

## On the Generic Allocation of “*Aligena*” *Pisum* Dall, 1908

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ON THE GENERIC ALLOCATION OF “*ALIGENA*” *PISUM* DALL, 1908

Marina Güller<sup>1\*</sup> & Diego G. Zelaya<sup>1, 2</sup>

INTRODUCTION

Between 1887 and 1888, the United States *Albatross* conducted an expedition to the southern tip of South America. The bivalves from that expedition were studied by Dall (1889, 1890, 1896, 1901, 1902, 1908, and 1915), who reported 24 new species from the Magellanic region. However, the descriptions of many of them were poor and lacking in details and 17 were unfigured; these facts resulted in several subsequent confusion and misidentifications. This is the case, for instance, of *Aligena pisum* Dall, 1908, a species described based on a single left valve. Dall's description refers to a small, suborbicular shell, “striately” sculptured, having a pale, shiny periostracum; with a prominent, slightly prosogyrate beak; an internal, opisthodontic, rather long ligament; and the hinge bearing “a single obscure tooth or nodular prominence”. Although the species is mentioned in several subsequent checklists for the area (Carcelles, 1950; Carcelles & Williamson, 1951; Osorio & Bahamonde, 1970; Bernard, 1983; Ramírez Böhme, 1993), there were no additional records. Harry (1969), in the context of a systematic revision of the genus *Aligena* Lea, 1846, concluded that *Aligena pisum* was wrongly located under this genus, and proposed its tentative reallocation in the genus *Axinulus* Verrill & Bush, 1898, a decision not followed by Ramírez Böhme (1993), who retained the species under *Aligena*. Bernard (1983) considered *Aligena pisum* as a *nomen dubium*.

The genus *Adontorhina* was proposed by Berry (1947) to include Lower Pleistocene specimens of his new species *A. cycليا*. The species was subsequently reported as also living by Howard (1952). Other species currently regarded under *Adontorhina* are: *A. sphaericosa* Scott, 1986, *A. lynnae* Valentich Scott (in Coan, Valentich Scott & Bernard), 2000, *A. keegani* Barry & McCormack, 2007, and *A. similis* Barry & McCormack, 2007.

In this paper, *Aligena pisum* is redescribed, properly illustrated, and reallocated to *Adontorhina*.

MATERIALS AND METHODS

The specimens reported in this paper were collected during several field trips in southern Chile, Beagle Channel, and Magellan Strait. Samples were obtained by using a dredge of 2 mm mesh size net, and sorted from the sediment by using a stereoscopic microscope. The number of specimens (s), articulated valves (av), and disarticulated valves (v) is provided. These specimens were deposited in the collections of the Museo de La Plata (MLP) and Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (MACN), Argentina. For comparative purposes, the holotype of *Aligena pisum*, housed at the United States National Museum (USNM), Smithsonian Institution, Washington, was studied.

Shell morphology was studied and illustrated with Scanning Electron Microscopy (SEM). Shell measurements were taken according to the following criteria: L: maximum antero-posterior distance; H: maximum dorso-ventral distance, perpendicular to L; W: maximum distance across closed valves. The mean and standard deviation for H/L and W/H ratios, and the number of measurements (n), are given.

Information on gross anatomy comes from dissection under stereoscopic microscope of decalcified specimens; decalcification was performed by rinsing the specimens in 5% formalin with 2% acetic acid.

SYSTEMATICS

Thyasiridae Dall, 1900

*Adontorhina* Berry, 1947

Type species: *Adontorhina cycليا* Berry, 1947 (OD)

*Adontorhina pisum* (Dall, 1908), new combination (Figs. 1–17)

Type Locality: 53°01'00”S, 70°42'15”W, *Albatross* station 2778, Magellan Strait, 61 fathoms [111.6 m], mud.

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**Material Examined:** Magellan Strait: Holotype (USNM 110715); 53°41'S, 72°20'W, Bahía Nash, 25 m (3v, MLP 13276); 53°38'S, 72°24'W, Seno Ballena, 35 m (1s, MLP 13277). Beagle Channel: 54°53'S, 67°52'W, Isla Gable, 66–68 m (12s, MACN-In 38183); 54°52'S, 68°02'W, Punta Segunda, 168 m (7s & 1v, MACN-In 38183); 54°49'S, 68°13'W, Bahía Ushuaia, 138–144 m (25s, 1av & 5v, MLP 13278); 54°49'S, 68°14'W, Bahía Ushuaia, 126–135 m (8s & 2v, MLP 13279); 54°53'S, 68°14'W, 53–91 m (1s, MACN-In 38182); 54°52'S, 68°32'W, Bahía Lapataia, 27–29 m (1s & 1a, MACN-In 38185). Southern Chile: 42°22'S, 72°25'W, Fiordo Comau, 73–89 m (14s, 2av & 13v, MLP 13280; 10s, 7av & 11v, MACN-In 38186); 42°15'38"S, 72°25'53"W, Fiordo Cahuelmo, 70–113 m (1s, MLP 13281).

**Known Distribution:** Magellan Region, from Chiloé, Chile, to Tierra del Fuego. Living specimens: 27–168 m (Fig. 1).

**Redescription:** Shell small (maximum observed  $H = 2.5$  mm), subquadrate ( $H/L = 1.00 \pm 0.04$ ,  $n = 28$ ), somewhat inflated ( $W/H = 0.65 \pm 0.04$ ,  $n = 28$ ), inequilateral, delicate, whitish, shiny. Anterior end higher than posterior end, moderately to widely ventrally projecting; posterior end truncate. Anterodorsal margin short, straight, nearly horizontal, forming well-marked angle at junction with anterior margin (Figs. 2–9). Dorsal part of anterior margin obliquely flattened, originated by wide depression on shell, anterior to beak; ventral part of anterior margin obliquely straight to widely arcuate, sometimes forming angle at junction with the dorsal part (Figs. 4–9). Ventral margin widely curved, markedly projected anteriorly. Posterodorsal margin short, sloping nearly straight, forming variably developed angle with posterior margin (Figs. 4–9). Posterior area well discernible from central area. First posterior fold wide, low; posterior sulcus shallow, producing straight to weakly sinuate posterior margin (Figs. 4, 6). Second posterior fold ill defined. Submarginal sulcus deep, producing variably developed submarginal sinus. Auricle moderately projecting (Figs. 4–9). Lunule narrow, elongate (Fig. 11). Beaks prominent, inflated, subcentrally located, anteriorly directed. Prodissoconch ovate, about 125  $\mu$ m in diameter, delimited by low cord; initial part sculptured with numerous branched folds, almost symmetrically distributed from main central axis (Fig. 10). Shell surface sculptured with fine, low, regularly

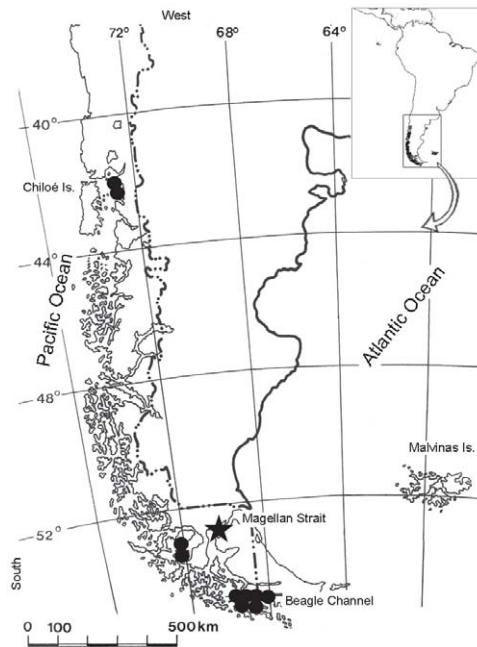
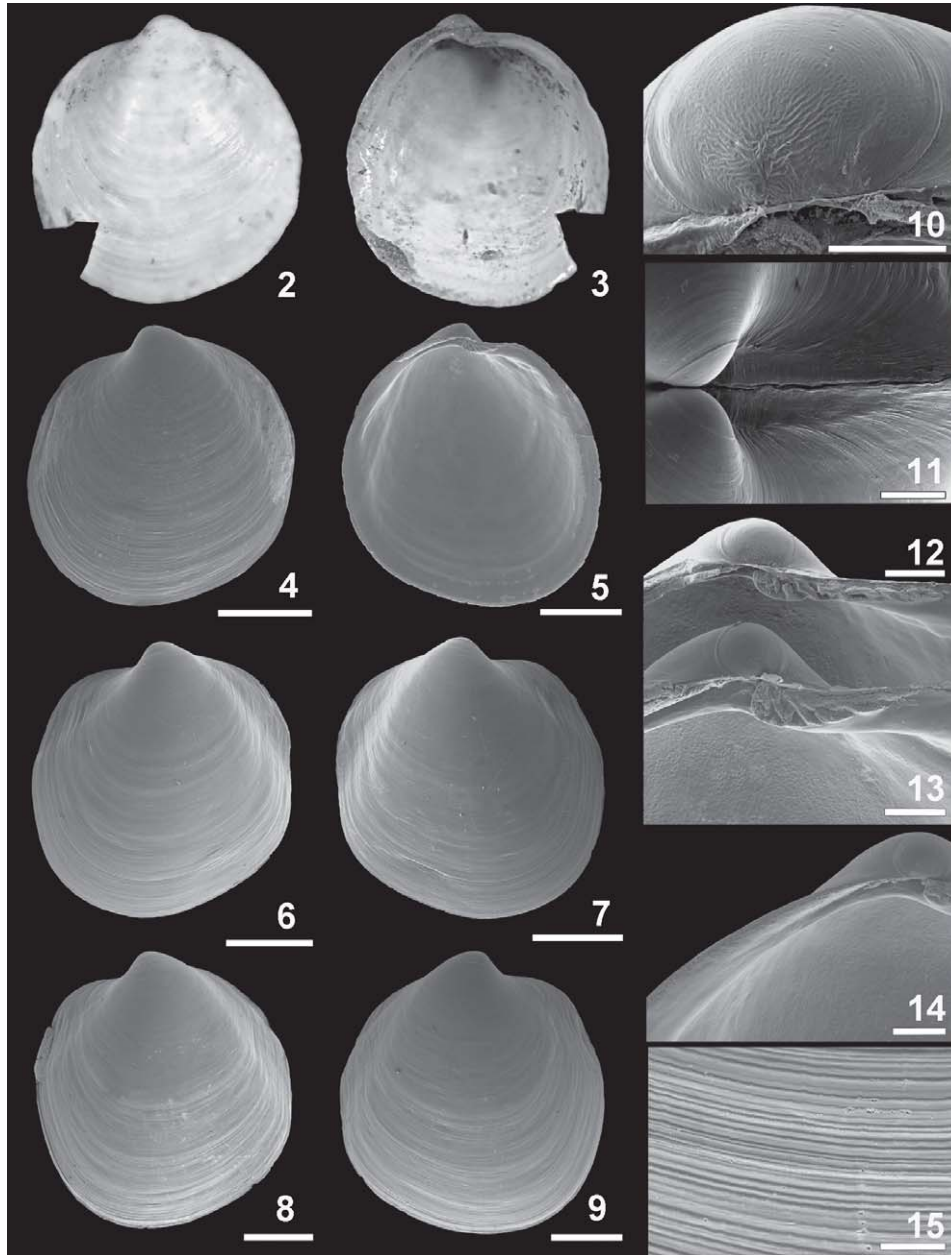


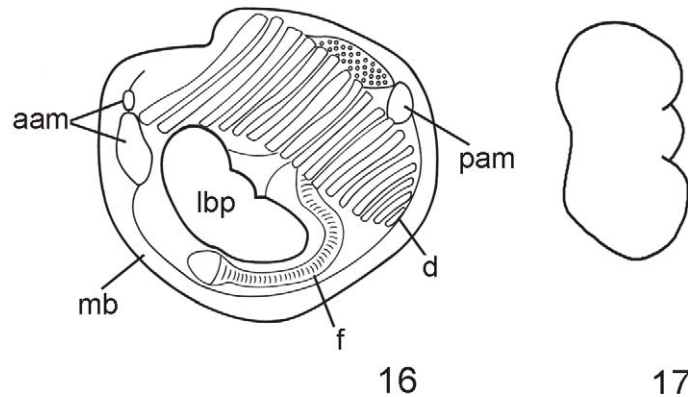
FIG. 1. Known distribution of *Adontorhina pisum*: type locality (★), other material examined (●).

distributed comarginal cords, increasing in solidness (Fig. 15). Anterior and posterior ends frequently incrustated with ferruginous material. Periostracum thin, translucent. Hinge plate consisting of two parts: anterior with irregular, elongate granules, extending for  $\frac{1}{2}$  to  $\frac{2}{3}$  of dorsal margin length. Granules strong, radiating ventrally beneath beaks, and slender and parallel to dorsal margin, anteriorly, forming distinct individual patterns (Figs. 12, 13). Posterior part of hinge plate smooth (Fig. 14). Ligament, elongate, about one half the length of posterodorsal margin, deeply sunken, not visible externally.

**Anatomy:** Mantle margin largely free, for about  $\frac{3}{4}$  of its length, widened anteroventrally (Fig. 16). Small posterior exhalant aperture, present. Transverse section of adductor muscles ovate, anterior larger than posterior. Only one (the inner) demibranch present, comprising 15–17 filaments in larger specimens (Fig. 16); ascending and descending lamellae similar in size. Lateral body pouch relatively large, with an anterior median constriction, and 3–5 posterior lobes (Fig. 17). Foot elongate, with distinct bulbous tip (Fig. 16).



FIGS. 2–15. *Adontorhina pisum*. Shell morphology. FIG. 2: Outer view, left valve, holotype (USNM 110715); FIG. 3: Inner view, left valve, holotype (USNM 110715); FIG. 4: Outer view, left valve; FIG. 5: Inner view, left valve; FIGS. 6, 8: Outer view, left valve; FIGS. 7, 9: Outer view, right valve; FIG. 10: Prodissoconch; FIG. 11: Lunule; FIG. 12: Hinge plate; FIG. 13: Anterior part; FIG. 14: Posterior part; FIG. 15: Shell sculpture. Collecting sites = FIG. 4: Magellan Strait, 53°38'S, 72°24'W, 35 m (MLP 13277); FIGS. 5, 13: Southern Chile 42°22'S, 72°25'W, 73–89 m (MLP 13280); FIGS. 6–12, 15: Beagle Channel 54°49'S, 68°14'W, 126–135 m (MLP 13279); FIG. 14: Beagle Channel 54°49'S, 68°13'W, Bahía Ushuaia, 138–144 m (MLP 13278). Scale bars: FIGS. 4–9 = 500  $\mu$ m; FIGS. 10, 15 = 50  $\mu$ m; FIGS. 11–14 = 100  $\mu$ m.



FIGS. 16, 17. *Adontorhina pisum*. Anatomy. FIG. 16: Gross anatomy of a decalcified specimen; FIG. 17: Detail of left lateral body pouch. Abbreviations: aam = anterior adductor muscle, d = demibranch, f = foot, lbp = lateral body pouch, mb = mantle border, pam = posterior adductor muscle.

## DISCUSSION

### Generic Placement

The hinge of *Adontorhina pisum* was previously misunderstood. Dall (1908) described it as having “a single obscure tooth or nodular prominence”, and consequently placed the species under *Aligena*. Harry (1969) regarded such prominence as “a single irregular tooth ... immediately below and in front of the umbo. The hind part of the tooth may be a broken, finger-like projection, but it appears to have several rounded bosses, one of which is on the top side. A triangular extension forward of this tooth, has a moderately sharp ventral border, along which are several incised lines sloping upward and backward”. Based on this interpretation, Harry (1969) tentatively reallocated the species to *Axinulus*. However, the hinge plate in *Axinulus* is completely smooth or bears a single “cardinal” tubercle (Scott, 1986). This is not the condition present in “*Aligena*” *pisum*, where several “granules” appear. These granules are stronger beneath the beak – corresponding to what Harry (1969) interpreted as “rounded bosses” – and anteriorly become slender, running parallel to the dorsal margin (i.e., the “triangular extension” and “incised lines” of Harry (1969)). This peculiar hinge plate morphology reveals that the species actually belongs to *Adontorhina*, the single thyasirid genus having irregular granules (Scott, 1986; Barry & McCormack, 2007).

### Comparison with Other *Adontorhina* Species

*Adontorhina pisum* closely resembles *A. cyclia*, from which it differs by having subquadrate shell outline, horizontal anterodorsal margin, and wide depressed area anterior to beak. In addition, the granules present in the anterior part of hinge plate of *A. pisum* are elongate and narrow, whereas those of *A. cyclia* are shorter and solid, resembling “mammalian molars”, such as described by Scott (1986). Furthermore, the foot of *A. pisum* has a distinct bulbous tip which, according to Scott (1986), is absent in *A. cyclia*.

*Adontorhina lynnae*, *A. keegani*, and *A. similis* differ from *A. pisum* in their ovate shell outline, originated by their widely projected anterior end. According to Barry & McCormack (2007) the hinge plate of *Adontorhina similis* has an additional “small cardinal tubercle in the right valve”, which is absent in *A. pisum*; and both *A. similis* and *A. keegani* have a minor number of gill filaments than *A. pisum* (seven to eight in *A. keegani*; 10–11 in *A. similis*; 15–17 in *A. pisum*).

*Adontorhina sphaericosa* differs from *A. pisum* by having a more inflated shell outline ( $W/H = 0.78 \pm 0.04$ ,  $n = 16$ ) and deeply sunken escutcheon.

In addition to the above-mentioned differences, *Adontorhina pisum* differs from all other *Adontorhina* species by having the posterior part of hinge plate smooth. This condition enlarges the diagnostic characters

previously regarded for *Adontorhina*, which consequently encompasses species with either a smooth or granulated posterior part of the hinge plate.

#### Significance of the Record

The reallocation of *Aligena pisum* into *Adontorhina* significantly increases the geographic distribution of *Adontorhina*. The genus was previously reported from the Northern Hemisphere in the North Atlantic Ocean [*Adontorhina keegani* and *A. similis* from Porcupine Bank, west of Ireland (Barry & McCormack, 2007)], and in the North Pacific Ocean [*A. cyclia*, from the Bearing Sea, Alaska to Baja California, Mexico (Scott, 1986), and from Bering Sea, Sea of Okhotsk, and Sea of Japan (Kamanev, 1996); *A. sphaericosa* from Alaska to California (Scott, 1986; Coan et al., 2000); and *A. lynnae* from near the Farallon Islands, California (Coan et al., 2000)]; and an as-yet undescribed species in the Gulf of California, Mexico (Coan, personal communication, 7 Oct. 2010). Thus, *Adontorhina pisum* provides the first record of the genus in the Southern Hemisphere. In addition, this finding increases the diversity of thyasirids known from the Magellan Region, previously represented only by *Thyasira* Lamarck, 1818; *Parathyasira* Iredale, 1930; *Conchocele* Gabb, 1866; and *Mendicula* Hedley, 1907 (Zelaya, 2009, 2010).

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