

Taxonomical notes on some poorly known mollusca species from the Strait of Messina (Italy): second contribution

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ABSTRACT

Changes in currents and temperature of the sea water, the intensification of maritime traffic and the increment of knowledge on the taxonomy of some groups of molluscs justify the present second contribution to the knowledge of poorly known species of Mollusca of the interesting biotope constituted by the Strait of Messina (North-Eastern Sicily). As our previous work, the aim of this new contribution is to give a better taxonomic definition and a new iconography, through photographs and drawings of the shell - as well as the external soft parts of the living animals when possible - of problematic species of Mollusca which have stimulated our curiosity due to their rarity, scanty findings or poor knowledge or definition of their taxonomy. Among others, Rissoellidae are present with dense populations during the summer season: new investigations on their animal chromatism gave light to species assemblage in the studied environment and a better delineation of the single species, whose shell resulted scarce of morphological characters, being minute, almost smooth and colourless.

KEY WORDS

Poorly known species; Messina Strait; Sicilian coast; Mediterranean Sea.

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INTRODUCTION

In a previous contribution we have dealt with the peculiar environment represented by the Strait of Messina (Villari & Scuderi, 2017) due to the happy coincidences of chemical-physical environmental factors and the geographical position. But updates of the malacological presences in this area of Sicily still continued to reveal new very important findings and other new species were described, both from the Sicilian as well as the Calabrian side of the Straits. Notwithstanding the short lapse of time passed, numerous new species have been described in

these last five years: see for instances Dell’Angelo et al., 2017; Villari, 2017; Renda et al., 2019; Villari & Scuderi, 2022. All these contributions underline how peculiar is the environment of the Strait of Messina and, at the same time, how it is susceptible of human interferences, which could cause important negative consequences to the organism assemblages and in particular to the endemisms present among them. The present paper adds new interesting malacological notes for this area of N-Eastern Sicily, on the basis of the recently collected materials and by the light of further new taxonomical progresses acquired, even if new discussions concerning some other

currently problematical taxa are needed. Our previous paper pointed out the enlargement of the geographical distribution of some species, among which the most surprising was those of *Tricolia deschampsii* Gofas, 1993, described as endemic of Southern Mediterranean Spain, and of the alien *Chelidonura fulvipunctata* Baba, 1938, nowadays accepted as *Biuvae fulvipunctata* (Baba, 1938). Moreover the re-definition of some taxa were also performed, as concerned by the rissoids: *Setia sciutiana* (Aradas et Benoit, 1874), *Alvania sororcula* Granata-Grillo, 1877 and *A. peloritana* Aradas et Benoit, 1874. This latter species, has been recently re-described and figured by Amati et al. (2019), who designated a lectotype among materials of the Monterosato collection (MZR) and did not considered conspecific the specimen figured in Villari & Scuderi (2017, Fig. 21). Since our picture appeared not well fitting to the basic concept of the species, though it shares the main characteristic traits with the numerous specimens found, of which it could be considered a morphological extreme, and since some doubts concerning its interpretation and relation with the original concept of the other congeners illustrated by Aradas & Benoit (1874) still remain, we decided to realize more thorough studies on this argument, supplied by a new series of pictures on this taxon and by further studies of the original diagnosis, supported by observations of the original type material in MNHM.

The present contribution is completed by data on some other species of particular interest due to their recent description as new species or their recent finding in the Messina Strait area. As in the preceding contribution, in this paper only findings along the Sicilian coast of the Strait are discussed.

MATERIAL AND METHODS

Samples were conducted along the shores of Messina in June–September 2019–2020 by SCUBA diving in the same localities of our preceding paper (Villari & Scuderi, 2017, Fig. 1): 1. Harbor of Messina; 2. S. Raineri, Maddalena Lo Faro wreck; 3. S. Raineri, “Degassifica” station; 4. Marina del Nettuno; 5. Contrada Paradiso; 6. Ganzirri.

Methods of collecting were even the same:

materials were obtained by handily “brushing” on both shaphilic and photophilic hard substrata, from the surface to -4/6m depth, with a hand-towed net with a 1 mm mesh size. Molluscs were immediately stored in marine water and sorted for the identification under stereomicroscope after few minutes. Some specimens were drawn with gray and colored pencils and then saved in 90° ethanol. The use of digital pictures and small clips (mpeg file) were also of great help in living collected specimens observations. Additional material derived from preceding collecting samples in the collections of both the Authors of the present paper.

ABBREVIATIONS AND ACRONYMS. h: height; liv.: living specimens; sh.: shell/shells; st.: station; AVC: Alberto Villari collection (Messina, Italy); DSC: Danilo Scuderi collection (Catania, Italy); MBAC: Museum of the Department of Animal Biology of the University (Catania, Italy); MCZR: Museo Civico di Storia Naturale di Roma (Roma, Italy); MSNM: Museo Civico di Storia Naturale di Milano (Milan, Italy); MZB: Museo Zoologico dell’Università di Bologna (Bologna, Italy); PMC: Pasquale Micali collection (Fano, Italy).

RESULTS

Here follow conclusions on the most interesting malacological material grouped according to the systematic order of taxa.

Classis GASTROPODA Cuvier, 1795

Subclassis CAENOGASTROPODA L.R. Cox, 1960

Ordo LITTORINIMORPHA A.N. Golikov & Starobogatov, 1975

Familia EULIMIDAE R.A. Philippi, 1853

Genus *Melanella* R.A. Philippi, 1853

Melanella sp.

MATERIAL EXAMINED. ITALY • 1 sh; Sicily, Messina, st. 6; 100–150 m depth; DSC.

REMARKS. A single specimen of an undetermined eulimid was found in 09.II.1995 at Ganzirri (Messina) among residuals of fishing nets (Fig. 27). Though the only single shell found is broken at the

top, it is quite peculiar: in particular, while the slightly curved spire is almost similar to that of other eulimids, the outline of the last whorl is characterized by the straight basal portion, which is truncated with concave outline at the base, giving a bi-angulated shape to the peristome. Such similar character is present only in two non-Mediterranean species of this family: *Hemiliostraca irafca* (Bartsch, 1915) from South Africa, which however shows two brownish spiral lines, one just above the suture and the second in the middle of the last whorl, whose mouth is straighter and the base more rounded, with a not curved spire; the New Zealand *Melanella truncata* (Suter, 1908) has the same type of base, even more marked in outline than the preceding, but the internal lip is more rounded and the spire seem smaller and not curved.

This specimen could represent a still not described alien species, arrived in the Mediterranean through human mediated dispersal. According to us, it is more likely to be an extinct fossil - probably an undescribed species which remained between the ancient layers constituting the stones where it was found.

Genus *Curveulima* Laseron, 1955

Curveulima beneitoi Peñas et Rolán, 2006

MATERIAL EXAMINED. ITALY • 1 liv.; Sicily, Messina, st. 6; 100–150 m depth; fishing nets; DSC • 2 liv.; Sicily, Messina, st. 5; 20 m depth; fishing nets; AVC.

REMARKS. Specimens were found among residuals of fishing nets, but were dry at finding. This species was firstly described only on specimens found in Southern Mediterranean Spain. The Easternmost record of this species inside the Mediterranean seems that of Manousis et al. (2021), but specimens are only illustrated and no other indications on locality or other data on their identification are reported.

Familia RISSOIDAE Gray, 1847

Genus *Alvania* Risso, 1826

Alvania peloritana (Aradas et Benoit, 1874)

TYPE MATERIAL. One paralectotype (here drawn) in MNHM, h 3.69 mm (Figs. 1–5).

MATERIAL EXAMINED. ITALY • 65 liv. + 120 sh; Sicily, Messina, st. 1 to st. 6; 2–4 m depth; among algae; DSC • 30 liv.; Sicily, Messina, st. 1; AVC.

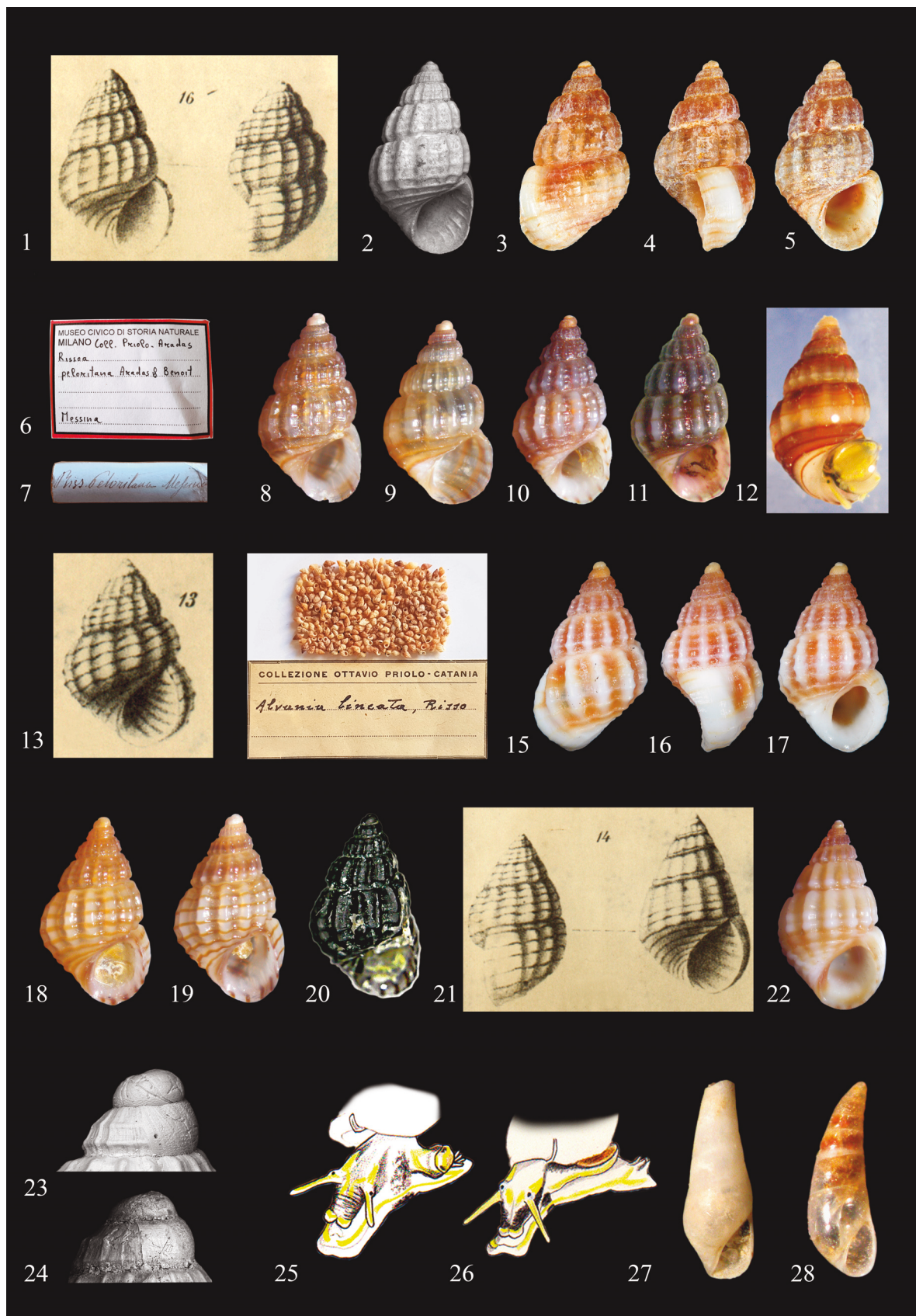
REMARKS. As reported on our previous contribution, this species appears distinguishable from the two sympatric *A. lineata* Risso, 1826 and *A. discors* (Allan, 1818), of which it seems to have an intermediate teleoconch shell, on account of some morphological characters, well underlined by Amati et al. (2019), who re-described and illustrated the shell of the collection Benoit (MCZR), as could be argued by the accompanying labels. The protoconch (Fig. 24) is similar to that of *A. lineata* (Fig. 23), paucispiral, sculptured by fine wave treads constituted by micro-tubercles, but less wide and less protruding. This and some other teleoconch characters excludes the identification of *A. peloritana* with *A. discors*, whose protoconch is instead almost smooth. The external morphology of the soft parts of *A. peloritana* (Fig. 26) is similar to that of *A. lineata* (Fig. 25), with the exception of only the lateral black band behind cephalic tentacles shattered and less marked in the latter. We distinguished two slightly different morphs of *A. peloritana* along the Messina's shoreline: the first shows a stronger shell, with a thicker outer lip and a more variable colour, usually brown tending to violet, corresponds to specimens of open sea areas. The second, corresponding to populations of repaired marine environment, have a thinner shell with, often, a sharp outer lip, probably due to freshwater affluxes, like those present inside the harbour. The specimen of *A. peloritana* figured in Villari & Scuderi (2017, Fig. 21) belongs to the first morph, but it is an extreme among the morphological intraspecific variation, though it shares all the characters with the remaining specimens found of the same lot (Figs. 8–12). Specimens of *A. lineata* of the same environment are variable as the shell colour (almost completely dark specimens as in Fig. 20 are not rare) but has a constant less tapered and more rounded shell, with marked spiral lines and rounded axial ribs extending to the base, clearly different from that of *A. peloritana*. The new series of pictures here provided better represent the intra-specific variation of this species. Furthermore, new searches among material in MNHM to well understand the complicate taxonomical question which involves *A. peloritana*, but also *A. montagui* (Payraudeau,

1826) and *A. nicolosiana*, allowed us to find the original lot of the former species in the Aradas collection (MNHM), previously not found in Milan by Amati et al. (2019, fide G. Buzzurro), nor in the section of the Aradas collection in Catania (fide D. Scuderi). This lot includes one adult shell and two small rissoids not conspecific with the type specimen, probably two young specimens of *Rissoa lia* (Monterosato, 1884), accidentally ended up in the same vial. It corresponds to that reported as original by Priolo (1942), who acquired the Aradas collection, and, according to him, the adult shell is probably the same figured in the original plate (Fig. 16 in the original plate, here in Fig. 1). This specimen has the same morphological characters of that described and figured in Amati et al. (2019) and, like that, it is accompanied by an original label by Benoit (Fig. 7). All the considerations and comparisons reported by Amati et al. (2019) on the species, therefore, remain valid. The only element we feel to add is the designation of the specimen in the lot in MNHM as paralectotype, being the collection of Benoit directly acquired by Monterosato and now in MCZR. The last doubt regards why Aradas & Benoit compared their new species to *A. montagui*, nowadays considered synonym of *A. discors*, rather than to *A. lineata*, reporting as new another species, *A. nicolosiana*, which is evidently morphologically more similar to *A. discors*. In the first check-list of the Mediterranean marine molluscs (Bedulli et al., 1990) *A. montagui*, *A. nicolosiana* and *A. peloritana* are all listed as synonyms under *A. discors*.

Some Authors in the past, among whom Palazzi (1997), supposed that a mistake occurred during the composition of the original plate, in which n. 13

should really represented *A. peloritana*, which he considered only as a synonym of *A. lineata*. We do not agree with this last interpretation. Actually, the problem is what really Aradas & Benoit intended as *A. montagui* and what is currently considered by modern malacologist. In fact, the description of this latter species by Aradas & Benoit (1874) perfectly fit to the drawing reported in their Fig. 13, confirming that their concept of *A. montagui* coincides with the current concept of *A. lineata*. As a proof, we can read how, among Aradas' materials, Priolo (1942) had found a lot of *A. montagui* composed by numerous specimens of *A. lineata* Risso, 1826, as confirmed by pictures of this lot in MNHM here reported (Figs. 14–17). Moreover Amati et al. (2019) figured the syntype of *A. montagui* (Amati et al., 2019: 105, Figs. 83–88), without reporting any comment, which is more similar to *A. lineata* than to *A. discors*. Being our intent far from solving the question concerning the real taxonomical status of *A. lineata*, we can conclude that in XIX century the concept of *A. montagui* coincided with our current idea of *A. lineata*. Putting together all these facts, we can conclude that Aradas & Benoit recognized morphological differences between *A. montagui* (= *A. lineata*, as nowadays intended), illustrated in Fig. 13 of “Conchigliologia” (1874) and a sympatric species in the harbour of Messina, which they decided to describe as new under the name *A. peloritana*, figured in Fig. 16 of the same book, while *A. nicolosiana* (here we illustrate in Fig. 22 possible type material of this species labelled as “*Alvania specie nova*” in MBAC) was instead described from Ognina (Catania) ignoring the existence of *A. discors*, as currently intended, though the Eastern-Sicily populations of this latter

Figures 1–28. Mollusca species of the Strait of Messina (Italy). Fig. 1. Original drawing of *A. peloritana* (Aradas et Benoit, 1874). Figs. 2–5, 24. Syntype of *A. peloritana* (MNHM), h 3.69 mm. Figs. 2, 24. SEM photographs of the entire specimen and of the protoconch. Figs. 3–5. Digital photographs of the same in dorsal, lateral and frontal views. Fig. 6. Label of the syntype of *A. peloritana* of MNHM. Fig. 7. Original label of the syntype in Benoit's handwriting. Figs. 8–12. Some specimens representing intraspecific variability in *A. peloritana* from (8, 9) the harbour of Messina and from (10–12) st. 6 (Fig. 12 represent the same living specimen in Fig. 21 in Villari & Scuderi, 2017); from 8 to 12 respectively h 3.6; 3.8; 3.7; 3.65 and 3.2 mm. Fig. 13. Original drawing of *A. montagui* (Aradas et Benoit, 1874). Fig. 14. Lot of *A. lineata* in Priolo's collection from the Aradas collection (MNHM), originally labelled as “*A. montagui*”. Figs. 15–17, 23. Digital (Figs. 15–17) and SEM (Fig. 23) photographs of a specimen of *A. lineata* in dorsal, lateral and frontal views, from the same lot in Fig. 14; h 3.58 mm. Figs. 18–20. Three specimens representing intraspecific variability in *A. lineata* from st. 6: from 18 to 20 respectively h 3.6; 3.55 and 3.4 mm. Fig. 21. Original drawing of *A. nicolosiana* (Aradas et Benoit, 1874). Fig. 22. A specimen from a lot labelled “*Alvania specie nova*” in Aradas collection (MBAC) possibly representing *A. nicolosiana*. Fig. 25. External soft parts of *A. lineata*. Fig. 26. External soft parts of *A. peloritana*. Fig. 27. *Melanella* sp., Ganzirri, h 2.5 mm. Fig. 28. *Curveulima beneitoi*, Ganzirri, h 1.8 mm.



species show some morphological differences compared to the typical *A. discors*.

***Alvania scuderii* Villari, 2017**

MATERIAL EXAMINED. ITALY • 1 sh; Sicily, Messina, Ganzirri, 2–4 m depth; rocky bottom; holotype MZB 47004 • 9 liv. + 14 sh; same data of holotype; AVC, DSC and PMC.

REMARKS. New materials of this species have been found just among the last samples collected. The newly described species seem to have populations currently well-structured inside the coastal malacofauna taxocoene of the Messina's waters and along the rest of the Jonian coasts of Sicily. But the re-examination of materials of the same localities previously collected within a period of teens of years by the Authors of the present note had revealed the existence of no specimens at all. This latter considerations suggested us that the presence of this species along the Italian coasts is recent and could be linked to changes in marine current's prevalence, which now probably is supplying our coasts with species of Eastern-Mediterranean affinity.

Subclassis HETEROBRANCHIA Burmeister, 1837
Infraclassis EUTHYNEURA Spengel, 1881
Familia RISSOELLIDAE Gray, 1850
Genus *Rissoella* J.E. Gray, 1847

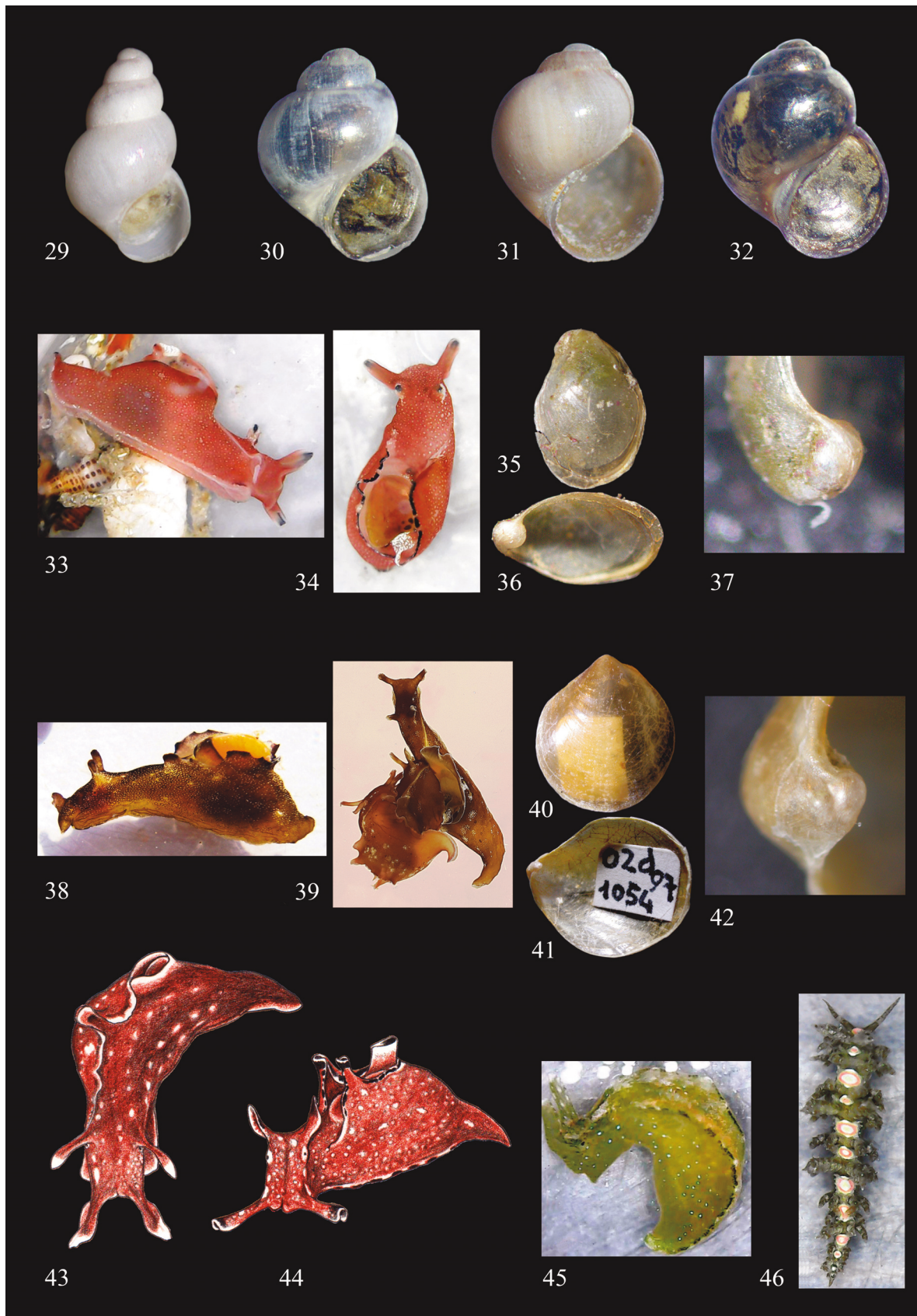
***Rissoella* spp.**

MATERIAL EXAMINED. *Rissoella diaphana*: ITALY • 1 liv.; Sicily, Messina, st. 6; 2–4 m depth; brushing on stones; AVC • 1 liv.; same data as previous; DSC. *R. inflata*: ITALY • 10 sh + 46 liv.; Sicily, Messina, st. 6; 2–4 m depth; brushing on stones; AVC and DSC. *R. opalina*: ITALY • 6 sh; Sicily, Messina, st. 1; 5–6 m depth; on boat's hawsers; DSC • 1 sh; Sicily, Messina, st. 5; 1–5 m depth; brushing

on stones; AVC. *R. camillae*: ITALY • 1 sh; Sicily, Messina, Ganzirri, st. 6; 1–5 m depth; brushing on stones; holotype MZUB 60419 • 1 sh; same data of holotype; paratype 2 AVC • 1 sh; same data of holotype; paratype 3 DSC. Further 20 liv. and 5 sh from the type locality and 8 sh from S. Giovanni Li Cuti, 20–25 m were found and are present in the private collections of the Authors.

REMARKS. The difficulty in the identification of numerous specimens of gastropods of the genus *Rissoella* found in the first samples suggested us to postpone the discussion of this group of heterobranchs. These difficulties are generated by the poorly appreciable characters of the almost entirely smooth teleoconch as well as protoconch shell, which moreover is of very minute dimensions. Only *R. diaphana* (Alder, 1848), which is the type-taxon of the genus, is easily distinguishable for the elongated spire of the shell (Fig. 29), which no other similar species seem to share in European waters. Among the low-spiral shell species, *R. opalina* (Jeffreys, 1848) is recognizable for the pinkish color of the shell and the narrow umbilicus in adult specimens. The high variable shell morphology observed in our material of *R. inflata* (Monterosato, 1880), the common and most widely distributed species whose type materials has been discussed and figured by Appolloni et al. (2018), lead us to effect more detailed observations. Instabilities of its systematic position has been resolved by Villari & Scuderi (2022), who described the external chromatism of the soft parts of topotypic specimens as a further important character for its identification. Slight differences between groups of two different morphs concerning the shell and the external chromatism of soft parts, the hypobranchial gland in particular, characters well utilized in recent taxonomical papers on Rissoellidae (Simone, 1995; Rolan et Hernandez, 2000; Ortea & Espinoza, 2004; Manousis, 2021), allowed us the distinction of a new species: *R. camillae* Villari et Scuderi, 2022.

Figures 29–46. Mollusca species of the Strait of Messina. Fig. 29. *Rissoella diaphana*, live collected specimen from S.ta Tecla, Catania, h 1.4 mm. Fig. 30. *R. inflata* live collected specimen from Ganzirri, Messina, h 1.3 mm. Fig. 31. *R. opalina*, Tarifa, Spain, h 1.4. Fig. 32. *R. camillae*, holotype (MZUB) from Ganzirri, Messina, live collected specimens, h 1.3 mm. Figs. 33–37, 44. *Aplysia parvula*, live collected specimen from (Figs. 33, 34) Ganzirri, Messina, h 6.9 mm and drawing of the specimen bred in aquarium, h. 6 mm. Figs. 35–37. Shell of the same specimens of Fig. 44, h 2.4 mm. Fig. 38. *Aplysia punctata*, live collected specimen from (Figs. 38, 39) Ganzirri, Messina, h 39 mm and drawing of the specimen bred in aquarium, h. 40 mm. Figs. 35–37. Shell of the same specimens of Fig. 43, h 12 mm. Fig. 45. *Elysia gordanae*, Ganzirri, Messina, h 16 mm. Fig. 46. *Limenandra nodosa*. Ganzirri, Messina, h 20 mm.



Rissoella globularis (Forbes et Hanley, 1853) is currently excluded by us from the Mediterranean malacofauna.

Familia APLYSIIDAE Lamarck, 1809

Genus *Aplysia* Linnaeus, 1767

Aplysia cf. *parvula* Mörch, 1863

MATERIAL EXAMINED. Messina, st. 6; tidal pools; AVC • 3 liv.; Sicily, Catania, Acitrezza; DSC. *A. punctata*. ITALY • 4 liv.; Sicily, Catania, Acitrezza; DSC • 20 liv.; Sicily, Messina, st. 6; tidal pools; AVC.

REMARKS. This species has been reported as *A. parvula* for some different localities on the basis of the paper of Bebbington (1970), in which it represents the smaller species in the Mediterranean, and considered as an alien species. It is characterized, beneath the minute size of usually less than 10 mm in animal length when crawling, by the reddish-brown colour of the mollusc, with numerous white stains all over the body, cephalic tentacles and the parapodia, the blackish edge of parapodia, siphon, tentacles and rhynophora and the posterior tip of the foot, in form of sucker. The only Mediterranean species which resembles *A. parvula* is *A. punctata*, the smallest native species, which instead reaches and often exceed 40 mm in animal length. A conspicuous part of the internal shell, bigger compared to that of *A. parvula*, protrudes from the foramen. In a recent paper, Golestani et al. (2019) attest the absence of *A. parvula* from the entire Mediterranean, being all the preceding records based on juveniles stages of *A. punctata* or on “hybrids” of both the species during a period of temporary coexistence. According to our observations *A. cf. parvula* could be considered a not common but constantly occurring species in the photophilic lower marine environments along the Eastern coasts of Sicily. In particular, it was ever present in all the collecting sites of the Strait of Messina above indicated during these last decades. The first Author collected four specimens of *A. punctata* and three of *A. cf. parvula* inside the Acitrezza harbor and bred in aquarium for 4 months (November 1996 to February 1997) for the taxonomical characterization and drawing of their living animals. Specimens of the former of *A.*

punctata, apart the bigger dimensions, were different on account of the entirely brownish color background, where the white stains are bigger and organized in 4–5 rows. Parapodia, siphon, tentacles and rhynophore's tips are white, but a couple of specimens had blackish edges with alternating white lines, being probably linked to variability of the species. During this time, bigger specimens mated with relatives of the same dimensions with the help of the sucker-like tip of the male attaching on the protruded portion of the shell of female from the foramen, just before introducing its penis, everted from the right side of the mantle, inside the female vagina, situated in the same side. On December 1996 deposited a gelatinous egg-chord 70 mm long, containing a number of almost 180 eggs/mm², each 1.14 mm in diameter. Most surprisingly, the smaller specimens attributable to *A. cf. parvula*, have registered no significant increment of their dimensions and deposited in the same period a gelatinous egg-chord 20 mm long, containing a number of almost 70 eggs/mm², 0.14 mm in diameter each. After 1–2 days, from the latter numerous veligers almost of the same dimensions of the eggs spread. None from the former. The nucleus of the protoconch shell in both species was measured after death of specimens bred: it is 0.50 x 0.45 mm in *A. punctata*, 0.40 x 0.45 mm in *A. cf. parvula*, although the former was covered by a shell laier.

According to our observations, these two species are different on account of:

- different dimensions in adult specimens of both sexes;
- mating occurred only between specimens of the same dimensions;
- different egg masses and spawnings;
- different external soft parts colour patterns;
- different shell with different protoconch.

So the hypothesis that these two forms represent different stages of only one species is incorrect. The question of what name should be used for *A. cf. parvula* remains open.

Familia PLAKOBRANCHIDAE Gray, 1840

Genus *Elysia* Risso, 1818

Elysia gordanae Thompson et Jaklin, 1988

MATERIAL EXAMINED. ITALY • 1 liv.; Sicily, Messina, st. 6; 2–4 m depth; among algae; AVC.

REMARKS. Locus typicus of this sacoglossan is the Northern Adriatic but rare specimens were scattered recorded along few other Mediterranean localities (Cervera & Lopez-Gonzalez, 1996). The present record for the Strait of Messina is the first for Sicily. Some species of *Elysia* are able to gain chloroplast from the siphonal algae they feed upon and to maintain them functional over their parapodia and take advantage from the photosyntates produced (kleptoplasty).

Familia AEOLIDIIDAE Gray, 1827

Genus *Limenandra* Haefelfinger et Stamm, 1958

Limenandra nodosa Haefelfinger et Stamm, 1958

MATERIAL EXAMINED. ITALY • 1 liv.; Sicily, Messina, st. 6; 2–4 m depth; sandy bottom; AVC.

REMARKS. This rare species has been recorded in scattered localities inside the Mediterranean Sea. It was supposed almost variable in external morphology and cosmopolitan as geographical distribution.

Only in recent time, in a paper with morphological and molecular approach, the species has been differentiated in 5 extant species in the world (Carmona et al., 2014).

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