

Mainly Mediterranean Rissoellidae (Heterobranchia Acteonimorpha?) with the description of *Rissoella camillae* n. sp.

Alberto Villari¹ & Danilo Scuderi^{2*}

¹Via Villa Contino 30, 98124 Messina, Italy; e-mail: villarialberto48@gmail.com

²Via Mauro de Mauro 15B, Piano Tavola, 95032 Belpasso (CT), Italy; e-mail: stiliger38@gmail.com

*Corresponding author

ABSTRACT

The present paper is focused on the Mediterranean representatives of the neglected Gastropod family Rissoellidae, but some other not Mediterranean species are treated and figured for comparisons. This family comprises species of minute dimensions and almost smooth and transparent spiral shell. This has led to errors and misidentifications and an objective difficulty in the correct discrimination among species. Quite the opposite, the chromatism of external soft parts is clearly different according to species: in particular the form, width and colour of the hypobranchial gland seen through the transparent shell is a peculiar character for different species. In fact, in recent times taxonomy of Rissoellidae has been reviewed in several geographic areas starting from the animal coloration, with encouraging results. In the Mediterranean the three “classical” species need a modern revision and their taxonomical position should be evaluated to well define single taxa. In the present paper the taxonomy of Mediterranean Rissoellidae is approached starting from the animal chromatism, defining the single species according to shell and soft parts differences and solving long-standing taxonomical problems. On the basis of both shell and external soft parts morphological characters, *Rissoella camillae* n. sp. is also described as new, increasing to five the number of extant species in this geographical area.

KEY WORDS

Gastropod; animal chromatism; Mediterranean Sea; Europe; Rissoellidae; new species.

Received 22.08.2022; accepted 19.09.2022; published online 30.09.2022

INTRODUCTION

The systematic position of Rissoellidae has been widely debated since its first description as a family of Gastropods. The presence of a well spiraled shell, inside which the mollusc can entirely retract, and some anatomical characters, i.e. a well incised mouth, eyes situated in the middle of the head, at the base of duplicated cephalic tentacles (two true cephalic tentacles projected laterally and two expansions of it, projected anteriorly), place Rissoellidae in an intermediate position between Prosobranchs

and Opisthobranchs. Even the significance of these two latter groups of Gastropods has been modified during the last couple of decades. Only after the resurrection of Heterobranchia Burmeister, 1837 (Haszprunar, 1985) and after its subsequent better systematic definition, Rissoellidae seems to have found a more stable position there, grouped in the meantime together with some other families of previous uncertain position, i.e. Architectonicidae, Omalogyridae, Cornirostridae, etc. But the concept of Heterobranchia seem just antiquate: new updates is occurring on the systematics of Gastropods. Currently, Rissoellidae are placed in the Euthyneura (In-

fraclass), together with Acteonidea constituting Acteonimorpha (Subterclass).

Ponder & Yoo (1977), summarizing an ample debate, concluded that *Rissoella* is the name to be used for 73 species of the world. A second genus, *Cythnia* Carpenter, 1864, has been described for only two other species of the Eastern Pacific, which seem to have differences in feeding habits (Ortea et al., 2004), being parasitic of Asteroidea, and operculum: such differences and the presence of a smooth and transparent shell could reveal a more correct placement of the two species of *Cythnia* in a different family (Eulimidae?).

Taxonomy of species of Rissoellidae has always been complicated by the minute size and wanting an evident sculpture of the transparent, almost colourless shell, with a simple unsculptured protoconch. But with the utilization of the striking chromatism of the external soft parts (Simone, 1995) the number of species described as new considerably increased: as an example, starting from the only one species known for the entire Caraibic area, *R. caribea* Rehder, 1943, the number of species increased to eight after the papers published by Simone (1995) and Ortea & Espinoza (2004). For the European waters, four extant

species were described, of which three are present in the Mediterranean Sea: *R. diaphana* (Alder, 1848), which is the typetaxon of the genus, *R. inflata* (Monterosato, 1880) and *R. opalina* (Jeffreys, 1848). Only *R. globularis* (Forbes & Hanley, 1853) is currently excluded from the Mediterranean malacofauna. In recent times, following the above-mentioned Authors of the Caraibic area, three new species were added for the Eastern Atlantic: *R. contrerasi* Rolan et Hernandez, 2000 and *R. salasae* Ortea, 2019 for Canary Islands, *R. trigoi* Rolan et Hernandez, 2000 for Senegal. While one new species, *R. angeli* Manousis, 2021, has been described for the Eastern Mediterranean (Northern Greece). But none of this Authors has ever reviewed or debated these three older name, neither the most similar to their newly described species for comparison. Taxonomy of the Mediterranean species has been treated by Fasulo (1989), but this paper was restricted to the Gulf of Naples and discussed on the basis of only the shell morphology. Actually, the Mediterranean species needs further new contributions to solve doubts even on the “classical” best known taxa and to take stock of the situation in this geographical area. This is the aim of the present paper.

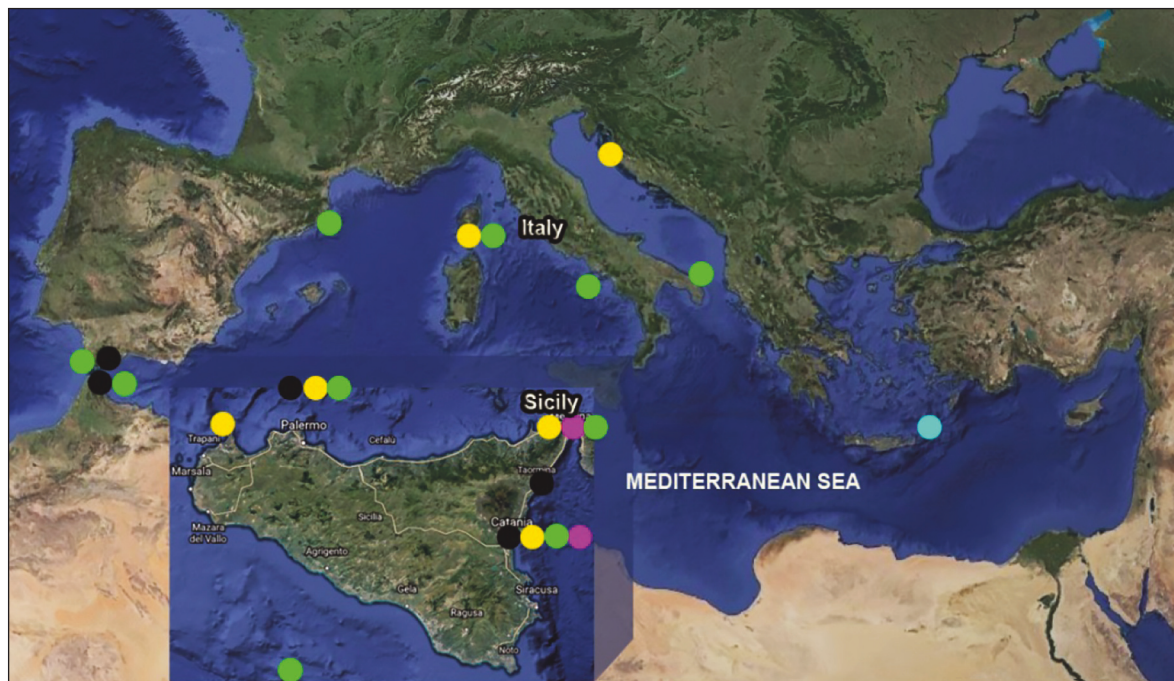


Figure 1. Map of the sampling Mediterranean localities: azure circle: *Rissoella angeli*, pink circle = *R. camillae*, black circle = *R. diaphana*, yellow circle = *R. inflata*, green circle: *R. opalina*.

MATERIAL AND METHODS

Materials used for the present paper derives from previously recorded specimens from different Mediterranean localities present in our own and other private collections and from some more recent samples conducted to find new living materials, obtaining informations on external soft parts chromatism. Samples were conducted along the Eastern Ionian coasts of Sicily (Fig. 1) and were collected handily by SCUBA diving with a hand-towed net, with a 0.5 mm mesh size, to gather the biological material obtained by brushing on both shaphilic and well lighted photophilic hard substrata, from the surface to 4/6 m depth. Materials fallen into the net were immediately stored in marine water, than sorted under stereomicroscope after few minutes. Some specimens were photographed and filmed to obtain pictures (.jpg file) and small video clips (.avi file); others were suddenly drawn with gray and coloured pencils. All specimens were then stored in 90° ethanol. The following material of extra-Mediterranean species of *Rissoella* is also studied for comparisons: *R. cfr. salasae* Ortea, 2019 from Spain, La Gratiola Is., Canary Is., beached shell grit, 7 sh. (DSC); *R. cfr. globularis* (Forbes & Hanley, 1853) from Norway, Vesteroy, 1 sh. (PMC).

ABBREVIATIONS AND ACRONYMS. AVC: Alberto Villari collection (Messina, Italy); DSC: Danilo Scuderi collection (Catania, Italy); H = maximum height (in mm); h = height of last whorl (in mm); H/sp = shell total height/spire height ratio; H/W = shell total height/width ratio; SEM = scanning electron microscope; sh.: shell/shells without soft parts inside; MFV-ME = Museo della Fauna del Dipartimento di Scienze Veterinarie dell'Università di Messina, Messina, Italy; MZB = Museo Zoologico dell'Università di Bologna, Bologna, Italy; PMC = Pasquale Micali collection (Fano, Italy); sp. = living collected specimen/s; sr = shell spire; W: maximum width (in mm).

RESULTS

Systematics

Classis GASTROPODA Cuvier, 1795

Subclassis HETEROBRANCHIA Burmeister, 1837

Subterclassis ACTEONIMORPHA

Superfamilia RISSOELLOIDEA J.E. Gray, 1840

Familia RISSOELLIDAE Gray, 1850

Genus *Rissoella* Gray, 1847

Type-species: *Rissoa diaphana* Alder, 1848 (by subsequent designation)

DESCRIPTION. Shell (Fig. 2) small, usually colorless or pale colored of rose or yellow, but transparent, with a more or less wide umbilicus delimited by a pre-umbilical cord, even though in some not Mediterranean species both could be lacking. Peristome continuous. The external columellar edge could form an obtuse or acute angle at the upper connection to the body-whorl wall. Protoconch unsculptured, globose, flat or slightly protruding.

Due to transparency of the shell, the colorful chromatism of external soft parts is visible (Fig. 2) and constitutes a very helpful item in discriminating species. Foot almost short and wide, often incised anteriorly; head with rounded cephalic tentacles projected laterally and cephalic expansions (oral lobes) anteriorly, with eyes situated in the middle, often in an unpigmented area, placed beyond the transparent edge of the shell when the animal is crawling; no snouth; the hypobranchial gland is wide, often showily coloured with scattered black spots or simply constituted by groups of small whitish granules. The form and colour of the hypobranchial gland is a good species-specific taxonomical character and should be observed in living specimens through the transparent shell, since it loses colour when stored in preservative solutions. Dry specimens with soft parts inside could save the form and the colour of this gland. Visceral mass of the whorls preceding the last, mainly constituted by gonads and digestive system, usually darker with or without colored spots. Operculum corneous (Fig. 2), well-fitting the aperture, resembling that of Neritidae for the presence in the lower side of a short but robust protuberance with a rounded end. In Rissoellidae this latter is attached to a long muscle (our personal observations on only Mediterranean species, Fig. 2, m), which could be linked to the aperture/closure speedy of operculum. Upper side thin, yellowish, translucent, with a nucleus almost in the central area from which three thickened borders starts: one upward, the second downward and the last forms a thin slat on the center. Due to this central slat spiral scars are not perfectly concentric.

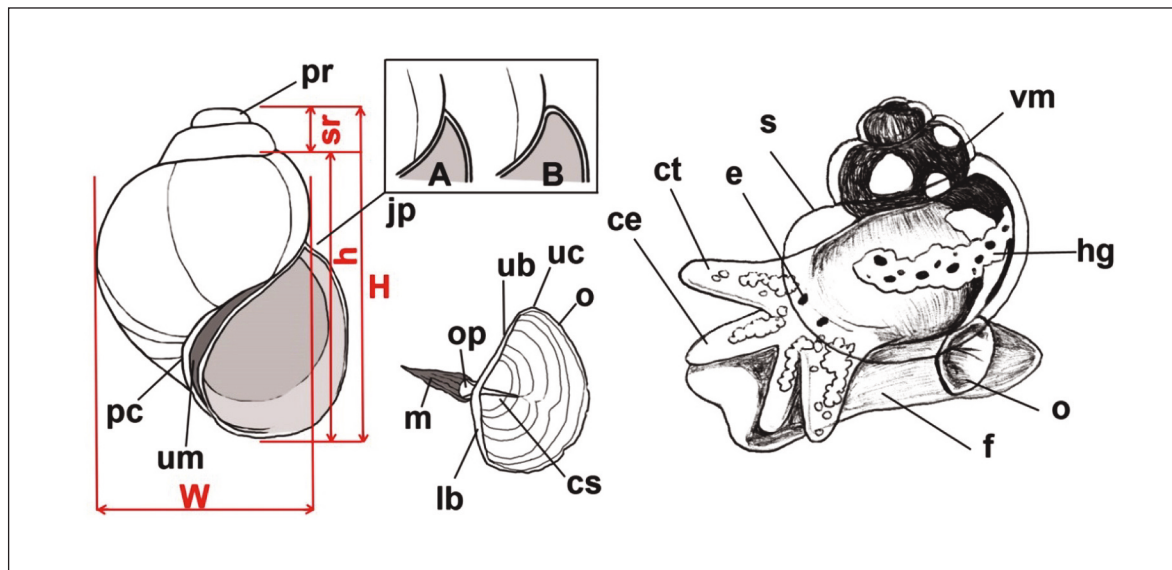


Figure 2. Schematic drawing of the shell (left), operculum (center) and living animal (right) of a generic *Rissoella*. Nomenclature: pc – pre-umbilical cord, pr – protoconch, um – umbilicus, jp – joining point of outer lip with the wall of the body-whorl; cs – central slat, lb – lower border of operculum, m – muscle of opercular process, o – operculum, op – opercular process, ub – upper border of operculum, uc – upper corner of operculum, ce – cephalic expansions, ct – cephalic tentacles, e – eyes, f – foot, hg – hypobranchial gland, s – shell, vm – visceral mass. In red: dimensional parameters as in Acronyms.

The chromatic pattern of dark stains visible through operculum is here considered as a useful taxonomic character. The shape of operculum is quite constant in a species and could differ among species. It could be more or less rounded, according to the position of the center, and more or less pointed in the upper corner due to the more (Fig. 2, jp B) or less rounded (Fig. 2, jp A) edge of the joining point of the outer lip with the wall of the body-whorl.

Rissoella angeli Manousis, 2021 (Figs. 6, 21, 28, 42)

MATERIAL EXAMINED. Greece: Achata, Karpathos Island, shell grit –35 m, 22 sh. and 4 sp. (DSC, PMC).

DESCRIPTION. For both the shell morphology as well as the animal chromatism we refer to the original description (Manousis et al., 2021), since all the characters furnished in the original diagnosis are here confirmed and well discriminate the species. Teleoconch constituted by two and ½ well convex whorls with distinctly defined sutures; surface smooth and glossy, with weak prosocline growth lines. Protoconch 0.27 mm in diameter, 0.65 whorls, almost flat but rounded, smooth; nucleus 0.12 mm in diameter.

Average dimensions of our specimens are: H = 0.9 mm; h = 0.8 mm; W = 0.74 mm; H/W = 1.22.

REMARKS. This species has been described only in recent times, following modern morphological parameters included data on morphology of the external soft parts. The shell characters are similar to that of *R. inflata*, but is smaller on average dimensions, the spire is less elevated, the whorls are flatter, slightly less rounded, the umbilicus something narrower, with internal plicae, the protoconch is slightly larger. The chromatism of the external soft parts are instead more similar to that of *R. diaphana*, being yellowish-beige in background colour, brown to dark-brown in the visceral mass, with some large scattered dots of the same brown colour and hypobranchial gland constituted by groups of minute white or yellowish granules diffused around the last portion of the body-whorl (neck). Here we enlarge the distribution of this species to the Southern Greece, on account of our examined material. Never recorded along the Ionian Italian coasts.

Rissoella diaphana (Alder, 1848) (Figs. 15, 16, 25, 32, 38, 43, 44)

MATERIAL EXAMINED. Marocco: Ceuta, shell grit,

–35 m, 2 sh. (DSC). Spain: La Gratiola Island, Canary Islands, beached shell grit, 10 sh. (DSC); Getares, shell grit, –30 m, 12 sh. (PMC). Italy: Palermo, Ustica Island., shell grit, –30 m, 1 sh. (DSC); Catania, Armisi, shell grit, –8/20 m, 5 sh. (DSC). Catania, S. Giovanni Li Cuti, brushing on stones, –2/4 m, 10 sp. (DSC); Messina, Taormina, 1 sh. (PMC); Reggio Calabria, Villa S. Giovanni, 3 sh. (PMC).

DESCRIPTION. Shell elongated, smooth, fragile, colorless and transparent. Teleoconch constituted by two, two and ½ convex whorls, with incised suture; the body-whorl constitutes almost the 77–78% of the total height of the shell. Spire elevated, almost equal to or slightly more than the half of the aperture length. Aperture large, semicircular, almost ovate with thin and slightly S-shaped columellar edge. Outer lip thin, with sharp edge; in full-grown specimens the abapical corner formed by outer lip and body-whorl is narrowly angled. Umbilicus narrow, with a not well-marked pre-umbilical cord. Protoconch 0.17 mm in diameter, 2 rounded, smooth whorls; nucleus 0.07 mm in diameter.

Animal. Foot anteriorly rounded, moderately incised, wide, uniformly yellowish-beige in background colour, with large dots and little brown strips; sole semi-transparent, of the same background colour. Cephalic tentacles pointed, not rounded as their not very long expansions, uniformly yellowish with white granules and eyes situated in the middle, inside an unpigmented area. Visceral mass brown with darker dots and yellowish strips. Hypobranchial gland constituted by some groups of white and yellow granules and one large dark brown dot. A second chromatic variation is almost black instead of brownish, especially on the visceral mass. Operculum corneous, semicircular, rounded but highly pointed in the upper corner, incremental lines undulated, yellowish with upper and lower black zones; inner side angle almost central; short but large opercular process.

REMARKS. Currently this species seem taxonomically well defined and do not present difficulties in the identification, being the only European species with an elevated spire.

Rissoella globularis (Forbes et Hanley, 1853) (Figs. 17–19, 26, 33)

MATERIAL EXAMINED. *Rissoella* cfr. *globularis* Norway, Vesteroy, Southern Oslo, 1 sh. (PMC).

DESCRIPTION. Original diagnosis: “Were it is not for the membranaceous operculum, whose nucleus is lateral (adjacent to the middle of the pillar lip), this minute and fry-like species might readily be taken for a young *Valvata*. It is obliquely orbicular, excessively fragile, and of a transparent shining and somewhat iridescent bluish white, but more usually is coated with an olivaceous crust; the surface is nearly smooth, exhibiting only some indistinct wrinkles of increase, chiefly apparent near the outer lip, in the few individuals we have examined. The three rounded volutions, which compose the shell, are of quick increase, and swell out abruptly, from the simple, yet profound, suture, both above and below. The spire occupies from one-third to two-fifths of the dorsal length; the penult turn is more than twice as broad as it is high; the apex, which is symmetrically coiled, is blunt or retuse. The surface of the lower disk is much rounded, and pierced by a large umbilicus, whose capacious mouth is not spirally sculptured, but is more or less wrinkled lengthways. The periphery of the body is bluntly rounded. The aperture, which projects both laterally and at the broadly rounded anterior extremity, occupies about four-sevenths of the total length, and fully one-third of the ventral area: it is of a rounded ovate figure, as the body does not project into the mouth. The lips, which are united at both ends, so that the peristome is entire, are neither thickened nor reflected; the other one is much arcuated, and simple edged; the inner one is elongated, erect, and subarcuated. The breadth is scarcely the twelfth of an inch” (Forbes & Hanley, 1853).

“Animal obscure fusco-nigricans, lobis frontibus tentaculis brevioribus, solea antice late bilobata, postice obtuse acuminata [animal dark-blackish, with shorter frontal tentacles, sole of foot anteriorly bilobed, posteriorly bluntly pointed]” (Sars, 1878).

REMARKS. As admonished by Forbes & Hanley (1853), the shell of this species resemble very closely that of a species of *Valvata*, or similar freshwater molluscs (like *Islamia* for example, we can add), except for the operculum structure. The only one specimen we observed from Vesteroy, Norway (PMC) matches to the original description and picture, but it was empty, thus its classification remains uncertain. The specimen is 0.95 mm high, 0.92 mm wide, entirely white, somewhat more solid com-

pared to other congeners; especially in the first of the two and $\frac{1}{2}$ whorls; marked incremental scars are present, which form the “wrinkled lengthways” sculpture inside the large umbilicus. Protoconch 0.25 mm in diameter, 2 rounded, smooth whorls, nucleus 0.12 mm in diameter.

This species is very poorly known at all, not only in the Mediterranean, and all the pictures seen in ancient or modern literature, as well as on the WEB, do not encounter the original description, with the exception of those of Sars (1878), who figured a living specimen here reported for comparison (Fig. 19) together with that of the original description (Fig. 18). Also the few scattered Mediterranean records of *R. globularis* (Palazzi, 1985; Bogi e Nofroni, 1986) are here considered questionable since no informations on the living animal have been ever furnished and the shell, when figured, is different from that of the original description, resembling better a freshwater species. Thus, we agree with Giannuzzi-Savelli et al. (2014) in considering it as not present inside the Mediterranean Sea.

Rissoella inflata (Monterosato, 1880) (Figs. 3–5, 20, 27, 35, 39)

MATERIAL EXAMINED. Bosnia and Herzegovina, Ključ, 14 sh. (PMC). France, Corsica, Paragan-Piscicani, beached shell grit, 2 sh. (DSC). Italy: Palermo, Ustica Island, shell grit, –30 m, 3 sh. (DSC); Trapani, Capo S. Vito, beached shell grit, 1 sh. (DSC); Messina, Ganzirri, brushing on stones, –1/5 m, 10 sh. and 46 sp. (AVC and DSC); Catania, Armisi, shell grit, –8/20 m, 12 sh. (DSC); Catania, “Tavernetta”, shell grit, –10 m, 1 sh. (DSC); Catania, Capo Molini, beached shell grit, 1 sh. (DSC); Catania, “Cannizzaro”, shell grit, –42 m, 9 sh. and 1 sp. (DSC); Reggio Calabria, Scilla, shell grit, –42 m, 18 sh. (DSC).

DESCRIPTION. Shell rounded, inflated, something more solid than other species, entirely colorless, transparent. Teleoconch constituted by 2.75 well convex whorls; the body-whorl constitutes almost the 83% of the total height of the shell. Spire of moderate height, not elevated, slightly less than the half of the aperture length. Aperture large, semicircular, with thin and slightly S-shaped columellar edge. Outer lip thin, with sharp edge; in full-grown specimens the abapical corner formed

by outer lip and body-whorl is not narrowly angled, but rounded. Umbilicus wide and deep, with a well-marked pre-umbilical cord. Protoconch 0.22 mm in diameter, 1 and $\frac{1}{2}$ whorls, slightly protruding but rounded, smooth; nucleus 0.1 mm in diameter. Average dimensions of our specimens are: H = 1.5 mm; h = 1.21 mm; W = 1.15 mm; H/W = 1.30.

Animal. Foot anteriorly rounded, moderately incised, wide, uniformly dark grey to almost black, except for the anterior portion and posterior tip which are paler; sole semi-transparent, of the same colour. Cephalic tentacles and their expansions not very long but almost large, rounded, uniformly black, paler in the tips, eyes situated in the middle, inside an unpigmented area. The anterior blackish part is separated by a wide entirely red zone from the posterior visceral mass, which is black with big red almost squared stains and flames of various dimensions. Hypobranchial gland with irregular margins, wide, U-shaped, yellow with scattered rounded black dots. Operculum corneous, semicircular, rounded with a low center, incremental lines undulated, yellowish with wide anterior black side; inner side angled; short and rounded opercular process.

REMARKS. This species is characterized by well-rounded whorls, only slightly swollen on the upper half, a well-developed spire, a wide umbilicus, edged by an evident pre-umbilical cord, and by the upper obtuse corner of the outer lip. The sculptureless surface of the shell is transparent and bright, with only faint growth lines. The protoconch is not symmetrically coiled, but slightly deviated. Concerning its taxonomical position, Rolàn & Hernandez (2003) noticed that “*the species cited for the Canary Is. by Nordsieck and Garcia-Talavera (1979)*” could be a nomen nudum according to Robertson (1961), who (1962) finally attributed to Locard (1892) the formal description of the taxon. Without looking after the current status of the Monterosato’s name, Rolàn & Hernandez (2003) described *R. contrerasi* from Canary Is. leaving unsolved the nomenclatural problem of the validity of *R. inflata* and the possibility that their new described species could be the same. Ortea (2019) did the same describing the similar *R. salasae* from the Canary Islands. The statements of Robertson (1961, 1962), which were wrong anyway, really regarded generically *R. inflata* as a taxon, not only the

species cited from the Canary Islands. In fact, from 1872 to 1978 Monterosato never formally described the species, which could be really considered as a nomen nudum until 1880, when a description was finally reported and the name became available: even if it was almost brief, the species is sufficiently recognizable. In Appolloni et al. (2018) the type material of this species is listed and figured (Figs. 28K, L). This material is constituted by two lots: MCZR-M-21847 contains specimens from Palermo, Messina (by Granata-Grillo), Trapani and S. Vito; the second, MCZR-M-21845, from Palermo and Trapani. Among the four species of *Rissoella* present in the Strait of Messina, only one shows the large type of “naticiform” umbilicus (“... l’ombelico ha forma di quello della *Natica intricata* Donovan.”, Monterosato, 1880) and match perfectly with the type material in all the external morphological shell characters here traced. So, the shell alone is well distinct too in adult large specimens, but some not full-grown one could resemble other similar species: *R. angeli* (Figs. 6, 21, 28), *R. contrerasi* and *R. salasae* (Figs. 7, 22, 29). Compared to these latter species, in *R. inflata* the large umbilicus is present even in young specimens; moreover the internal lip is more rounded in its S-shape, with lower center, and the whorls are slightly higher, with a larger and bulging nucleus of protoconch. In these similar species the upper angle of external lip and the body whorl is not so rounded as in *R. inflata*. With the above described chromatism of the soft parts, based on specimens from one of the localities listed in the type material, this species appears now well defined and different from all the Mediterranean and extra-Mediterranean species known, even the new recently described, and is to be considered endemic.

Rissoella opalina (Jeffreys, 1848) (Figs. 8–10, 23, 30, 36, 40)

MATERIAL EXAMINED. Morocco: Ceuta, shell grit, –35 m, 12 sh. and 1 sp. (DSC). Spain: Tarifa, –35 m, 132 sh. and 2 sp. (DSC); Medas Island, hand towed net on *Posidonia* leaves, –8 m, 2 sp. (DSC). France, Corsica, Paragan-Pisciucani, beached shell grit, 65 sh. (DSC). Italy: Palermo, Ustica Island, shell grit, –30 m, 2 sh. (DSC); Messina, harbor, –5/6 m, on boat’s hawsers, 6 sh.

and 2 sp. (DSC); Messina, Villaggio Pace, brushing on stones, –1/5 m, 1 sh. and 1 sp. (AVC); Agrigento, Linosa Island, shell grit, –35 m, 1 sh. (DSC); Reggio Calabria, Scilla, shell grit, –42 m, 1 sh. (DSC); Foggia, Tremiti Islands, S. Domino, hand towed net on *Posidonia* leaves, –8 m, 57 sp. (DSC); Napoli, Ischia Island, hand towed net on *Posidonia* leaves, –8 m, 4 sh. and 2 sp. (DSC).

DESCRIPTION. Shell rounded but not globular, relatively solid compared to other species, entirely pink or brownish, paler in some (Mediterranean Sea) populations. Teleoconch constituted by almost two convex whorls, with not incised suture. Surface smooth, with only weak prosocline growth lines. The body-whorl constitutes almost the 78–79% of the total height of the shell. Spire narrow, low, much more less than the half of the aperture length. Aperture large, semicircular, with thin and slightly S-shaped columellar edge. Outer lip thin, with sharp edge. Umbilicus very narrow, with a marked preumbilical cord. Protoconch almost 0.20 mm in diameter, 1.5 whorls, flat, rounded, smooth; nucleus 0.11 mm in diameter. Average dimensions of our specimens are: H = 1.4 mm; h = 1.1 mm; W = 1.0 mm; H/W = 1.4.

Animal. Foot anteriorly rounded, wide, yellowish-brown in background color, with scattered black dots and strips; sole semi-transparent, of the same background colour. Cephalic tentacles and their expansions not very long, large, rounded, semi-transparent with yellow granules; eyes situated in the middle, inside an unpigmented area. Hypobranchial gland wide, with irregular margins, U-shaped, deep yellow with scattered both rounded and squared black dots of various dimensions. Operculum corneous, semicircular, narrower than in other species, something pointed in the upper corner, incremental lines undulated, yellowish with wide anterior black side; inner side angled; not long, almost squared opercular process.

REMARKS. This species is well characterized by the uniform colour of the shell, which ranges from yellowish-pink to reddish-pink: Mediterranean populations seem paler, but always colored. The shell outline is characteristic too, being ovate: in particular the penultimate whorl is almost high but with a wide base, giving to the shell an egg-shaped form. The umbilicus is very narrow in comparison to the other Mediterranean species.

Rissoella camillae n. sp. (Figs. 11–14, 24, 31, 37, 41) - <https://zoobank.org/pub:CE0460FF-AC03-44F9-BA8A-C15B9762E89E>

TYPE MATERIAL. Holotype MZUB 60419, H = 1.5 mm, W = 1.28 mm, Italy: Messina, Ganzirri, brushing on stones, –1/5 m (Figs. 11, 24, 41); paratype 1 (Figs. 12, 31, 34, 37), MFV-ME 2169, H = 1.55 mm, W = 1.07 mm, same data of the holotype; paratype 2 (Fig. 13), H = 1.22 mm, W = 0.85 mm, same data of the holotype, in AVC; paratype 3 (Fig. 14), H = 1.35 mm, W = 0.9 mm, same data of the holotype, in DSC.

OTHER EXAMINED MATERIAL. The following specimens of *R. camillae* n. sp. were also examined: Messina, Ganzirri, brushing on stones, –1/5 m, 15 sh. and 35 sp. (AVC and DSC); Catania, “Cannizzaro”, shell grit, –42 m, 9 sh. and 6 sp. (DSC); Catania, Ognina, –1/2 m, 1 sh (DSC); Catania, Acitrezza, fishing nets residual, –40/50 m, 2 sh. and 2 sp. (DSC); Catania, Capo Molini, beached shell grit, 1 sh. (DSC); Catania, Armisi, shell grit, –8/20 m, 15 sh. (DSC); Reggio Calabria, Scilla, shell grit, –42 m, 14 sh. (DSC); Reggio Calabria, Villa S. Giovanni, washing algae, 0–1.5 m, 2 sp. (PMC).

DESCRIPTION OF THE HOLOTYPE. Shell. Small, globose. Teleoconch constituted by two and ½ convex whorls, not shiny, the last very inflated, which is 9/10 of the entire shell length. Spire narrow, very low, much more less than the half of the aperture length, with a subsutural thin cordlet. Surface smooth but not glossy, with only weak prosocline growth lines slightly curved under the suture. Colour transparent, except for two brown bands, encircling the upper, abapical portion of the teleoconch and the umbilical area, giving to internal lip a brownish color at the base. Aperture large, semicircular, with the columellar edge simple, not straight, but slightly S-shaped. The aperture edge is upward narrowly attached to the wall of the body-whorl, forming a not very acute angle. Umbilicus narrow but deep, never closed; preumbilical cord thin, which joints the columellar edge at the base. Protoconch 0.2 mm in diameter, 1.5 whorls, flat, rounded, without sculpture; nucleus 0.09 mm in diameter. Dimensions of the shell: H = 1.3 mm; h = 1.13 mm; W = 1.06 mm; H/W = 1.22.

Animal. Generically as described for the genus. Foot anteriorly rounded, moderately incised, wide,

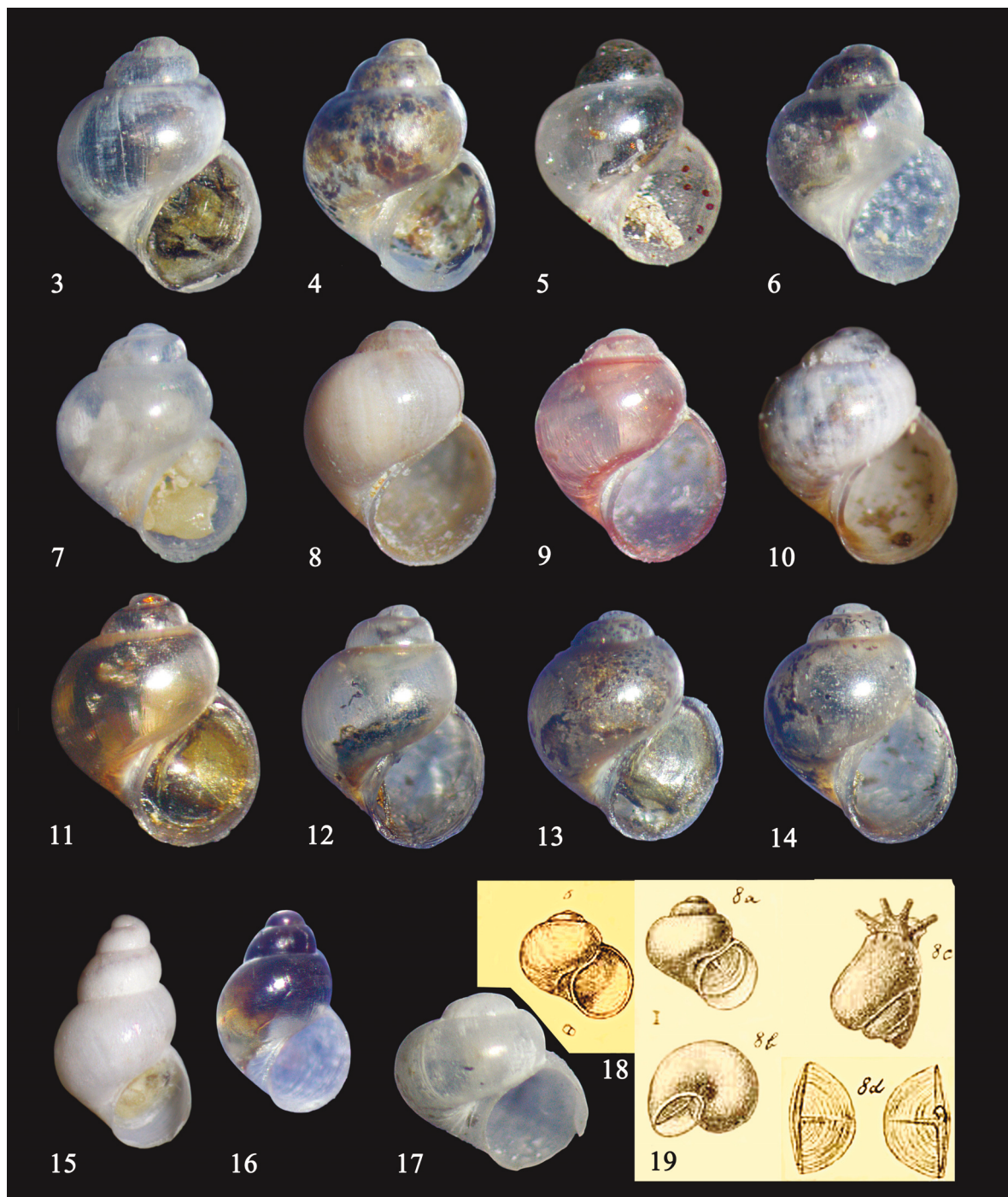
pale gray, with a darker line from the head to operculum. Cephalic tentacles and their expansions not very long, rounded, gray in the upper side with white granules and eyes situated in the middle, inside an unpigmented area. The anterior grayish part, with black strips and dots, is separated by the posterior visceral mass, almost entirely dark gray or black, by a modest red strip bordered by white. Wide hypobranchial gland pale yellow or whitish in color, with irregular margins and few dark oblong stains. Sole pale gray, semitransparent. Operculum as in the general description of the genus, corneous, semicircular, rounded, upper corner too; upper side with incremental lines undulated, yellowish with wide anterior black side; the median nucleus gives an angled aspect to the more thickened inner side, where a short and rounded opercular process is present.

VARIABILITY. The species, also due to the lack of sexual dimorphism, appears constant in both the shell and the animal chromatism characters. In some specimens the spire could be slightly more elevated than in others: H/sp ranges from 5.15 (higher spired specimens) to 6.19 (lower spired specimens). The subsutural cordlet could be faint in some species to almost relieved in others. Average dimensions of our specimens are: H = 1.2 mm; h = 1 mm; W = 1 mm; H/W = 1.20.

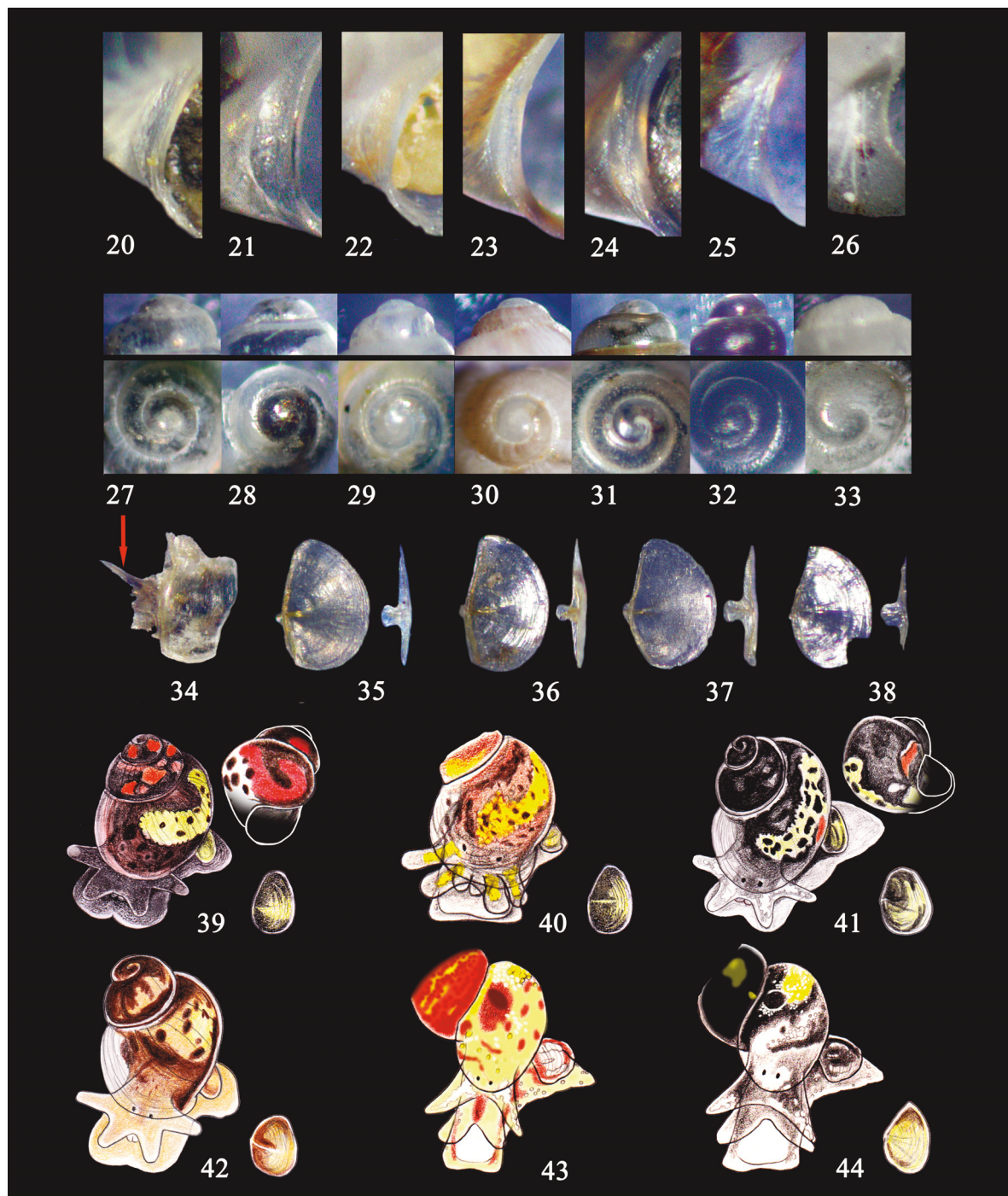
DISTRIBUTION AND BIOLOGY. The range of distribution of the new species seem restricted to the Ionian coasts of Sicily and Calabria, from Reggio Calabria to Catania, in shallow rocky environment among algae, usually between 2 and 10/20 m depth.

ETYMOLOGY. The species is dedicated to Camilla Aliprandi, granddaughter of the first Author.

REMARKS. On account of the morphology of the shell the most similar among Mediterranean congeners is *R. opalina*, from which the new species could be distinguished for the more globose shell and conical spire; the chromatism of the external soft parts are consistently different in background colour, almost brownish and yellow in the former without red zones; the hypobranchial gland in *R. opalina* is more deep yellow with rounded brown dots. Notwithstanding here we do not consider present among the Mediterranean malacofauna, *R. globularis* could resemble young specimens of *R. camillae* n.sp. for the globose shell outline: anyway,



Figures 3–5. *Rissoella inflata* live collected specimen from Italy. Fig. 3: Ganzirri, Messina, H = 1.3 mm; Fig. 4: S. Giovanni Li Cuti, Catania, H = 1.2 mm; Fig. 5: Ganzirri, Messina, H = 1.2 mm. Figure 6. *R. angeli*, Karpachos, Greece, live collected specimen, H: 1.1 mm. Figure 7. *R. cf. salasae*, La Gratiola Is., Canary Is., Spain, H = 0.9 mm. Figures 8–10. *R. opalina*; Figs. 8, 9: Tarifa, Spain, H = 1.4 and 1.2 mm. Fig. 10: Acitrezza, Catania, Italy, live collected specimen, H = 1.4 mm. Figures 11–14. *R. camillae* n. sp., all from Ganzirri, Messina, Italy, live collected specimens. Fig. 11: holotype, H = 1.3 mm (MZUB); Fig. 12: paratype 1, H = 1.55 mm (MFV–ME); Fig. 13: paratype 2, H = 1.22 mm (AVC); Fig. 14: paratype 3, H = 1.35 mm (DSC). Figures 15, 16. *R. diaphana* live collected specimen from Italy. Fig. 15: S.ta Tecla, Catania, H: 1.4 mm. Fig. 16, S. Giovanni Li Cuti, Catania, H: 0.9 mm. Fig. 17, *R. cf. globularis*, Vesteroy, Norway, H = 0.95 mm (PMC). Figures 18, 19. *R. globularis*. Fig. 18: original drawing after Forbes & Hanley (1853); Fig. 19: original drawing after Sars (1878).



Figures 20–26. Umbilici of *R. inflata* (Fig. 20), *R. angeli* (Fig. 21), *R. cfr. salasae* (Fig. 22), *R. opalina* (Fig. 23), *R. camillae* n.sp. (Fig. 24), *R. diaphana* (Fig. 25), *R. cfr. globularis* (Fig. 26), details of specimens figured respectively in Figs. 3, 6, 7, 8, 11, 16 and 17. Figures 27–33. Protoconchs of the same specimens. Figure 34. Detail of the operculum and the muscle connected to the op (red arrow) in *R. camillae* n.sp., same data of Fig. 12. Figures 35–38. Opercula (upper and lateral view) of Fig. 35, *R. inflata*, same data of Fig. 3; Fig. 36, *R. opalina*, same data of Fig. 10; Fig. 37, *R. camillae* n. sp., same data of Fig. 11; Fig. 38, *R. diaphana*, same data of Fig. 16. Figures 39–44. Drawings of the living animals and chromatism of the upper side of operculum of Fig. 39, *R. inflata*, same data of Fig. 3, with detail of the red zone of the lower (apertural) side of the shell; Fig. 40, *R. opalina*, same data of Fig. 10; Fig. 41, *R. camillae* n. sp., same data of Fig. 11; Fig. 42, *R. angeli*, same data of Fig. 6; Fig. 43, 44, *R. diaphana*, same data of, respectively Fig. 15 and Fig. 16.

the latter has a different not elliptical profile, lacks a greenish periostracum and blueish iridescences of the shell surface while the umbilicus is narrower and with pre-umbilical cord and is the only one Mediterranean species with two coloured bands on the shell. Moreover, on account of the description of Sars (1878) the animal chromatism of *R. globularis* has a different pattern which does not include red and yellow colours.

The new species is also similar to *R. inflata* for the blackish background of the visceral mass, but, except the basal red strip dividing the anterior part of the animal to the posterior, no red stains are present in *R. camillae* n. sp., which has white granules on the cephalic tentacles and on their expansions; the colour of the remaining animal is pale grayish instead of blackish and different are the hypobranchial gland and the shell outline, more turreted in *R. inflata*. All the other recently described species of Macaronesian area and West-Africa, i.e. *R. contrerasi* Rolán et Hernández, 2004 and *R. salasae* Ortea, 2019 from Canary, *R. trigoi* Rolán et Hernández, 2004 from Senegal, as well as *R. angeli* from Greece are more similar to *R. inflata* in shell outline and show a different animal chromatism: see Rolán & Hernández (2004) for a summary of the chromatism of external soft parts of the Lusitanian species, while for comparisons to species of the Caraibic area we refer to Caballer et al. (2011).

Among Indo-Pacific species *R. zebra* Thiele, 1925 from Eastern Africa is similar in shell outline, but has a wider and deeper umbilicus and a shell colour whitish with alternated brownish vertical bands. Among Australian species *R. micra* and *R. imperforata* are the most similar: the former is almost entirely brown in shell colour, has a more elevated spire and the internal lip is slightly thickened and white; the animal chromatism is different and the hypobranchial gland is reduced to a couple of black spots. The latter is entirely brown too, has a very narrow umbilical chink in young specimens, which became absent in adults; the description of the animal chromatism is different and in particular no yellow hypobranchial gland are reported.

ACKNOWLEDGEMENTS

We are grateful to Pasquale Micali (Fano, Italy) who loaned his specimens of Rissoellidae at our

disposal for study. Walter Renda (Amantea, Italy) furnished us a helpful small video clips of *R. inflata*. Finally MFV-ME is thanked for the technical support to us.

REFERENCES

- Appolloni M., Smriglio C., Amati B., Lugliè L., Nofroni I., Tringali L.P., Mariottini P. & Oliverio M., 2018. Catalogue of the primary types of marine molluscan taxa described by Tommaso Allery Di Maria, Marquis of Monterosato, deposited in the Museo Civico di Zoologia, Roma. *Zootaxa*, 4477: 1–138. <https://doi.org/10.11646/zootaxa.4477.1.1>
- Bogi C. & Nofroni I., 1986. Su alcuni micromolluschi mediterranei rari o poco noti (Contributo I). *Bollettino Malacologico*, 22: 153–160.
- Caballer M., Ortea J. & Redfern C., 2014. On the Genus *Rissoella* Gray, 1847 (Gastropoda: Heterobranchia: Rissoellidae) in the Bahamas. *American Malacological Bulletin*, 32: 104–121. <https://doi.org/10.4003/006.032.0109>
- Caballer M., Ortea J. & Narciso S., 2011. Description of two new species of *Rissoella* Gray, 1847 (Mollusca, Gastropoda, Heterobranchia) from Venezuela, with a key to the Caribbean species known for the genus. *ZooKeys*, 115: 1–18. <https://doi.org/10.3897/zookeys.115.1163>
- Chira Siadén L.E., Wakeman K.C., Webb S.C., Hasegawa K. & Kajihara H., 2019. Morphological and molecular diversity of rissoellids (Mollusca, Gastropoda, Heterobranchia) from the Northwest Pacific island of Hokkaido, Japan. *Zootaxa*, 4551: 415–431. <https://doi.org/10.11646/zootaxa.4551.4.2>
- Fasulo G., 1989. Molluscs of the Gulf of Naples, Family Rissoellidae M.E. Gray, 1850 (Gastropoda, Heterogastropoda ?). *La Conchiglia*, 21: 242–245.
- Forbes E. & Hanley S.C., 1848–1853. A history of British Mollusca and their shells. London, van Voorst. London, van Voorst, 486 pp.
- Giannuzzi Savelli R., Pusateri F., Micali P., Nofroni I. & Bartolini S., 2014. Atlas of the Mediterranean Seashells, Vol. 5 (Heterobranchia). Edizioni Danaus, 204 pp.
- Haszprunar G., 1985. The Heterobranchia, a new concept of the phylogeny of the higher Gastropoda. *Zeitschrift für zoologische Systematik und Evolutionsforschung*, 23: 15–37.
- Manousis T., Zaminos G., Samara E., Mbazios G. & Galinou-Mitsoudi S., 2021. *Rissoella angeli* n. sp. (Gastropoda: Heterobranchia: Rissoellidae) and additional new records of molluscs for the Mediterranean and the Hellenic Seas. *Xenophora Taxonomy*, 31: 51–70.

- Monterosato T.A. di, 1880. Conchiglie della zona degli abissi. *Bullettino della Società Malacologica Italiana*, 6: 50–82.
- Ortea J., 2019. La belleza como recurso contra la tristeza: Descripción de una nueva especie de *Rissoella* J. E. Gray, 1847 (Gastropoda: Heterobranchia) de Lanzarote, islas canarias, como homenaje a Margarita Salas, una ejemplar mujer para la Ciencia. *Avicennia* 25: 73–78.
- Ortea J., Espinosa J. & Magaña J., 2004. Descripción de una nueva especie del género *Rissoella* J.E. Gray, 1847 (Mollusca, Gastropoda, Heterobranchia) del Pacífico de Costa Rica. *Avicennia*, 17: 95–100.
- Ortea J. & Espinosa J., 2004. Una combinación de ciencia, arte y naturaleza: Especies nuevas del género *Rissoella* J.E. Gray, 1847 (Gastropoda, Heterobranchia) descritas en homenaje a las artistas de la plástica cubana. *Avicennia* 17: 77–94.
- Palazzi S., 1985. Malacofauna marina della Sicilia. Area 141 (Censimento malacofauna marina italiana) *Notiziario S.I.M.*, Milano, 3: 58.
- Ponder W.F. & Yoo E.K., 1977. A revision of the Australian species of Rissoellidae (Mollusca: Gastropoda). *Records of the Australian Museum*, 31: 133–185.
- Robertson, R., 1961. A second Western Atlantic *Rissoella* and a list of the species in the Rissoellidae. *The Nautilus*, 74: 131–136 (partim), 75: 21–26.
- Robertson R., 1962. Supplementary notes on the Rissoellidae. *Notulae Naturae*, The Academy of Natural Sciences of Philadelphia, 352: 1–2.
- Rolán E. & Hernández J.M., 2004. Dos nuevas especies de *Rissoella* (Mollusca: Rissoellidae) de Canarias y el Senegal. *Revista Academia Canaria de Ciencias*, 15: 229–236.
- Sars G.O., 1878. Mollusca regionis Arcticae Norvegiae. In *Bidrag til Kundskaben om Norges Arktiske Fauna*. Christiania. 466 pp. 18 pits.
- Simone L.R.L., 1995. *Rissoella ornata*, a new species of Rissoellidae (Mollusca: Gastropoda: Rissoelloidea) from the southeastern coasts of Brazil. *Proceedings of the Biological Society of Washington*, 108: 560–567.