

New and little known land snails from Sicily (Mollusca Gastropoda)

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ABSTRACT

In the present paper are reported new and little known land snails from Sicily (Mollusca Gastropoda). Particularly, *Platyla similis* (Reinhardt, 1880) (Aciculidae) and *Rumina saharica* Pallary, 1901 (Subulinidae) are first recorded in the island; new taxonomic data, useful for a better systematic classification, are provided on two little-known taxa, *Lampadusa lopadusae nodulosa* Monterosato, 1892 (Clausiliidae) and *Cernuella (Cernuella) tineana* (Benoit, 1862) (Hygromiidae); and finally, a new species of slug, *Tandonia mari-nellii* n. sp. (Milacidae), currently known from North-Western Sicily, is described.

KEY WORDS

Mollusca; land snails; Sicily; taxonomy; new species.

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INTRODUCTION

During 19th century several taxa of terrestrial molluscs of Sicily were established, many of which are still little known and of uncertain taxonomic status, nevertheless some genera or families of molluscs, including slugs, have been neglected for a long time. The study of terrestrial molluscs of Sicily undertaken by present authors in the last decade, despite the complexity of the subject, continues with this further contribution in which some new faunal reports are provided, little known taxa are examined and, in addition, a new species of slug is described.

ACRONYMS. APP = anterior portion of palatal plica; BC = bursa copulatrix; BCD = diverticulum of bursa copulatrix; CL = columellar lamella; DE = distal epiphallus; DG = digitiform glands; DSC = dart sac complex; DBC = duct of the bursa copulatrix; DCP = distal cavi of the penis; DGS = dart gun; DG = digitiform glands; DSC = dart sac complex;

DSO = dart sac opening; E = epiphallus; F = flagellum; FO = free oviduct; FR = frenula; G = penial papilla; GA = genital atrium; ISO = inner stylophore opening; L = lunella; OSO = outer stylophore opening; P = penis; PCP = proximal cavi of the penis; PD = penial diverticulum; PE = proximal epiphallus; PL = parietal lamella; PLL = parallel lamella; PP = principal plica; PPP = posterior portion of (upper) palatal plica; PR = penial retractor muscle; SCL = sub-columellar lamella; SL = spiral lamella; SP = sutural plica/plicae; V = vagina; VAG = vaginal accessory gland; VC = vaginal chambre; VD = vas deferens; VP = vaginal pleats.

The materials used for this study are deposited in the following Museums and private collections: M. Bodon collection, Italy, Genova (CB); D.P. Cilia collection, Santa Venera, Malta (CC); S. Giglio collection, Cefalù, Italy (CG); Laboratory of Cytogenetics and Molecular Biology, University of Urbino, Italy (LCMBU); F. Liberto collection, Cefalù, Italy (CL); Museo Civico di Storia naturale di Comiso,

Italy (MCSNC); Museo Civico di Storia Naturale di Genova "G. Doria", Italy (MSNG); G. Nardi collection, Nuvolera, Italy (CN); A. Reitano collection, Tremestieri Etneo, Italy (CR); I. Sparacio collection, Palermo, Italy (CS); The Steinhardt National Collections of Natural History, Zoological department, Tel-Aviv University, Israel (TAU).

MATERIALS AND METHODS

All specimens were collected by sight on the soil and under the rocks or by sieving litter and soil.

Observations on ecology of these organisms and their feeding behavior were made directly in the field. Dry shells have been studied as regards size, colour, morphology, sculpture, aperture, plicae and lamellae, lunella and clausilium. Photographs were taken with a digital camera. In order to study and illustrate genital organs, the specimens were drowned in water and fixed in 75% ethanol.

Reproductive apparatus was extracted by means of scalpel, scissors and needles. Illustrations of genitalia were sketched using a camera lucida. Height and maximum diameter of the shell along with some parts of genitalia were measured (in millimeters) by a digital gauge. Voucher specimens were stored in collections indicated below. Toponyms (place-names) are reported following the Portale Cartografico Nazionale (PCN, [http://www.pcn.mi-](http://www.pcn.mi-nambiente.it/PCN/)

[nambiente.it/PCN/](http://www.pcn.mi-nambiente.it/PCN/)), Map IGM 1:25000. Each locality and/or collection site is named in the original language (italian). The material used for the molecular analysis was collected on the field during February 2012. All the specimens were studied and observed at the stereomicroscope (Leica MZ 7.5).

Genetic study described in the present study was based on a comparative analysis of COI partial sequences which are frequently used as markers in the investigation of evolutionary processes at the specific level. Briefly, the study was conducted by DNA isolation, PCR amplification, sequencing, alignment of the sequences and phylogenetic reconstructions using the Maximum Likelihood algorithm. For a detailed description see below.

RESULTS

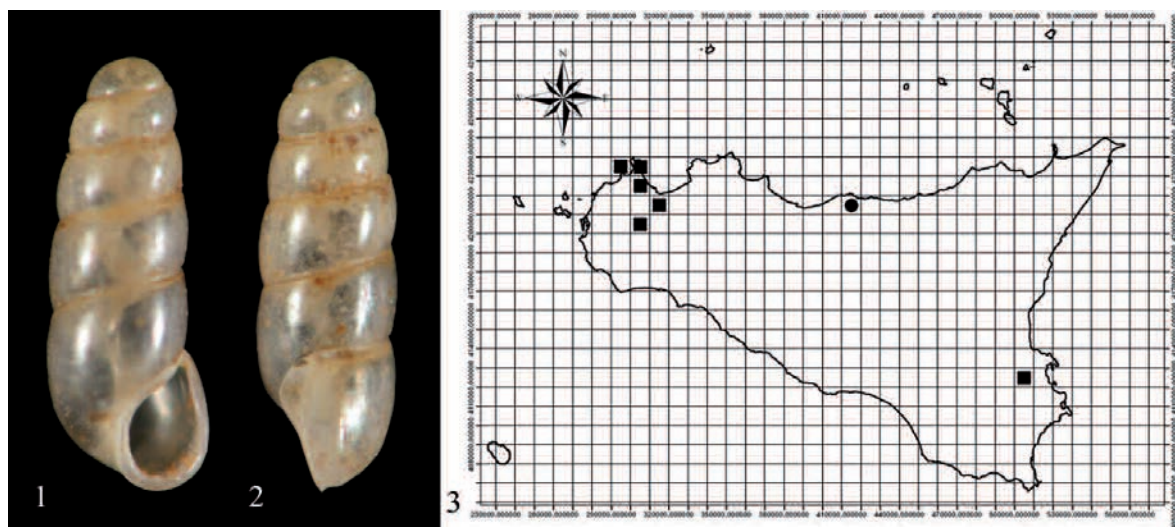
Class Gastropoda Cuvier, 1795

Ordo Architaenioglossa Haller 1890

Family Aciculidae J.E.Gray, 1850

Platyla similis (Reinhardt, 1880)

EXAMINED MATERIAL. Italy, Sicily, Cefalù, Rocca di San Nicola, 37°59'07"N 14°02'42"E, 600 m, 01.VI.2008, 6 specimens (CG); Cefalù, Cozzo Carcarello, 37°59'29" N, 14°03'05"E; 320 m, 15.VI.2008, 8 specimens (CL); idem, 23.VIII.2009, 22 specimens (CL); idem, 23.IV.2012, 12 specimens (CL).



Figures 1,2. Shell of *Platyla similis* from Cefalù, Cozzo Calcarello, h: 2.32 - D: 0.89. Figure 3. Geographic distribution of *Platyla similis* (circles) and *P. subdiaphana* (squares) in Sicily (personal data).

DESCRIPTION. Morphologically, this sicilian population of *P. similis* has typical characters of the species: shell conical (Figs. 1-2), slender, colorless, height 2.16-2.58 mm, width 0.80-0.98 mm, with 4-5 whorls slightly convex, last portion of last whorl slightly ascending in relation to the penultimate, aperture slightly oblique, sinulus little depth, external peristomal rib consists of a weak thickening, not clearly defined anteriorly and posteriorly.

BIOLOGY AND DISTRIBUTION. *P. similis* lives in woodland litter, on the soil, in the cracks and at the base of the calcareous rocks. *P. similis* has South-Oriental European distribution including Bulgaria, Croatia, Serbia, Greece, Romania, Kosovo, and Central and Southern Italy (Boeters et al., 1989; Bodon et al., 1995; Bodon & Cianfanelli, 2008; Bank, 2012).

REMARKS. We report the presence of *P. similis* for the first time in Sicily, from Northern Madonie mountains, on the calcareous rocks named "Rocca di San Nicola" and "Cozzo Calcarello". Shells were collected by sieving litter and soil, sampled in cracks of the calcareous rock, at the base of rocky walls or under boulders in the woods of oaks.

In Sicily it was known until now only the endemic species: *P. subdiaphana* (Bivona, 1839) (Boeters et al., 1989; Bodon et al., 1995; Bodon & Cianfanelli, 2008; Bank 2012) (Fig. 3). Boeters et al. (1989) distinguish all species of *Platyla* Moquin-Tandon, 1856 into three groups on the basis of the presence or absence and conformation of the external peristomal rib (see also Bodon & Cianfanelli, 2008).

P. similis is inserted into the second group characterized by an external peristomal rib not robust and not clearly delimited posteriorly. *P. subdiaphana* belongs to the third group characterized by a robust external peristomal rib bounded by a sharp line or by a large groove. *P. subdiaphana*, also, is distinguished from *P. similis* for bigger size (height 3.5-4.45 mm).

Ordo Stylommatophora A. Schmidt, 1855
Family Milacidae Germain, 1930

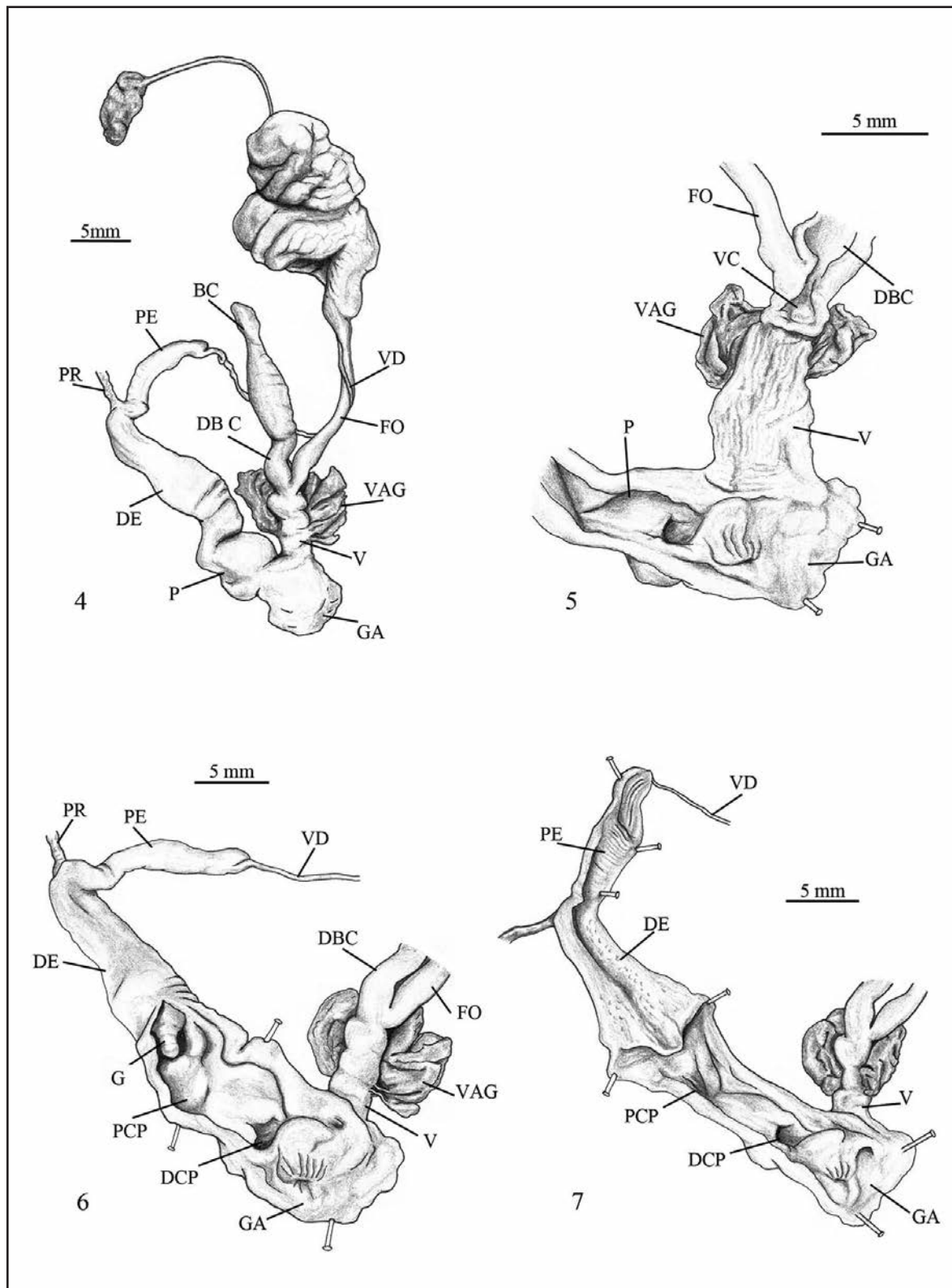
***Tandonia marinellii* n. sp.**

EXAMINED MATERIAL. Holotypus: Italy, Sicily, Custonaci, Monte Sparagio, Pizzo Giacomamaro,

38°03'18"N 12°44'35"E, 665 m, 08.I.2012 (MSNG 56989). Paratypes: Italy, Sicily, Custonaci, Monte Co-fano, 38°06'11"N 12°40'39"E, 255 m, 14.IV.1991, 2 specimens (CS); San Vito lo Capo, Macari, Pizzo Castelluzzo, 38°07'28"N 12°44'41"E, 364 m, II.2007, 3 specimens (CR); Erice, 38°02'24"N 12°35'34"E, 500 m, 03.X.2011, 1 specimen (CN); Calatafimi, Cozzo Gessi, 37°54'44"N 12°50'41"E, 264 m, 20.XI.2011, 3 specimens (CL); idem, 2 specimens (CG); Calatafimi, Monte Bernarco, 37°54'56"N 12°49'45"E, 370 m, 20.XI.2011, 6 specimens (CL); Castellammare del Golfo, Fragnesi, 38°01'06"N 12°50'08"E, 180 m, 4.XII.2011, 1 specimen (CS); Custonaci, Monte Sparagio, Pizzo Giacomamaro, 38°03'18"N 12°44'35"E, 665 m, 8.I.2012, 1 specimen (CL); idem, 1 specimen (TAU 76575); idem, 1 specimen (MCSNC 4411); Custonaci, Monte Sparagio, Pizzo Giacomamaro, 38°03'17"N 12°44'57"E, 716 m, 4.II.2012, 8 specimens (CL); Trapani, contrada Chinèa, near the Lago Rubino, 37°53'49"N 12°44'05"E, 260 m, 18.II.2012, 2 specimens (CS); Custonaci, Muciara, 38°03'27"N 12°43'64"E, 542 m, 4.III.2012, 11 specimens (CS); idem, 2 specimens (MSNG 56990; MSNG 56991).

DESCRIPTION OF HOLOTYPE. Slug medium-sized, length 55 mm after preservation (the specimen is contracted). Clypeus about 1/3 of body length, superficially granulated, with horseshoe-shaped groove, and a hollow near keel; evident carina running from clypeus to posterior apex of body. Body and mantle brownish-yellow with blackish pigment forming irregular reticulation and dots which disappear toward the sole, keel orange. Foot sole tripartite, creamy-coloured, mucus thick, viscous, white-yellowish. Shell (limacella) nail-like, oval, well calcified, white, with apex posterior and situated on major axis, at the highest point, convex above, slightly concave ventrally (Figs. 18-20); length: 7.5 mm; diameter: 4.9 mm.

Genitalia (Figs. 4-7, 11). Vas deferens thin, ending laterally at proximal epiphallus tip. Epiphallus very long (20 mm), divided by a slight constriction in a narrow cylindrical proximal portion with thin walls (proximal epiphallus) and in an ample conic distal portion with thick walls (distal epiphallus). Internally, the proximal epiphallus is crossed by around 15 annular crests more evident in the central zone, and 5-6 longitudinal folds in the slight broadening apical knob, while the distal epiphallus has a very narrow duct; penial retractor muscle ending



Figures 4-7. Genitalia of *T. marinellii* n. sp., holotypus: whole genitalia (Fig. 4), internal structure of vagina (Fig. 5), internal structure of penis (Fig. 6), internal structure of penis and epiphallus (Fig. 7).

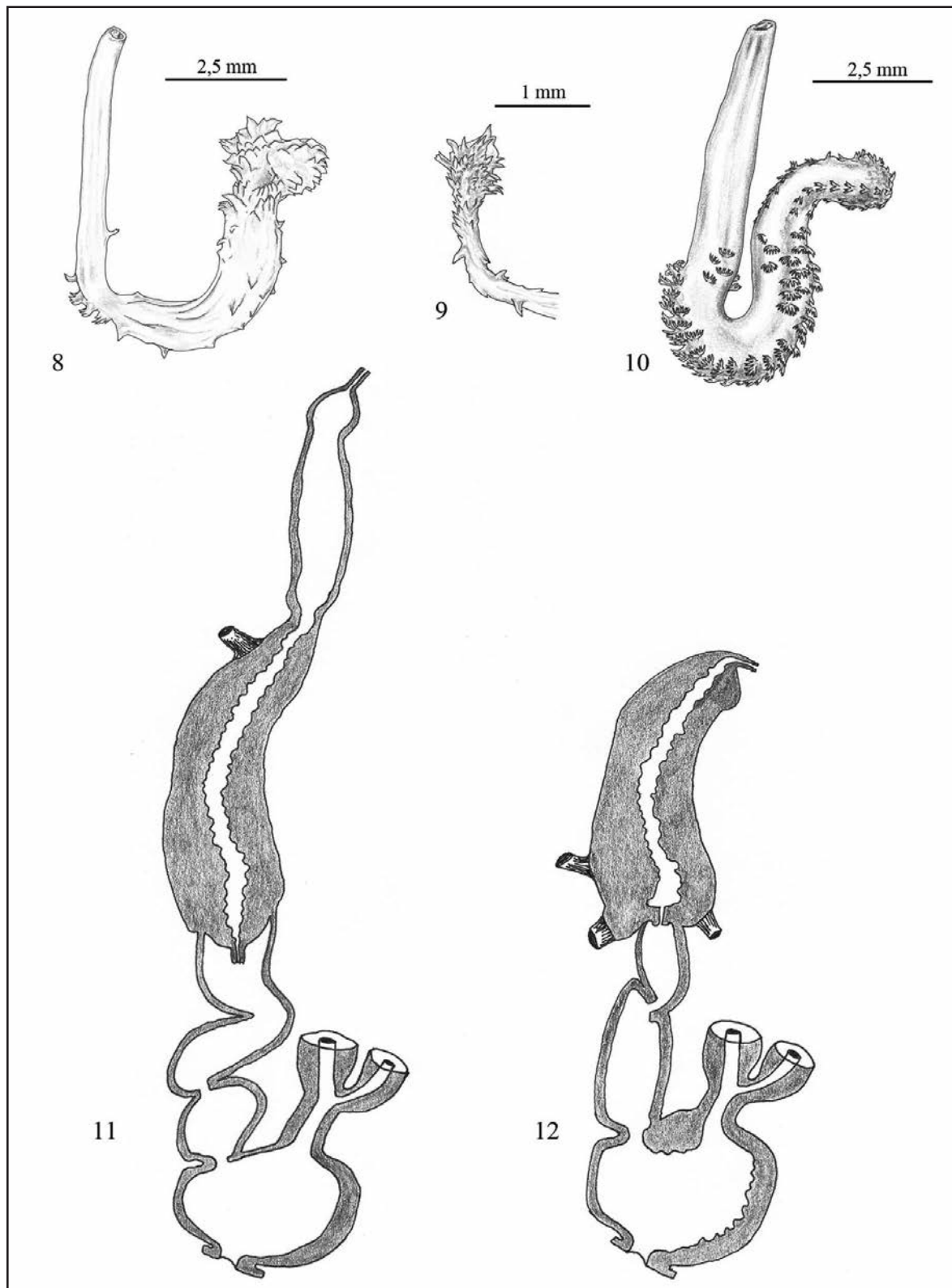


Figure 8. Spermatophore of the holotypus of *T. marinellii* n. sp. Figure 9. Anterior portion of spermatophore of *T. marinellii* from Calatafimi. Figure 10. Spermatophore of *T. sowerbyi* from Novara di Sicilia, Rocca Novara, Sicily. Figures 11, 12. Scheme of genitalia of *T. marinellii* n.sp., (Fig. 11) and of *T. sowerbyi* by Wiktor (1987), modified (Fig. 12).

laterally on penial complex where slight constriction separates distal epiphallus from proximal epiphallus. Border between epiphallus and penis externally evident, inside the epiphallus protrudes into the penis with a semispheric extension, bearing at its apex a small cylindrical papilla. Penis irregular, cylindrical, 11 mm long, approximately $\frac{1}{2}$ of length of epiphallus, with thin walls, inside with some striations and divided by a constriction in two cavities: a narrower, oblong proximal cavity (8 mm) and a short, wide distal cavity (2.2 mm). A thin sheath envelopes the penial complex, keeping proximal epiphallus bent on the distal epiphallus and the penis contracted; wide and short genital atrium, with fine folds around the genital opening.

Vagina long (9.8 mm), inside there are some discontinuous longitudinal folds. Vaginal accessory gland enters by means of thin canaliculi at about midway along vagina. An annular pad separates the real vagina from a small chamber (vaginal chamber) with thick, smooth wall, where the duct of bursa copulatrix and the free oviduct end. Duct of bursa copulatrix short and slender. Bursa copulatrix elongate with a narrow apical prolongation. Long and slender free oviduct, slightly wider near vagina.

Spermatophore (Fig. 8) worm-like, glossy, golden. Anterior apex lacking (broken), the remaining anterior portion is regularly tubular and bare, only on the distal part there are some short spines (with 4-5 apices), the posterior portion is covered with some short spines with bifurcate point (two apices) or simple (one apex); posterior apex of the spermatophore, bigger, completely covered of bifurcate or simple spines. The spermatophore was found in the channel of the bursa copulatrix with the posterior apex contained into "vaginal chamber".

VARIABILITY. Body colour variable (Figs. 13-16) from uniform orange with some spots hardly visible to orange-brown speckled with darker patches; keel clear, orange or cream; clypeus with blackish horseshoe-shaped groove and sometimes with a dark central line; genitalia: proximal epiphallus and distal epiphallus generally have the same length, but in some specimens the proximal portion is slightly shorter; the epiphallus protrudes into the penis with a semispheric or conic extension, penis length varying from 6 mm to 10 mm; vagina length varies from 2 mm to 9 mm. Spermatophore variable in size (Fig. 9) and color from red to yellow-gold;

these were found in the channel of bursa copulatrix with the big apex contained into "vaginal chamber".

ETIMOLOGY. The new species is dedicated to Aldo Marinelli (Roma), as sign of appreciation for creating the forum "Natura Mediterraneo" (available at: <http://www.naturamediterraneo.com/forum/>).

BIOLOGY AND DISTRIBUTION. Species rather common in natural environments with forests, mediterranean maquis or garrigue, nocturnal, during the day specimens shelter under rocks and logs; sexual maturity occurs in winter. *T. marinellii* n. sp., at present, is known only from North-Western Sicily (Fig. 21).

COMPARATIVE NOTES. *T. sowerbyi* (Férussac, 1823) was the only known species in Sicily (Wagner, 1931, Giusti, 1973; Manganelli et al., 1995; Bank 2012) (Fig. 21). In this region it seems to be native as widely widespread, especially in natural environments, and having been reported since 1800 (Lessona & Pollonera, 1882 sub *Amalia carinata* and *A. carinata* var. *oretea*; Minà Palumbo, 1883 sub *Amalia carinata*; Pollonera, 1891 sub *Amalia carinata*). The populations of eastern Sicily examined by us show the typical morphological characters of *T. sowerbyi* (Wiktor, 1987, Giusti et al., 1995) (Figs. 10, 12). The epiphallus in *T. sowerbyi* is of medium length and cone-shaped, while in *T. marinellii* n. sp. the epiphallus is very long and equipped with an evident proximal portion completely absent in *T. sowerbyi*; the penis retractor muscle in *T. sowerbyi* ends at about $\frac{2}{3}$ of the length of the epiphallus, while in *T. marinellii* n. sp. ends at half the length of the epiphallus exactly where the distal portion ends and the proximal one begins; a pair of short supplementary muscles inserted at the distal end of epiphallus observed in *T. sowerbyi*, lack in the new species.

The penis in *T. sowerbyi* is divided by a constriction in a short distal portion followed by a longer proximal chamber, while in *T. marinellii* a proximal long portion is followed by a short distal one, wide and sac-shaped; penial papilla in *T. sowerbyi* is squished, of vestigial type, while in *T. marinellii* is of cylindrical shape; the fold-like thickening (reduced "stimulator") present in *T. sowerbyi*, lacks in *T. marinellii*; the spermatophore in *T. sowerbyi* has a posterior portion covered with very branched spines (Fig. 10), whereas in *T. marinellii* is covered by scattered spines not branched or



Figures 13-16. *T. maninellii* n.sp., Custonaci, Monte Sparagio, Giocolamaro, 08.I.2012: variability of the body colour. In a specimen (Fig. 16) is visible the white-yellowish mucus.

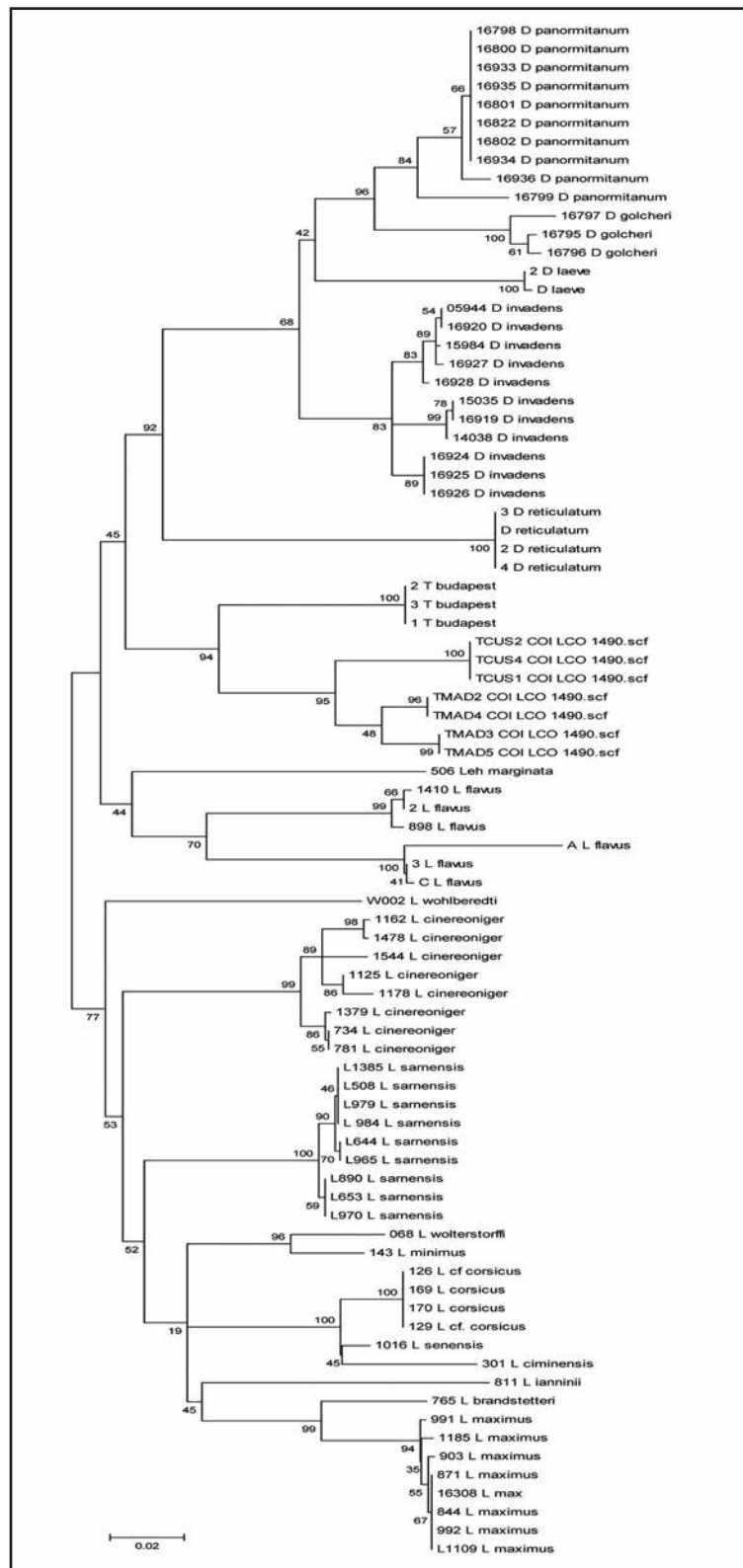


Figure 17. Maximum Likelihood consensus tree (rooted with respect to the genus *Limax*) inferred from a dataset of 83 (seven sequences obtained in the present paper and 76 retrieved from GenBank database) mitochondrial COI gene partial sequences. Numbers above branches represent bootstrap values.

at most bifurcate with wider base, and the posterior apex is bigger.

Examined material of *Tandonia sowerbyi*. Italy, Emilia Romagna, Castiglione dei Pepoli, Roncobilaccio, 44°06'59"N 11°13'42"E, 593 m, 5.XI.2011, 2 specimens (CS). Italy, Sicily: Castelbuono, Cozzo Luminario, Piano Sempria, 37°54'18"N 14°03'59"E, 1192 m, X.1990, 4 specimens (CS); Palermo, Parco della Favorita, Vallone del Porco, 38°10'07"N 13°20'39"E, 243 m, 13.XI.1990, 4 specimens (CS); Monreale, Bosco Ficuzza, Diga Scanzano, 37°55'14"N 13°22'25"E, 536 m, 1.XII.1990, 6 specimens (CS); Palermo, Fiume Oreto, Ponte delle Grazie, 38°04'4"N 13°19'25"E, 95 m, 19.XI.1990, 5 specimens (CS); idem, 3.XII.1990, 2 specimens (CS); Isnello, Contrada Montaspro, 37°54'42"N 13°59'30"E, 857 m, 5.III.1991, 1 specimen (CS); Collesano, Contrada Croce, 37°55'23"N 13°55'20"E, 511 m, 5.III.1991, 6 specimens (CS); Cammarata, Monte Cammarata, Cozzo Panepinto, 37°38'16"N 13°36'34"E, 984 m, III.1992, 4 specimens (CS); idem, 2 specimens (CL); Petralia Sottana, Fiume Imera Meridionale, 37°48'26"N 14°05'01"E, 808 m, 2.XI.1992, 3 specimens (CS); San fratello, Monte Soro, Pizzo Muto, 37°56'16"N 14°38'16"E, 1410 m, X.2001, 1 specimen (CS); idem, 1 specimen (CL); Melilli, Riserva Naturale Integrale Grotta Palombara, 2008 (CR); Monreale, Ponte Arcera, 37°55'42"N 13°23'01"E, 470 m, 14.XI.2008, 2 specimens (CL); Melilli, Riserva Naturale Integrale Grotta Palombara, 2008 (CR); Vizzini, Contrada Rubala, near the F. Vizzini, 37°08'28"N 14°44'15"E, 376 m, 11.I.2009, 5 specimens (CL); Prizzi, Fontana Grande, 37°42'53"N 13°25'43"E, 800 m, 15.XI.2009, 4 specimens (CL); Torrenova, Rocca Scovoni, Piano Scodoni, 38°05'38"N 14°41'26"E, 25 m, 06.XII.2009, 1 specimen (CL); Castelbuono, S. Guglielmo, near the creek San Calogero, 37°55'04"N 14°04'22"E, 670 m, I.2010, 3 specimens (CL); Novara di Sicilia, Rocca Novara, 37°59'35"N 15°08'25"E, 1000 m, 07.XI.2010, 4 specimens (CL); Itala, Piano Fattareda, 38°02'48"N 15°25'09"E, 612 m, 12.XII.2010, 2 specimens (CL); Isnello, Vallone Montaspro, 37°54'18"N 13°58'55"E, 783 m, 26.II.2012, 2 specimens (CL).

Tandonia rustica (Millet, 1843) has an European central and southern distribution and is found in the northern regions of Italy and along the Apennines up to the central regions. This species is cha-

racterized by a very long epiphallus externally similar to that of *T. marinellii*. However, *T. rustica* is characterized by its whitish or creamy coloration, somewhat violetish, with numerous, small black dots; the penial complex (epiphallus+penis) is smaller (around 10 mm) compared to *T. marinellii* (20-31 mm), and has a different structure: penis proportionally shorter and epiphallus showing internally long longitudinal rows of papillae, penial papilla proportionally larger and much more ornate; the place where musculus retractor inserts is not constricted; atrium is narrow and tube-shaped while in *T. marinellii* is short and very broad.

Examined material of *Tandonia rustica*. Italy, Emilia Romagna, Castiglione dei Pepoli, Roncobilaccio, 5.XI.2011, 1 specimen (CS); Italy, Lombardia, Brescia, Valvestino, Armo, 45°46'N 10°35'E, 666 m, 22.X.2000, 1 specimen (CN); idem, Anfo, S. Petronilla, 45°46'N 10°29'E, 524 m, 4.V.2008, 1 specimen (CN); idem, Ghedi, 45°24'N 10°16'E, 85 m, 20.IX.1996, 1 specimen (CN); idem, Marone, Vello, 45°45'N 10°05'E, 200 m, 01.V.2007, 1 specimen (CN).

MOLECULAR ANALYSIS. Seven *Tandonia* specimens, three from Custonaci (TP) and four from Madonie mountains (PA), labelled as TCUS and TMAD respectively, were analyzed. Samples were stored in 75% Ethanol at -20 °C in test tubes. For each individual, a piece of about 40-50 mg was used for total DNA extraction. Pieces of each specimen were deposited as vouchers at University of Urbino, Lab. of cytogenetics and molecular biology. COI amplicons (654 bp) were obtained by LCO1490/HCO2198 universal primers (5'-GGTCAACAAATCATAAAGATATTGG-3'/5'-TAAACTTCAGGGTGACCAAAAAATCA-3') as in Folmer et al. (1994) with a PCR cycle of 95 °C for 5 min; 95 °C for 1 min, 42 °C for 1 min, 72 °C for 1 min (37 cycles); 72 °C for 10 min. Sequencing of the purified PCR products was carried out using automated DNA sequencers at Eurofins MWG Operon (Germany). Finally, sequence chromatograms of each amplified fragment were browsed visually. Sequences generated in this study were analysed with additional seventy-six Limacidae COI sequences retrieved from GenBank (IDs: AF239733-34, AM259702-06, AM259712-14, EF128217, FJ481179, FJ481181, FJ606455-71, FJ606481, FJ606483, FJ606485, FJ606487, FJ606489, FJ606491, FJ606493, FJ606495,

FJ606497, FJ606499, GQ145509, GQ145523, GQ145525, GQ145527, GQ145538-39, GQ145553, GQ145572-75, JN248291-99, JN248300-15; see also Reise et al., 2011). Sequences were visualized with BioEdit Sequence Alignment Editor 7 (Hall, 1999), aligned with the ClustalW option included in this software and double checked by eye. Standard measures of nucleotide polymorphism and phylogenetic analyses were conducted in MEGA 5.0.3 (Tamura et al., 2011). The best-fit evolution model of nucleotide substitution resulted GTR+G (General Time Reversible+Gamma). The evolutionary history was inferred by using the Maximum Likelihood method; the bootstrap consensus tree was inferred from 500 replicates; a discrete Gamma distribution was used to model evolutionary rate differences among sites (5 categories; +G, parameter = 0.4467). Codon positions included were 1st+2nd+3rd. All positions containing gaps and missing data were eliminated. Divergence among TCUS and TMAD groups (Dxy), assessed as p distance, was 5.9%.

Although genetic differences (p distance) are only indicative when assigning a group to a given taxonomic rank, the distance we assessed (5.9%) between COI sequences obtained from specimens collected in Madonie mountains and Custonaci not only is in line with values considered discriminatory at the specific level in Mollusca (i.e. Herbert et al., 2003; Pfenninger et al., 2006), but it is even greater than estimated distances separating entities accepted as distinct species (*L. corsicus*/*L. senensis*, 2.3%; *L. ciminensis*/*L. senensis*, 4.2%; *L. minimus*/*L. wolterstorffi*, 4.4%).

In conclusion, phylogenetic tree (Fig. 17) and genetic distance between TCUS and TMAD groups firmly support the hypothesis that specimens from Custonaci and Madonie mountains belong to two distinct *Tandonia* species.

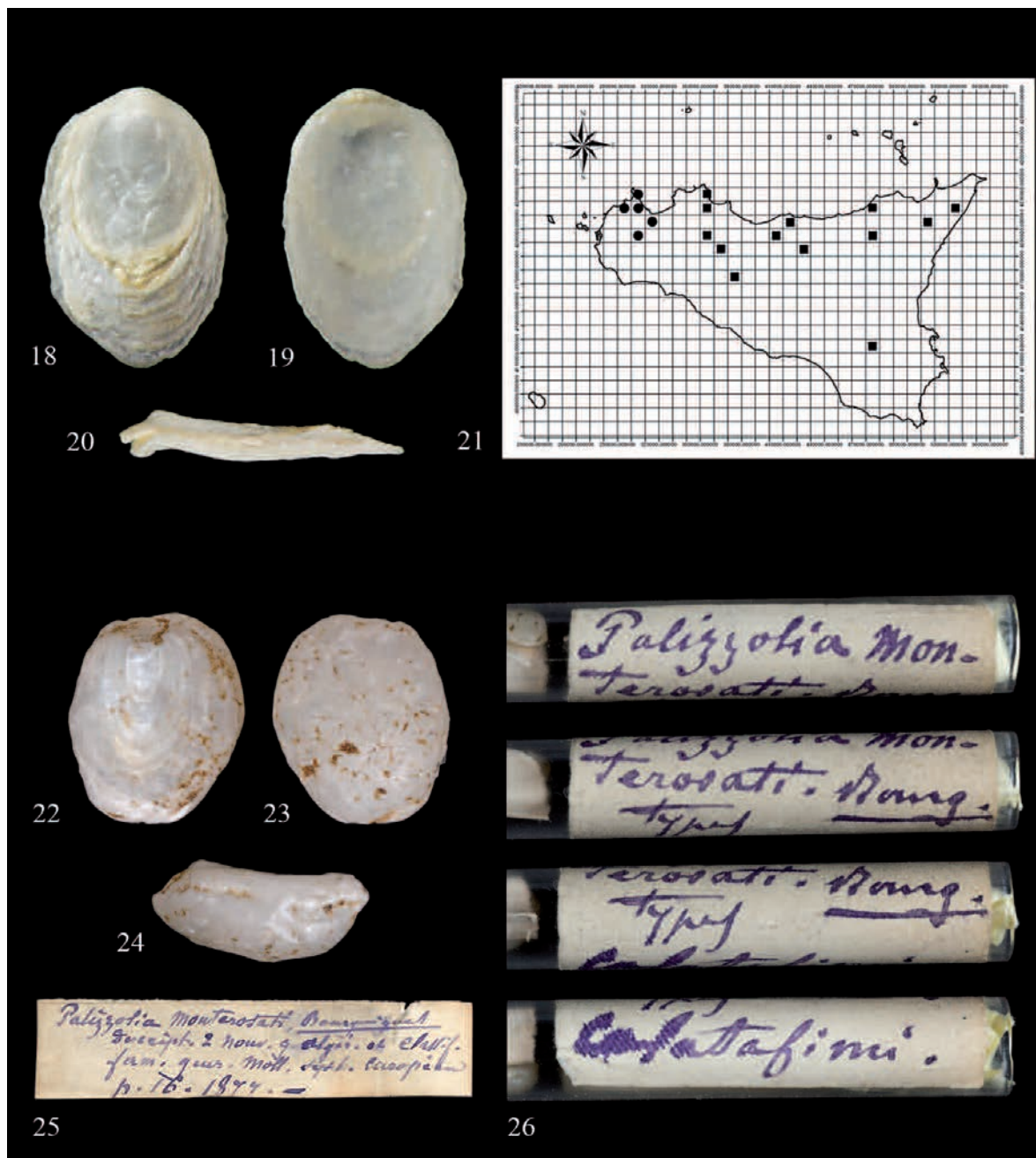
REMARKS. The genus *Tandonia* Lessona & Pollonera, 1882 has European-Mediterranean distribution extended to the Black Sea coasts (Wiktor, 1987, Giusti et al., 1995). In Italy it's verified the presence of six species (Bank, 2012): *T. nigra* (C. Pfeiffer, 1849), *T. budapestensis* (Hazay, 1880), *T. robici* (Simroth, 1884), *T. rustica*, *T. simrothi* (Hesse, 1923), *T. sowerbyi*. Among them, *T. sowerbyi* and *T. rustica* are morphologically the more similar to *T. marinellii* n. sp. that, on the other hand, sharply differs from these taxa for all the characters described above. Noteworthy, in bibliography about Si-

cilian and surrounding geographical areas a few taxa of uncertain taxonomic value are reported. These taxa are examined below. *Amalia marginata* var. *oretea* Lessona & Pollonera, 1882 is a taxon described for Sicily (locus typicus: "Palermo presso il fiume Oreto") only on external morphological characters: "Typica, clipeo tantum zonula nigra longitudinali mediana instructo" (Lessona & Pollonera, 1882). The body coloration in *Tandonia* (= *Amalia* Moquin-Tandon, 1855) is quite variable and topotypic specimens studied by us can be traced back, due to the shape of genitalia, to *T. sowerbyi* (Figs. 10-12). *A. marginata* var. *oretea* is then confirmed as a synonym of *T. sowerbyi* (Giusti, 1973; Bank, 2012). It would have been critical examination of typical material, but the specimens described by Lessona & Pollonera (1882) are no longer available in their collection housed at the Museo Regionale di Scienze Naturali di Torino (E. Gavetti in litteris).

Bourguignat (1877) established a new genus and a new species, *Palizzolia monterosati*, on a single Milacidae shell from Calatafimi with the following description: "Limacelle ovulaire, épaisse, très-bombée (comme sphérique) en dessous, caractérisée en dessous: 1° Par une surface plane, sur laquelle on distingue un cucléus médian, circonscrit par une profonde dépression; 2° par une forte échancrure à sa partie médiane supérieure"

Lessona & Pollonera (1882) recognise in *Palizzolia* diagnostic characters of the shell of Milacidae (oval, medial nucleus) and put *Palizzolia* in homonymy with the genus *Milax* Gray, 1855 (sub *Amalia*). This choice was followed by Cockerell (1991), Kennard & Woodward (1926), Wiktor (1987) although with a question mark, Alzona (1971) and Barker (1999). However, the shell of Milacidae offers no morphological characters useful for a reliable classification at both genus and species level and therefore it is possible that *Palizzolia* could be an older synonym of *Tandonia*.

The taxon *monterosati* was usually treated as doubtful species (Lessona & Pollonera, 1882; Minà Palumbo, 1883; Cockerell & Collinge, 1893; Wiktor, 1987; Cockerell, 1991;) because the rear hollow, the considerable thickening of the lower part of the shell and the groove around the apex are abnormalities detectable in different species of both *Milax* and *Tandonia* genera; only Kennard & Woodward (1926) pose the taxon *monterosati* in synonymy with *Milax gagates* (Draparnaud, 1801).



Figures 18-20. Shell (limacella) of *T. marinellii* n.sp., holotypus, h: 7.65 mm - D: 5.05 mm. Figure 21. Geographic distribution of *Tandonia marinellii* n. sp (circles) and *T. sowerbyi* (squares) in Sicily (personal data). Figures 22-24. Typus of *Palizzolia monterosati* (MHNG BGT 2385), h: 4.5 mm - D: 3.8 mm, thickness 2.2 mm. Figure 25. Original label of *P. monterosati* (MHNG BGT 2385). Figure 26. Four sequential visions of the ampoule rotated progressively so that to allow the overall vision of the label of *P. monterosati* (MHNG BGT 2385).

Giusti et al. (1995) note that *Tandonia* shells are generally thicker and oval, however examination of the *Palizzolia monterosati* type (MHNG BGT 2385) (Figs. 22-26) does not provide indications

for univocal taxonomic attribution. At Calatafimi, locus typicus of *P. monterosati*, we surveyed *M. nigricans* (Philippi, 1851) and *T. marinellii* n. sp., but the presence of *M. gagates* and *T. sowerbyi* cannot

be definitely ruled out. Hence, it appears that the taxon/binomial *Palizzolia monterosati* Bourguignat 1877 is a nomen dubium, attributable with certainty at neither genus nor species level. In these cases, on the basis of article 75.5 of ICZN, the Commission may be asked, in order to settle all taxonomic doubts, to set up a neotype which, in our opinion, should be *Milax gagates* since *Palizzolia*, as prevalent use, has been considered a synonym of the genus *Milax*, and *monterosati* synonym of *Milax gagates*.

For North Africa, particularly Tunisia and North Eastern Algeria, no species of the genus *Tandonia* was ever reported (Cockerell, 1891; Wiktor, 1987; Abbes et al., 2010). *Milax gasulli* Altena, 1974 and *Amalia ater* Collinge, 1895 are well known morphologically (genitalia) and considered as valid species of the genus *Milax*. Wiktor (1987) based on specimens of Algeria (without additional indications) puts *Limax scaptobius* Bourguignat, 1861 in synonymy with *Milax gagates* and both *Amalia cabiliana* (Pollonera, 1891) and *A. gagates* (var. or subsp.) *mediterranea* Cockerell, 1891 in synonymy with *Milax nigricans*.

Amalia maculata Collinge, 1895, described for the surroundings of Algiers, was considered by Wiktor (1987) synonymy of *T. sowerbyi*, but the original description does not allow per se a certain assignment to the genus *Tandonia*. The taxon *maculata* Collinge 1895, however, is pre-occupied by *Amalia maculata* Koch & Heynemann, 1874 = *Lytopelte maculate* (Koch & Heynemann, 1874) of the family Agriolimacidae (see Wiktor, 1987) and, for this reason, Hesse (1926) published, in its place, the new taxon *Milax collingei*. *Limax eremophilus* Bourguignat 1861 (locus typicus Algiers, Algeria) was described only based on color and remains a taxon of uncertain allocation at both genus and species level. *T. sowerbyi* is reported for the regions of Southern Italy, attested with certainty up to Basilicata (Ferreri et al., 2005).

For Calabria two little-known taxa were described by Paulucci (1879), unreported even by Alzona (1971): *Amalia mongianensis* (locus typicus: Monte Pecoraro, Mongiana, Catanzaro) and *A. fulva* (locus typicus: "Monte Sant'Elia, Palmi"). The specimens from Calabria we could examine are to be considered as *T. sowerbyi*, although there are some morphological features that require further study.

Family Subulinidae Thiele, 1931

Rumina saharica Pallary, 1901

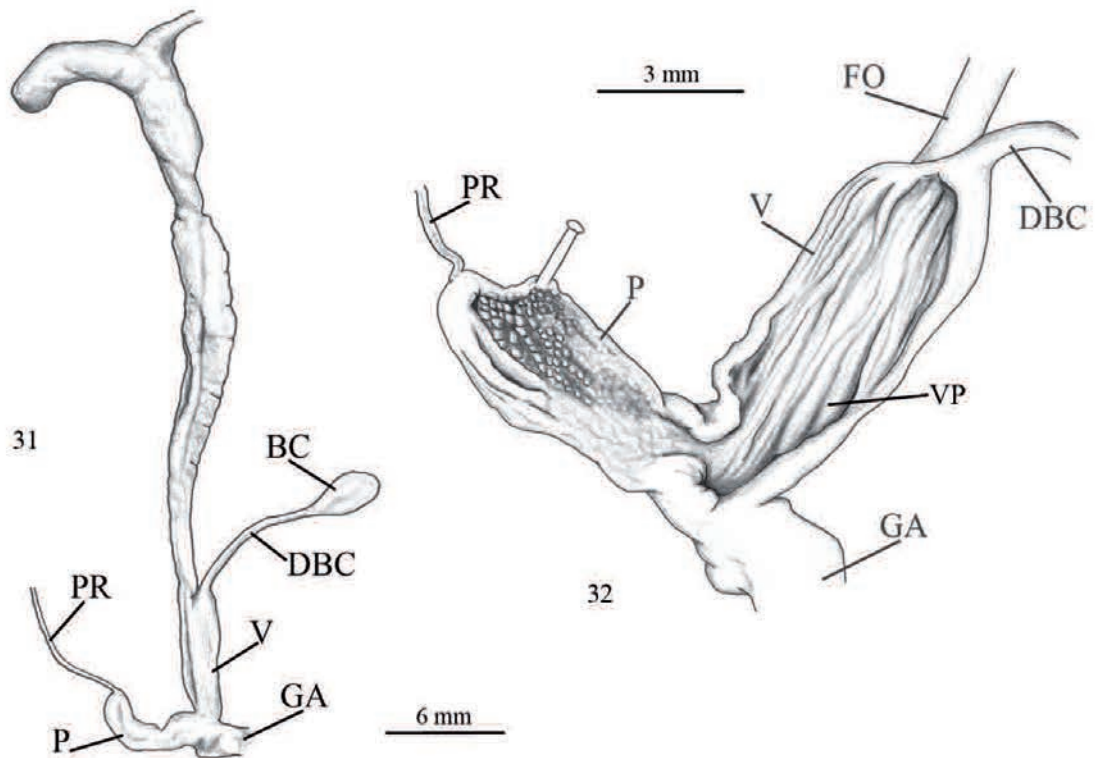
EXAMINED MATERIAL. *Rumina saharica*. Italy, Sicily, Egadi Islands, Marettimo, admist Case Romane and Buccerie 200-250 m, 37°58'N, 12°03'E, 30.V.2010, 6 specimens, 1 shell (CL); idem, 18 shells (CS); idem VIII.2012, 2 specimens, 10 shells (CC).

DESCRIPTION. Shell dextral (Figs. 27-30), whitish, truncated, height 30.5 mm, maximum diameter 10 mm, slender, sub-cylindrical, with slightly convex sides, the last whorl is wider than the penultimate whorl. Animal white. Genitalia (Figs. 31-32) characterized by vagina internally with longitudinal pleats and penis internally with some sparsely distributed papillae towards the proximal end.

BIOLOGY AND DISTRIBUTION. *R. saharica* is a thermophilic and xeroreistant species. The genus *Rumina* Risso, 1826 has Mediterranean distribution extending to Macaronesia, but it was dispersed by man in some extra-Mediterranean countries (United States, Mexico, Cuba, Bermudas, China, Japan). Currently, *R. saharica* seems to prevail in the north African-East European area (Carr, 2002; Prévot et al, 2007).

REMARKS. Prévot et al. (2007) with molecular analyses demonstrated the presence in the Mediterranean area of two groups of species: *R. decollata* and *R. saharica*. They also showed the presence in *R. decollata* of two clades genetically distinct but morphologically similar. In addition, Mienis (2002) re-evaluates the validity of *R. paviae* (Lowe 1861) from Morocco, Algeria, and Tunisia. In Sicily, actually, is known only *R. decollata* (Manganelli et al., 1995; Bank, 2012) (Figs. 23-24).

Carr (2002) signals, in the collection of Natural History Museum of London, the presence of three shells similar to *R. saharica* collected in Sicily, however he points out that without data on the genitalia the classification of *Rumina* species is not certain. The population of *Rumina* from Marettimo Island (Western Sicily) which we examined shows the typical morphological characters of *R. saharica* (sensu Carr, 2002) with the exception of the duct of bursa copulatrix which is slightly longer.



Figures 27, 28. Shell of *Rumina saharica*, **Marettimo**, h: 31.9 mm - D: 10.2 mm. Figures 29, 30. Idem, h: 26.4 mm - D: 9.8 mm. Figure 31. Genitalia of *R. saharica*, **Marettimo**. Figure 32. Idem, internal structure of penis and vagina.

Family Clausiliidae Mörch, 1864

Lampedusa lopadusae nodulosa Monterosato, 1892

Clausilia (Lopadusaria) nodulosa - Monterosato, 1892: 29

Clausilia (Lopadusaria) nodulosa - Kobelt, 1893: 303

Clausilia (Lopadusaria) nodulosa - Kobelt, 1897: 292

Clausilia lopadusae var. *nodulosa* - Westerlund, 1901: 105

Clausilia lampedusae var. - Giglioli, 1912: 217

Lampedusa lopadusae nodulosa - Alzona in Zavatari, 1961: 427

Delima (Lmpedusa) lopedusae - Alzona, 1971: 92

Lampedusa lopadusae, (synonym) *nodulosa* - Holyoak, 1986: 217

Lampedusa lopadusae, (synonym) *nodulosa* - Beckmann, 1992: 22

Lampedusa lopadusae, (synonym) *nodulosa* - Cianfanelli, 2002: 61, T. 9, f. 29

Lampedusa lopadusae, (synonym) *nodulosa* - Bank, 2012

EXAMINED MATERIAL. Italy, Sicily, Pelagian Islands, Lampioni, 31.VIII.2009, 12 specimens, legit T. La Mantia (CS); idem, 09.IX.2009, 23 specimens, legit A. Corso (CL); idem, 23.VII.2010, 5 specimens, legit T. La Mantia and S. Pasta (CS).

DESCRIPTION. Shell sinistral (Figs. 33-36), medium-sized (height 13-18.7 mm; maximum diameter 3.6-4.4 mm), fusiform, apex obtuse, elongated and inflated at half of its height, rather thick and robust, yellowish-brown in colour when fresh; external surface with oblique, thin and close ribs, 54-81 ribs on penultimate whorl. Spire with 9-10 convex whorls slowly and regularly growing, last whorl distinctly narrower than penultimate whorl and tapering downwards, rather gibbous near umbilicus. Sutures deep, subcrenulated; umbilicus slit-like, internally closed; aperture about $\frac{1}{4}$ of shell height (height 3.5-4.4 mm; maximum diameter 2.9-3.7 mm), irregularly ovalar or sub-squared, peristome continuous, reflected, little thickened. Aperture with 5 lamellae on parietum and columellar side and 3 or 4 plicae and lunella on palatum. On parietum (Figs. 41-42), starting from suture, there are: parallel lamella in the form of small relief, spiral lamella at centre of parietum, columellar lamella, a little subcolumellar lamella, and a tooth like parietal lamella (upper lamella); only columellar lamella and parietal lamella

are visible through the opening (in apertural view). On the palatum (Fig. 43) there is a lateral lunella and, starting from suture: a long, well developed sutural plica; a second sutural plica variable in length: as long as the first one, shorter, or sometimes absent; principal plica thin and raised; palatal plica showing a rear portion merged with the upper part of lunella, a central indistinct part and an anterior part in the form of relief just visible. Clausilium elongated, plough-like (Fig. 44).

Body. Animal oval-elongate, narrow, posteriorly pointed, white-yellowish; upper tentacles short, cylindro-conical, apically widened, with small black eyes; lower tentacle very short (Fig. 51; see also Cianfanelli, 2002 fig. 29).

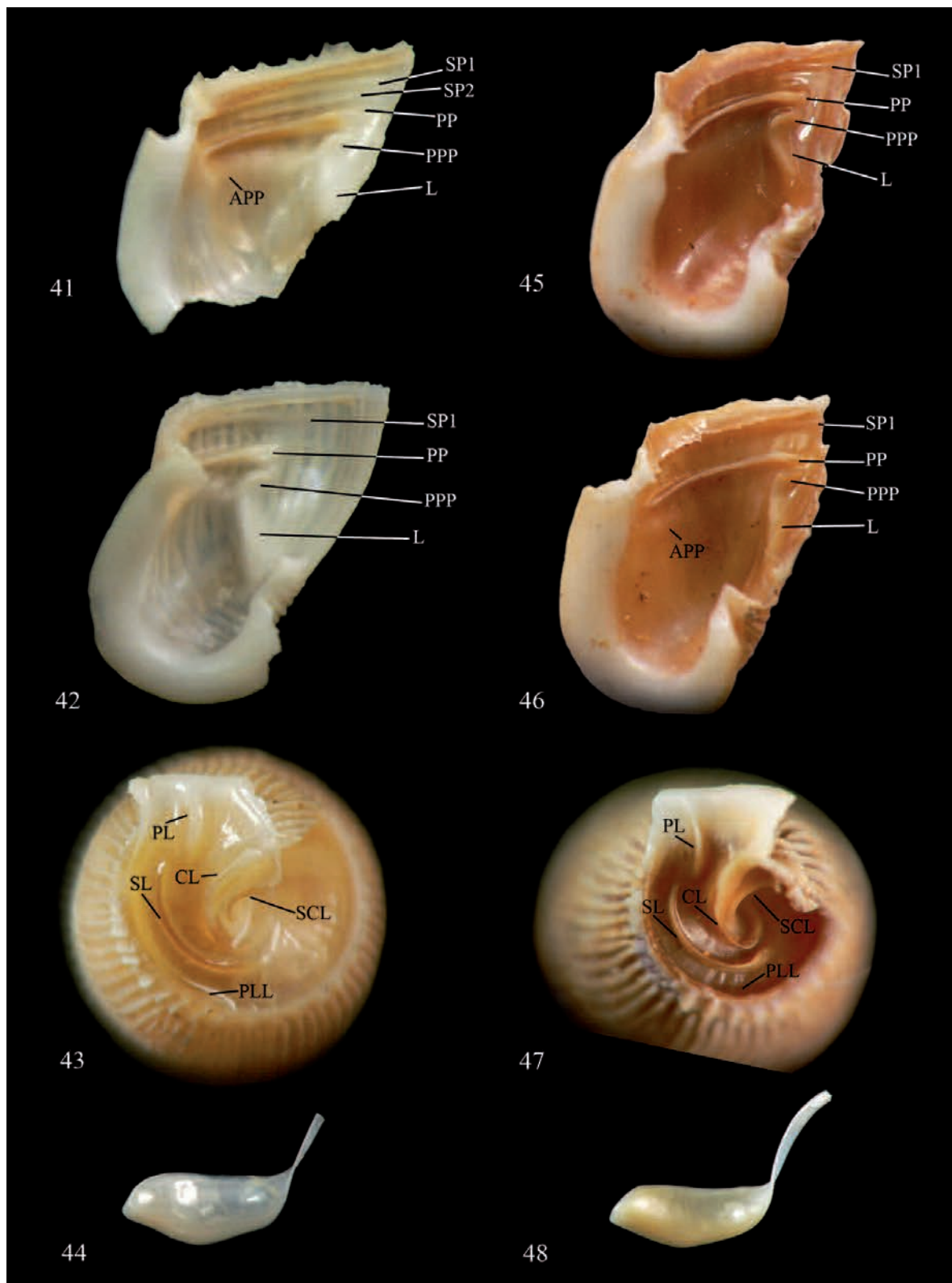
Genitalia. Anatomical organization of the genitalia (Fig. 49) is similar to *L. lopadusae* (Soòs, 1933; Pintér & Varga, 1984; Holyoak, 1986; Giusti et al., 1995) with penial complex consisting of flagellum, epiphallus, penis and penial diverticulum; flagellum short and slender; epiphallus divided by insertion of penial retractor muscle into proximal (1.5-1.6 mm) and distal (1.2-1.9 mm) portions; long, hook-like penial diverticulum (1.5-1.88 mm) arising on border between epiphallus and penis; penis long (2.6-3.6 mm); on the inner wall there are 5 longitudinal crests which are parallel in the distal portion and rather indistinct towards the penial diverticulum. Vagina long; short, wide copulatory duct branched in a short and slender duct of bursa copulatrix with small oval bursa copulatrix, and a short diverticulum of bursa copulatrix; short free oviduct.

BIOLOGY AND DISTRIBUTION. At the base of vegetation, at the soil, under stones (T. La Mantia in verbis). *L. lopaduse nodulosa* is endemic of the little isle of Lampioni (Fig. 52), Pelagian Islands, between Sicily and Tunisia.

REMARKS. Monterosato (1892) described "*Clausilia (Lopadusaria) nodulosa*" from the island of Lampioni, with the following words: "Conchiglia solida, striata quasi obliquamente (nella *C. Lopadusae* le coste sono perpendicolari ed esattamente lamellate); apertura a bordi ben rivoltati, porcellanosi; colorazione bianchiccia; anfratti cochleiformi, apice più ottuso. Dimensione quasi la stessa." ["Solid shell, ribbed almost sideways (in *C. lopadusae* the ribs are perpendicular and exactly lamellated); opening with edges well turned, porcelain-like; whitish colour; cochlea-shaped whorls, apex more obtuse. Almost the same size"].



Figures 33-36. Shell of *L. lopadusae nodulosa*, Lampione, h: 16.94 mm - D: 4.16 mm. Figures 37-40. Shell of *L. lopadusae lopadusae*, Lampedusa, h: 17.11 mm - D: 4 mm.



Figures 41-44. *L. lopadusae nodulosa*, Lampione: palatum of two specimens (Figs. 41-42), parietum (Fig. 43) and clausilium (Fig. 44). Figures 45-48. *L. lopadusae lopadusae*, Lampedusa, palatum of two specimens (Figs. 45-46), parietum (Fig. 47) and clausilium (Fig. 48).

Subsequently, this taxon is reported by Kobelt (1893; 1897) while Westerlund (1901) and Alzona (1961) consider it respectively as variety and subspecies of *L. lopadusae*. Alzona (1971), Holyoak (1986) and Beckmann (1992) put *L. nodulosa* in synonymy with *L. lopadusae*. No news of this taxon is reported by Manganelli et al. (1995) and Cossignani & Cossignani (1995). Cianfanelli (2002), despite considering it a synonym of *L. lopadusae*, reports that the population of the island of Lampedusa "... presenta dei caratteri piuttosto distinti sia

nella conchiglia che nell'animale" ["... shows pretty distinct characters both in the shell and in animal"]. Nordsieck (2007) did not mention it in his catalog on the Clausiliidae of the world, Bank (2012) still considers it a synonym of *L. lopadusae*. *L. nodulosa* differs from *L. lopadusae* (Figs. 37-40. Figs. 45-48. Fig. 51) for shell less robust, darker in color i.e. yellowish-brown (yellowish-grey in *L. lopadusae*), with deeper sutures, and whorls more convex so that the shell profile, in frontal view, appears less linear than *L. lopadusae*; peristome is less develo-

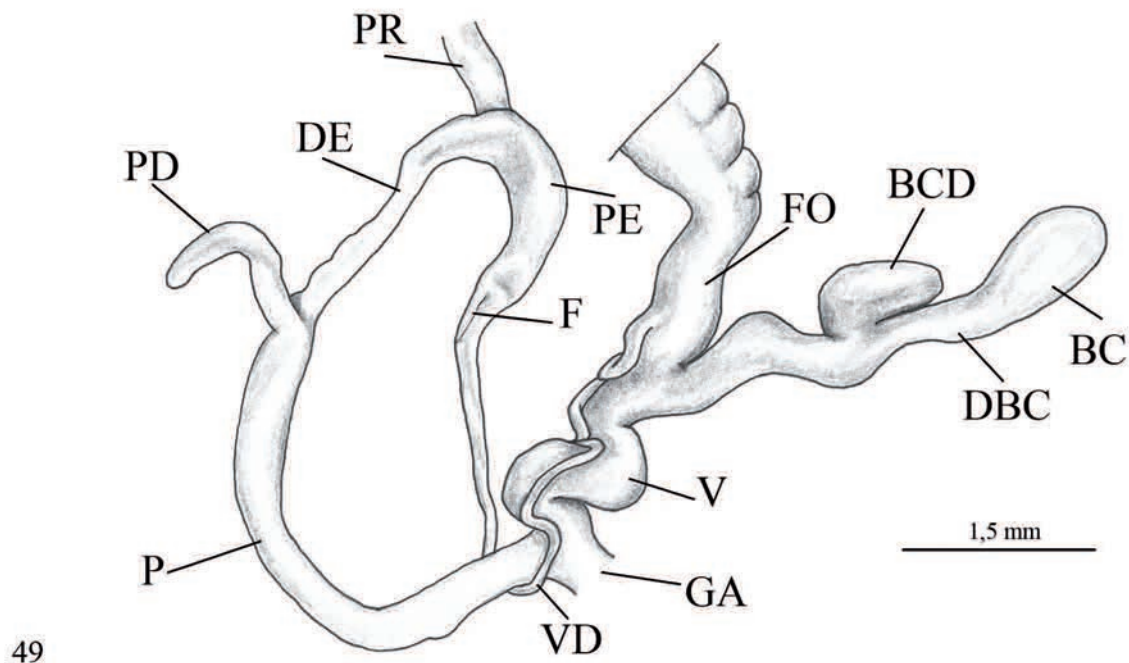


Figure 49. Genitalia of *L. lopadusae nodulosa*. Figure 50, 51. Body colour in *L. lopadusae lopadusae* (Fig. 50) and *L. lopadusae nodulosa* (Fig. 51). Figure 52. Lampedusa island (photo P. Lo Cascio).

ped and calcified; ribs are more oblique, more numerous and less robust; in the internal structure of the shell, *L. nodulosa* mostly shows a second sutural plica (rarely present in *L. lopadusae*). Genitalia of *L. nodulosa* differ from *L. lopadusae* for penial diverticulum slightly longer; the animal is lighter in color. As reported in the original description of Monterosato (1892), highlighted by Cianfanelli (2002) and confirmed by our observations, *L. nodulosa* presents some morphological differentiations with respect to *L. lopadusae* and therefore we believe it is worthy of taxonomic reconsideration, at least at the sub-specific level, also in view of its peculiar geographical isolation. Indeed, the island of Lampione, where *L. nodulosa* lives, reaches its maximum altitude at 36 m above sea level and is approximately 17.5 Km far from Lampedusa, from which is separated by a stretch of sea -80 m deep. Despite its very little size, this islet harbours a very rich pool of plant and animal species, particularly some local endemics of high biogeographic interest (Lo Cascio & Pasta, in press.)

Family Hygromiidae Tryon, 1866

***Cernuella (Cernuella) tineana* (Benoit 1862)**

Helix tineana - Benoit, 1862: 185-187, t. 4, fig. 24 (Calatafimi)

Helix tineana - Pfeiffer, 1868: 487 (Sicilia, Calatafimi)

Helix tineana - Benoit, 1875: 14 (Calatafimini)

Helix Xerophila tineana - Kobelt, 1875: 18 (Calatafimi)

Helix (Xerophila) Jacosta tineana -Westerlund, 1876: 104 (Sicilia)

Helix (Xerophila) Jacosta tineana var. *kobeltiana* -Westerlund, 1876: 104

Helix tineana - Kobelt in Rossmassler, 1877: 103-104, fig. 1452 (Sicilia, Calatafimi)

Xerophila (Jacosta) tineana - Kobelt, 1881: 47 (Sicilien)

Xerophila (Jacosta) tineana kobeltiana - Kobelt, 1881: 47 (Sicilien)

Helix tineana - Benoit, 1882: 37 (Calatafimini)

Helix (Helicella) Jacosta tineana - Tryon, 1887: 253 pl. 62 fig. 92-94 (Sicily)

Helix (Xerophila) Jacosta tineana - Westerlund, 1889: 318 (Sicilien, Calatafimini)

Helix (Xerophila) Jacosta var. *mista* - Westerlund, 1889: 318-319 (Sicilien)

Helix (Xerophila) Jacosta tineana var. *kobeltiana* -Westerlund, 1889: 319 (Sicilien)

Helix (Xerophila) Jacosta tineana var. *mista* -Westerlund, 1890: 61 (Sicilien)

Helix (Xerophila) Jacosta tineana var. *kobeltiana* -Westerlund, 1890: 61 (Sicilien)

Helicella Jacosta tineana - Pilsbry, 1894: 260

Helicella Jacosta tineana var. *mista* - Pylsbry, 1894: 260

Helicella Jacosta tineana var. *kobeltiana* - Pylsbry, 1894: 260

Helicella (Xerotropis) tineana - Alzona, 1971: 174

Helicella (Xerotropis) tineana mixta - Alzona, 1971: 174

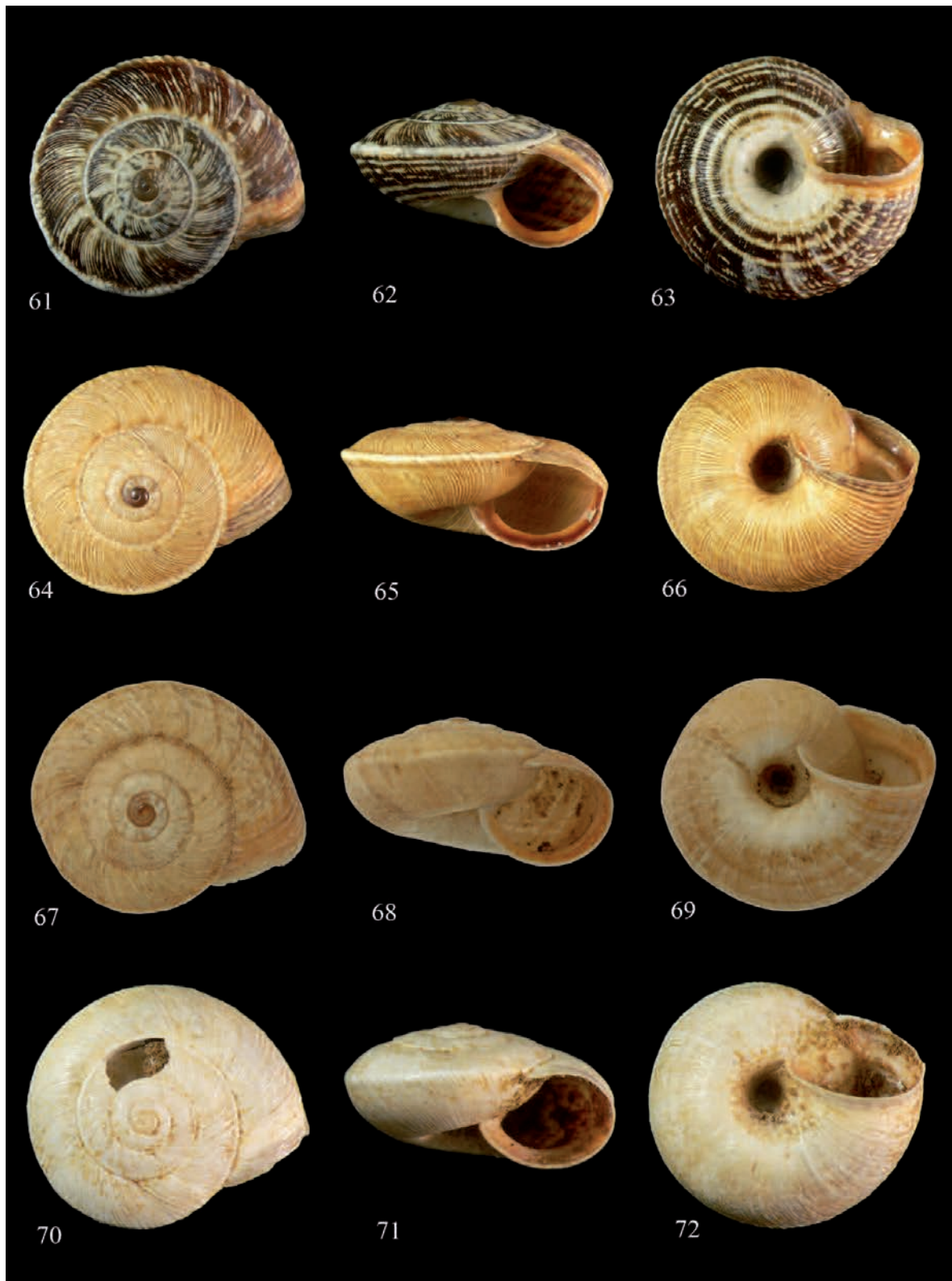
Helicella (Xerotropis) tineana kobeltiana - Alzona, 1971: 174

EXAMINED MATERIAL. Italy, Sicily, Monte Cofano, Gorgo Cofano, 38°06'07"N 12°40'31"E, 228 m, 14.X.1984, numerous specimens (CS); Italy, Sicily, Sciacca, Torre Macauda, 37°28'58"N 13°10'59"E, 59 m, 1.VII/31.VII.1986, numerous specimens (CS); Italy, Sicily, Monte Cofano, Gorgo Cofano, 38°06'07"N 12°40'31"E, 228 m, 14.IV.1991, numerous specimens (CS); Italy, Sicily, Ribera, Contrada Castello, 37°30'18"N 13°15'04"E, 153 m, IX.2005, 3 specimens, 10 shells (CR); idem, 37°30'23"N 13°14'12"E, 144 m, IX.2005, 2 specimens, 12 shells (CR); Italy, Sicily, Cava a Nord di Ribera, 30.XII.2007, 3 specimens, M. and E. Bodon (CB); Italy, Sicily, Sciacca, Torre Macauda, 37°28'58"N 13°10'59"E, 59 m, 24.V.2008, numerous specimens (CS); idem 22.II.2009, 23 shells (CL); Italy, Sicily, Sciacca, Torre Macauda, 37°28'58" N 13°10'59" E, 60 m, 22.XI.2009, 1 specimen, 8 shells (CL); Italy, Sicily, Custonaci, Rio Forgia, 38°03'42"N 12°39'32"E, 56 m, 6.II.2011, 3 subfossil shells (Figs. 70-72); Italy, Sicily, Monte Cofano, Gorgo Cofano, 38°06'07"N 12°40'31"E, 228 m, 20.XI.2011, numerous specimens (CS); Italy, Sicily, Monte Cofano, Gorgo Cofano, 38°06'07"N 12°40'31"E, 228 m, 4.III.2012, numerous specimens (CS); Italy, Sicily, Custonaci, Baglio Cofano, 38°06'11"N 12°40'40"E; 250 m, 05.VIII.2012, 29 shells (CL).

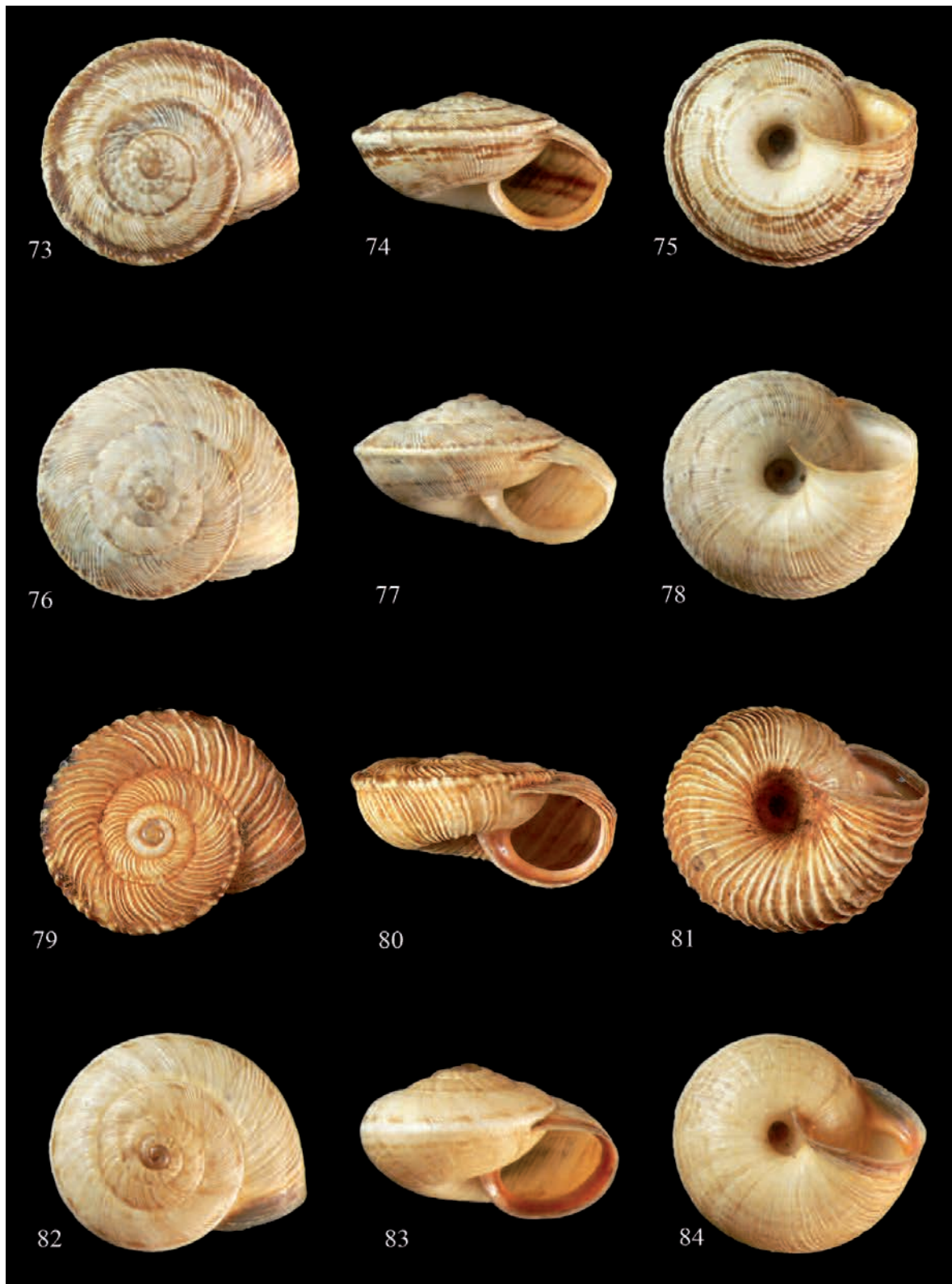
DESCRIPTION. Shell dextral (Figs. 53-55, 57-75), medium-sized (height: 7.2 mm, maximum diameter 17 mm), depressed, robust, whitish or greyish-yellow in colour with brown band and dark apex; external surface finely and regularly ribbed, opaque,



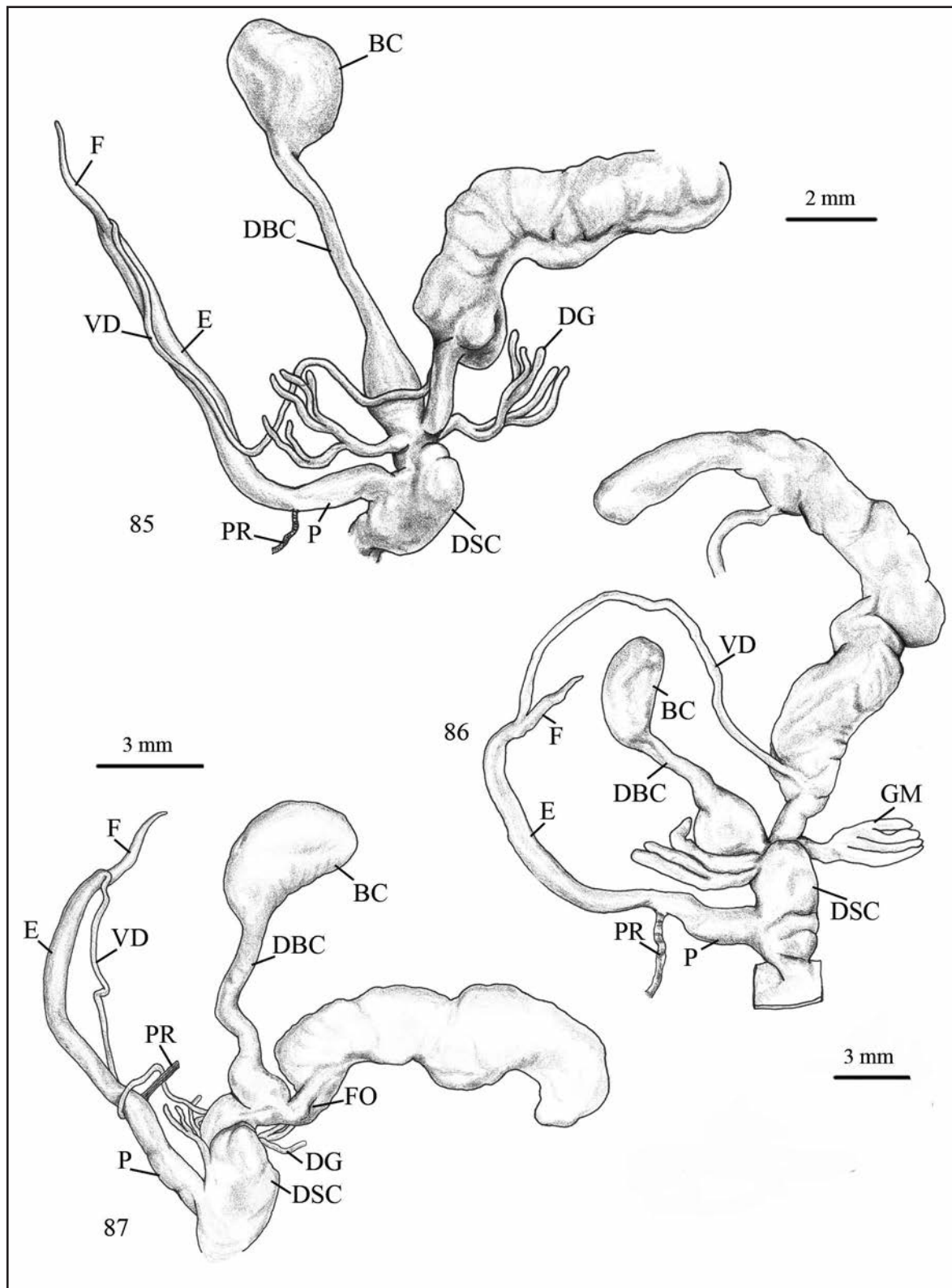
Figures 53-56. "*Helix*" *tineana*, Calatafimi, Paulucci collection (MZUF GC/10825) (Figs. 53-55) and original label (Fig. 56), photos Saulo Bambi. Figures 57-60. *C. tineana*, Customaci, Monte Cofano, Baglio Cofano, h: 5.55 mm - D: mm 11.10 mm.



Figures 61-63. *Cernuella tineana*, Sciacca, Torre Macauda, h: 6.90 mm - D: 12.92 mm. Figures. 64-66. Idem, h: 6.30 mm - D: 12.46 mm. Figures 67-69. *C. tineana*, Sciacca, Monte San Calogero, coll. Paulucci (MZUF GC/41419), foto Saulo Bambi. Figures 70-72. *C. tineana*, Custonaci, Rio Forgia, subfossil.



Figures 73-75. *Cernuella tineana*, Sciacca, Torre Macauda, h: 7.07 mm - D: 12.42 mm. Figures. 76-78. *C. amanda*, San Vito lo Capo, Salinelle, h: 12.18 mm - D: 7.12 mm. Figures 79-81. *C. rugosa*, Castelluzzo, Calette degli Agliarelli, h: 6.30 mm - D: 11.95 mm. Figures 82-84. *C. cisalpina*, Castellammare del Golfo, Fraginesi, h: 6.90 mm x D: 10.80 mm.



Figures 85-87. Genitalia of *Cernuella tineana*, Custonaci, M. Cofano, Gorgo Cofano (Fig. 85), *C. cisalpina*, Castellammare del Golfo, Fragnesi (Fig. 86) and *C. rugosa*, Castelluzzo, Golfo di Cofano (Fig. 87).

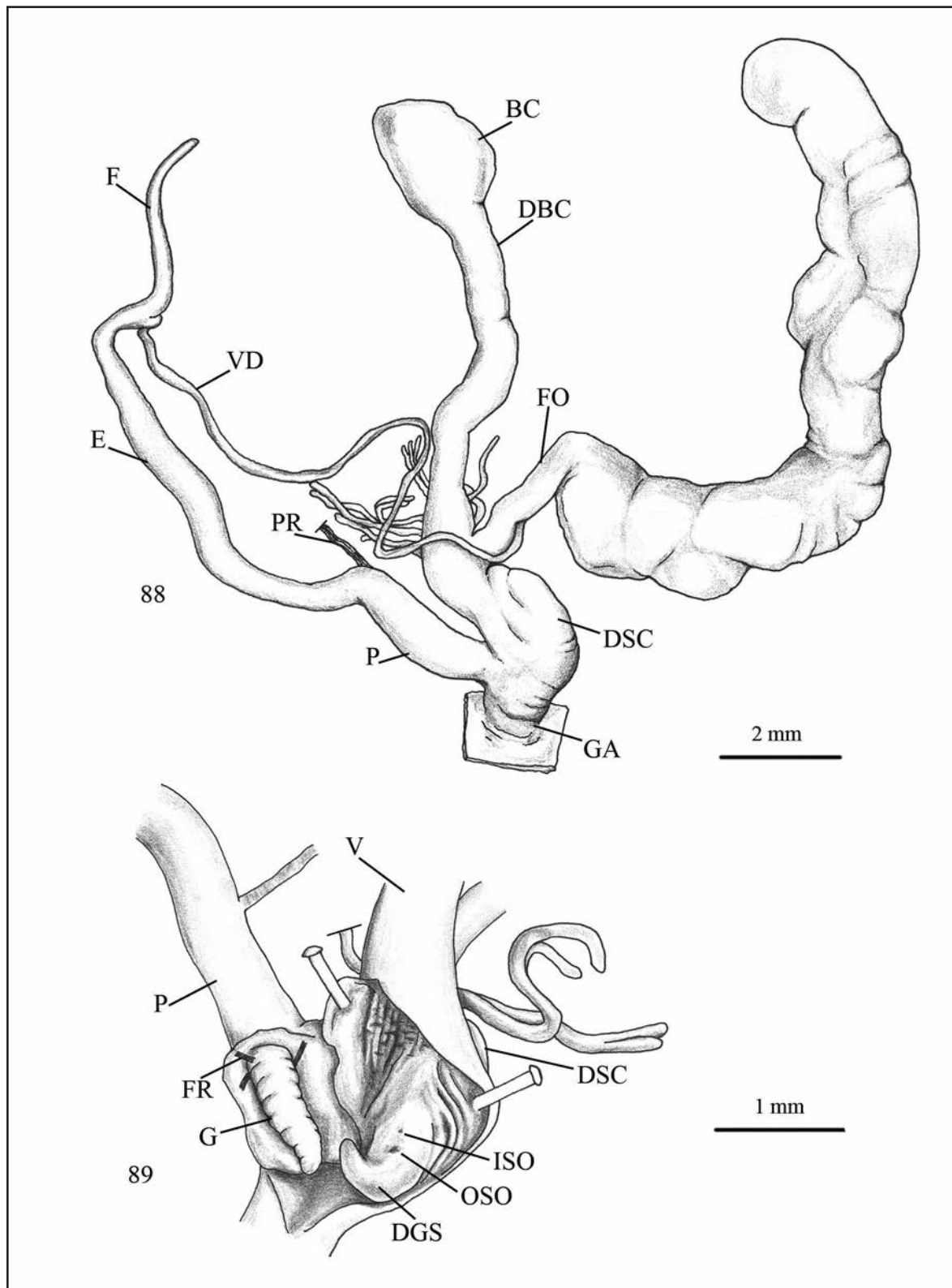


Figure 88. Genitalia of *Cernuella tineana*, Sciacca, Torre Macauda. Figure 89. Idem, internal structure of penis, dart sac and vagina.

spire more or less flat, with 5 regularly growing whorls, slightly convex; marked sutures; last whorl very convex below and keeled at its periphery; umbilicus deep and wide, about 1/3 of maximum shell diameter; aperture oval and slightly angled, peristome simple, interrupted, with internal rib.

Body. Animal whitish; dorsal region provided, more or less extensively, of dark spots.

Genitalia. Short free oviduct, duct of bursa copulatrix of medium length, with large base, ending in a sac-like bursa copulatrix; vagina short (1-1.6 mm), 2 tufts of digitiform glands with 4-5 slender lobes and 8-12 apices, disposed on opposite sides of proximal vagina. Dart-sac complex consisting of a pair of stylophores located on one side of vagina; large outer stylophore containing dart. Penial complex composed of flagellum, epiphallus and penis; flagellum long (2-2.4 mm), ending where vas deferens enters penial complex; epiphallus long 3-5 times the length of the penis (4.5-5.5 mm), ending where penial retractor muscle contacts penial complex wall; penis short (1.5-2.2 mm); penial papilla cylindrical, elongate, with apical opening, and base connected to penial walls by three small muscles (frenula).

BIOLOGY AND DISTRIBUTION. *C. tineana* is found on the ground, usually on grass often under stones. It is endemic to Sicily, distributed with point populations in coastal and low-hill territories ranging from Custonaci (Monte Cofano) in the province of Trapani to Ribera in the province of Agrigento (Fig. 90).

COMPARATIVE NOTES. Anatomical character of "*Helix*" *tineana* suggest to ascribe this species to the genus *Cernuella* Schluter, 1838 sensu stricto: penial papilla with three basal frenula, two groups of digitiform glands on opposite sides of the vagina, proximal vagina short or absent, proximal portion of the duct of bursa copulatrix wide (Manganelli & Giusti, 1987; Manganelli et al., 1996a, b, 2001). Currently, five species of *Cernuella* s. str. are recognized in Sicily (Bank, 2012): *C. aradasi* (Pirajno, 1842), *C. metabola* (Westerlund, 1889), *C. cisalpina* (Rossmässler, 1837), *C. virgata* (Da Costa, 1778), *C. rugosa* (Lamarck, 1822).

C. aradasi is a dune-species with limited distribution to the dunes near the lighthouse in Messina (North-east Sicily) and neighbouring sandy soils. It's distinguished from *C. tineana* for shell smaller, smooth, globose and without keel; genitalia characterised by relatively large penis and by epiphallus twice as long as penis.

C. metabola is an endemic species from Lampedusa island; it is distinguished from *C. tineana* by the shell with the globose shell with discontinuous, thick ribs and narrow umbilicus. A preliminary study on the genitalia of this species seems to highlight significant differences from the other *Cernuella* species (unpublished data).

C. cisalpina is a polymorphic species, with a Mediterranean distribution, for which several taxa of still difficult taxonomic interpretation were established. Shell of small-medium size, "small sized *Cernuella*" sensu Manganelli & Giusti (1987), subglobose, with thin ribs, sometimes well raised, last whorl usually rounded or angled at its periphery (keel-like) (Figs. 82-84). Some populations of *C. cisalpina* present a shell similar to that of *C. tineana*, but in addition to the morphological characteristics of *C. tineana* pointed out above, they are always distinguishable by their genitalia with epiphallus 2-3 times longer than penis, flagellum and penis proportionally shorter and digitiform glands lower, i.e. between the vagina and the inner dart sac (Fig. 86).

C. virgata is a polymorphic species showing a European-wide distribution. In Sicily it is common at low and medium altitudes where specimens can be found on grass and shrubs. *C. virgata* is distinguished from *C. tineana* for the shell which is smooth or with faint wrinkles, without keel and larger, "large sized *Cernuella*" sensu Manganelli & Giusti (1987); genitalia resembling those of *C. cisalpina* but with epiphallus longer and more numerous digitiform glands.

C. rugosa, endemic of Western Sicily known only for two locations (Figs. 79-81, 90), is an extremely vulnerable species deserving of protection. From the morphological point of view *C. rugosa* is distinguished from *C. tineana* for the shell with raised, irregularly spaced ribs and a cordlike, crenulated keel at its periphery, and for the penial complex (Figure 87; Manganelli et al., 1996b, Fig. 16) with penis longer, epiphallus and flagellum shorter.

C. tineana is morphologically well distinguishable from other *Cernuella* species sensu stricto. Differential diagnosis problems may arise with the shell of *Cernuella* (*Xeroamanda*) *amanda* Rossmässler, 1838 (see also Benoit, 1862-1857) (Figs. 76-78).

In the latter species the shell is as convex inferiorly as in the upper part, the keel is less obtuse than *C. tineana*, opening more angled and the um-

bilicus markedly funnel-shaped. However, an examination of genitalia can easily allow to distinguish the two species that belong to distinct subgenera (Manganelli et al., 1996).

REMARKS. *Helix tineana* was described by Benoit (1862) for the surroundings of Calatafimi, "Pizzo di grasso" and dedicated to the then Director of the Orto Botanico of Palermo, Vincenzo Tineo. Benoit (1857) provides, in addition to the detailed description of the shell, also a comparative analysis of "*Helix*" *rugosa* Lamark, 1822 and "*Helix*" *amanda* Rossmässler, 1838, and draws the three species in table IV, figs. 24, 25, 29. In his later works, Benoit (1875, 1882) reported this species citing only the locus typicus. Other authors cited this species: Pfeiffer (1868), Kobelt (1875), Kobelt in Rossmassler (1877), Tryon (1887). Westerlund (1876) reports it indicating the locality "Sicilia" and describes the variety *kobeltiana* on the basis of specimens received by Kobelt under the name "H.

tinei Ben.". Subsequently, Westerlund (1889) re-describes *H. tineana* from "Sicilien bei Calatafimi" and adds to the variety *kobeltiana* the new var. *mista* with "Sicilien" as locus typicus.

Alzona (1971) ascribes "*tineana*" to the genus *Helicella* Férussac, 1821 subgenus *Xerotropis* Monterosato, 1892 and considers the two varieties described by Westerlund (1889) as valid subspecies. Neither Cossignani & Cossignani (1995) and Manganelli et al. (1995) nor Bank (2012) report "*Helix*" *tineana* for, respectively, the Italian fauna and the European fauna.

Despite repeated searches, we have not found this species in the locus typicus, Calatafimi. However, in Paulucci collection we saw a shell determined as "*Helix tineana*" (MZUF GC/10825), collected in Calatafimi by a sicilian naturalist De Stefani, in 1868 (Figs. 53-56). This topotypic sample corresponds with Benoit's original description and even with the specimens we have sampled and studied on Monte Cofano. The more southerly po-

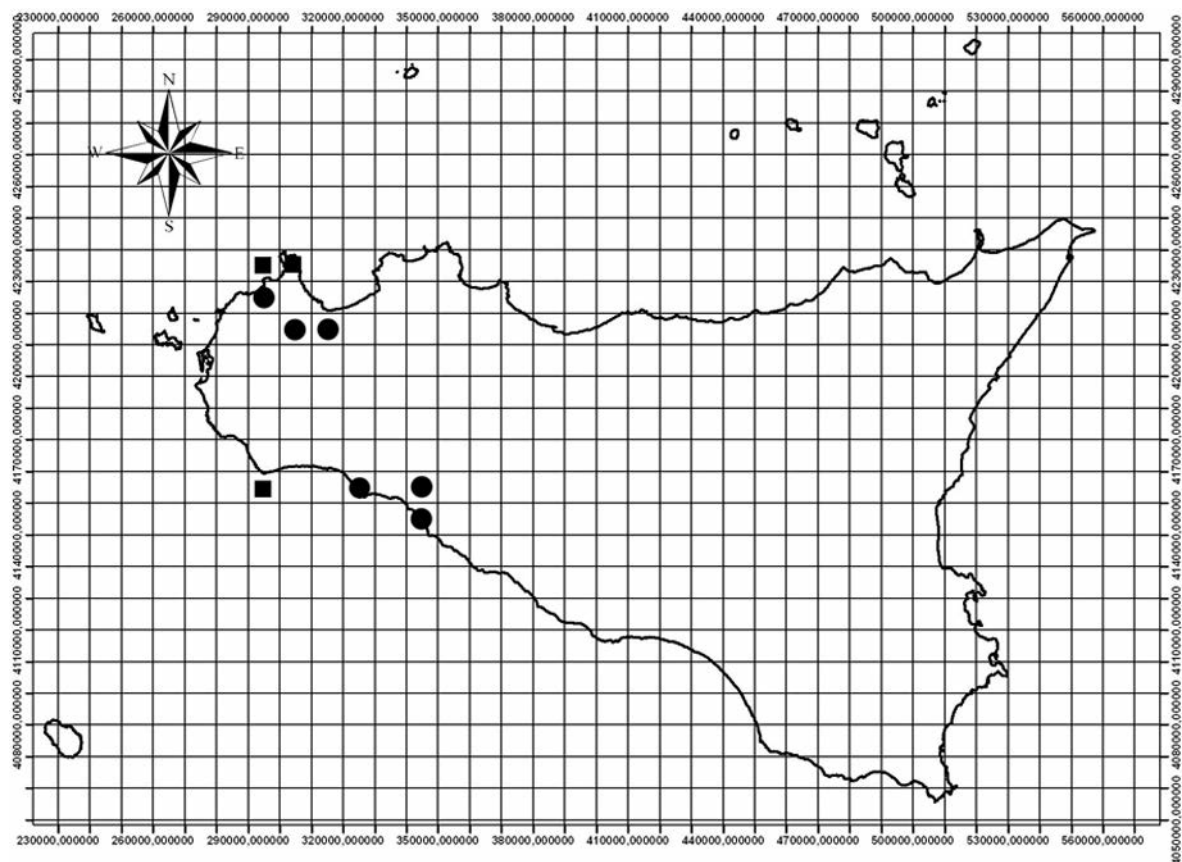


Figure 90. Geographic distribution of *C. tineana* (circles) and *C. rugosa* (squares) in Sicily.

pulations (Sciacca, Ribera) have slightly larger dimensions. To these populations we attribute, by comparison, also one sample from Paulucci collection sub *H. caficiniana* (MZUF GC/41419) picked up at Sciacca, Monte San Calogero (South-Western Sicily) (Figs. 67-69).

"*Helix*" *caficii*, described by Westerlund (1876) with locus typicus Sciacca, corresponds, in our view, with the populations of *C. tineana* of Sciacca. If the examination of the type in the Westerlund collection will confirm this assumption "*Helix*" *caficii* may be a synonym of *C. tineana*.

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