

A new species of rissoid of the genus *Alvania* Risso, 1826 from the E-Sicily: *Alvania maximilicutiani* n. sp. (Gastropoda Rissoidae)

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ABSTRACT

Alvania maximilicutiani n. sp. is here described and figured as a new Mediterranean species from the E-Sicily. The most similar species in morphological characters are *A. clathrella* (Seguenza L., 1903), *A. dalmatica* Buzzurro et Prkić, 2007, *A. daniensis* Oliverio, 1988, *A. dictyophora* (Philippi, 1844), *A. hallgassi* Amati et Oliverio, 1985. All these species and other similar Mediterranean and not Mediterranean congeners are here compared to the new species, which differs by the very minute dimensions, being one of the smaller *Alvania* ever described, the protoconch morphology and the colour pattern of the external soft parts. The Macaronesian *A. piersmai* Moolenbeek et Hoenselaar, 1989, *A. poucheti* Dautzenberg, 1889, *A. spreta* (Watson, 1873) and other congeners are furthermore compared to *A. maximilicutiani* n.sp. The new species could also resemble a dwarf form of *A. lanciae*, but to a more deepened exam of the shell the latter species appears morphologically very different in both protoconch and teleoconch characters. The type material of *A. maximilicutiani* n.sp. was collected in very shallow waters in the rocky shores of the small village S. Giovanni Li Cuti (Catania, Italy).

KEY WORDS

Gastropoda; Rissoidae; new species; taxonomy; Mediterranean Sea; Recent.

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INTRODUCTION

Rissoids of the genus *Alvania* Risso, 1826 undergone a high adaptive radiation and are uniformly distributed along the main marine biocenosis. Some Authors debated whether they could be considered as representative species of a separated family (Golikov & Starobogatov, 1975), mainly based on anatomical proofs which other Authors, through further deepened studies, considered not as clear and stable characters but only as anatomical schemes variable among species (Ponder, 1984). The anatomy of *Alvania* is thus comparable to that of *Rissoa* Desmarest, 1814 being the animals rather similar in structure and differences are due mainly to different

habitat preferences (Ponder, 1985). Similarities are close related as concerns the animal and shell between genera *Alvania* and *Crisilla* Monterosato, 1917 being the latter tentatively separated only as a subgenus by Ponder (1985), but currently considered as a valid separated genus for the actual checklists (Clemam, 2013; MarBEF, 2013).

The Mediterranean represents an elective geographic area where rissoids exhibit wonderful patterns of speciation (Bouchet in Giannuzzi-Savelli et al., 1996), due to its environmental variability of habitats. With 160 species of rissoids the Mediterranean represents the most diverse site in the world and plays an important role as one of the source of rissoid-flow in the world (Ávila et al., 2012). In the

Mediterranean sea and the adjacent Macaronesian area (E-Atlantic) the genus *Alvania* is the most abundant of rissoid species (Gofas, 1990; Van der Linden, 1993; Hoenselaar, H.J. & Goud, J., 1998; Ávila, 2000; 2012), while lower number of species are also present in the western Atlantic and Indo-Pacific Ocean (Bouchet in Giannuzzi-Savelli et al., 1997; Garilli & Parrinello, 2010), E-Africa (Gofas, 1999). In particular, species with non-planktotrophic development seem to be limited to only the western or the eastern part of the Mediterranean (Garilli & Parrinello, 2010). Moreover, this basin is the site with higher number of endemic species of *Alvania* (Ávila et al., 2012). Many species of Rissoidae are reported as endemisms to restricted areas of Mediterranean, particularly islands (Bogi et al., 1983; Oliverio, 1986; Amati & Oliverio, 1987; Oliverio, 1988; Giusti & Nofroni, 1989; Oliverio & Amati, 1990; Cecalupo & Quadri, 1995; Margelli, 2001; Buzzurro, 2003; Micali et al., 2005; Buzzurro & Landini, 2006; Buzzurro & Prkić, 2007; Oliver & Templado, 2009). Numerous species of molluscs, among which some of *Alvania*, are described as endemic to the E-Sicily, which represents a high hotspot for the speciation of molluscs in the Mediterranean, due probably to its variety of different environments present in this area: *A. dictyophora* (Philippi, 1844) and *A. clathrella* (Seguenza L., 1903, ex *Monterosato* ms) are an example.

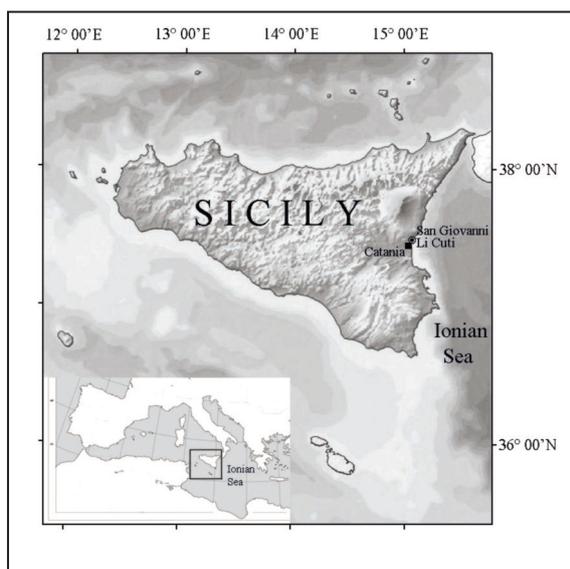


Figure 1. Study area.

A new species of *Alvania*, named *A. maximilicutiani* n.sp., was found in the E-Sicily coasts (Fig. 1) and is here described and figured as new for science and compared to the close similar congeners.

MATERIAL AND METHODS

Living materials of the new species were collected by brushing the surface of little lava stones inside a net of 0.5 mm mesh at a depth of 0.5 to 2.5 m. No empty material was found among the shell grit collected handily with ARA. Drawings of the external soft parts were obtained observing the living animals in aquarium. Fossil materials of similar species were studied and compared to the new *Alvania*.

ACRONYMS. Museo del Dipartimento di Biologia Animale, University of Catania, Italy (MBAC); Alberto Villari malacological collection, Messina, Italy (AVC); Bruno Amati malacological collection, Roma, Italy (BAC); Danilo Scuderi malacological collection, Catania, Italy (DSC).

Alvania maximilicutiani n. sp.

EXAMINED MATERIAL. Holotypus, Catania, E-Sicily, Italy: S. Giovanni Li Cuti, in shallow water, under lava stones. Paratypi, same data of holotypus, 11 living specimens.

Holotype in MBAC, n. MBLMC-CT-79; 1 paratype in AVC; 1 paratype in BAC. Other paratypes in DSC.

DESCRIPTION OF HOLOTYPE. Shell (Fig. 6) ovate-conic, stout, relatively strong, imperforate, 1.1 mm high x 0.65 mm broad. Teleoconch constituted by 1.9 whorls in adult specimens, separated by marked sutures, bearing two spiral chords on the first and rather on the majority of the last whorl: only a trace of a third spiral chord appear almost at the end-half of the last whorl. Spiral micro sculpture is present over the surface of all the tele-whorls. The axial ribs are angular, marked, opisthocline and in number of 12 on the first tele-whorl, 14 on the body whorls, never reaching the base of the shell. The first adapical spiral chords are less marked than the axial ribs and become stronger at the base. They form a cancellate sculpture at the intersection with the axial ribs, with not marked, almost rounded,

tubercles at the crossing points. At the base four well marked spirals are present, except the last which appears almost vanishing. Very thin spiral threads cover the interspace and run over the axial ribs too. The last whorl forms rather 76% of the total shell height. Aperture ovate, drop shaped, with thick uninterrupted peristome, which bears no denticles and form a varix in the outer lip. Background colour almost dark-brown in protoconch and first tele-whorl, creamy in the body-whorl with two small darker bands, the first sub-sutural, which forms dark spots in correspondence of the tubercles (one every three axial ribs) and the second, larger, at the base.

Protoconch (Figs. 10, 11) low-rise, paucispiral with direct development, constituted by 1.3 to 1.5 regularly convex whorls. Protoconch I slightly less than 1 whorl, with 7-8 very thin spiral threads. Protoconch II with 13-14 equally thin spiral threads.

The living animal (Fig. 12) is whitish as background colour and bears dark-brown to almost black strips on head, anterior foot and opercular area. In the head they are "V" shaped just before the eyes and straight in the snout and foot, surrounding the operculum and extending to the edge in the middle of the foot: it is not visible on the sole of the foot, where a whitish gland is visible in transparency in the middle. The same gland is visible under the operculum. Two whitish granular masses are also visible on the snout just near the eyes. Few white stains are present on both the cephalic tentacles. Only one metapodial tentacle is visible. Operculum (Fig. 9) thin, paucispiral, with eccentric nucleus.

VARIABILITY. All the fully developed adult specimens collected seems not to differ in size (1–1.2 mm high x 0.65 mm wide) (Figs. 2–5; 6–8). The only character which seem to vary is the colour of the body whorl, entirely dark brown to creamy with brown spots. Protoconch and first tele-whorl are always darker. The colour variability could be linked to the shady habits of the animal. If so, the paler coloration could be considered typical and the darker an adaptation.

ETYMOLOGY. The specific name is in memory of my father, Massimo, and also recalls the small village, locus typicus of the present species, where he spent his life as a fisherman and where he conducted me to begin my marine biology career and my malacological studies.

BIOLOGY AND DISTRIBUTION. The new species seem confined exclusively to rocky very shallow waters, under stones. Only living specimens were hardly collected. It was never recorded among shell grit. The new species was collected only from the type locality in the Jonian sea, but, because of its very small dimensions, it could be unnoticed and its real distribution range could be wider.

COMPARATIVE NOTES. Because of the very small dimensions of adult specimens, the peculiar characters of the teleoconch, particularly the number of whorls, the sculpture and the colour pattern of the shell, the protoconch sculpture and the external soft parts of the living animal, the new species is unique among all the Mediterranean and not Mediterranean species of the same genus. The comparative notes here following explore the possibility that a dwarf form of a still known species is involved and demonstrate the validity of the new species. So, among Mediterranean species, *A. maximilicutiani* n. sp. is morphologically similar to *A. lanciae* (Calcara, 1845), *A. aeoliae* Palazzi, 1988, *A. datchaensis* Amati et Oliverio, 1987, *A. fractospira* (Oberling, 1970) on one hand and to *A. dictyophora*, *A. hallgassi* Amati et Oliverio, 1985, *A. daniensis* Oliverio, 1988, *A. dalmatica* Buzzurro et Prkic, 2007 on another hand. In the meantime the new species is here compared to some Macaronesian congeners: *A. grancanariensis* Segers, 1999, *A. hoeksemai* Hoenselaar et Goud, 1998, *A. moniziana* (Watson, 1873), *A. piersmai* Moolenbeek et Hoenselaar, 1989, *A. poucheti* Dautzenberg, 1889, *A. spreta* (Watson, 1873).

The possibility that the new species could be a dwarf form of *A. lanciae* (Fig. 13), or of a close similar species as *A. datchaensis*, *A. fractospira*, was the first eventuality explored. but the different protoconch, lacking the "orange skin" sculpture, colour pattern of shell and soft parts make it easily recognisable. Amati (2012) recently re-described and figured *A. lanciae*, *A. arguta* Locard et Caziot, 1900 and *A. consociella* Monterosato, 1884, considering these two latter taxa, often distinguished for the stouter shape and the larger dimensions, as synonyms of the former. In the same paper he presented an exhaustive comparison of *A. lanciae* with *A. datchaensis* and *A. fractospira*.

A. aeoliae has a more slender teleoconch, with a colour pattern also similar, being almost darker in the first whorls, paler with two darker spiral bands

in the body-whorl, but they do not form any stain on the axial ribs. The protoconch has a different shape, more elevated and with dense undulated spiral sculpture like that of *A. lineata*, and the axial ribs of teleoconch, which are opisthocline too, are more numerous and with heavier spiral sculpture.

Two new species of *Alvania* were lately described for the Mediterranean (Tisselli & Giunchi, 2013): *A. bozcaadensis* Tisselli et Giunchi, 2013 and *A. campanii* Tisselli et Giunchi, 2013. They are both quite different from *A. maximilicutiani* n. sp. on account of shell and protoconch differences. The former is a species close similar to *A. dorbignyi* (Audouin, 1826) as for the almost smooth protoconch and the teleoconch, with characters of *A. lineata* mixed with those of *A. discors* (Allan, 1818). The latter seems linked to the *A. datchaensis/A. fractospira* group of species as for both teleoconch characters and protoconch, with “orange skin” sculpture.

Typical *A. dictyophora* (Fig. 14) are usually 2.5–2.8 mm, bear three spiral chords (excluding the 4 basal, present in the space between the upper attachment of the external lip and the end of the base of the shell) and 9–10 axial ribs in the bodywhorl. But small specimens of this species (up to 1.4–1.7 mm) with only 2 spiral chords are known (Fig. 15; Palazzi & Villari, 2001, Fig. 27). These dwarf forms of *A. dictyophora* resemble in shell morphology the new species, which however is easily distinguishable by the smaller dimensions, the lower number of whorls, the different protoconch and colour pattern of the shell, the less marked spiral cords which cross the more opisthocline axial ribs.

Shells of *A. hallgassi* and *A. daniensis* are almost close similar, being the former only more delicate in teleoconch sculpture. The protoconch in both species is constituted by 6 marked spiral chords, on a smooth (*A. hallgassi*) or granulated with small dots background (*A. daniensis*). The new species has the teleoconch different in dimensions, shape, shell sculpture and colour pattern and the protoconch with a different form and more conspicuous and delicate sculpture.

A. dalmatica is a species described few years ago and shares with the above mentioned species a bodywhorl with a similar sculpture, only slightly more marked and with pointed tubercles at the intersections. The new species differs for having a different shell colour pattern and sculpture of the last whorl, while the similar protoconch differs for the less dense and more marked spiral threads.

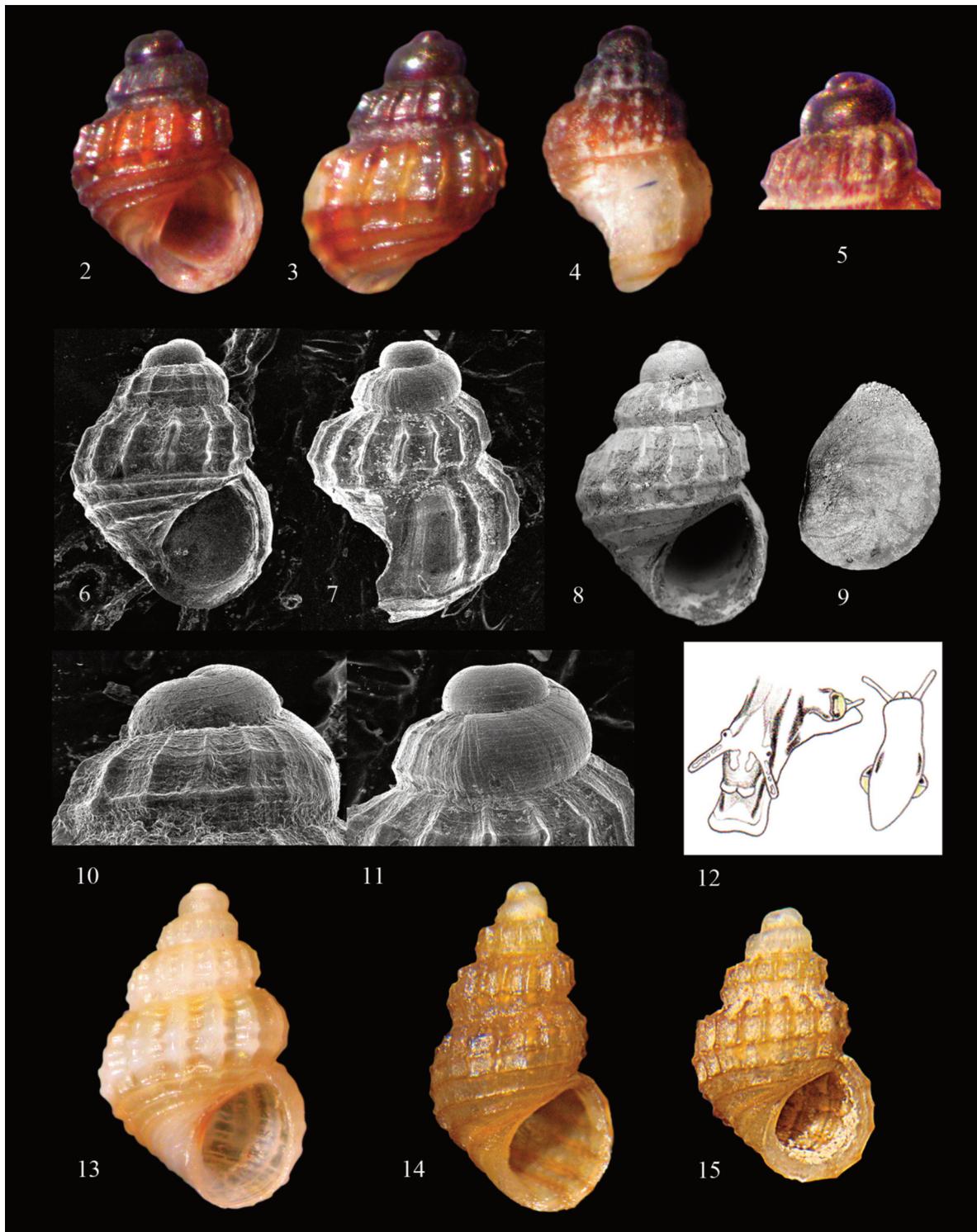
A. clarae (Nofroni et Pizzini, 1991) is an eastern Ionian species described for Zakynthos, Greece in recent time, which shares with the new species a similar protoconch sculpture and shell colour pattern. Compared to the new species, it is higher and with one more tele-whorl. The shape of teleoconch is much more slender, with a different sculpture, dense of marked tubercles some of which (those on adapical first spiral chord) are oriented upward. The subsutural zone is wider. The less wide base bears one spiral chord less. The protoconch is shorter, less wide, almost white and bears more marked spiral sculpture.

A problematic taxon is *A. peloritana* (Aradas et Benoit, 1870): Scuderi & Terlizzi (2012) exposed their idea of this species, based on topotypical materials, which is different in both protoconch and shell characters from the new species.

In a recent paper Garilli (2008) restored *A. cingulata* (Philippi, 1836), which have a protoconch similar to that of the new species as for general outline and sculpture, but the spiral threads are lower in number and the teleoconch is very different in general outline, more similar to a big *A. tenera*, and sculpture, composed by thin and numerous axial ribs crossed by spiral lines of the same consistence.

Among the numerous Macaronesian congeners *A. maximilicutiani* n. sp. is here compared with those of small dimensions and close similar morphological characters. The new species resulted peculiar in sculpture of teleoconch, characters and dimensions of protoconch, resulting the smallest species of *Alvania* in this area too, sculpture of teleoconch and characteristics of protoconch. The morphology of the external soft parts of many species of this geographical zone are unknown: for this reason comparisons between species of the living animals were not possible.

A. grancanariensis is a species which could be referred to the Mediterranean *A. lanciae* group, as for general outline and sculpture of the teleoconch. The darker colouration of the protoconch and first tele-whorls make it similar to the new species, which however could be easily distinguished for the protoconch characteristics. Another congener whose coloration is similar to this latter species is *A. hoeksemai*, but the predominant spiral sculpture, the heavier shell aspect and the different protoconch make it easily differentiable from the new species.



Figures 2–12. *A. maximilicutiani* n. sp. Figs. 2–5: paratype, S. Giovanni Li Cuti, H: 1 mm (D. Scuderi coll.). Fig. 5: detail of protoconch, same data. Fig. 6: holotype, SEM photograph, H: 1.0 mm (MBAC). Figs. 7, 8: paratypes, same data of holotype, SEM photograph, both H: 1.1 mm (B. Amati coll. and A. Villari coll.). Fig. 9: upward view of operculum, H: 600 μ m (same data of Fig. 7). Fig. 10: protoconch of holotype (257x328 μ m), front view. Fig. 11: protoconch of paratype (267x300 μ m), lateral view. Fig. 12: external morphology of the soft parts. Figure 13. *A. lanciae*, S. Giovanni Li Cuti, H: 2.6 mm. Figures 14, 15. *A. dictyophora*, Salina, Eolie Is., H: 2.7 mm and 2.0 mm (B. Amati coll.).

The Madeiran *A. moniziana* shares with the new species the general shape and number of tele-whorls, but it is bigger, lacks axial sculpture and is almost entirely whitish in colour, while the protoconch is different at all.

Apart the size, almost double, the different pattern of shell colour, more light coloured with marked white stains in the peripheral line of each whorl, the sculpture, constituted by stronger axial ribs and more numerous spiral chords, especially in the peripheral zone, and the different protoconch distinguish *A. piersmai*, a small Canary recently described species, from the new species.

A. poucheti is a small (2 mm high) species, dark in colour, which resembles the new species for general shape, but differs in dimensions, shell and protoconch sculpture.

Juveniles specimens of *A. spreta*, a small dark shell Madeiran species, resemble *A. maximilicutiani* n. sp. as for the opisthocline shell sculpture and the coloration. But the former is higher, the number of whorls being equal, with more incised sutures and more numerous spiral chords, which give to whorls a less stouter aspect; the protoconch is different in colour and sculpture and the external lip in adult specimens is thicker and more rounded.

According to literature data (Dall, 1889, 1927; De Jong & Coomans, 1988; Leal, 1989), among Western Atlantic congeners few species properly belonging to *Alvania* recall the new species in dimensions and general shell features. *A. auberiana* (d'Orbigny, 1842) has a similar colour pattern, but is bigger, bears three spirals of the same thickness of the axial ribs above the outer lip, of which the uppermost is separated from suture, and has a different protoconch. As the latter species, *A. faberi* de Jong et Coomans, 1988 bears a third spiral chord on the last tele-whorl, while the uppermost colour band is continuous and the protoconch has different morphology. The general shape, dimensions and shell sculpture, together with the different protoconch, discriminate *A. nigrescens* Bartsch et Rehder, 1939 from the new species. Another small similar Caribbean congener is *A. moolenbeeki* De Jong et Coomans, 1988 which shares with the new species similar dimensions reaching 0.9 mm in adult specimens, but it is almost entirely white and has spiral sculpture predominant on the two tele-whorls, a clear umbilicus is present and the protoconch has different dimensions and sculpture.

Two eastern Pacific congeners resemble the new species in morphology, according to literature data (Bartsch, 1912; Backer et al., 1930; Bartsch & Rehder, 1939): both *A. purpurea* Dall, 1871 and *A. cosmia* Bartsch, 1911 are similar in teleoconch sculpture, constituted by only two spirals above the outer lip. Therefore, compared to the new species, they are almost double in dimensions, they are constituted by three rather higher tele-whorls in adult specimens and show a different shell colour pattern; the protoconch is different. Three more species of the same geographical area, *A. almo* Bartsch, 1911, *A. tumida* Carpenter, 1857 and *A. oldroydae* Bartsch, 1911, share with the new species a similar general outline, almost stubby and swollen, constituted by only two or three tele-whorls. They all have a different sculpture, mainly constituted by spiral keels and numerous less marked axial ribs, a different shell colour pattern and protoconch.

Concerning the external morphology of the soft parts the new species shows a peculiar character as concerns the presence of only one single metapodial tentacle. Usually species of *Alvania* are reported to bear 3-7 metapodial tentacles (Ponder, 1985) and previous observations of one single metapodial tentacle by Jeffreys (1867) for *A. punctura* (Montagu, 1803), *A. lactea* (Michaud, 1832) and *A. abyssicola* (Forbes, 1850) have been rejected on the basis of Clark's (1852) observations (Ponder, 1985). Now the question on the number of metapodial tentacles in species of this genus could be re-opened on the basis of the present observations.

Among fossil species *A. maximilicutiani* n. sp. shows some grossly resemblance with *A. circumcincta* Seguenza G., 1873 and *A. bicingulata* Seguenza L., 1903 and with species of *Galeodinopsis* Sacco, 1895 (Garilli, 2008), but show substantial differences in dimensions, teleoconch sculpture and protoconch shape and sculpture.

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