A new species of *Mysella* from Patagonia (Bivalvia: Galeommatoidea)

Cristián Ituarte
Museo Argentino de Ciencias Naturales
Av. Ángel Gallardo 470
C1405DJR Buenos Aires, ARGENTINA
ituarte@macn.gov.ar

Diego G. Zelaya
Departamento Biodiversidad y Biología Experimental
Facultad de Ciencias Exactas y Naturales
Universidad de Buenos Aires
and
Museo de La Plata
Paseo del Bosque s/n
1900 La Plata
Buenos Aires, ARGENTINA

Juan Pablo Martin
Unidad Académica San Julián
Universidad Nacional de la Patagonia Austral
Colón y Sargento Cabral
9310 Puerto San Julián
Santa Cruz, ARGENTINA

ABSTRACT

The poorly known diversity of the genus *Mysella* in the southwestern Atlantic is improved with the description of a new species from San Julián Bay, Santa Cruz Province, Argentina. *Mysella patagona* new species is characterized by the relative large, strikingly subquadrate, slightly inequilateral and flat shell; a cleft hinge plate, with two widely diverging teeth in the right valve, and a cylindrical internal ligament located in a deep ligamental pit. From the anatomical point of view, *M. patagona* new species is characterized by the presence of inner and outer demibranchs, with very few interlamellar junctions. The marked subquadrate shell outline easily distinguishes *M. patagona* from any other *Mysella* species currently known from the Magellan Region.

Additional keywords: Southwestern Atlantic, Southern Hemisphere, bivalves

INTRODUCTION

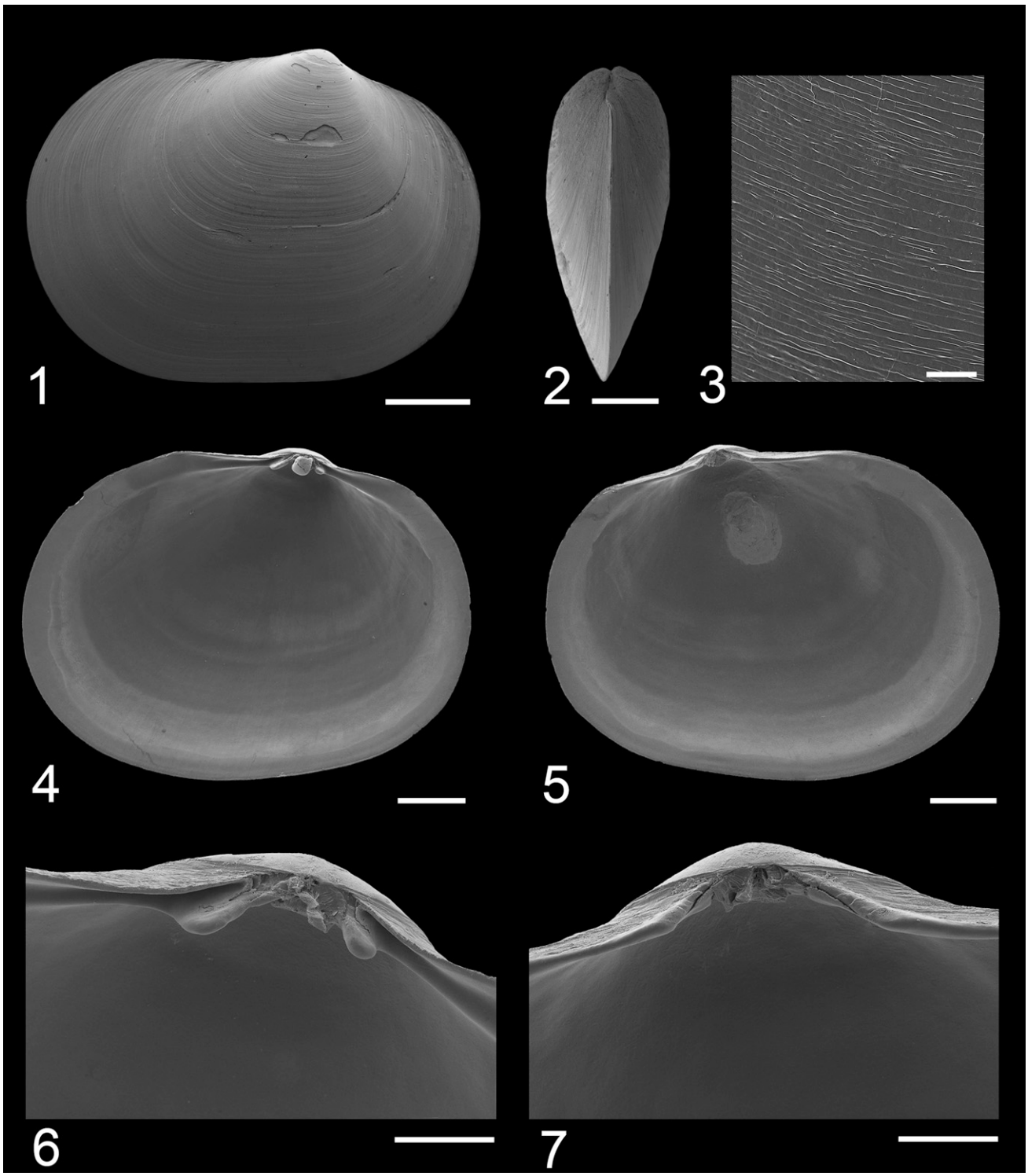
Recent contributions have described and re-described several small-sized Magellanic bivalves, helping improve the scanty attention given to this fauna in the past (Zelaya and Ituarte, 2002, 2004, 2009, 2012). Members of the genus *Mysella* are not an exception. At present, four species of *Mysella* are known from Magellanic waters: *Mysella mabillei* (Dall, 1908), *Mysella rochebrunei* (Dall, 1908) and *Mysella sculpta* Soot-Ryen, 1957, all from the Magellan Strait, and *Mysella arthuri* (Cooper and Preston, 1910) from Malvinas (Falkland) Islands.

In the past few years, mysellids from other parts of the world have been covered in several contributions (Boyko and Mikkelsen, 2002; Coan and Valentich-Scott, 2012; Passos and Domaneschi, 2006; Passos et al., 2005). Gofas and Salas (2008), after studying the type species of *Mysella* Angas, 1877, *Rochefortia* Vélain, 1878, *Rochefortula* Finlay, 1927, and *Altenaeum* Spaink, 1972, considered *Mysella* and *Rochefortia* as synonyms, instead of two separate genera as done by other authors (Coan et al., 2000). Furthermore, Gofas and Salas (2008) concluded that *"Mysella" bidentata* (Montagu, 1803), as well as other European species previously placed in *Mysella,* are not congeneric with *Mysella anomala* Angas, 1877, the type species of the genus, and introduced the genus *Kurtiella* to include them. Coan and Valentich-Scott (2012) also considered the Pacific "mysellids" from tropical West America under *Kurtiella*.

In the present paper, a new species of *Mysella* from southern Patagonia is described and fully illustrated.

MATERIALS AND METHODS

Specimens collected during low tides by sieving (1 mm mesh) portions of substratum from a tidal flat at San Julián Bay were immediately fixed in 70% ethanol. Specimens for histology were decalcified by immersion in Bouin's fixative for 8 h, rinsed in tap water, dehydrated in an ethanol series, and embedded in epoxy resin (Historesin Leica®). Sections (3.5 µm thick) were stained with hematoxylin–eosin. Voucher specimens are deposited at Museo Argentino de Ciencias Naturales (MACN) and Museo de La Plata (MLP). Linear measurements (shell length [L], shell height [H], and shell width [W]) were taken with a Zeiss Stemi 2000-C stereomicroscope with ocular micrometer.



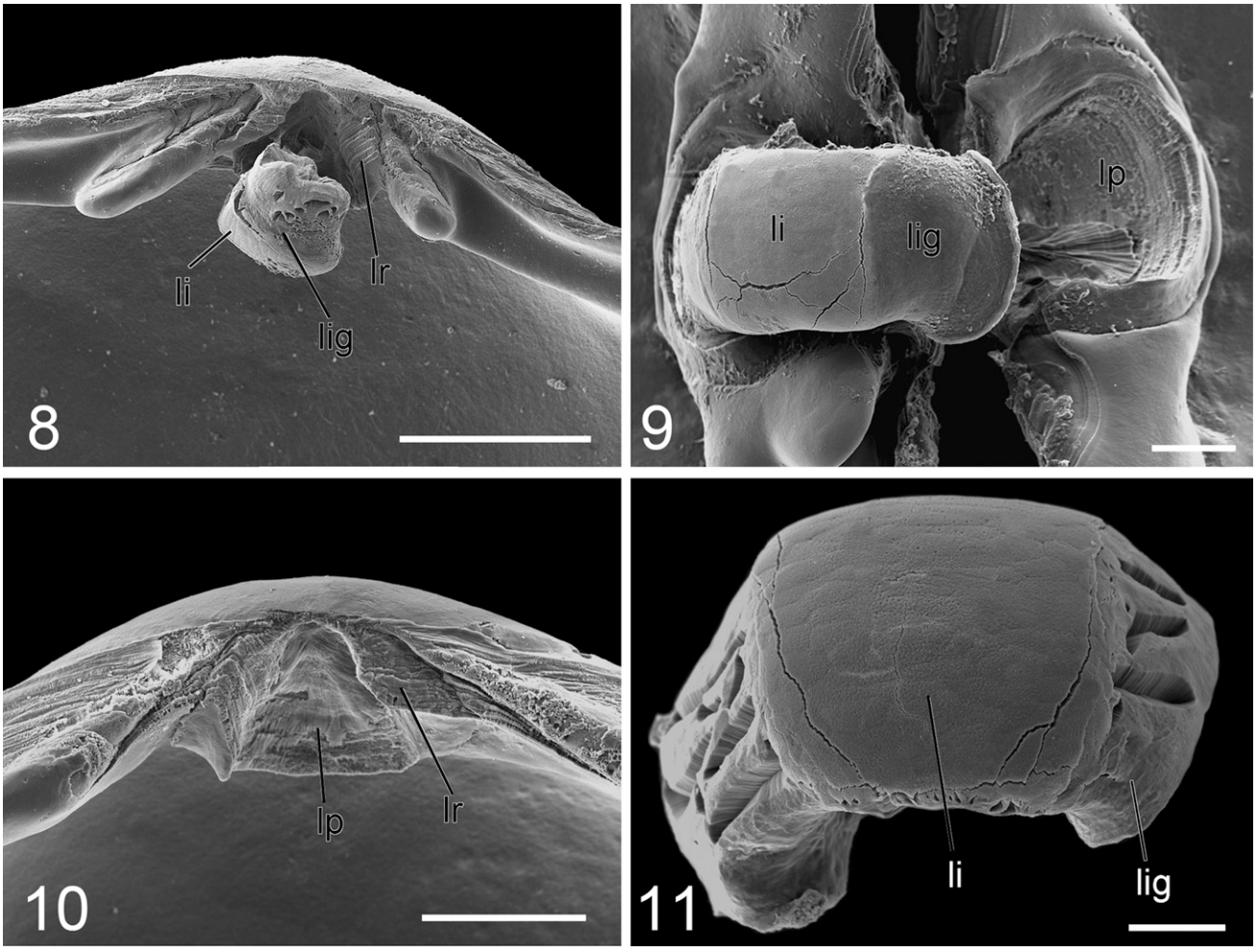
Figures 1–7. *Mysella patagona* new species: Shell morphology. **1.** Holotype, MACN-In 38865, lateral view of left valve. **2–7.** Paratypes MACN-In 38866. **2.** Posterior view. **3.** Shell surface with periostracum folds. **4.** Inner view of right valve. **5.** Inner view of left valve. **6.** Right valve, detail of hinge. **7.** Left valve, detail of hinge. Scale bars: Figure 1 = 1 mm; Figures 2, 4, 5 = 0.5 mm; Figure 3 = 20 μm; Figures 6, 7 = 300 μm.

SYSTEMATICS

***Mysella patagona* new species**
(Figures 1–19)

Description: Shell thin, relatively large for genus (maximum observed L = 7 mm), compressed (W/H ratio = 0.50 ± 0.05, n = 15), nearly equilateral, anterior half longer (Figures 1, 2). Valves subequal. Shell outline subquadrate (H/L ratio = 0.70 ± 0.02, n = 15); beaks small, low, subcentral, opisthogyrate, slightly projecting above dorsal margin (figures 1, 4, 5). Dorsal margin about 55% of shell length, slightly flaring anteriorly, with anterior and posterior portions similar in length; anterior half straight or slightly concave, posterior half slightly curved or straight. Anterior and posterior margins wide and evenly curved, anterior higher, forming weak angles at junction with dorsal margin (figures 1, 4, 5). Ventral margin nearly straight (Figure 1), slightly curved at anterior end. Shell surface whitish, sometimes brownish in larger specimens, sculptured with very low, irregularly spaced periostracal folds, and slightly marked growth lines (Figure 3). Prodissoconch oval, length about 650 µm (n = 3), smooth.

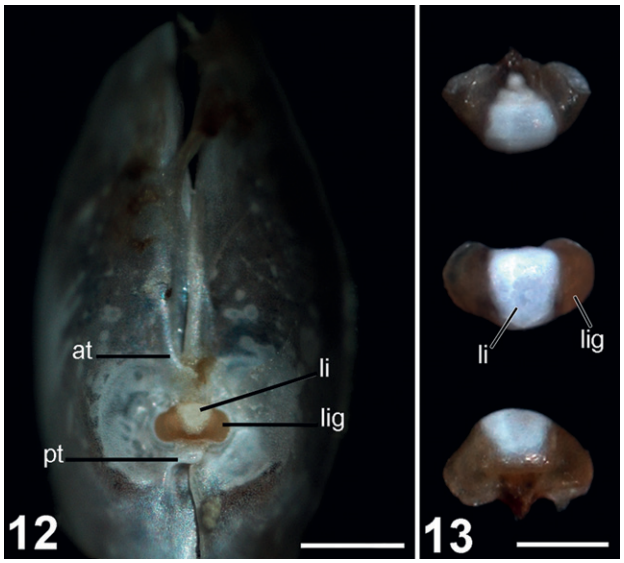
Hinge plate not solid, cleft just beneath beaks, leaving a passage for internal ligament (resilium) (Figures 6, 7, 8, 10). Right valve with two small, subequal, peg–like teeth, anterior longer and slender, posterior somewhat columnar, located on either side of resilium (Figures 4, 6, 8). Anteriorly to anterior tooth and posteriorly to posterior tooth, hinge plate margin forms low ridge delimiting with dorsal shell margin two grooves (Figures 4, 6) that accommodate margin of opposite valve (Figures 5, 7). Left valve edentulous, with dorsal margin moderately thickened on each side of resilium, forming short lamellae that interlock with grooves in right valve (Figures 5, 7). Ligamental pit



Figures 8–11. *Mysella patagona* new species: Ligament and ligamental pit. **8.** Detail of right valve hinge showing teeth, ligament and deep ligamental pit. **9.** Ventral view of ligament and ligamental pit. **10.** Detail of ligamental pit in left valve. **11.** Detail of ligament with lithodesma. Abbreviations: **li,** lithodesma; **lig,** ligament; **lp,** ligamental pit; **lr,** ridge of ligamental pit. Scale bars: Figure 8 = 200 µm; Figures 9, 10 = 100 µm; Figure 11 = 50 µm.

(resilifer) deep. In both valves, two strong, vertical pre- and post-ligamental ridges delimiting ligamental pit, are connected laterally with hinge plate (Figures 8, 10). Ligament strong, cylindrical (Figure 9), with a wide, somewhat trapezoidal, calcified area, forming very thin ventral shield, lithodesma (Figures 11, 12, 19), that extends to cover partially anterior and posterior portions of ligament (Figures 13, 19).

Anatomy: Mantle border thin, nearly smooth; widely open in a long inhalant–pedal aperture extending for about 3/4 of mantle margin length, separated from small posterior exhalant aperture by short presiphonal suture. Short, slightly pointed papillae present and restricted to anterior part of inhalant–pedal aperture and posterior to presiphonal suture (Figures 14, 15). Ctenidia non-plicate, inner and outer demibranchs present, outer one reflected upward (Figure 14), with few interlamellar junctions, mainly restricted to lower portion of ctenidia (Figure 16). Ctenidial axis almost parallel to dorsoventral axis. Outer demibranch small, less than half length of inner demibranch, with up to 40 filaments approximately parallel to antero-posterior axis (Figure 14). Ascending and descending lamellae of outer demibranch equally developed. Inner demibranch with 50 obliquely directed filaments (in larger studied specimen); ascending lamella approximately half length of descending lamella. Tips of filaments of ascending lamellae attached to visceral mass tegument by tissue junctions (Figure 16). Left and right inner demibranchs fused at posterior end at level of presiphonal suture (Figure 15). Brooding in gills was observed in one specimen (ca. 7 mm length) collected in April (Austral Autumn). Labial palps with 10 sorting ridges. Ventral surface of presiphonal suture ciliated, forming a groove when valves are closed (Figures 15, 18). Foot large, compressed laterally, with well developed posterior heel (Figure 14). Anterior part of foot heavily ciliated. Transverse section of anterior and posterior adductor muscles ovate, subequal, anterior adductor with posterior indentation (Figure 14). Anterior pedal retractor strong. Prominent byssal gland opening in a ciliated byssal groove (Figure 17).



Figures 12–13. *Mysella patagona* new species: Ligament and lithodesma. **12.** Hinge and ligament from ventral view. 13. Ligament and lithodesma: anteroventral view (upper), ventral view (centre), posteroventral view (bottom). Abbreviations: **at,** anterior right tooth; **li,** lithodesma; **lig,** ligament; **pt,** posterior right tooth. Scale bars: Figure 13 = 0.5 mm; Figure 14 = 0.2 mm.

Habitat: *Mysella patagona* new species lives in lower intertidal and shallow subtidal mud-sandy beaches: 46–68% mud (silt + clay), 31–53% fine sand, and 2.5–4.0% organic matter content. *Mysella patagona* is a conspicuous species of the infaunal assemblage dominated by the bivalve *Darina solenoides* (King, 1832), the amphipod *Ampelisca* sp., and the polychaetes *Scolecolepides uncinatus* Blake, 1983 and *Eteone sculpta* Ehlers, 1897. *Mysella patagona* showed abundances of up to 30,000 ind.m^{-2}, representing in some areas the dominant species of the infaunal assemblage (J.P. Martin, unpublished data).

Type Locality: 49°17′30″ S, 67°43′22″ W, northwest of San Julián Bay, Santa Cruz Province, Argentina.

Material Examined: Holotype (MACN–In 38865) and 15 paratypes from the type locality (4 MACN–In 38866, mounted for SEM; 5 MACN–In 38866, ethanol preserved specimens; 5 MLP 13635, dry specimens).

Etymology: The species name, a noun in apposition, honors to Patagones, the name given by Spaniard explorers to the ancient people who inhabited vast regions of the Argentine southern littoral.

Distribution: Only known from the type locality.

Remarks: *Mysella patagona* new species is similar to *Mysella rochebrunei* (Dall, 1908), differing by its larger size and by having a markedly subquadrangular shell outline with straight, nearly horizontal (not sloping) anterior and posterior parts of dorsal margin, ventral margin nearly straight, slightly curve at anterior end, and more prominent beaks. The larger size and subquadrate shell outline easily separate *Mysella patagona* new species from the other mysellid species reported from the Magellan Region: *Mysella mabillei* (Dall, 1908) from eastern Magellan Strait, *Mysella arthuri* (Cooper and Preston, 1910) from the Malvinas (Falkland) Islands, and *Mysella sculpta* Soot-Ryen, 1957, from the Magellan Strait, as well as from the Antarctic species *Mysella charcoti* (Lamy, 1906) and *Mysella narchii* Passos and Domaneschi, 2006; all of these have a strikingly trigonal-ovate and markedly inequilateral shells. Furthermore, *Mysella arthuri* has only one, the anterior, cardinal tooth in the right valve.

Kurtiella Gofas and Salas, 2008, was based on "the complete regression of the hinge plate beneath the umbones",

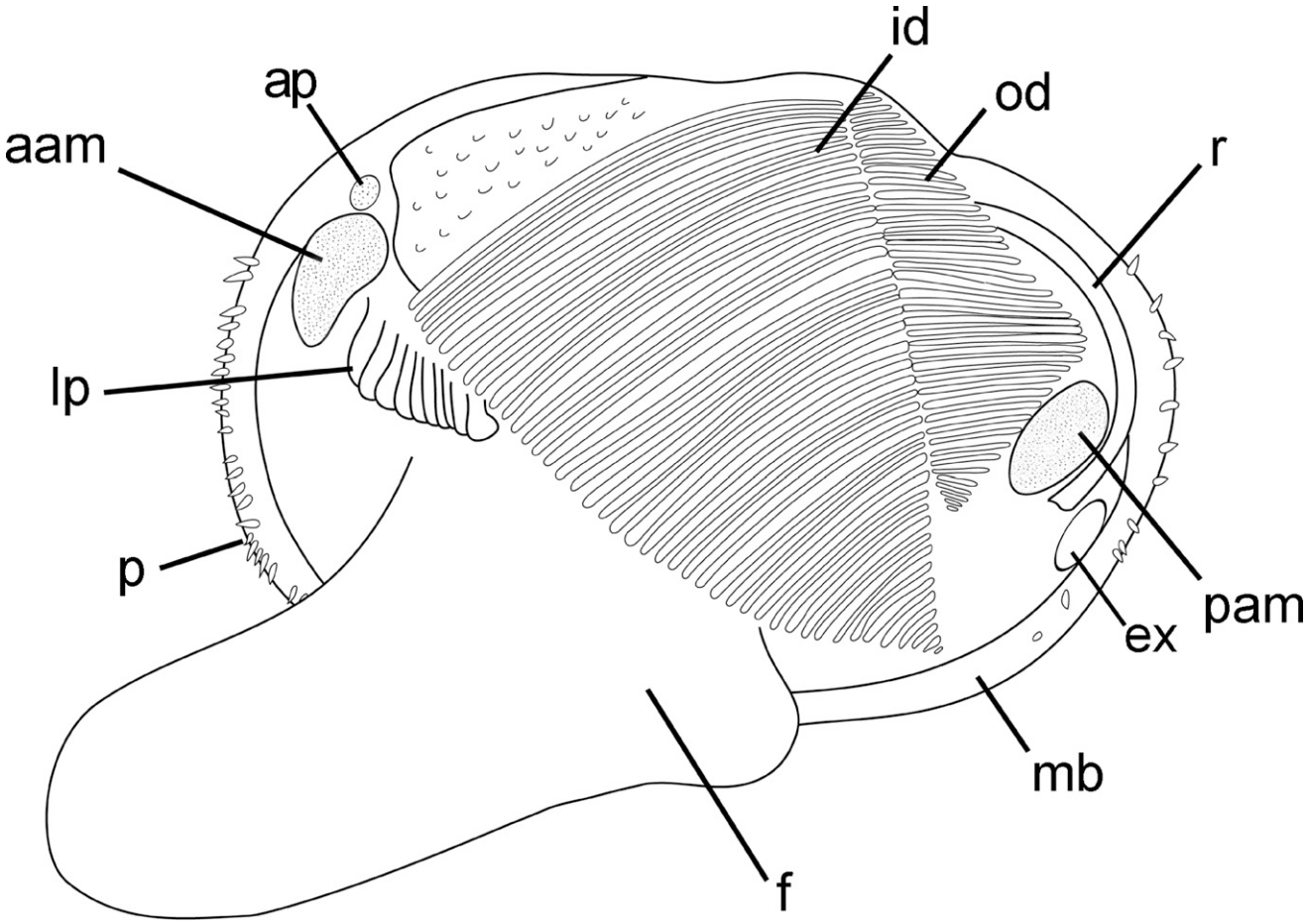
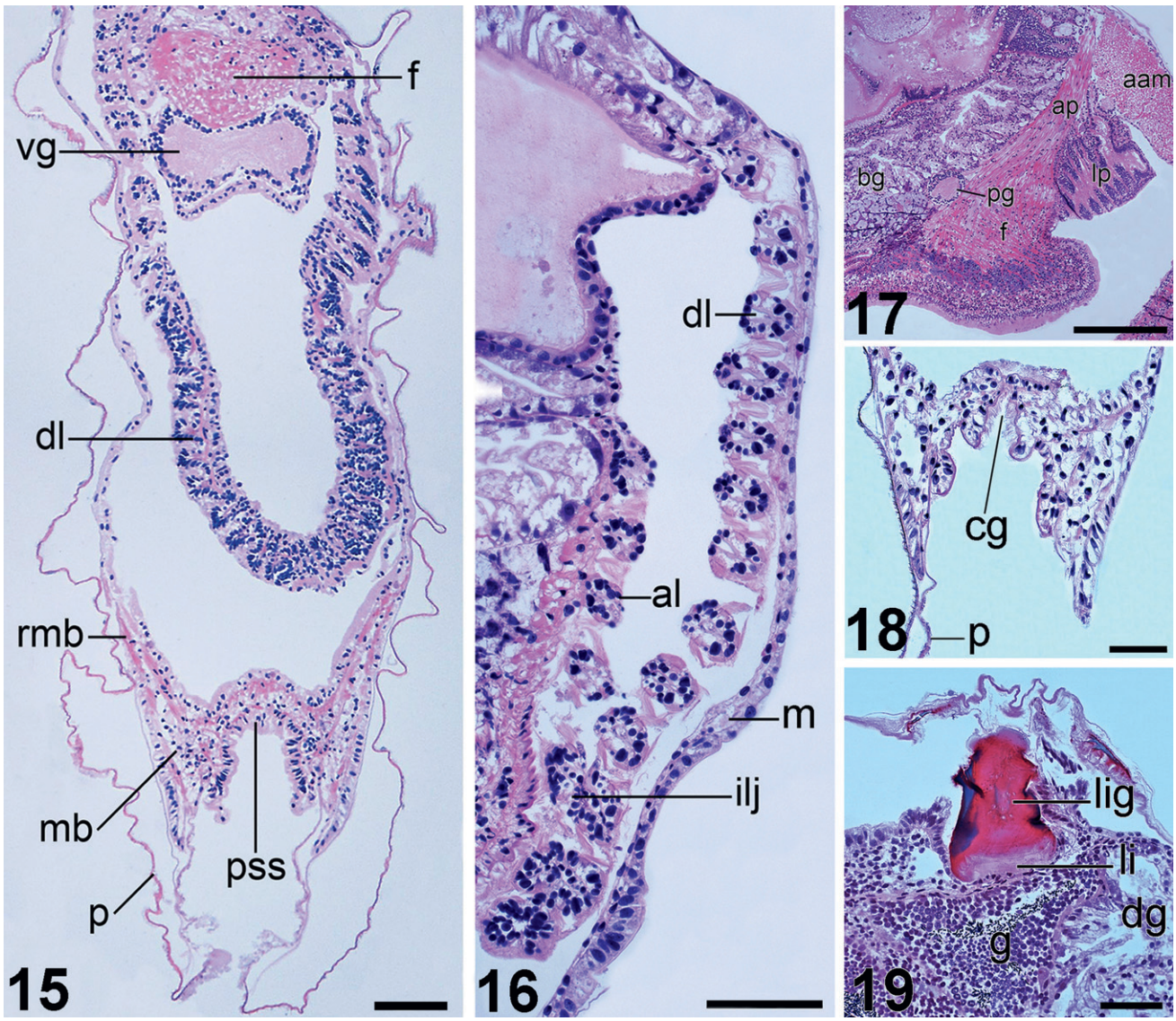


Figure 14. *Mysella patagona* new species: Gross anatomy, left lateral view, left shell and mantle removed. Abbreviations: **aam,** anterior adductor muscle; **ap,** anterior pedal retractor; **ex,** exhalant aperture; **f,** foot; **id,** inner demibanch; **lp,** labial palp; **mb,** mantle border; **od,** outer demibranch; **p,** papillae; **pam,** posterior adductor muscle; **r,** rectum.

a condition not present in *Mysella anomala*, the type of the genus in which the solid hinge plate underlies a not outstanding ligamental pit. In *Kurtiella* species the internal ligament is connected to the shell. The latter condition is more similar to that found in *Mysella patagona*, in which, however, the space below the beaks is occupied by a strong resilifer which is flanked by two strong lateral ridges. This condition is not seen in the type of *Mysella* nor in *Kurtiella* (see for example the hinge of *K. bidentata* (Montagu, 1803) illustrated by Gofas and Salas (2008: fig. 7 E, F). Anterior and posterior teeth of right valve are subequal in *M. patagona* as in *Kurtiella* species, but while in *Kurtiella* only the inner demibranchs are present, *M. patagona* new species has both inner and outer demibranchs. For the above reasons, the generic location of the new species is difficult, and we prefer to be conservative, placing *Mysella patagona* provisionally under *Mysella*.

The presence of a lithodesma associated with the internal ligament, a structure well known for many, but not all anomalodesmatans (Harper et al., 2006), and reported by Morton (1980) in some montacutids as *Mysella (Montacutona) compacta* (Gould, 1861) and *Mysella (Montacutona) olivacea* (Habe, 1959), was also reported by Gofas and Salas (2008) as one of the diagnostic characters of *Kurtiella* (originally placed in Montacutidae).

As recently discussed by Boyko and Mikkelsen (2008), the family-level relationships in the Galeommatoidea are not clear, nor they have been revised for relationships at the family and genus levels. Montacutidae is the family to which *Mysella* was traditionally assigned. *Mysella patagona* new species agrees in general terms with montacutid anatomy, differing in having both inner and outer demibranchs, an important character at the family level. Coan et al. (2000) and Coan and Valentich-Scott (2012), not finding consistent characters to separate the Erycinidae, Kellidae and Montacutidae, considered them under a single family, Lasaeidae, a criterion also followed by Bieler et al. (2010).



Figures 15–19. *Mysella patagona* new species. Histology. **15.** Transverse section showing posterior fusion of descending lamellae of inner demibranch and presiphonal suture. **16.** Detail of inner demibranch. **17.** Sagittal section of foot. **18.** Detail of posterior mantle fusion. **19.** Sagittal section with detail of ligament. Abbreviations: **aam,** anterior adductor muscle; **al,** ascending lamella of inner demibranch; **ap,** anterior pedal retractor; **bg,** byssus gland; **cg,** ciliated groove; **dg,** digestive gland; **dl,** descending lamella of inner demibranch; **f,** foot; **g,** gonad; **ilj,** interlamellar junction; **li,** organic matrix of lithodesma; **lig,** fibrous portion of ligament; **lp,** labial palp; **m,** mantle; **mb,** mantle border; **p,** periostracum; **pg,** pedal ganglion; **pss,** presiphonal suture; **rmb,** retractor muscle of mantle border; **vg,** visceral ganglia. Scale bars: Figure 15 = 200 µm; Figures 16, 18 = 50 µm; Figures 17, 19 = 100µm.

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