

## Two new Clausiliidae (Gastropoda Pulmonata) of Sicily (Italy)

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### ABSTRACT

In the present paper the Authors describe two new Clausiliidae (Gastropoda Pulmonata) of Sicily (Italy): *Muticaria cyclopica* n. sp. from SE-Sicily and *Siciliaria calcarae orlandoi* n. ssp. from W-Sicily. The two new species are described by virtue of their distinctive conchological and anatomical features. Additional biological and taxonomic notes are provided.

### KEY WORDS

Door snails; Clausiliidae; *Muticaria*; *Siciliaria*; new taxa; taxonomy; Sicily.

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### INTRODUCTION

*Muticaria* Lindholm, 1925 and *Siciliaria* Vest, 1867 s. str. are xeroresistant and calcicolous mollusks, widespread, the first, in CE and SE-Sicily and Maltese Islands, the second in W-Sicily and Egadi Islands (Alzona, 1971; Beckmann, 1990, 1992; Cossignani & Cossignani, 1995; Giusti et al., 1995; Manganelli et al., 1995; Nordsieck, 2007, 2013; Liberto et al., 2010, 2015; Bank, 2011; Colomba et al., 2012). The strict connection between the geological nature (calcareous) of the soil they live in and the extremely scarce vagility of specimens results in island-like distributional patterns and contributes to high levels of endemism. Nordsieck (2007) listed 6 taxa of specific and subspecific ranks for *Muticaria* and 16 taxa for *Siciliaria* s. str. Recently, Colomba et al. (2012) described a new species of *Muticaria*.

The researches carried out in the last years on the Sicilian freshwater and land mollusks allow us

to describe two new Clausiliidae (Gastropoda Pulmonata), *Muticaria cyclopica* n. sp. from SE-Sicily and *Siciliaria (Siciliaria) calcarae orlandoi* n. ssp. from W-Sicily.

ABBREVIATIONS AND ACRONYMS. AUPP = anterior upper palatal plica; BC = bursa copulatrix; BCD = diverticulum of bursa copulatrix; CD = copulatory duct; CL = columellar lamella; D = shell width; DBC = duct of the bursa copulatrix; DE = distal epiphallus; FO = free oviduct; G = penial papilla; GA = genital atrium; H = shell height; L = lunella; LPP = lower palatal plica (basal plica); P = penis; PD = diverticulum of penis; PE = proximal epiphallus; PL = parietal lamella; PLL = parallel lamella; PP = principal plica; PR = penial retractor muscle; PUPP = posterior upper palatal plica; SCL = subcolumellar lamella; SL = spiral lamella; SUL = sulcalis plica; SP = sutural plica; V = vagina; VD = vas deferens; ex/x = specimen/s, s.l. = sensu lato; s. str. = sensu stricto.

The materials used for this study are deposited in the following Museums and private collections:

A. Brancato collection, Syracuse, Italy (CB); S. Giglio collection, Cefalù, Italy (CG); Laboratory of Cytogenetics and Molecular Biology, University of Urbino, Italy (LCMBU); F. Liberto collection, Cefalù, Italy (CL); Museo Naturalistico F. Minà Palumbo, Castelbuono, Italy (MNMP); Museo Civico di Storia Naturale di Comiso (MSNC); Museo Civico di Storia Naturale di Genova "G. Doria", Italy (MSNG); Museo Regionale di Terrasini (MRT); A. Reitano collection, Tremestieri Etneo, Italy (CR); I. Sparacio collection, Palermo, Italy (CS); R. Viviano collection, Palermo, Italy (CV).

## MATERIAL AND METHODS

All specimens were collected by sight on the soil and under the rocks. Observations on ecology of these organisms were made directly in the field. Dry shells have been studied as regard size, colour, morphology, sculpture, aperture, plicae and lamellae, lunella and clausilium. 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. Photographs were taken with a digital camera. 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 listed above. Toponyms (place-names) are reported following the Portale Cartografico Nazionale (PCN, <http://www.pcn.minambiente.it/PCN/>), Map IGM 1:25000. Each locality and/or collection site is in the original language (Italian).

All the specimens were studied by a Leica MZ 7.5 stereomicroscope. The taxonomic order and nomenclatural arrangement follow Nordsieck (2007, 2013) and Bank (2011).

## RESULTS

### SYSTEMATICS

Phylum MOLLUSCA Cuvier, 1795  
 Classis GASTROPODA Cuvier, 1795  
 Ordo PULMONATA Cuvier in Blainville, 1814  
 Subordo STYLOMMATOPHORA A. Schmidt, 1855

Familia CLAUSILIIDAE J.E. Gray, 1855  
 Subfamilia ALOPIINAE A.J. Wagner, 1913  
 Tribus MEDORINII H. Nordsieck, 1997

Genus *Muticaria* Lindholm, 1925

Type species: *Clausilia scalaris* L. Pfeiffer, 1850

*Muticaria cyclopica* n. sp. (Figs. 1–13)

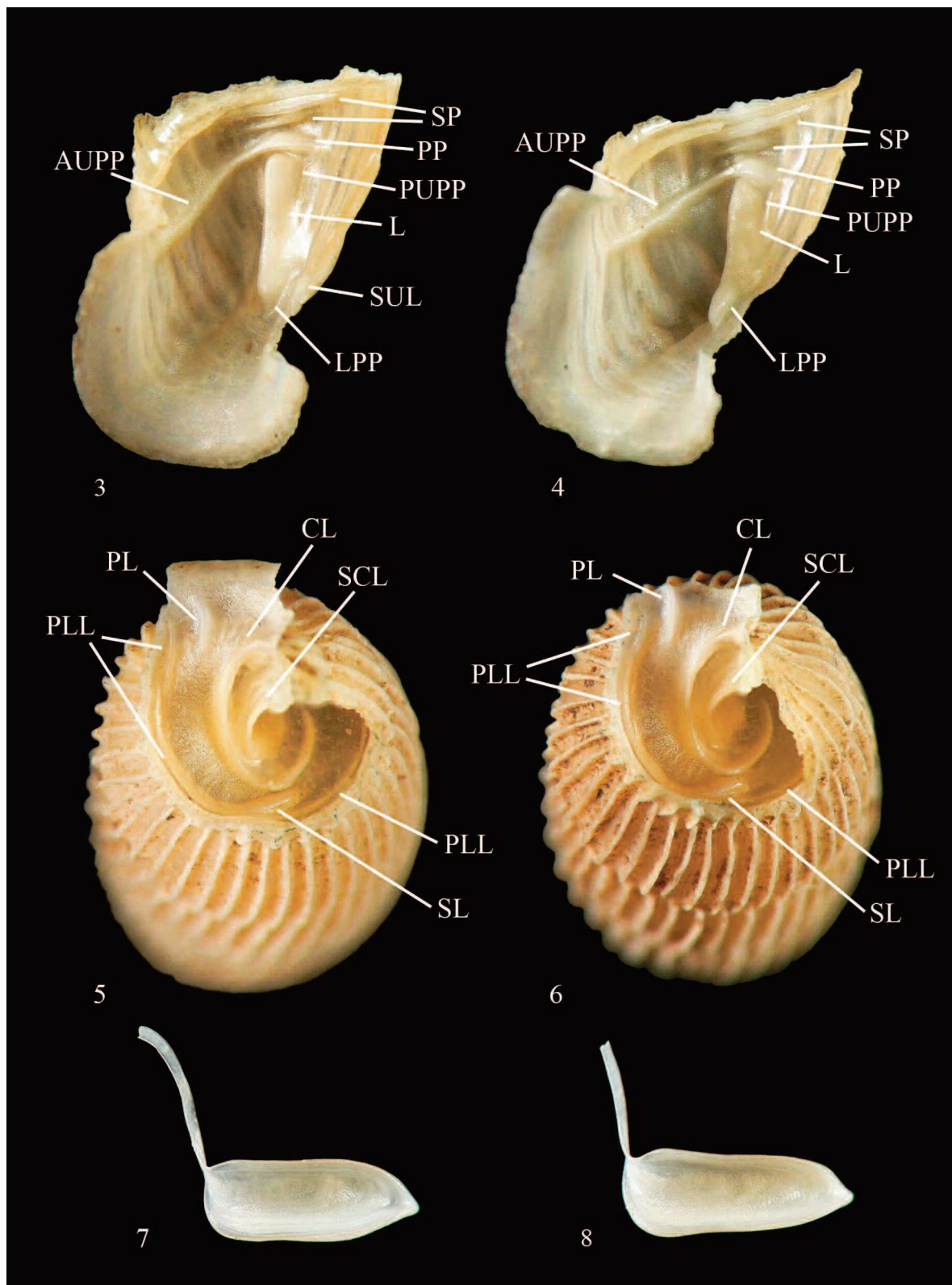
EXAMINED MATERIAL. Holotype: Italy, Sicily, Siracusa, Epipoli, 37°05'20"N, 15°13'49"E, 122 m, legit A. Reitano, 5.V.2015 (MSNC n. 4537). Paratypes: Siracusa, Epipoli, Castello di Eurialo, 37°05'20"N, 15°13'48"E, 112 m, legit A. Reitano and A. Brancato, 8.XI.2012, 5 exx (LCMBU); idem, 3 shells (MSNC n. 4537); idem, 49 shells (CL n. 16514–16562); idem, 8.XI.2012, legit A. Reitano, 38 exx (CR); idem, 2 exx (MSNG), idem, 2 exx (MNMP); idem, 37°05'20"N, 15°13'49"E, 122 m, legit A. Reitano, 5.V.2015, 6 exx, 13 shell (CL n. 16771–16789); idem, legit A. Reitano, 6.IV.2016, 8 exx (CL n. 16798–16805); idem, legit A. Reitano, 6.IV.2016, 28 exx (CS); idem, 37°05'20"N, 15°13'48"E, 112 m, legit A. Reitano, 6.IV.2016, 3 exx (MSNC n. 4538, 4539, 4540); idem, 8.VI.2016, 15 shells (CL n. 17293–177307).

DESCRIPTION OF HOLOTYPE. Shell sinistral, dimensions: height: 13.58 mm, maximum diameter: 4.2 mm, cylindrical-fusiform, decollate, rather robust, light yellowish-grey in colour; external surface with minute, raised, close ribs, 40 ribs on penultimate whorl; last whorl with robust and spaced ribs; spire slowly and regularly growing, with 4 whorls; last whorl tapering downwards, with elevated and curved cervical keel and lower basal keel; suture moderately deep; umbilicus closed; square aperture, with 5 lamellae (on parietum and columellar side) and lunella and 5 plicae (on palatum); on parietum, starting from suture, there are: very long parallel lamella, emerging in its anterior portion and well prolonged inside the shell in its posterior portion; short spiral lamella, deviating from centre of parietum to adhere to parallel lamella; (upper) parietal tooth-like lamella; on columellar side there are a low columellar lamella and an internal subcolumellar lamella; on palatum (Fig. 3) there is an evident and raised lunella and, starting from suture: two sutural plicae, the principal plica is robust in its posterior portion, whereas its anterior portion, fused to anterior upper palatal

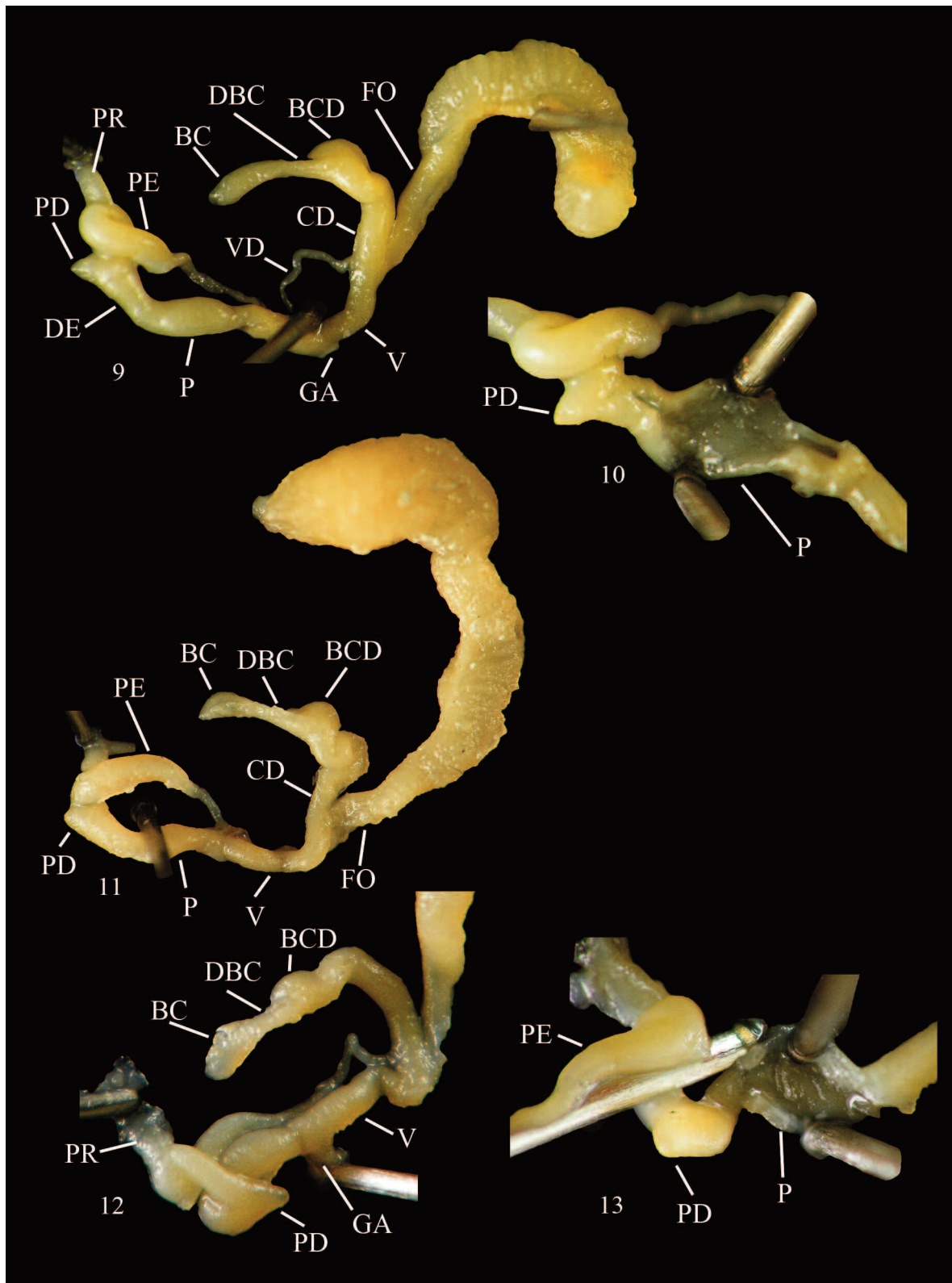


Figure 1. Shell of *Muticaria cyclopica* n. sp., Italy, Sicily, Siracusa, Epipoli, H: 11.35 mm - D: 3.90 mm (MSNC n. 4537).  
Figure 2. Idem, H: 13.95 mm - D: 4.40 mm (CL n. 16527).





Figures 3–8. *Muticaria cyclopica* n. sp., Siracusa, Epipoli: palatum, parietum, clausilium. Figure 3. Palatum of holotype (MSNC n. 4537). Figure 4. Palatum (CL n. 16514). Figures 5–6. Parietum of two specimens (CL n. 16522, 16523). Figures 7–8. Clausilium of two specimens (CL).



Figures 9–13. Genitalia of *Muticaria cyclopica* n. sp., Siracusa, Epipoli. Figure 9. Genitalia of holotype (MSNC n. 4537). Figure 10. Internal structure of penis, with penial papilla (same specimen of figure 9). Figure 11. Genitalia (CL n. 16772). Figure 12. Genitalia (CL n. 16798). Figure 13. Internal structure of penis, with penial papilla (same specimen of figure 12).

plica, is thinner and raised; rudimental posterior upper palatal plica fused to lunella apex; short basal plica fused to the base of lunella, small and curved sulcal plica; clausilium slender; plough-like basal plate, apically pointed, with subparallel columellar and palatal edges, and rounded sutural angle; peristome continuous, reflected, distinct from the wall of the last whorl.

Genitalia (Figs. 9, 10) are characterized by: short vagina (1.47 mm), very short free oviduct (0.4 mm), well developed ovispermiduct and a short copulatory duct (0.9 mm) ending in a branched bursa copulatrix complex: one branch consisting of a short and wide diverticulum of the bursa copulatrix (0.78 mm) and the other branch with very short bursa copulatrix duct and oval and elongated (1.52 mm) bursa copulatrix. Penial complex consisting of flagellum, epiphallus, penial diverticulum and penis; epiphallus (2 mm) divided, by point insertion of robust penial retractor muscle, into proximal and distal portions, the latter very short; very short and pointed penial diverticulum (0.55 mm) arising on border between distal epiphallus and penis; penis short (1.22 mm). Internal walls of penis without pleat.

VARIABILITY. Shell (10 specimens examined) (Figs. 1, 2, 4–8): dimensions in decollate specimens (4–5 whorls): height: 15.19–12.55 mm (on average: 13.59 mm); maximum diameter: 4.43–3.90 mm (on average: 4.21 mm). The number of ribs on 2 mm of the penultimate whorl ranges from 9 to 7 (on average, 7.7); parallel lamella from emerging to scarcely visible in frontal view of the aperture; spiral lamella adherent or fused to parallel lamella. Genitalia (5 specimens examined) (Figs. 11, 13): short to moderately long vagina (1.20–1.65 mm) and copulatory duct (0.9–1.65 mm); pointed to round penial diverticulum.

ETYMOLOGY. The specific epithet is derived from the English word cyclopic referring to the characteristic ancient Greek cyclopic walls of the type locality.

BIOLOGY AND DISTRIBUTION. Like the other *Muticaria* species, *M. cyclopica* n. sp. is xeroresistant and calcicolous and lives on limestone blocks of the ancient Greek walls of the type locality and under stones in stony soils.

The genus *Muticaria* is represented by about 7 taxa, most of which having a strictly limited distri-

bution in C-E and S-E Sicily (Fig. 14) and Maltese Islands. *M. syracusana* (Philippi, 1836) is confined to a few coastal locality of Syracuse province (locus typicus Syracuse: Philippi, 1836), *M. neuteboomi* Beckmann, 1990 (locus typicus Cava d'Ispica, Modica, Raguse province: Beckmann, 1990) occurs throughout the greater part of the S-E Sicily, *M. brancatoi* Colomba, Gregorini, Liberto, Reitano, Giglio et Sparacio, 2012 has a restricted distribution to South of Syracuse, and *M. cyclopica* n. sp., at moment, is known only for the description locality: Epipoli, a hill about 150 m high, very close to the modern city of Syracuse (20–60 m). *Muticaria macrostoma* (Cantraine, 1835) is endemic to the Maltese Islands where it occurs with four subspecies: *M. macrostoma macrostoma*, *M. macrostoma scalaris* (L. Pfeiffer, 1850), *M. macrostoma oscitans* (Charpentier, 1852) and *M. macrostoma mamotica* (Gulia, 1861).

COMPARATIVE NOTES. *Muticaria cyclopica* n. sp. is morphologically closer to *M. brancatoi* n. sp. than other *Muticaria* species (see Colomba et al., 2012); for the morphology of other *Muticaria* species see Giusti et al. (1995) and Colomba et al. (2010).

However, *M. cyclopica* n. sp. has a rudimental posterior upper palatal plica (absent in *M. brancatoi*), a more raised anterior portion of principal plica (fused to anterior upper palatal plica), a longer and often emerging parallel lamella; the genitalia have a smaller penial diverticulum and the internal walls of penis without pleats (present in *M. brancatoi*).

*Muticaria cyclopica* n. sp. is similar to *M. syracusana* in morphology of shell but it is distinct for the longer and often emerging parallel lamella, the thinner anterior portion of principal plica (fused to anterior upper palatal plica), the rudimental posterior upper palatal plica (more developed in *M. syracusana*); genitalia have a smaller penial diverticulum and shorter copulatory duct.

*Muticaria cyclopica* n. sp. is well distinct also from *M. neuteboomi* and *M. macrostoma macrostoma* for the anterior portion of principal plica fused to anterior upper palatal plica (independent in *M. neuteboomi* and *M. macrostoma* spp.) and for longer parallel lamella which adheres to spiral lamella (independent in *M. neuteboomi*, *M. macrostoma macrostoma*, *M. macrostoma oscitans* and *M. macrostoma scalaris*).



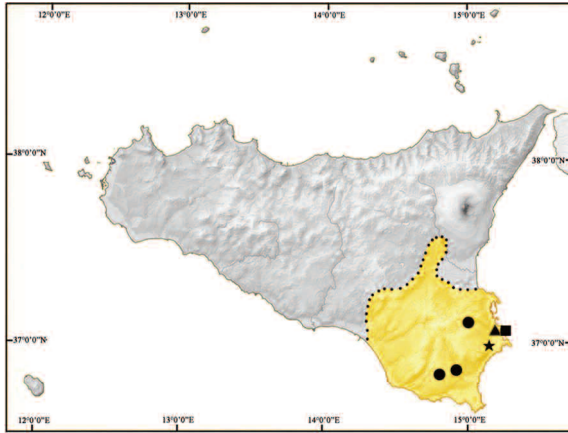


Figure 14. Geographic distribution of genus *Muticaria* in CE and SE Sicily (in yellow) with *M. cyclopica* n. sp. (triangle), *M. brancatoii* (star), *M. syracusana* (square) and *M. neuteboomi* (dots).

Genitalia with very short penial diverticulum, longer in *M. neuteboomi* and *M. macrostoma macrostoma*, *M. macrostoma scalaris* and *M. macrostoma oscitans*. Only *M. macrostoma mamotica* has a penial diverticulum similar to that of *M. cyclopica* n. sp.; however, *M. macrostoma mamotica* has genitalia with a pleat on the internal wall of the penis (not present in *M. cyclopica* n. sp.) and a ventricose shell (fusiform in *M. cyclopica* n. sp.) with shorter parallel lamella and anterior portion of principal plica distinct from anterior palatal plica (fused in *M. cyclopica* n. sp.).

Preliminary molecular studies (Gregorini et al., 2008; Colomba et al., 2010; 2012) showed the existence of significant genetic differences between populations attributed either to *M. syracusana*, *M. neuteboomi* or *M. brancatoii*, including the topotypic ones. Moreover, further and more complete molecular data (personal unpublished data), confirmed these preliminary results; furthermore, by comparing cytochrome oxidase I (COI) partial sequences, specimens of *M. cyclopica* n. sp. turn out to be genetically distant from all other Sicilian and Maltese *Muticaria* populations.

Tribus Delimini R. Brandt, 1956

Genus *Siciliaria* Vest, 1867

Subgenus *Siciliaria* Vest, 1867

Type species: *Clausilia grohmanniana* Rössmassler, 1836

***Siciliaria (Siciliaria) calcarae orlandoi* n. ssp.**  
(Figs. 15–30)

EXAMINED MATERIAL. Holotype: Italy, Sicily, Corleone, Rocca Busambra, Ficuzza, 27.IX.1981, legit V.E. Orlando (MRT, n. 31040 Orlando collection, written in the box and in the register: *Siciliaria calcarai* n. subsp., det. H. Nordsieck); Paratypes: same data of holotype, 4 exx (MRT, n. 31041/4 Orlando collection); Corleone, Bosco Ficuzza, 25.IV.1971, legit V.E. Orlando, 2 exx (MRT, n. 4903/4 Orlando collection); Monreale, Ficuzza, Val di Conti, 23.III.1981, 2 exx (CS); idem, legit I. Sparacio, 8 exx (CL n. 17276–17283); Monreale, Diga Scanzano, 31.XII.1989, 5 exx (CS); Monreale, Bosco del Cappelliere, 2.I.1991, 21 exx (CS); idem, 28.XI.1993, 8 exx (CS); Godrano, Rocca Busambra, Alpe Cucco, 21.II.2010, 5 exx (CS); Monreale, Bosco Ficuzza, Ponte Arcera, 37°55'42" N; 13°23'01" E; 27.IX.2009; 9 exx, (CL n. 5508–5516); Monreale, Bosco del Cappelliere, Cozzo San Leopoldo, 37°54'53"N, 13°22'57"E, 616 m, 2.IV.2016, 4 shells (CV); idem, 3 exx, legit R. Viviano (CL n. 16446–16448).

OTHER EXAMINED MATERIAL. *Siciliaria calcarae calcarae* (Philippi, 1844). Italy, Sicily, Palermo, San Ciro, 31.X.1986, 7 exx (CS); idem, 38°05'11"N, 13°23'07"E, 190 m, legit Sparacio I., 28.XI.2015, 2 exx (CL n. 16807–16829); Bagheria, Monte Catalfano, 30.VI.2006, 28 exx (CS); Palermo, base Monte Grifone, Cimitero Santa Maria di Gesù, 24.VIII.2014, 11 ex (CS); Favignana Island, Grotta delle Uccerie, 37°57'04"N, 12°18'18"E; 30 m, 11.IX.2010, 17 exx, 14 shells, (CL n. 8414–8444); Calatafimi, Le Rocche, 37°54'14"N, 12°48'14"E, 493 m, 20.XI.2011, 6 exx, 15 shells (CL n. 10763–10783); Scopello, Torre Bennistra, 07.XII.2016, 3 exx (CR); Erice, Monte Castellazzo, 20.VI.2002, 26 exx (CR); Castellammare del Golfo, Monte Inici, VI.1996, 5 exx (CR).

*Siciliaria (S.) calcarae belliemi* (Brandt, 1961). Italy, Sicily, Partinico, Monte Belliemi, 1.III.2015, 28 exx (CS); idem, 8.V.2016, 34 exx (CS); idem 9 shells (CL n. 17284–17292).

*Siciliaria (S.) ferrox* (Brandt, 1961). Italy, Sicily, Trabia, Torre Sant'Onofrio, 143 m, 25.VIII.2007, 30 shell (CL n. 2331–2360); Altavilla Milicia, Grotta Mazzamuto, 15.X.2015, 25 exx (CS).

**DESCRIPTION OF HOLOTYPE.** Dimensions: height 19 mm; maximum diameter 4.8 mm. Shell elongated, fusiform, sinistral, not decollate, obtuse apex, robust, brown in colour (Figs. 15, 16); external surface with very minute and just raised ribs equally arranged in all whorl of teleoconch; 92 ribs on penultimate whorl. Spire slowly and regularly growing, with 11 whorls little convex; basal and cervical keels little distinct; umbilicus closed; suture shallow with papillae scattered and slightly evident (more numerous from third to seventh whorl); aperture about  $\frac{1}{4}$  of shell height, subovoidal, with 4 lamellae on parietum and columellar side, lunella, and 4 plicae on palatum. On palatum there is an evident lateral lunella, starting from suture there are a long and raised principal plica not fused to lunella apex and slightly wider in its posterior portion, a short posterior portion of upper palatal plica fused to lunella apex and an obsolete upper palatal plica represented only by a short, large callosity little in relief, a medium long basal plica, the internal first part of which is joined to the base of lunella; a short sulcalis. On parietum and columellar side there are: non emergent and well raised spiral lamella in centre of parietum; tooth-like (upper) parietal lamella, moderately high (inferior) columellar lamella, non emergent subcolumellar lamella. Peristome continuous, slightly thickened, reflected, superiorly attached to the wall of last whorl.

**VARIABILITY.** Dimensions of paratypes (not decollate) (Fig. 17): height: 18–22 mm; maximum diameter: 4.2–4.8 mm; ribs on the penultimate whorl of the shell ranges from 88 to 95 mm, but some ribs are incomplete or obsolete; sometimes a very little sutural plica is present; the upper palatal plica can be very small or absent (Figs. 18, 19). Parietum as in figure 20. Clausilium (Figs. 21–22) with elongate plough-like basal plate, sutural angle slightly bent up, palatal and columellar edges of plate nearly parallel; outer corner more or less pointed.

Genitalia (5 specimens examined) (Figs. 23–28) are characterized by: slender and thin free oviduct, well developed ovispermiduct; bursa copulatrix complex consist of slender copulatory (3.45–2.8 mm) duct ending in two branches: one branch consisting of a long diverticulum of the bursa copulatrix (5.2 mm), second branch consisting of very short bursa copulatrix duct with cylindrical bursa copulatrix; vagina short (1.8–2.5 mm) and uniform in diameter; vas deferent long and slender, entering

the epiphallus; epiphallus (2.6–3.2 mm) divided by point insertion of robust penial retractor muscle into cylindrical-conic proximal portion and shorter distal portion slightly enlarged before entering in the penis. Penis short (1.6–2.2 mm), wider than epiphallus; internal walls of penis show two weak longitudinal furrows; conic penial papilla, with slightly pointed apex and a restriction to the base.

Body. Animal long, narrow, posteriorly pointed, blackish with a dorsal, narrow and whitish band; skin tubercle ovale-elongated; upper tentacles rather short, cylindro-conical, whitish, apically widened with small black eyes; pneumostome and genital opening on left side; foot long, narrow, with sole paler than body.

**BIOLOGY AND DISTRIBUTION.** *Siciliaria calcarae orlandoi* n. ssp. lives under the bark of dead trees and in the leaf litter of woods vegetating both in sandstone (Bosco del Cappelliere, Diga Scanzano) and calcareous (Alpe Cucco, Rocca Busambra) soils (Figs. 29, 30); in these two last localities *S. calcarae orlandoi* n. ssp. is found also on calcareous rocks into the woods. This new subspecies is known for the “Nature Reserve Bosco della Ficuzza, Rocca della Busambra, Bosco del Cappelliere e Gorgo del Drago” an area which is included in the Sicani Mountains Regional Natural Park since 2013.

*Siciliaria calcarae* s.l. lives on calcareous rocks, in cavities and under stones on calcareous soils. It is described from Palermo and is widespread in Western Sicily and the Egadi Islands (see Beckmann, 2004) (Figs. 31, 32, 56).

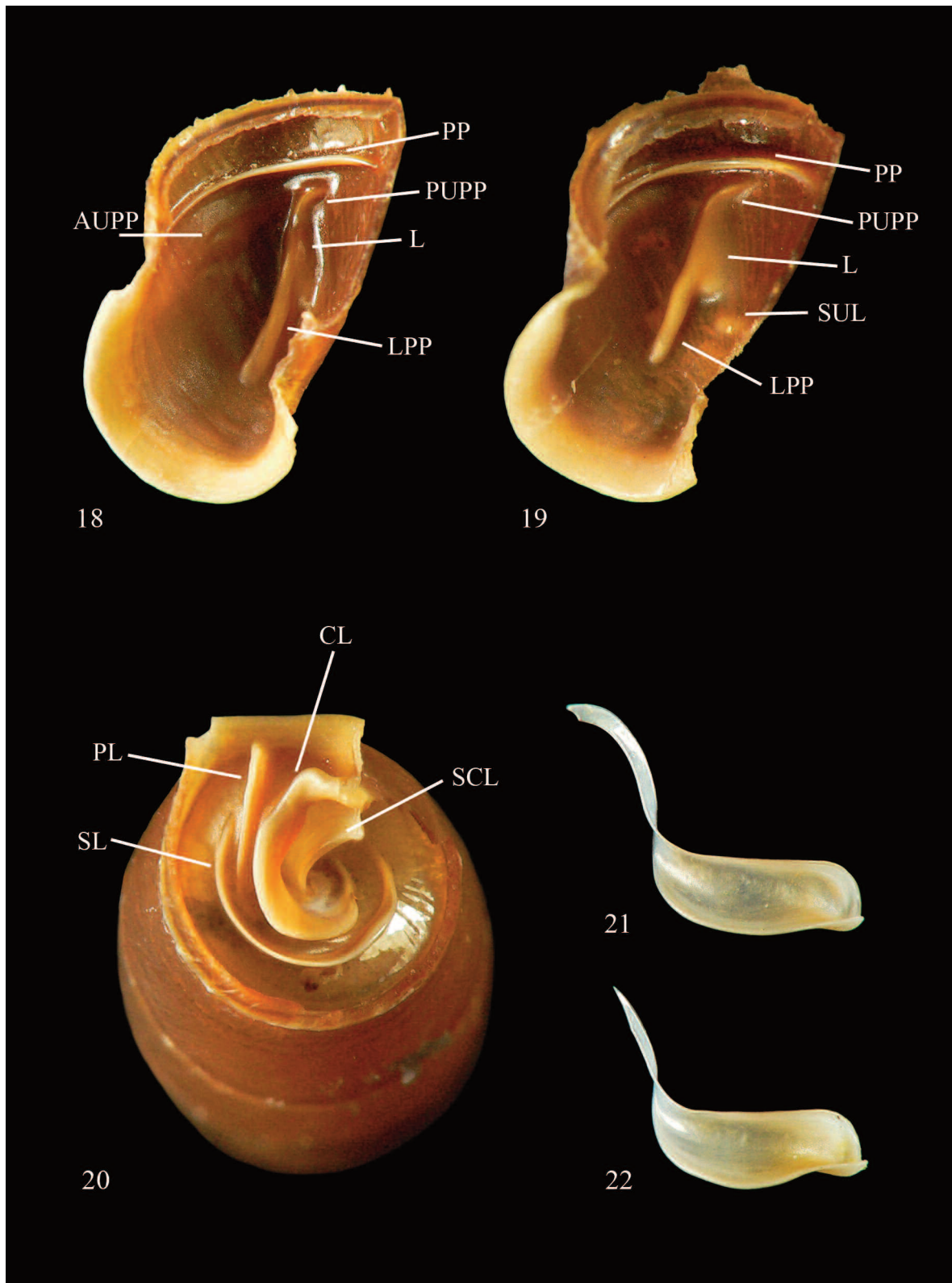
**ETYMOLOGY.** The new subspecies is dedicated to Vittorio Emanuele Orlando (1928–2014, Terrasini, Italy), who identified this taxon, to his passion for molluscan studies and his museum activity in Sicily.

**COMPARATIVE NOTES.** *Siciliaria calcarae orlandoi* n. ssp. is distinct from *S. calcarae calcarae* (Figs. 31, 35, 37–41, 45–55) for the reduced anterior upper palatal plica (longer and raised in *S. calcarae calcarae* who as, rarely, also a small second upper palatal plica), reduced or absent sutural plica (present in *S. calcarae calcarae*), moderately high columellar lamella (low in *S. calcarae calcarae*), the clausilium with sutural angle slightly bent up, thus palatal and columellar edges of plate are nearly parallel (sutural angle much bent up in *S. calcarae calcarae*).





Figure 15. Holotype of *Siciliaria (S.) calcarae orlandoi* n. ssp., Italy, Sicily, Corleone, Bosco Ficuzza, h: 19 mm, D: 4.8 mm (V.E. Orlando coll., MRT). Figure 16. Label of holotype of *S. calcarae orlandoi* n. ssp. (V.E. Orlando coll., MRT). Figure 17. Shell of *S. calcarae orlandoi* n. ssp., Monreale, Bosco Ficuzza, Ponte Arciera, H: 18.65 mm, D: 4.5 mm (CL n. 5512).



Figures 18–22. *Siciliaria (S.) calcarae orlandoi* n. ssp., palatum, parietum and clausilium. Figures 18, 19. Palatum: Monreale, Bosco Ficuzza, Ponte Arciera (CL n. 5509–5511). Figure 20. Parietum: Corleone, Val di Conti (CL n. 17276). Figures 21, 22. Clausilium: Monreale, Bosco Ficuzza, Ponte Arciera (CL).

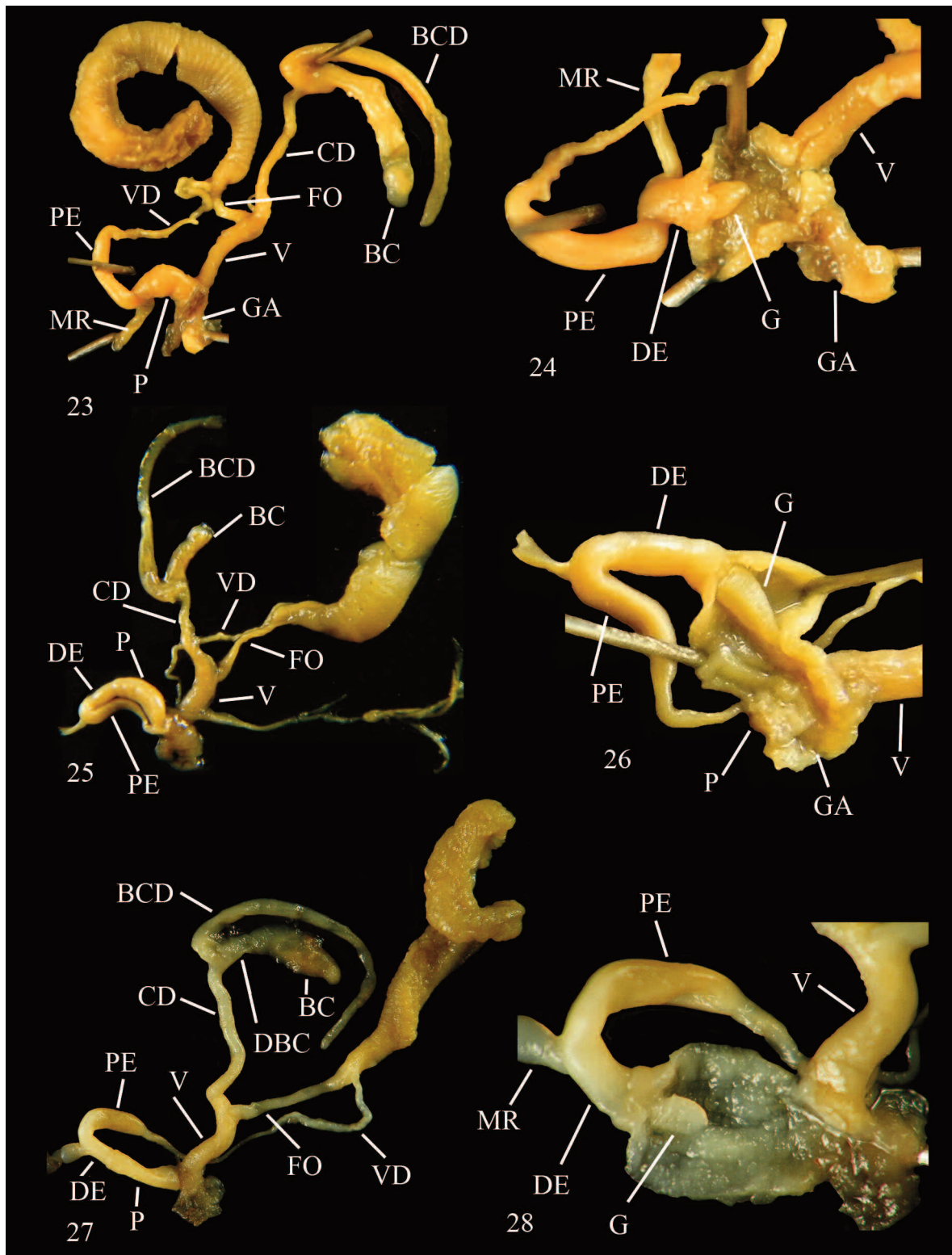


Figure 23–28. Genitalia of *Siciliaria (S.) calcarae orlandoi* n. ssp. Figure 23. Monreale, Bosco Ficuzza, Ponte Arciera (CL n. 5511). Figure 24. Idem, internal structure of penis, with penial papilla. Figure 25. Monreale, Bosco Ficuzza, Ponte Arciera (CL n. 5508). Figure 26. Idem, internal structure of penis, with penial papilla. Figure 27. Monreale, Bosco del Cappelliere, Cozzo San Leopoldo (CL n. 16448). Figure 28. Idem, internal structure of penis, with penial papilla.



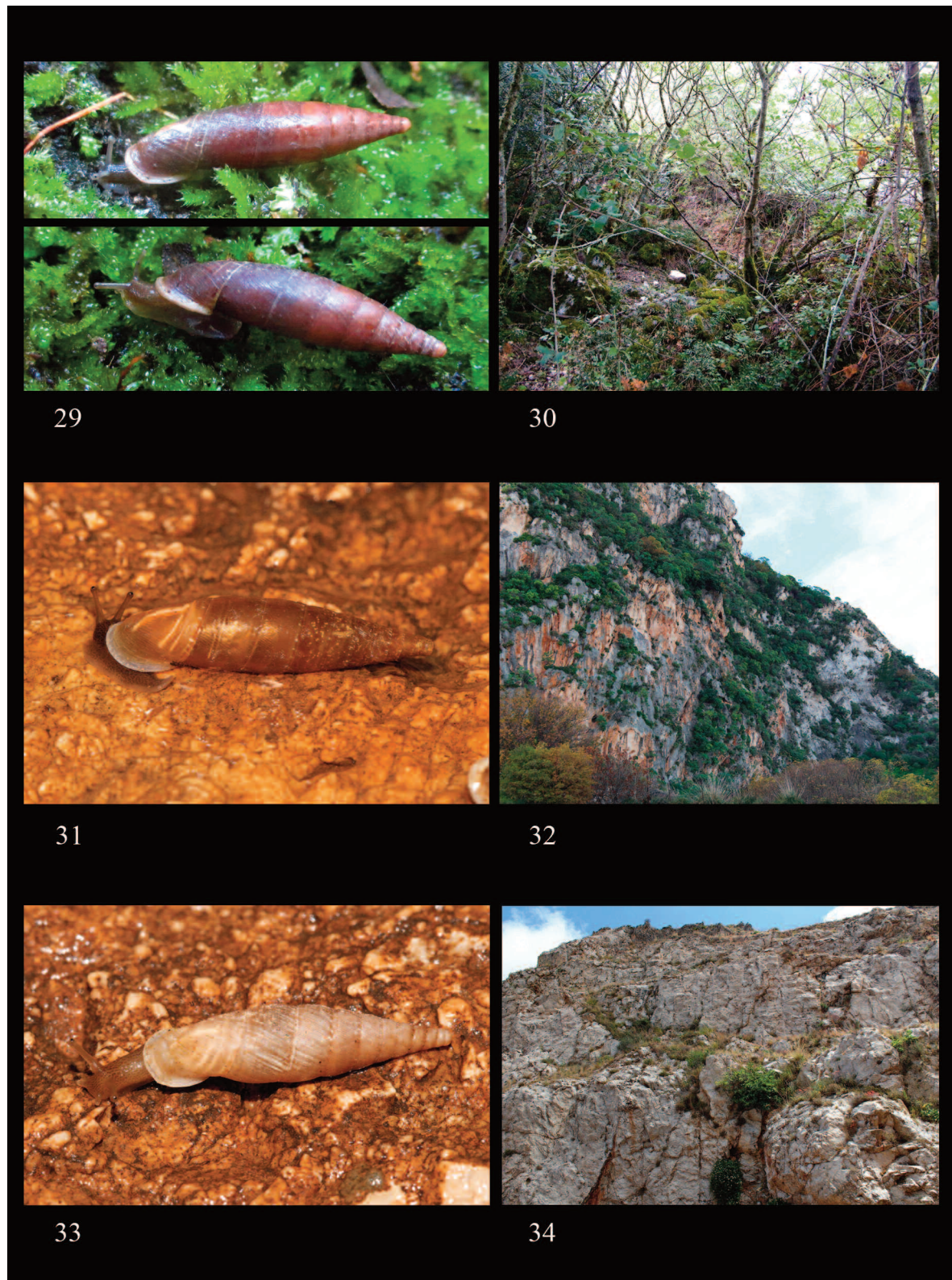


Figure 29. *Siciliaria (S.) calcarae orlandoi* n. ssp. in natural habitat. Figure 30. Landscape of Bosco Ficuzza, Monreale. Figure 31. *Siciliaria (S.) calcarae calcarae* in natural habitat. Figure 32. Landscape of San Ciro, Monte Grifone, Palermo. Figure 33. *Siciliaria (S.) calcarae belliemi* in natural habitat. Figure 34. Landscape of Monte Belliemi, Partinico.





Figure 35. *Siciliaria (S.) calcarae calcarae*, San Ciro, Monte Grifone, Palermo, H: 19.9 mm, D: 4.7 mm (CL n. 16816).  
Figure 36. *Siciliaria (S.) calcarae belliemi*, Monte Belliemi, Partinico, H: 17.35 mm, D: 4.15 mm (CL n. 17284).



Figure 37. *Siciliaria (S.) calcarae calcarae*, Le Rocche, Calatafimi H: 20.5 mm, D: 4.65 mm (CL n. 10769).  
Figure 38. *Siciliaria (S.) calcarae calcarae*, Grotta dell'Uccerie, Favignana, H: 18.5 mm, D: 4.1 mm (CL n.8431).



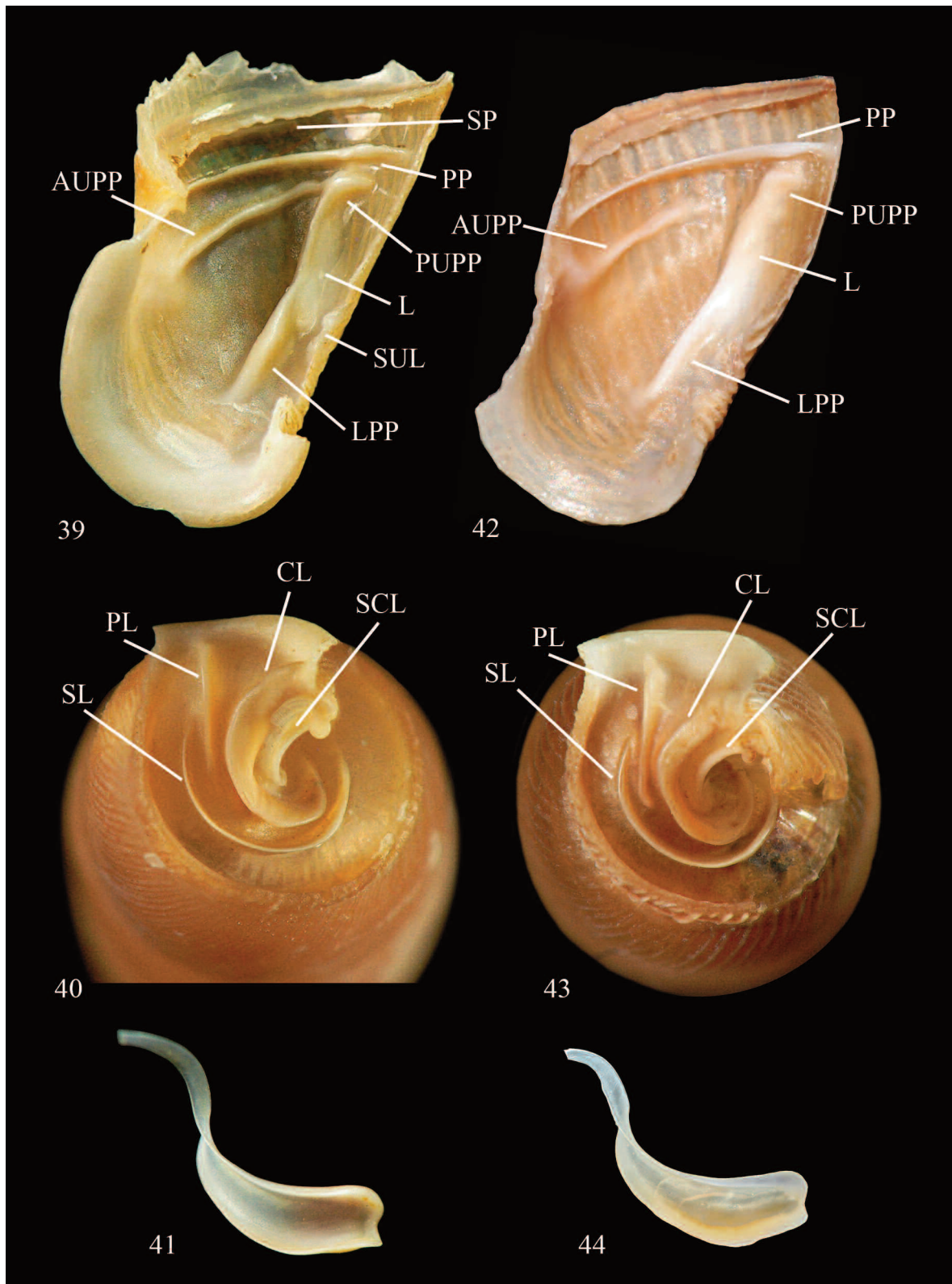


Figure 39. *Siciliaria (S.) calcarae calcarae*, San Ciro, Monte Grifone, Palermo: palatum (CL n. 16819). Figure 40. Idem, parietum (CL n. 16820). Figure 41. Idem, clausilium (CL). Figure 42. *Siciliaria (S.) calcarae belliemi*, Monte Belliemi, Partinico: palatum (CS). Figure 43. Idem, parietum (CL n. 17286). Figure 44. Idem, clausilium (CL).

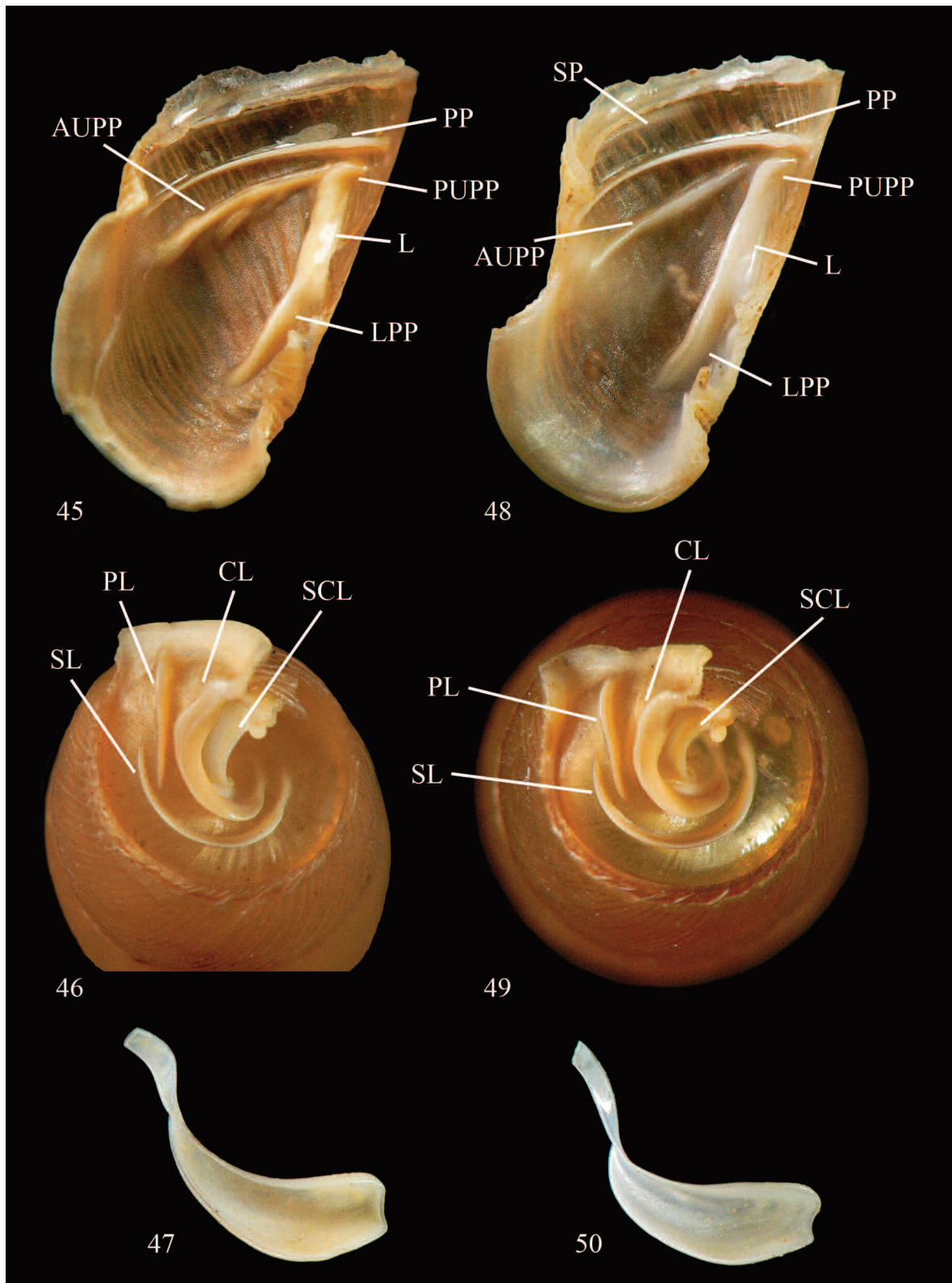
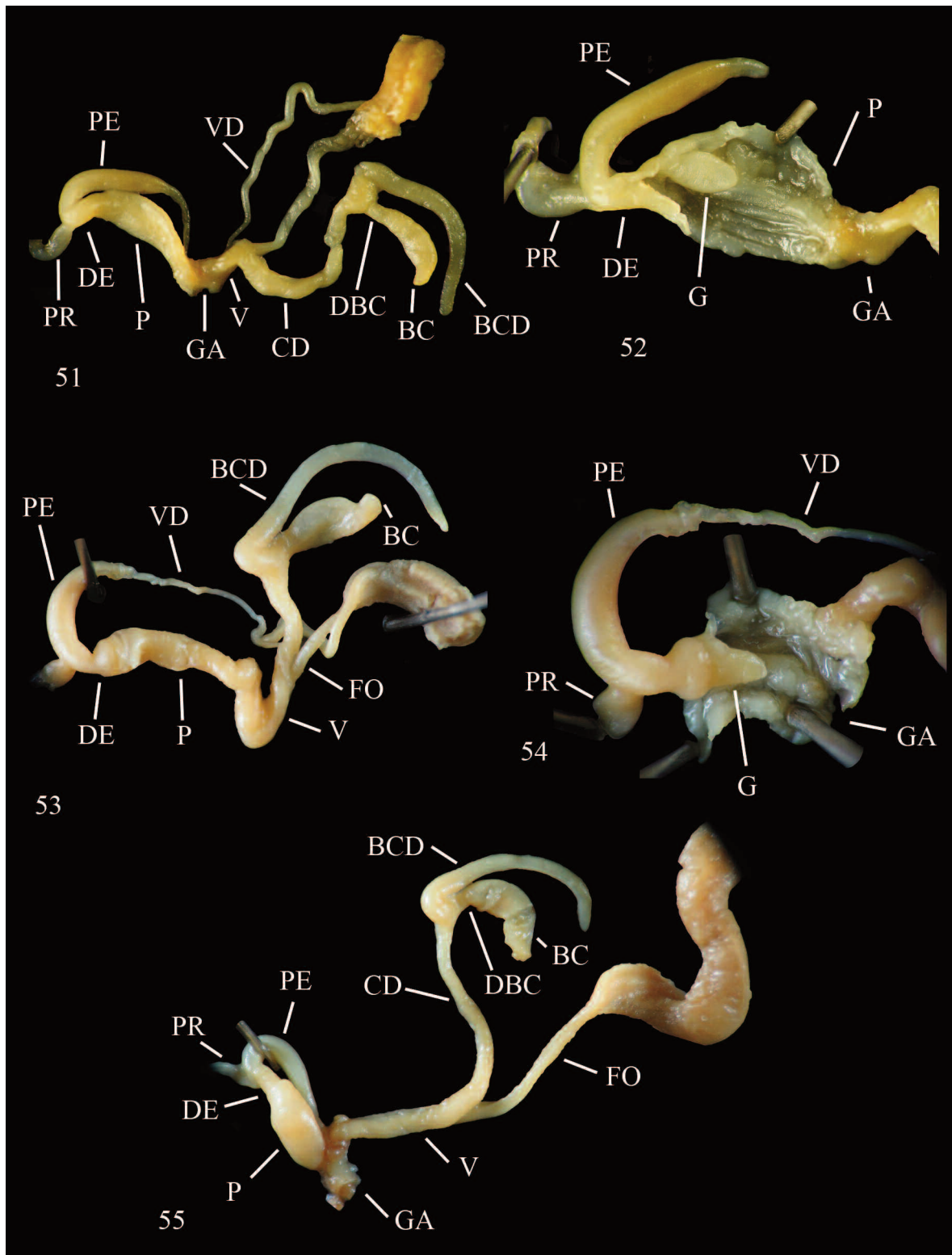


Figure 45. *Siciliaria (S.) calcarae calcarae*, Le Rocche, Calatafimi, palatum (CL n. 10770). Figure 46. Idem, parietum (CL n. 10771). Figure 47. Idem, clausilium (CL). Figure 48. *Siciliaria (S.) calcarae calcarae*, Grotta dell'Uccerie, Favignana, palatum (CL n. 8432). Figure 49. Idem, parietum (CL n. 8433). Figure 50. Idem, clausilium (CL).



Figures 51–55. Genitalia of *Siciliaria (S.) calcarae calcarae*. Figure 51. San Ciro, Monte Grifone, Palermo (CL n. 16807). Figure 52. Idem, internal structure of penis, with penial papilla. Figure 53. Le Rocche, Calatafimi (CL n. 10764). Figure 54. Idem, internal structure of penis, with penial papilla. Figure 55. Grotta dell’Uccerie, Favignana (CL n. 8424).



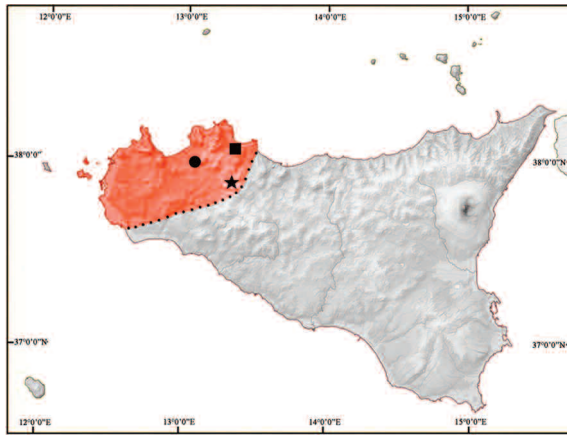


Figure 56. Geographic distribution of *Siciliaria* (*S.*) *calcarae* s.l. in W-Sicily (in red) with type locality of *S. (S.) calcarae orlandoi* n. ssp. (star), type locality of *S. (S.) calcarae calcarae* (square), and type locality of *S. (S.) calcarae belliemi*.

*Siciliaria calcarae belliemi* Brandt, 1961 (Figs. 36, 42–44), from Monte Belliemi, near Partinico, is characterized for ribbed whorls (rib-striated in *S. calcarae calcarae* and *S. calcarae orlandoi* n. ssp.); the anterior upper palatal plica is longer and raised same as in *S. calcarae calcarae*. Nordsieck (2002) considers *S. calcarae belliemi* a “transitional form between neighboring species which may have originated by hybridation (c. *calcarae/tiberii*)” (see also Beckman, 2004).

REMARKS. *Siciliaria calcarae* s.l. is the more widespread species of the genus *Siciliaria* s. str. It lives from Bagheria in the East to Favignana Island and Levanzo Island in the West, up to Castelvetro in the South.

It is reported in Quaternary deposits of Palermo (De Gregorio, 1927 sub *Clausilia adelina*, Palermo, Pietrazzi) and in Quaternary deposit Wied tal-Bahrija in the Island of Malta (Giusti et al., 1995 sub *Siciliaria* cfr. *septemplicata*).

*Siciliaria calcarae calcarae* is morphologically little variable, nevertheless some taxa were described in the past for this mollusk, and nowadays they are considered synonyms.

Küster (1847–1862) described *Clausilia adelina* on specimens received by the Sicilian naturalist Luigi Benoit, with type locality “*Inseln Sicilien*”. The accurate Küster’s description and illustration (Küster, 1847: Pl. 34, figs. 4–6) show that *S. adelina* is a *S. calcarae* with a well developed anterior upper palatal plica and a low columellar lamella.

These characters are typical of *S. calcarae calcarae* and exclude any reference to *S. calcarae orlandoi* n. ssp. Benoit (1875, 1882) specifies as distribution localities for *C. adelina*: “*Favignana e Bonagia presso Calatafimi*”.

Pini (1884) described *Clausilia (Siciliaria) brugnonea* for Palermo. Also Pini’s description and illustrations of *C. brugnonea* allow to refer this name to the typical *S. calcarae calcarae* for the presence of a developed upper palatal plica (Pini, 1884: Pl. 2, fig. 16a) and low sinuous columellar lamella (Pini, 1884: Pl. 2 fig. 16b).

Monterosato (1892) described *Clausilia (Siciliaria) adelina* var. *subsolida* for the Aegadian islands by these few words “*più solida e più fortemente striata*” [more solid and more strongly striated]. This description and the examen of topotypic specimens (Figs. 38, 48–50, 55) allowed us to consider the taxon *subsolida* clearly distinguished from *S. calcarae orlandoi* n. ssp.

Westerlund (1892) described *Clausilia (Siciliaria) calcarae* var. *nodosa* from Palermo, with these words: “*Testa non decollata, tenue regulariter costulato-striata, plica palatalis infera perbrevis, peristoma expansum, incrassatum, margine externo sub sinulum nodoso, plica palatalis superiora secunda tenuis, brevis. Hab. Sicilien, bei Palermo (A. de Monterosato comm.)*”. Monterosato (1892) specifies that the type series of *nodosa* came from Bagheria (East of Palermo). The diagnostic characters of *S. nodosa* Westerlund, 1892 are the presence of a small second upper palatal plica and a small callus on the upper outer edge of the peristome. A similar species is *S. (S.) ferrox* Brandt, 1961 which is widespread along the coast from Termini Imerese in the East to Altavilla Milicia in the West, very close to Bagheria (Reitano et al., 2007). In fact, *S. ferrox* has the shell similar to *S. calcarae* s.l. but with a second upper palatal plica, therefore as in *S. nodosa*. Nevertheless, *S. calcarae calcarae* occasionally have a little second upper palatal plica; anyway this is absent in *S. calcarae orlandoi* n. sp.; nowadays *C. (S.) nodosa* Westerlund, 1892 is considered a synonym of a nominotypical subspecies of *S. calcarae* (Bank, 2011; Nordsieck, 2013).

Finally, De Gregorio (1894) described *Clausilia proxima levanzensis* from Levanzo Island (Aegadian Island, Western Sicily) but, however, for this little island, only *S. calcarae* is known (Fiorentino et al., 2004).

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We dedicate this work to the memory of our dear friend Giuseppe Pocaterra (San Pietro in Casale, Bologna, Italy).

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