

Late Cretaceous Occurrences on the Pacific Slope of North
America of the Melanopsid Gastropod Genus
Boggsia Olsson, 1929

by

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Abstract. The shallow-marine gastropod *Potamides tenuis* Gabb, 1864, from Upper Cretaceous (Campanian Stage) rocks in northern California, western Washington, and southwestern Canada, belongs to the gastropod genus *Boggsia* Olsson, 1929, formerly known only as two species from lower Eocene strata of northwestern Peru. The northern California specimens of *Boggsia tenuis*, are early Campanian in age, plentiful, and were deposited on an inner shelf in storm-lag accumulations composed of nearshore-marine and shelf-dwelling mollusks. The Washington specimens are middle Campanian in age and are rare. The Canadian specimens are middle to late Campanian in age and are also rare.

Boggsia tenuis has an anterior canal that is turned sideways and a very low, smooth protoconch poorly demarcated from the teleoconch. These features were previously unknown for the genus, hence its familial placement was uncertain. It can now be placed in family Melanopsidae, which ranges from Early Cretaceous (Albian) to Recent. New World melanopsids range from Early Cretaceous (Albian) to early Eocene and were shallow-marine dwellers. *Boggsia tenuis* is the first report of a melanopsid from the Pacific slope of North America. Old World melanopsids range from Late Cretaceous to Recent and are restricted to brackish or freshwater deposits.

INTRODUCTION

This paper concerns a shallow-marine gastropod species that is mostly found in Upper Cretaceous (lower Campanian Stage) rocks near Chico and Pentz, northern California (Figure 1). Rare specimens are found about 135 km northwest of Seattle on Sucia Island, San Juan County, Washington, and about 120 km northwest of Vancouver on Hornby Island, eastern British Columbia. The species has long been known as *Potamides tenuis* Gabb, 1864, but it is not a potamidid and is herein assigned to genus *Boggsia* Olsson, 1929. This particular genus was previously known only as two species from lower Eocene

shallow-marine rocks of northern Peru, but the familial position of the genus was uncertain due to lack of information regarding the protoconch and the anterior end of the aperture. These features are preserved in *Boggsia tenuis*, and the genus can now be placed in family Melanopsidae.

As will be discussed below, the classification of family Melanopsidae has been inconsistent, with some workers regarding it as a subfamily of Thiaridae and other workers regarding it as a family of its own. The geologic history of family Melanopsidae is poorly known because most members lived in brackish or freshwater habitats, which have a low potential for preservation. The fossil record

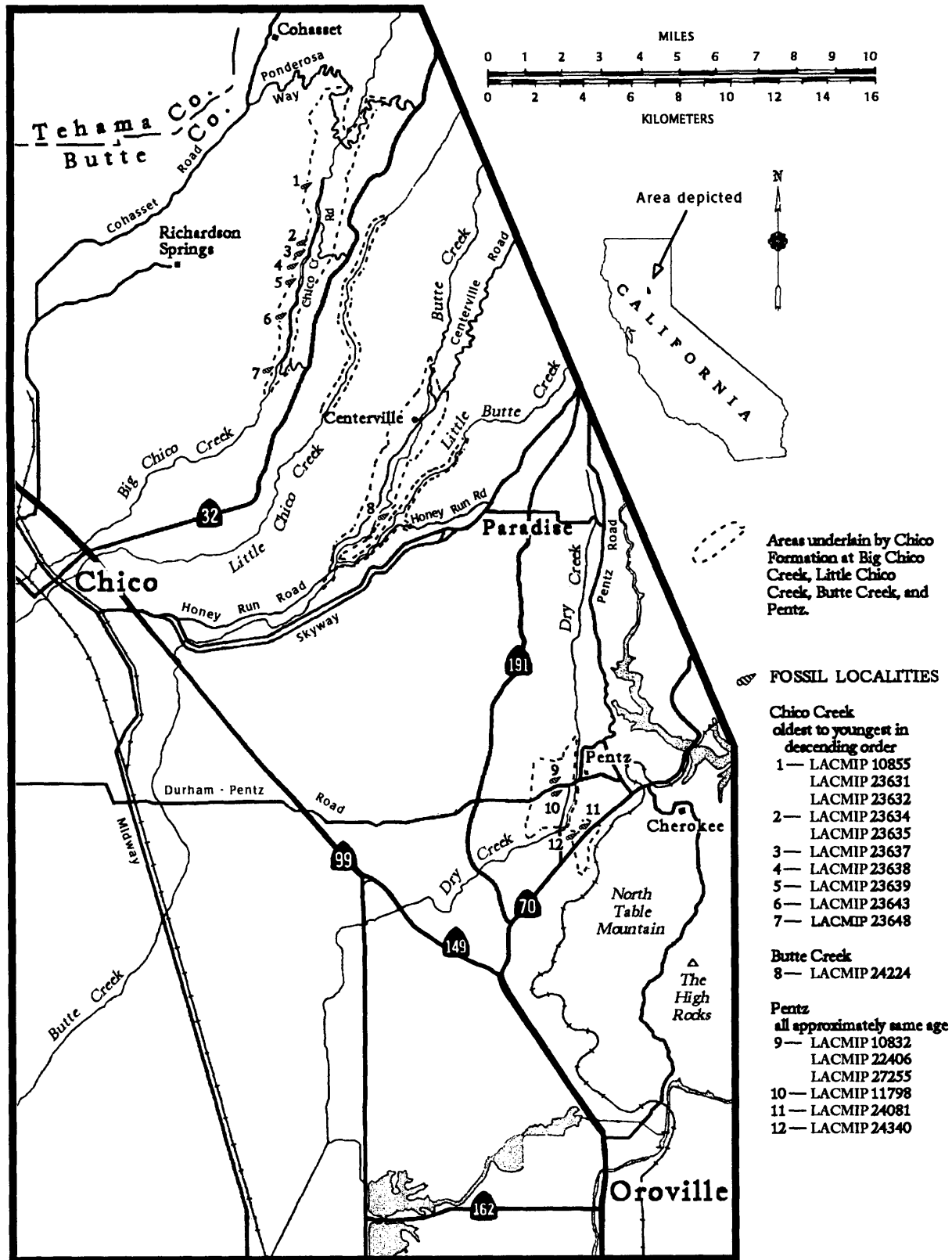


Figure 1

Index map for northern California localities of *Boggsia tenuis* (Gabb, 1864).

of melanopsids in the New World is very sketchy, and the recognition of *Boggsia* as a melanopsid from Upper Cretaceous rocks in California, Washington, and British Columbia, as well as from Eocene rocks in Peru, helps greatly in understanding the evolutionary history of this family. The shallow-marine habitat of *Boggsia* allowed the genus to achieve more widespread distribution than it could have if it lived in brackish or freshwater environments.

Abbreviations used are: CIT, California Institute of Technology (collections now stored at LACMIP); GSC, Geological Survey of Canada, Ottawa; LACMIP, Natural History Museum of Los Angeles County, Section of Invertebrate Paleontology, Los Angeles; UCLA, University of California, Los Angeles (collections now stored at LACMIP).

SYSTEMATIC PALEONTOLOGY

Superorder CAENOGASTROPODA Cox, 1959

Order NEOTAENIOGLOSSA Haller, 1882

Superfamily CERITHIOIDEA Ferrussac, 1819

Family MELANOPSIDAE H. & A. Adams, 1854

Discussion: The family Melanopsidae usually has been regarded as a subfamily of Thiaridae Troschel, 1857. In a cladistic analysis, Houbriek (1988) showed melanopsids to be distinct from thiarids and deserving of full familial status. In his analysis, the Melanopsidae is in a separate branch but relatively close to the branch supporting the Thiaridae.

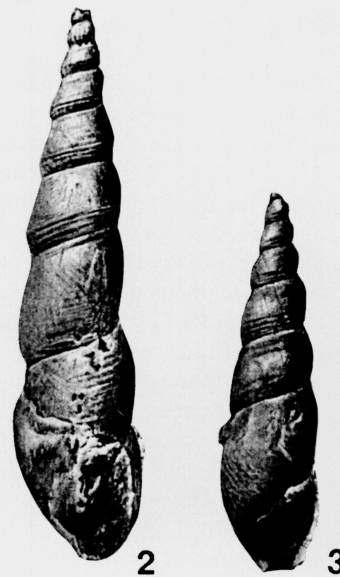
Family Melanopsidae is characterized by members having an operculate oval aperture with an anterior channel, a simple protoconch not clearly demarcated from the teleoconch, and a usually calloused columellar lip bent anteriorly (Davies & Eames, 1971; Bandel & Riedel, 1994).

Genus *Boggsia* Olsson, 1929

Original description: "Shell melanoid to sub-turriteloid, subulate, with numerous convex to subangulated whorls; sutures distinct, strongly oblique or descending; early whorls smooth or finely sculptured with revolving spirals; later whorls smooth; growth lines oblique but not sinuous; aperture subovate, *Littorina*-like in shape and with a thin outer lip" (Olsson, 1929:78).

Type species: *Turritella anceps* Woods, 1922, by original designation; early Eocene of northwestern Peru.

Discussion: Olsson was mistaken in reporting that *Boggsia* has a round aperture because he based his description on incomplete specimens. Although he did not figure *Turritella anceps*, the type species of *Boggsia*, illustrations of this species by Woods (1922:pl. 8, figs. 12, 13; pl. 9,



Figures 2–3

Reprints of Woods (1922:pl. 8, figs. 12, 13) illustrations of *Turritella anceps* Woods, 1922, the type species of *Boggsia*; apertural views, $\times 1.6$. Specimens stored at Sedgwick Museum, Cambridge, England. Figure 2. Same as Woods figure 12. Figure 3. Same as Woods figure 13.

figs. 1, 2) show that the anterior ends of the type specimens are broken, even though Woods mentioned that the aperture is rounded in front. The same is true for *T. annectens* Woods (1922:pl. 9, figs. 3, 4), the only other species assigned by Olsson to genus *Boggsia*.

Wenz (1938:fig. 887) reprinted two of the original illustrations of *T. anceps*, but the reprint of Woods' (1922) figure 12 is poor, and it is not obvious that the larger specimen has a broken anterior end of the aperture. Woods' (1922:pl. 8, figs. 12, 13) illustrations of *Turritella anceps* are included herein (Figures 2, 3). The extreme anterior parts of the apertures of these specimens look exactly like those of incomplete specimens of "*Potamides*" *tenuis* Gabb whose extreme anterior parts of the apertures are missing (e.g., Figure 13). These specimens of "*Potamides*" *tenuis*, have all of the diagnostic characters of genus *Boggsia*, especially in terms of the shape of the elongate teleoconch with anteriorly subangulated whorls that show sculpture on the spire. Well-preserved specimens of "*P.*" *tenuis* show the following additional characters not available from the type species: a short anterior canal that is not twisted but is turned sideways; a very low, smooth protoconch that is difficult to distinguish from the teleoconch; and a thin to moderately thick columellar callus. The western North American Cretaceous "*Potamides*" *tenuis*, which is herein unequivocally assigned to genus *Boggsia*, thus adds valuable new morphologic information about the genus and establishes that *Boggsia*'s so-called round aperture is only an appar-

ent feature associated with specimens whose anterior end is broken.

Because Olsson (1929) mistakenly believed that *Boggsia* had a rounded aperture without an anterior channel, he assigned *Boggsia* to the family Pseudomelaniidae Fischer, 1885. Wenz (1938) later questionably used this familial assignment. Family Pseudomelaniidae is characterized by an oval-rounded aperture without an anterior channel, a smooth and slightly elevated protoconch, and a smooth to weakly ornamented teleoconch. Olsson did not have available specimens of *Boggsia* whose extreme anterior end of the aperture was intact, nor did he have any information regarding the protoconch morphology of *Boggsia*. The morphologic features of *B. tenuis*, however, dictate that genus *Boggsia* cannot belong to family Pseudomelaniidae. Instead, the genus belongs in family Melanopsidae, whose characters were listed earlier under "Family Melanopsidae."

Genus *Nudivagus* Wade, 1917, also resembles *Boggsia*, in terms of the turruculate shell with a slightly curved, short anterior canal. *Nudivagus*, which is smoothish, is known primarily from Upper Cretaceous strata of the southeastern United States. Abbass (1973) also reported it from Lower Cretaceous (Aptian Stage) strata of the Isle of Wight, southern England. The familial status of *Nudivagus* has been somewhat problematical, and the most recent workers that addressed this problem were Sohl (1960) and Abbass (1973). Both believed it to be a member of family Procerithiidae.

With future taxonomic revisions, we consider it likely that turruculate gastropods distinguished by a short and slightly curved anterior canal, like that seen on *Boggsia*, on *Nudivagus*, and on certain fossil forms of "*Faunus*" (discussed below) will be grouped together either as a subgroup of melanopsids or as a new family, closely related to the melanopsids.

Boggsia tenuis (Gabb, 1864)

(Figures 4 to 17)

Potamides tenuis Gabb, 1864:130–131, 227, pl. 20, fig. 86; 1869, p. 227. Stanton in Turner, 1894:460. Stewart, 1927:356, pl. 23, figs. 8, 9. Anderson, 1958:164. Russell et al., 1986:191:1–2.

Potamides tenuis Gabb. Whiteaves, 1879:121 (in part), pl. 15, figs. 8a–8c; 1903:363. Not *Potamides tenuis*, variety *nanaimoensis* Whiteaves, 1879:12–122, pl. 15, figs. 9, 9a [= *Anchura nanaimoensis* (Whiteaves) *fide* Elder & Saul, 1996].

Original description: "Shell elongated, slender; spire high; whorls increasing gradually in size, seven to seven and a half. Upper two-thirds sloping almost perpendicularly; lower third sloping rapidly inwards towards the suture, which is narrowly channelled. Angle of whorls marked by pretty distinct, elongated tubercles, which, on the body whorl, sometimes take the form of elongated

sinuous ribs; at other times the surface of this whorls is smooth. Aperture elongated, acute behind, widest in the middle, contracted in advance. Outer lip acute, sinuous; inner lip thinly incrustated. Canal gently curved. Length, 0.75 inch [19 mm]; width of body whorl, 0.25 inch [6.3 mm]" (Gabb, 1864:130–131).

Supplementary description: Moderately small in size (up to 25 mm high, estimated), elongate-turrucate to fusiform, approximately eight whorls (including protoconch); high-spined, spire approximately one-half of shell height. Sutures oblique, impressed. Protoconch approximately one whorl, very low, smooth, and poorly differentiated from teleoconch. Teleoconch approximately six whorls; sculpture changes from early whorls to later whorls. Upper spire whorls with flattish posterior portion, a strong angulation on anterior one-third of whorl, and 10 to 11 broad opisthocline axial ribs. Strength of axial ribs variable; either broadly swollen from suture to suture or only as knobby swellings on the angulation. Upper spire whorls with minute (usually same strength as the growth lines) spiral threads, producing, on some specimens, a reticulate pattern where intersecting the opisthocline growth lines, especially in the high-sloping area between the angulation and anterior suture. Spiral ribs rarely moderately strong over entire whorl; on some specimens, a single moderately prominent spiral rib present in area between angulation and anterior suture. On middle spire whorls, axial ribs either better developed than on preceding whorls, or none at all; knobby swellings on angulation weak to obsolete; spiral ribs minute to obsolete.

Adult body whorl smooth; opisthocline growth lines usually moderately strong, especially near outer lip. Aperture small, elliptical, tapered anteriorly. Anterior canal spoutlike, very shallow, short, projecting, and bent sideways. Columella smooth, not twisted, with a thin to moderately thick callus; rarely a groove present between columellar callus and base of body whorl. Outer lip thin, not carrying a varix.

Lectotype: ANSP 4288 (designated by Stewart, 1927).

Type locality: Near Pentz, Butte County, northern California.

Hypotypes: ANSP 27858 and LACMIP 7898 to 7907.

Distribution: NORTHERN CALIFORNIA: Chico Creek, Butte County, Chico Formation, lowermost part of Ten Mile Member (LACMIP locs. 10855, 23631, 23632, 23634, 23635, 23637, 23638, 23639, 23643, 23648); Butte Creek, Butte County, Chico Formation, lowermost part of Ten Mile Member (LACMIP loc. 24224); Pentz area, Butte County, Chico Formation, informal Pentz Road member (LACMIP locs. 10832, 11798, 22406, 24081, 24340, 27255). WESTERN WASHINGTON: Sucia Island, San Juan County, Cedar District Formation (LACMIP loc. 10442). BRITISH COLUMBIA: Hornby Island, probably the Spray Formation.