* has not previously been described. This is an uncommon species, generally known from beachworm specimens collected at Mazatlan, Mexico. Seven lots are represented in the Los Angeles Museum, ranging from the Cape San Lucas area of Baja California south to Port Utria, Colombia, with operculate specimens on hand from the Tres Marias Islands and Cuastecamate Cove, Jalisco, Mexico. Living specimens occur on rocky bottoms offshore at depths of 20-50 feet.

The open umbilicus of mature shells of *Turbo mazatlanicus* differentiates this species from all other New World turbos. Juvenile shells of most turbinids are umbilicate (Robertson, 1957, p. 319), but the only other subgeneric taxon listed by Moore (1960, p. 268) as umbilicate in the mature shell is *Subbinella Thiele*, 1929 (*Lunatica Röding, 1798, is erroneously so listed*). The type species of *Subbinella*, the Australian *T. undulatus Gmelin, 1791, is a moderately large, low-spired form with rounded whorls and a convex operculum. The granular, deeply pitted operculum of *T. mazatlanicus* is not similar to that of any other New World subgenus of *Turbo* (*Callopora Gray, 1850; Halosephus Rehder, 1943; Marmorostoma Swainson, 1829; Taeniaturbo Woodring, 1928*). On the opercular distinction plus that of the umbilicate shell, the monotypic *Chaenoturbo* is regarded as coordinate in rank with the other above mentioned taxa.

The prefix *chaeno-* is derived from the Greek verb χανεω, meaning to gape, open, and referring in *Chaenoturbo* to the open umbilicus.

**Megastraea McLean, subgen. nov.**
(of *Astraea Röding*)

Type Species: *Trochus undosus Wood, 1828*.

Diagnosis: Shell exceptionally large, exceeding 100 mm in height; periostracum thick, forming raised lamellae. Outer face of operculum bearing 3 (or 4, counting the small, upper marginal rib) raised, spinose ridges.

Discussion: Two subtropical species of the Californian province comprise the Recent members of this subgenus of *Astraea Röding, 1798*: the familiar *A. undosa*, and the less well known *A. turbanica* (Dall, 1910), as synonyms of which I regard *A. petrothauma Berry, 1940*, and *A.
rupicollina Stohler, 1959. Not until 1959 with the description of A. rupicollina were fully mature living specimens of A. turbanica discovered near the Coronado Islands south of San Diego on the outer coast of Baja California (Stohler, 1959, p. 425). Dall's species (Dall, 1910, p. 134) was based upon an immature specimen from the Magdalena Bay area (see Keen, 1958, p. 263, fig. 75), and Berry's taxon was based upon Lower Pleistocene specimens from Los Angeles County (Berry, 1940, p. 10; plts. 2, figs. 2, 3). Recently collected material from a number of localities along the outer coast of Baja California now provides the basis for arriving at the above synonymy; comparison of this material with type material of the 3 taxa clearly indicates that a single species is represented. Woodring (1946, p. 63) anticipated this synonymy in treating Berry's taxon as a subspecies of Dall's taxon. Mature specimens of A. turbanica are easily separated from A. undosa. They are generally larger than A. undosa, have 2 peripheral carinae rather than one, and the lowermost ridge of the operculum is curved and nearly lacking spines, in contrast to that of A. undosa, in which it is uncurved, thick, and spiny. Astraea gradata Grant & Gale, 1931, from the middle Pliocene of Los Angeles County (Grant & Gale, 1931, p. 818; plts. 31, figs. 1, 3, 5, 8, 9) is also referable to Megastrea.

Astraea undosa was considered by early workers to be referable to the subgenus Pomaulax Gray, 1850, but the type species of Pomaulax is Trochus janipicus Dunker, 1845 (see Keen, 1956, p. 6; Moore, 1960, p. 266), a Japanese species having a smooth, convex operculum. Pomaulax is now in use for the Californian species A. gibberosa (Dillwyn, 1817). The subgenus Uvanilla Gray, 1850, type species Trochus unguis Wood, 1828, comprises a group of tropical eastern Pacific species of medium size, having 2 granulose (rather than spiny) ridges on the operculum. On the basis of size, peristomial, and opercular differences, Megastrea is regarded as coordinate in rank with Uvanilla.

The prefix megal- is derived from the Greek adjective μεγάς and means large, an appropriate designation for this group of the largest species of Astraea.

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