

On the rediscovery of the vermetid “*Siphonium*” *gaederopi* Mörch, 1861 (Gastropoda Vermetidæ) with systematic and ecological observations on the early juveniles stages

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ABSTRACT

Some specimens of a not identified *Dendropoma* Mörch, 1862 were collected in the Mediterranean. Further taxonomical studies allowed to identify this material as “*Siphonium*” *gaederopi* (Möorch, 1861), a species never recorded again after its first description. It is here redescribed and figured on the basis of the mentioned collected material and after the study of the type material of Möorch’s collection, among which the syntype is here selected. This species is assigned to *Dendropoma*, according to the morphological characters of the shell, radula, external soft parts and operculum. The shell, the soft parts and the juvenile stage of *D. gaederopi* are here figured for the first time and compared to congeners and to *Vermetus granulatus* (Gravenhorst, 1831), similar only in shell morphology. The new findings of this species represent the first certain record, after the doubtful locality of the original description.

KEY WORDS

Mollusca; Vermetidae; *Siphonium*; rediscovery; *Dendropoma*; ecology; juveniles.

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INTRODUCTION

The genus *Siphonium* Möorch, 1859 [not Link, 1807] was synonymised by Keen (1961), who restored *Dendropoma* Möorch 1861 as a good name for the genus, with *D. lituella* Möorch, 1861 as type species.

Scuderi (1995) had been recently reviewed the systematic position of the two known Mediterranean species of the genus *Dendropoma*: *D. petraeum* (Monterosato, 1878) is synonymised with *D. glomeratum* Bivona, 1832, while the studied type material of *D. anguliferum* (Monterosato, 1884) in the ZMR was not enough to establish whether this latter is a good species, so it still continues to have an uncertain systematic position

because of the lacking of recent material. Some specimens of a third species of *Dendropoma*, markedly different from the two congeneric, has been recently recorded in the Mediterranean sea. This species corresponded to the description of “*Siphonium*” *gaederopi* Möorch, 1861, which was described on material doubtfully reported from Spain and never cited in the recent time. The comparison of the specimens found with the type material of this latter species, housed in ZMUC, confirmed the previous diagnosis. A syntype is here selected among the material of the lot GAS-216.

The shell of adult specimens of *D. gaederopi* has a close morphological resemblance with that of another Mediterranean species, *Vermetus granulatus* (Gravenhorst, 1831).

In particular the former is very similar to a morphotype of the latter, called “form A” (Scuderi, 1999), but has different protoconch and operculum and the colour pattern of external soft parts is peculiar too. Differences on the shell sculpture of sub-adult shells of the two species (see remarks) are discriminating too.

MATERIAL AND METHODS

Living samples of *D. gaederopi* were collected by undermining the shells from hard substrates at -4/18 m depth; empty shells and juveniles stages were collected among the shell grit drawn at -35 m depth collected handly with ARA. Pictures of the external soft parts were obtained by observing the living animals in aquarium.

Type material of “*Siphonium*” *gaederopi* were examined from the Mörch’s collection stored in ZMUC.

ACRONYMS. AGC: Alfio Germanà collection, Catania, Italy; ARC: Agatino Reitano collection, Catania, Italy; DISTEBA: Department of Biological and Environmental Science and Technologies, University of Salento, Lecce, Italy; ISMAR-CNR: Istituto di Scienze Marine, Consiglio Nazionale delle Ricerche, Genoa, Italy; ZMR: Zoological Museum, Rome, Italy; ZMUC: Zoological Museum, University of Copenhagen, Denmark.

SYSTEMATICS

Dendropoma gaederopi (Mörch, 1861)

EXAMINED MATERIAL. Type material. Four lots in ZMUC labelled GAS 215/216/217/218, with two labels, probably in Mörch’s handwriting (Figs. 13, 14) and the label of the Museum (Fig. 15), were constituted by several tens of specimens; one specimen on *Spondylus gaederopus* Linnaeus 1758 is here selected as syntype among the lot GAS 216 (Fig. 1).

Other examined material. Agrigento, SW-Sicily, Italy: Linosa Is., “Cala Pozzolana di Levante”, -4/6 m, on ancient earthenwares; same locality, 7 living specimens, -18m, on the shell of a living *Charonia tritonis variegata* (Lamarck, 1816); “Faro”, -35 m,

shell-grit, 2 shells; “Punta Arena Bianca”, infralittoral shell-grit, 1 shell. Siracusa, SE-Sicily, Italy: Vendicari, beached shell-grit, 1 shell on the upper valve of *Spondylus gaederopus* Linnaeus, 1758; Marzamemi, 3 living specimens on calcareous stones, -5/6m (ARC and AGC). Lecce, S-Apulia, Italy: Otranto, 1 specimen with operculum and 4 protoconchs, on calcareous stones, -5/10m.

DESCRIPTION. Shell solid, generally funnel involved, with the last tele-whorl rounded and equal to the half of the entire shell (Figs. 2–5). Sculpture constituted by dorsal longitudinal keels, variable in number (often 2), which could produce striking spiny formations in large specimens. Between the keels, numerous and concentric lamellae cover the surface of the shell, particularly in young specimens (Figs. 3, 4). The mouth is rounded and has a diameter of 2–2.5 mm in adult specimens (Fig. 5): in the syntype here selected the external diameter of the aperture is 5.8 mm. Like in many species of *Dendropoma*, an eroded scar is often visible on the substratum around the apertural opening. The basal portion of the external side of the tube forms a second labial lip, that leans on the substratum. Dense mass of individuals were not observed, except one little cluster among type material (GAS 216) of about 20 shells of various size on a fragment of a large Bivalve, maybe a *Spondylus* Linnaeus, 1758.

The living animal (Fig. 8) is yellow-cream in colour, becoming red-orange on the anterior part of the cephalo-thorax, metapodium and foot, around the operculum; very small black spots are visible too. Black shade are present on the dorsal part and around the base of the cephalic tentacles and the mouth, wich are both yellow in colour; the mantle edge is yellow with black alternate lines.

The operculum (Figs. 6, 7) is large as the aperture and is quite different from that of all the congeners, being reverse-cone shaped, with the concave part upward, relatively deep and brown in color, often occupied by encrusting calcareous algae. The convex downward part is glossy and red-chestnut in color and do not present, unlike the two congeners, any depression around the central large button, but only a thin, almost undetectable scar.

Protoconch (Figs. 9–11) 0.5 mm high and 0.6 mm wide, swollen, but compressed superiorly and inferiorly, constituted by 1 and ½ smooth whorls.

A first embrional shell, separated from the rest of the protoconch, is distinguishable (Fig. 10).

EARLY DEVELOPMENTAL STAGES. Usually *D. gaederopi* has a not polygirate protoconch: the presence of a first embryonic nucleus, separated from the rest of the protoconch shell, suggest that this species could have a planctonic stage, which allow the diffusion of the species. Few juveniles found among shell grit and undoubtedly belonging to *D. gaederopi*, however, show one or two additional protoconch whorls (Fig. 12), confirming the possibility of some vermetids to produce more than one type of larval stage depending on seasons (Scuderi & Cantone, 2007). Moreover the first protoconch whorl seem to have a different coiling axis, differing of about 45° from that of the rest of the protoconch. This character, observed on other species of the same genus, could have phylogenetic implications. This changing of axis coiling in the protoconch seem to anticipate the subsequent changing of 90° of the first telewhorl, which allow vermetids to settle on the substratum.

DISTRIBUTION. Except for the doubtful locality reported in the original description (“...probably from Spain”), this species is known only from the material here examined, from S-Italy to Pelagie Is., between Sicily and N-African coasts of Libya. Not full grown specimens are easily mistakable with other congeners or with *V. granulatus* and this could reduce the real geographical distribution of the species along the Mediterranean and the E-Atlantic.

REMARKS. *Dendropoma gaederopi* was collected from the very shallow to the deeper fringe of infralittoral, 4/35 m depth, often on big shells, like *Spondylus* or *Charonia* Gistel, 1847: this habit appear not similar to the Mediterranean congeneric species, which are present on rocks in intertidal and upper infralittoral zones. Further findings of this species in S-Apulian, cited as *Dendropoma* sp. (Terlizzi et al., 2003; Scuderi & Terlizzi, 2012), seem to suggest that it could be present in a wider geographical area, mainly in South Mediterranean, but it probably still remain unrecognized, due to taxonomical difficulty in its identification.

Mörch well described *D. gaederopi*, clearly distinguishing it from the other species of

“*Siphonium*” (= *Dendropoma*). The Mediterranean congeneric *D. cristatum* (Biondi, 1857) results quite different on the basis of teleoconch's shell sculpture mainly constituted by more dense and thin axial lamellae and only one spiral chord, the not smooth protoconch, the colour pattern of external soft parts (Fig. 20) and the feature of the operculum (Figs. 16, 17) (see Scuderi, 1995 for further details). The analysis of the type material of the second Mediterranean species of *Dendropoma*, *D. anguliferum* Monterosato, 1884, housed in ZMR (n. 21295), have stated the differences between this latter and *gaederopi*, even if the question of the validity of the Monterosato's species remain opened (Scuderi, 2002).

Moreover, *D. gaederopi* seem not to be a gregarious vermetid, like some congeneric species, which could produces wide “trottoir” in some localities (Hadfield et al., 1972; Safriel, 1975; Barash & Zenziber, 1985; Chemello et al., 1990; Scuderi et al., 1998), and seem to prefer deeper waters.

Another Mediterranean vermetid is close similar to this species: except for the protoconch and the external characters of the soft parts, *D. gaederopi* differs from *V. granulatus* “form A” (Scuderi, 1999) by having a shell ambrate in color, with spiral sculpture constituted by only two (rarely more) axial ribs, which, in adult shells, produce spiny excrescences. In *V. granulatus* the basal portion of the external side of the tube never forms a second lip and no lamellae between the keels, nor scar eroded into the substratum are present. Moreover, as could be argued by pictures here presented, the operculum (Figs. 18, 19) is smaller and thin, the protoconch (Fig. 22) and external soft parts (Fig. 21) are different.

DISCUSSION

Dendropoma gaederopi is not reported in any recent checklist of the Mediterranean malacofauna (Bruschi et al., 1985; Sabelli et al., 1990–92; Bodon et al., 1995), even if it was cited as valid species by Monterosato (1892) fide Mörch (1861–1862).

The syntype here selected among the type series from ZMUC carries a black cross on the upper part of the shell, maybe to mark the sample from which



Fig. 1–14. *Dendropoma gaederopi*. Fig. 1. Syntype (ZMUC), on *Spondylus gaederopus*. Fig. 2. Shell, Linosa, aperture Ø 1mm. Fig. 3. Shell, Linosa, aperture Ø 1.5 mm. Fig. 4. Shell, not full grown specimen, Linosa, aperture Ø 0.5 mm. Fig. 5. Shell, Linosa, aperture Ø 3 mm. Figs. 6, 7. Operculum in downward and lateral (a) view, Ø 1.5 mm. Fig. 8. Drawing of the animal Ø 1.5 mm. Fig. 9. Protoconch and first tele-whorl, upward view, Linosa, 0.5 mm x 0.6 mm. Fig. 10. Same, detail of the nucleus. Fig. 11. Protoconch and first tele-whorl, side view, Linosa, 0.5 mm x 0.6 mm. Fig. 12. Multispiral protoconch and first tele-whorl, side view, Linosa, 1.5 mm x 0.85 mm. Fig. 13, 14. Original labels in Mörch's handwriting (ZMUC). Fig. 15. Label of ZMUC. Fig. 16, 17. *D. cristatum*. Operculum in downward and lateral view Ø 3.5 mm. Fig. 18, 19. *Vermetus granulatus*. Operculum in downward and lateral (a) view Ø 0.25 mm. Fig. 20. Drawing of the animal Ø 3.5 mm. Fig. 21. Drawing of the animal Ø 1.5 mm. Fig. 22. Protoconch and first tele-whorl, lateral view, Vendicari, 0.6 mm x 0.5 mm.

the operculum, preserved in a separate glass-tube, was obtained (the shell is breacked probably to draw out the soft parts). All the material was accompanied by two series of labels: one original, probably in Mörch's hand-writing; the second label of the ZMUC. An additional label reports: "*Following Bieler (1996) possible type(s) of Siphonium gaederopi Mörch, 1861*".

With *D. gaederopi* the number of known Mediterranean species of this genus increase to three, but further and more exhaustive studies should regard *D. anguliferum* to ascertain if it is really a good species.

All vermetid species have normally gastropod-like coiled early developmental stages: some spown as free swimming larvae; others are crawling juveniles at hatching. Hadfield et al. (1972) stated that nurse yolk assumption by the embryos influences the larval mode of life and dimensions, but only in *Vermetus rugulosus* both type of larvae could be simultaneously produced (Scuderi & Cantone, 2007).

The finding of more than one type of juveniles suggest that this species could take advantage from the planktonic lifestyle to settle on islands rocky environments and from the direct development to ensure specimen's enlargement to the established population.

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