

# New and little known species of Pseudolividae (Gastropoda) from the Tertiary of Chile

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## ABSTRACT

Two new species of Pseudolividae, *Macron vermeiji* and *Triumphis maitenlahuensis*, are described and figured from Miocene deposits of the Navidad Formation, central Chile. Both are among the oldest known representatives of their respective genera. Juvenile specimens of the Miocene species *Testallium cepa* (Sowerby, 1846) and the holotype of the Eocene *Sulcobuccinum retusum* (Philippi, 1887) are figured for comparison. One of the three syntypes of *Monoceros opimum* Hupé, 1854, and the holotype of *Monoceros labiale* Hupé, 1854, both previously considered synonyms of *Testallium cepa*, are figured for the first time and synonymy is confirmed.

## INTRODUCTION

The earliest descriptions of Tertiary gastropods of Chile were by d'Orbigny (1842), Sowerby (1846), Hupé (1854), and Philippi (1887). Subsequently, a major revision of Pliocene/Pleistocene faunas was conducted by Herm (1969). New collections of Miocene gastropods from Chile made by the senior author and Klaus Bandel (Hamburg, Germany) and collections housed in the Museo Nacional de Historia Natural (Santiago, Chile) made by the junior author and the late Vladimir Covacevich (Santiago, Chile), include a number of undescribed species, among them the two new pseudolivid species described herein. The family Pseudolividae was recently revised by Vermeij (1998) who presented a reevaluation of the entire family based on shell characters of Recent and fossil species and his classification is followed herein. Vermeij (1998) attributed the family-name Pseudolividae in his abstract to Cossmann (1901) and in the systematic section to Fischer (1884). However, it was de Gregorio (1880, p. 104) who first introduced this name and the family is consequently attributed to him.

Although there is a continuous pseudolivid record in South America since the Late Cretaceous, few species have been described (Vermeij, 1997, 1998). Only three Chilean Tertiary species are known (Vermeij and DeVries, 1997): the Eocene *Sulcobuccinum retusum* (Phi-

lippi, 1887), the Miocene *Testallium cepa* (Sowerby, 1846), which also occurs in Peru, and the Pliocene *Testallium escalonia* Vermeij and DeVries, 1997.

*Sulcobuccinum retusum* comes from strata near the village of Algarrobo (Figure 1), north of San Antonio, Chile. From an intertidal platform of that village, Eocene and Late Cretaceous sediments are known. Because no material other than the holotype is known, and the genus *Sulcobuccinum* d'Orbigny, 1850, is known from the Campanian onward (Vermeij, 1998), the age of the species remains unclear. However, Vermeij (1998) regarded this species as of early Eocene age. *Gastroidium retusum* Philippi, 1887, was reassigned to *Buccinorbis* Conrad, 1865, by Vermeij and DeVries (1997), a genus later considered to be a synonym of *Sulcobuccinum* (Vermeij, 1998). However, the holotype of *G. retusum* (Figures 13–14, SGO.PI.765, height 43 mm) has never been figured since the original drawing was published by Philippi (1887). The remaining species reported here come from the Navidad Formation (Figure 1).

## ABBREVIATIONS

MNHN-LG: Museum national d'Histoire naturelle, Laboratoire de Géologie, Paris, France. SGO.PI: Museo Nacional de Historia Natural, Departamento de Paleontología de Invertebrados, Santiago, Chile. SMF: Senckenberg Museum, Frankfurt, Germany.

## SYSTEMATIC PALEONTOLOGY

Family Pseudolividae de Gregorio, 1880

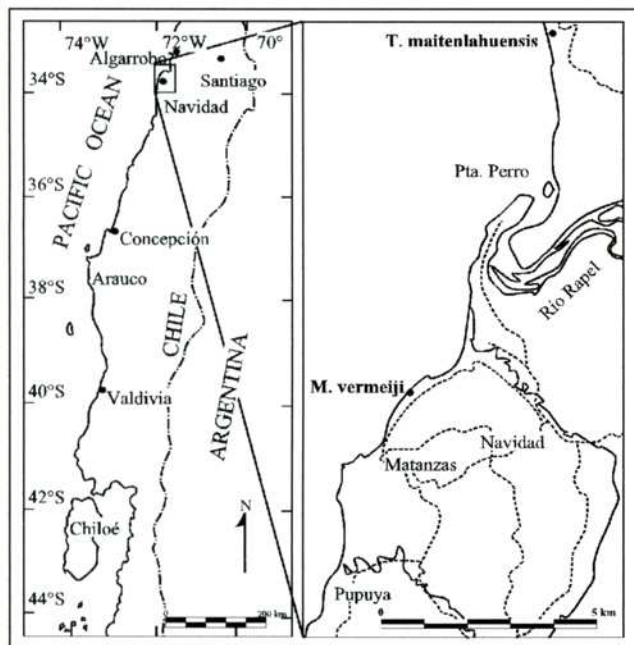
Genus *Macron* H. and A. Adams, 1853

**Type Species:** *Pseudoliva kellettii* A. Adams, 1855 (= *Buccinum aethiops* Reeve, 1847); Recent, West Mexico.

*Macron vermeiji* new species  
(Figures 7, 8, 10, 11)

**Description:** Shell medium-sized, ovate, spire low, consisting of five to six whorls. Height-to-width ratio





**Figure 1.** Type localities of *Macron vermeiji* and *Triumphis maitenlahuensis* and other localities mentioned in the text.

1.25. Whorls separated by narrow suture. Last whorl large, comprising 83% of total shell height, rounded, constricted basally above siphonal fasciole. Pseudolivid groove situated low on last whorl, terminating in distinct labral tooth. Spiral sculpture consisting of three cords below pseudolivid groove and very faint threads above, axial sculpture absent except for faint growth lines. Protoconch unknown. Outer lip planar. Anterior notch present, reflected as groove inside last quarter of last whorl. Interior of outer lip lirate. Columellar callus cutting deeply into former whorl, having two weak folds at entrance to siphonal canal. Columella with two weak folds at entrance to siphonal canal. Siphonal fasciole prominent, bounded above by keel. Anterior notch deep, no umbilicus.

**Type Material:** Holotype SGO.PI.5988 (height 24 mm, width 19 mm), paratype SGO.PI.3714 (height 22.5 mm; together with nine juvenile specimens of *Testallium cepa*). Early late Miocene (Tortonian), Navidad Formation.

**Type Locality (Figure 1):** About one kilometer north of Matanzas, Chile. Early late Miocene (Tortonian), Navidad Formation (see Frassinetti and Covacevich (1993) for more details on the locality).

**Occurrence:** Specimens of the new species of *Macron* were collected on an intertidal platform about 1 km north of the village of Matanzas as described by Frassinetti and Covacevich (1993) and from a fossil-bearing lens about 2 m higher in the section. That lens, however, was severely eroded the following year. It has been dated as Tortonian (upper Miocene) based on Foraminifera

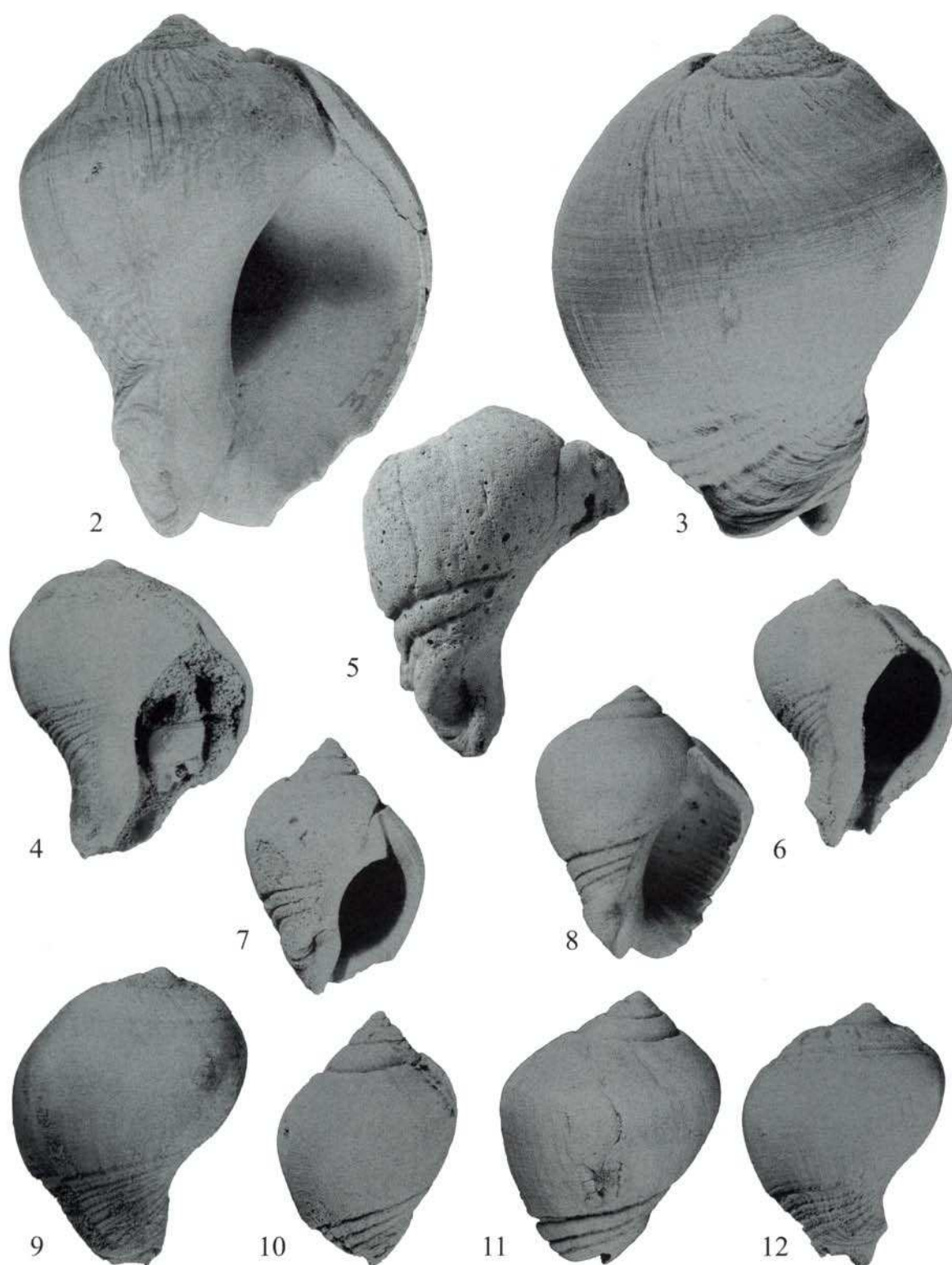
(Finger et al., 2003). The accompanying gastropod fauna indicates mainly a shallow-water environment but some possible deep-water species are present (Nielsen and DeVries, 2002), such as *Xenophora paulinae* Nielsen and DeVries, 2002. A deep-water environment is also indicated by benthic Foraminifera, the ostracod assemblage (Finger et al., 2003), and the presence of otoliths of fish species in the genus *Steindachneria* (Nolf, 2002). This contrasting evidence may be due to slumping of shallow-water sediments into deeper water, a model supported by the presence of reworked mudstone clasts. The sedimentology of these deposits was discussed elsewhere (Encinas et al., 2003).

**Etymology:** Named in honor of G. J. Vermeij (University of California, Davis, Geology) who contributed greatly to the knowledge of the Pseudolividae.

**Discussion:** Another possibly conspecific specimen is SGO.PI.766 (Figure 5, height 30.9 mm) from Navidad. Other species from the Tertiary of Chile resembling *Macron vermeiji* are the Eocene *Sulcobuccinum retusum*, and the Pliocene *Testallium escalonia*. *Sulcobuccinum retusum* has the pseudolivid groove situated high on the last whorl and is smooth inside the outer lip. Juvenile specimens of *Testallium cepa* (Figures 4, 6, 9, 12, both part of SGO.PI.3714) of about the same size as presumably adult *Macron vermeiji* differ in not having lirae inside the outer lip, in having more numerous spiral elements below the pseudolivid groove, and in having the columellar callus secreted onto former whorls, rather than cutting deeply into them. Most of the larger specimens of *Testallium cepa* (Figures 2, 3, part of SGO.PI.3714, height 46 mm) have additional spiral elements above the pseudolivid groove and a more globose appearance, characters that are even more prominent in adults. The Pliocene *Testallium escalonia* has a higher spire, stronger spiral sculpture and no lirae inside the outer lip.

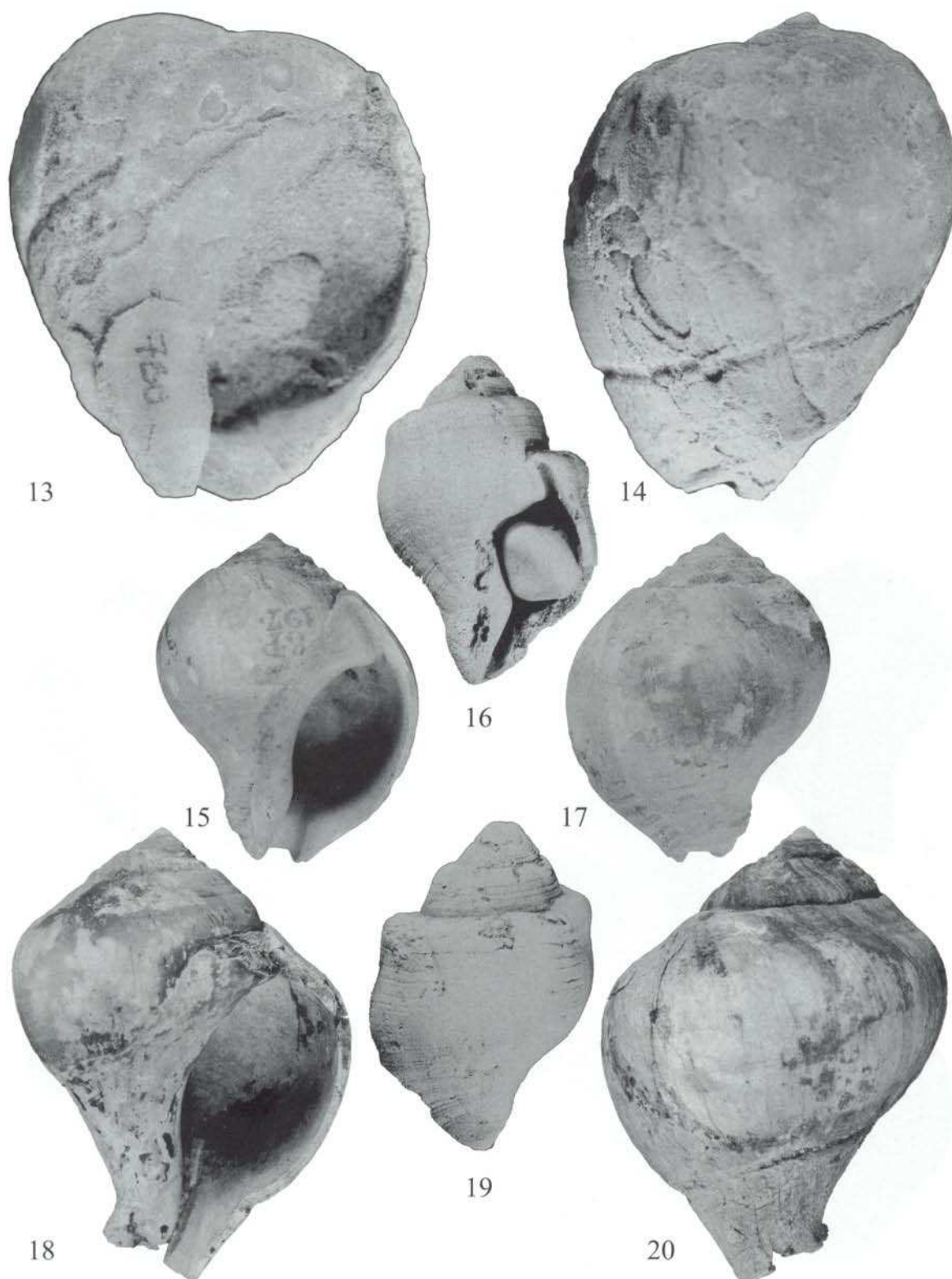
The spire of *Macron vermeiji* is relatively much lower than that of any previously known species of *Macron* (height-to-width ratio 1.25 in *M. vermeiji* compared with 1.9 to 4.1 in other species) and its last whorl is relatively larger (83% of total shell height compared with 68 to 74% in other species) so that the diagnosis of the genus given by Vermeij (1998) must be emended to include this species.

*Macron vermeiji* extends the geographic distribution of the otherwise strictly northern Pacific genus *Macron* into the southeastern Pacific. It is the lowest-spined species of *Macron* and thus closely resembles species of *Pseudoliva* Swainson, 1840, from which it mainly differs by the lirate interior of its outer lip. It is not only intermediate in shell-form but also comes from an area geographically between the mainly northeast Pacific *Macron* and the South African *Pseudoliva*. These genera have their origins in the (lower) Miocene of Venezuela (*Macron*; Gibson-Smith et al., 1997) and Madeira (*Pseudoliva*; Vermeij, 1998).



**Figures 2–12.** Pseudolividae from the Navidad Formation. **2–4, 6, 9, 12.** *Testallium cepa* (Sowerby, 1846). **2, 3.** Adult specimen SGO.PI.3714, height 46 mm. **4, 9.** Juvenile specimen SGO.PI.3714, height 26.3 mm. **6, 12.** Juvenile specimen SGO.PI.3714, height 23.5 mm. **5, 7, 8, 10, 11.** *Macron vermeiji* new species. **5.** cf. *Macron* cf. *vermeiji*, plaster cast of SGO.PI.766, height 30.9 mm (photo courtesy of T. J. DeVries. **7, 10.** Paratype SGO.PI.3714, height 22.5 mm. **8, 11.** Holotype SGO.PI.5988, height 24 mm.)





**Figures 13–20.** Pseudolividae from the Chilean Tertiary. **13, 14.** *Sulcobuccinum retusum* (Philippi, 1887). Holotype SGO.PI.765, height 43 mm. **16, 19.** *Triumphis maitenlahuensis* sp. nov. Holotype SGO.PI.5523, height 29 mm. **15, 17, 18, 20.** *Testallium cepa* (Sowerby, 1846). **15, 17.** Syntype of *Monoceros opimum* Hupé, 1854, MNHN-LG Gg2002/70, height 58 mm. **18, 20.** Holotype of *Monoceros labiale* Hupé, 1854. MNHN-LG Gg2002/71, height 80 mm.

Genus *Testallium* Vermeij and DeVries, 1997

**Type Species:** *Gastridium cepa* Sowerby, 1846; Miocene, Chile.

*Testallium cepa* (Sowerby, 1846)  
(Figures 2–4, 6, 9, 12, 15, 17, 18, 20)

**Discussion:** *Testallium cepa* has been discussed in detail by Vermeij and DeVries (1997) and it is present at most Miocene localities from southern Peru (DeVries and Frassinetti, 2003) to Isla Stokes, southern Chile (Frassinetti, 2001) and abundant in the Navidad Formation. However, juvenile specimens (Figures 4, 6, 9, 12) have not been figured and the three syntypes of *Monoceros opimum* Hupé, 1854 (Figures 15, 17; MNHN-LG Gg2002/70; height 58 mm) and the holotype of *Monoceros labiale* Hupé, 1854 (Figures 18, 20; MNHN-LG Gg2002/71; height 80 mm), put into synonymy with *Testallium cepa* by Vermeij and DeVries (1997), were unavailable at that time because the location of the collection described by Hupé was unknown. Rediscovery of Hupé's types in the MNHN-LG allows us to figure those specimens herein, confirming the inferred synonymy. According to new data its stratigraphic range is lowermost (DeVries and Frassinetti, 2003) to upper Miocene (Finger et al., 2003).

Genus *Triumphis* Gray, 1857

**Type Species:** *Buccinum distortum* Wood, 1828; Recent, Caribbean Sea.

*Triumphis maitenlahuensis* new species  
(Figures 16, 19)

**Description:** Shell moderately large with stepped whorl profile. Protoconch unknown. Whorls with steep, almost straight, slightly concave sides. Last whorl with strong, ridge-like shoulder. Whorl slightly constricted below shoulder, forming a concave area followed by convex, globose region. Whorl anteriorly constricted and thus well defining short, slightly twisted siphonal canal. Broad, flat primary spiral cords present on whole whorl, two to three finer secondary cords between them. Axial sculpture of low, blunt nodes between suture and periphery present on early whorls, becoming obsolete on last whorl. Aperture oval, columella smooth with weak fold at opening of siphonal canal. Outer lip unknown. Siphonal fasciole strongly developed. Pseudoumbilicus formed by fasciole and inner lip might be an artifact caused by erosion. Height 29 mm.

**Type Material:** Holotype SGO.PI.5523.

**Type Locality (Figure 1):** Early late Miocene (Tortonian), Navidad Formation. At the coastal cliff about 500 m south of the Estero Maitenlahue, Chile to the north of Río Rapel, at locality 140976.4 of Covacevich and Frassinetti (1986).

**Occurrence:** The new species of *Triumphis* was collected about 500 m south of Estero Maitenlahue to the north of Río Rapel (at the upper margin of Figure 1). This specific locality has not been dated, but nearby localities indicate a Tortonian (upper Miocene) age (Finger et al., 2003).

**Etymology:** Named after the type locality near the Estero Maitenlahue, Chile.

**Discussion:** *Triumphis* has been included in the family Buccinidae Rafinesque, 1815 by most workers (e.g. Keen, 1971), but Vermeij (1998) transferred it to Pseudolividae and this is followed here. Apart from the Recent type species, *Triumphis distorta*, only one poorly preserved specimen of *Triumphis* sp. from the middle Miocene of Kern County, California has been reported (Addicott, 1970). *Triumphis maitenlahuensis* differs from *Triumphis distorta* in being constricted below the ridge-like shoulder, in having subequal spiral ornament, and in having a well-defined siphonal canal. It differs from species of the similar genus *Nicema* Woodring, 1964, by having its ridge-like shoulder as an exterior projection of the posterior notch at the suture and not below the notch and suture. *Nicema* was considered to belong to the buccinid subfamily Photinae Troschel, 1867, by Vermeij (1998). *Triumphis maitenlahuensis* could be an intermediate species between *T. distorta* and the genus *Nicema*; however, as Vermeij (1998) adequately observed, "anatomical data and molecular sequences will be needed to confirm the phylogenetic affinities of *Triumphis*" (p. 73), and "anatomical observations on the living *N. subrostrata* will be needed to confirm assignment of *Nicema* to the Photinae" (p. 74).

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