

# The endemic door snail of Marettimo (Egadi Islands, Sicily, Italy): *Siciliaria (Siciliaria) scarificata* (L. Pfeiffer, 1856) (Pulmonata Clausiliidae)

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## ABSTRACT

The door snail *Siciliaria (Siciliaria) scarificata* (L. Pfeiffer, 1856) (Pulmonata Clausiliidae) is redescribed. The species is endemic to Marettimo (Egadi Islands, Sicily, Italy) and it is the only one of the genus *Siciliaria* Vest, 1867 living in this island. *Siciliaria scarificata* can be morphologically identified by the presence of a high columellar lamella, ascending in a double “S” curve, a wide anterior upper palatal plica, long basal plica, sulcalis present; clausilium plate distally less narrowed; genitalia are characterized by very short bursa copulatrix duct; short diverticulum of bursa copulatrix; penial papilla conic and short. Notes about its taxonomy, biology and conservation status are also provided.

## KEY WORDS

Door snail; *Siciliaria*; island endemism; taxonomy; conservation status.

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## INTRODUCTION

Vest (1867) described the genus *Siciliaria* for a group of door snail species from Sicily with *S. grohmanniana* Rossmässler, 1836 type species.

Adolf Schmidt (1868) classified the seven sicilian species known so far, into two groups which mainly differ by the formation of the clausilium plate and by sculpture, development of lamellae (inserta, inferior lamella) and palatal plicae. The first group is reported as: “Formenkreis of *septemplicata*” which includes *Clausilia grohmanniana*, *C. septemplicata* Philippi, 1836, *C. calcarae* Philippi, 1844, *C. confinata* Benoit, 1859 (= *scarificata* L. Pfeiffer, 1856), and *C. tiberii* A. Schmidt, 1868; the second group as “Formenkreis of *crassicostata*” with *C. crassicostata* L. Pfeiffer, 1856 and *C. nobilis* L. Pfeiffer, 1848.

O. Boettger (1877) named as *Siciliaria* Vest, 1867 sensu stricto the “Formenkreise of *septemplicata*”, and as *Trinacria* O. Boettger, 1877 the “Formenkreise of *crassicostata*”. Nordsieck (1979) listed the same species as O. Boettger (1877) and reunited the species groups (*Siciliaria* s. str., *Trinacria* (preoccupied) = *Sicania* Tomlin) because *S. calcarae* has an intermediate morphological position. Nordsieck (2002) listed 12 species of *Siciliaria* s.str., sub *Charpentieria (Siciliaria)*, and classified them in two species groups, based on some shell characters.

Nordsieck (2007), in his catalog on world Clausiliidae, listed 12 species with 7 subspecies of *Siciliaria* s.str., even as *Charpentieria (Siciliaria)*: *Siciliaria (Siciliaria) calcarae calcarae*, *S. calcarae belliemii* (Brandt, 1961), *S. crassicostata*, *S. eminentis* (A. Schimdt, 1868), *S. ferrox* (Brandt,

1961), *S. grohmanniana*, *S. leucophryna* (L. Pfeiffer, 1862), *S. nobilis*, *S. riberothi* (Brandt, 1961), *S. scarificata* (L. Pfeiffer, 1856), *S. septemplicata septemplicata*, *S. septemplicata alcamoensis* (Brandt, 1961), *S. septemplicata hemmeni* Beckmann, 2004, *S. spezialensis* (H. Nordsieck, 1984), *S. tiberii tiberii*, *S. tiberii scalettensis* Beckmann, 2004.

This checklist is confirmed by Bank (2011) and by Nordsieck (2013).

The genus *Siciliaria* s. str. is endemic to Western Sicily, from Caccamo in the East to the island of Marettimo in the West, and from San Vito lo Capo in the North, to Castelvetro and Ribera in the South. The hot spot of biodiversity are the mountains in the northern part, whereas in the central and southern area (Sicani Mountains) the presence of *Siciliaria* is discontinuous. The genus *Siciliaria* s. str. is reported in Quaternary deposits of Palermo (De Gregorio, 1886: Monte Pellegrino; 1927: Pietrazzi, Bellolampo; our personal data: Mount Catalfano) and in the Quaternary deposit of Wied tal-Bahrija in the Island of Malta (Giusti et al., 1995).

*Siciliaria scarificata* was discovered by the sicilian naturalist Luigi Benoit (1804–1890) who distributed shells of this door snail to his malacologists colleagues under the name of *Clausilia confinata*. Luis Pfeiffer (1856) published the first valid description with the name *C. scarificata* (Fig. 1) reporting its distribution as “Habitat in Sicilia”. Subsequently, L. Pfeiffer (1859) specified the distribution as “in insula Maretima Siciliae”. However in the course of 1800s and up to about the 1970s most authors used the name *C. confinata* Benoit or the incorrect spelling *C. sacrificata* Benoit, 1875 (see below). The original description and all subsequent descriptions were based on shell features; while genitalia were never described and illustrated.

This paper is intended to redescribe this species in detail (shell and genitalia) and also provided notes about its taxonomy, biology and conservation status.

## MATERIAL AND METHODS

All living specimens were relaxed in water and then preserved in 80% ethanol. Five specimens were anatomically investigated under a Leica MZ12.5 stereomicroscope using scalpel, scissors and needles. Empty shells were kept dry, and have been measured with a digital gauge. The plicae and

lamellae were studied breaking the shells with a scalpel. The method of calculating the number of whorls by Kerney & Cameron (1979) was used. Shell measures were based on the study of 20 specimens. Photos were carried out with a Panasonic Lumix DMC-FZ20 digital camera. Anatomical details were drawn using a Wild camera lucida. The collection data are listed as follows: State, region, municipality, locality, altitude, dates, collection and number of specimens in parentheses. Toponyms (place-names) are reported following Map “IGM 1: 25000, Isola di Marettimo, sheet 256 IV - N.O.”. Each locality and/or collection site is named in the original language (italian).

Voucher specimens were stored in the following Museums and private collections: F. Liberto, Cefalù, Italy (LC); Museo Naturalistico F. Minà Palumbo, Castelbuono, Italy (MNMP); A. Reitano, Tremestieri Etneo, Italy (RC); I. Sparacio, Palermo, Italy (SC).

CONCHOLOGICAL ACRONYMS. AUPP: Anterior upper palatal plica; CL: columellar lamella; D: shell width; H: shell height; L: lunella; LPP: lower palatal plica (basal plica); PL: parietal lamella; PLL: parallel lamella; PP: principal plica; PUPP: posterior upper palatal plica; SCL: sub-columellar lamella; SL: spiral lamella; SUL: sulcalis; SP: sutural plica. ANATOMICAL ACRONYMS. BC: bursa copulatrix; BCD: diverticulum of bursa copulatrix; DBC: duct of the bursa copulatrix; E: epiphallus; FO: free oviduct; G: penial papilla; GA: genital atrium; P: penis; PR: penial retractor muscle; V: vagina; VD: vas deferens.

## SYSTEMATICS

Family CLAUDILIIDAE J.E. Gray, 1855

Genus *Siciliaria* Vest, 1867

Type species: *Clausilia grohmanniana* Rossmässler, 1836

*Siciliaria (Siciliaria) scarificata* (L. Pfeiffer, 1856)

*Clausilia scarificata*, L. Pfeiffer, 1856: 185, Pl. 2, figs. 20–22 - Habitat in Sicilia

*Clausilia scarificata*, L. Pfeiffer, 1859: 765–766 - Habitat in insula Maretima Siciliae

*Clausilia confinata*, Benoit, 1859: Pl. 6, fig. 6

*Clausilia scarificata*, Küster, 1860–1861: 298, Pl. 34, figs. 1–3 - Insel Maretima

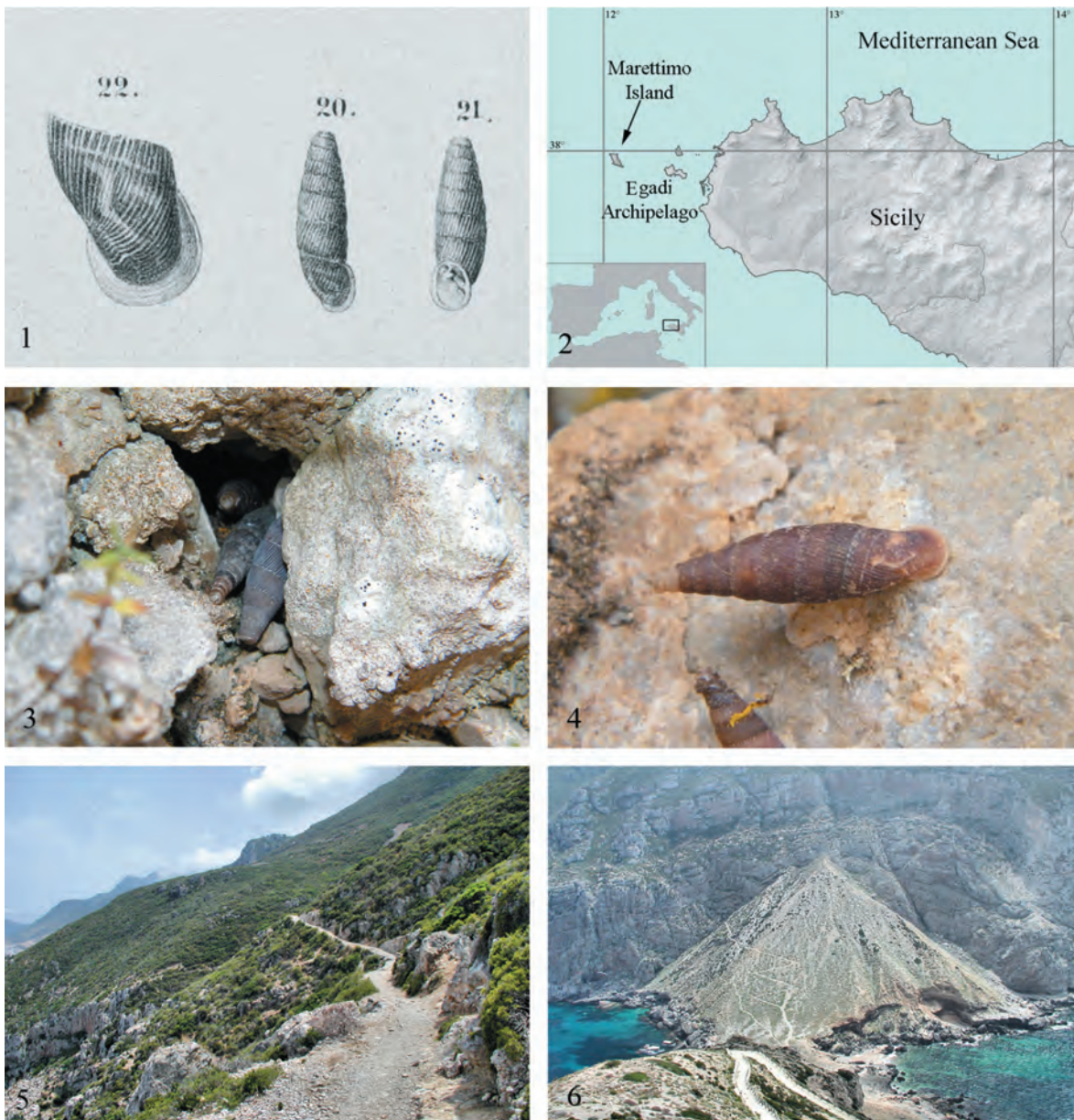


Figure 1. Reproduction of original drawing of *Siciliaria (Siciliaria) scarificata* (L. Pfeiffer, 1856). Figure 2. Map of Western Sicily, the arrow shows the position of Marettimo. Figures 3, 4. *Siciliaria scarificata* in natural habitat. Figures 5, 6. Landscape of Marettimo, slope with Mediterranean maquis.

*Clausilia confinata*, Vest, 1867: 167  
*Clausilia confinata*, A. Schmidt, 1868: 40–42  
*Clausilia confinata*, Appellius, 1869: 173  
*Medora scarificata*, Kobelt, 1871: 39  
*Clausilia sacrificata*, Benoit, 1875: 152 - isola di Marettimo  
*Siciliaria confinata*, Möllendorff, 1875: 17  
*Clausilia confinata*, L. Pfeiffer, 1877: 523 - Ins. Marettima Siciliae

*Clausilia (Siciliaria) confinata*, O. Boettger, 1877: 33, “gruppe *Siciliaria*” - Sicilien  
*Clausilia confinata*, Westerlund, 1878: 20 - Sicilia  
*Clausilia sacrificata*, O. Boettger, 1879: 89, Pl. 172, fig. 1731 - Insel Marettimo im Westen von Sicilien  
*Clausilia (Siciliaria) sacrificata*, Kobelt, 1881: 78 - Marettimo  
*Clausilia confinata*, Benoit, 1882: 105 - isola di Marettimo

- Clausilia confinata*, Westerlund, 1884: 46 - Maretimeo bei Sicilien
- Clausilia (Siciliaria) confinata*, Monterosato, 1892: 28 - Isola di Maretimeo
- Clausilia (Siciliaria) confinata*, Westerlund, 1892: 48
- Clausilia (Siciliaria) confinata*, Westerlund, 1901: 39–40, 180 - I. Maretimeo
- Delima (Siciliaria) scarificata*, Wagner, 1924: 124 - Insel Maretimeo im w. Von Sizilien
- Clausilia (Siciliaria) confinata*, Sacchi, 1955: 23
- Siciliaria confinata*, Sacchi, 1956: 8–9
- Siciliaria confinata*, Sacchi, 1957: 673
- Delima (Siciliaria) confinata*, Alzona, 1971: 91, sectio *Siciliaria* - Is. Maretimeo
- Siciliaria (Siciliaria) scarificata*, Nordsieck, 1979: 259
- Siciliaria (Siciliaria) scarificata*, Manganelli et al., 1995: 24, 47 - Isola di Maretimeo (Egadi)
- Charpentieria (Siciliaria) scarificata*, Nordsieck, 2002: 33–34
- Charpentieria (Siciliaria) scarificata*, Beckmann, 2004: 186, 188 - Insel Marétimeo
- Siciliaria scarificata*, Fiorentino et al., 2004 - Maretimeo
- Charpentieria (Siciliaria) scarificata*, Nordsieck, 2007: 54
- Charpentieria (Siciliaria) scarificata*, Bank, 2011: 23 - Sicily
- Siciliaria scarificata*, Welter-Shultes, 2012: 342 - S. Italy, Maretimeo island
- Siciliaria (Siciliaria) scarificata*, Nordsieck, 2013: 1–14

TYPE LOCALITY. Maretimeo (Egadi Islands, Sicily, Italy). This species was communicated by the naturalist Luigi Benoit to L. Pfeiffer who published the first valid description reporting its distribution as “Habitat in Sicilia” (L. Pfeiffer, 1856).

EXAMINED MATERIAL. Italy, Sicily, Favignana, Island of Maretimeo (Egadi Islands), Punta Troia, 50 m, VIII.1997, 3 shells (RC); idem, Case Romane, 200 m, VI.2005, 23 shells (RC); idem, VI.2005, 4 shells (RC); idem, from Case Romane to Monte Falcone 300–680 m, 30.V.2010, 11 specimens, 60 shells, (LC 8021–8096); idem, VI.2005, 3 shells (MNMP); idem, contrada Pelosa, 60 m, 30.V.2010, 16 specimens and 42 shells (SC); idem, Case Romane, 200 m, 30.V.2010, 18 shells (SC).

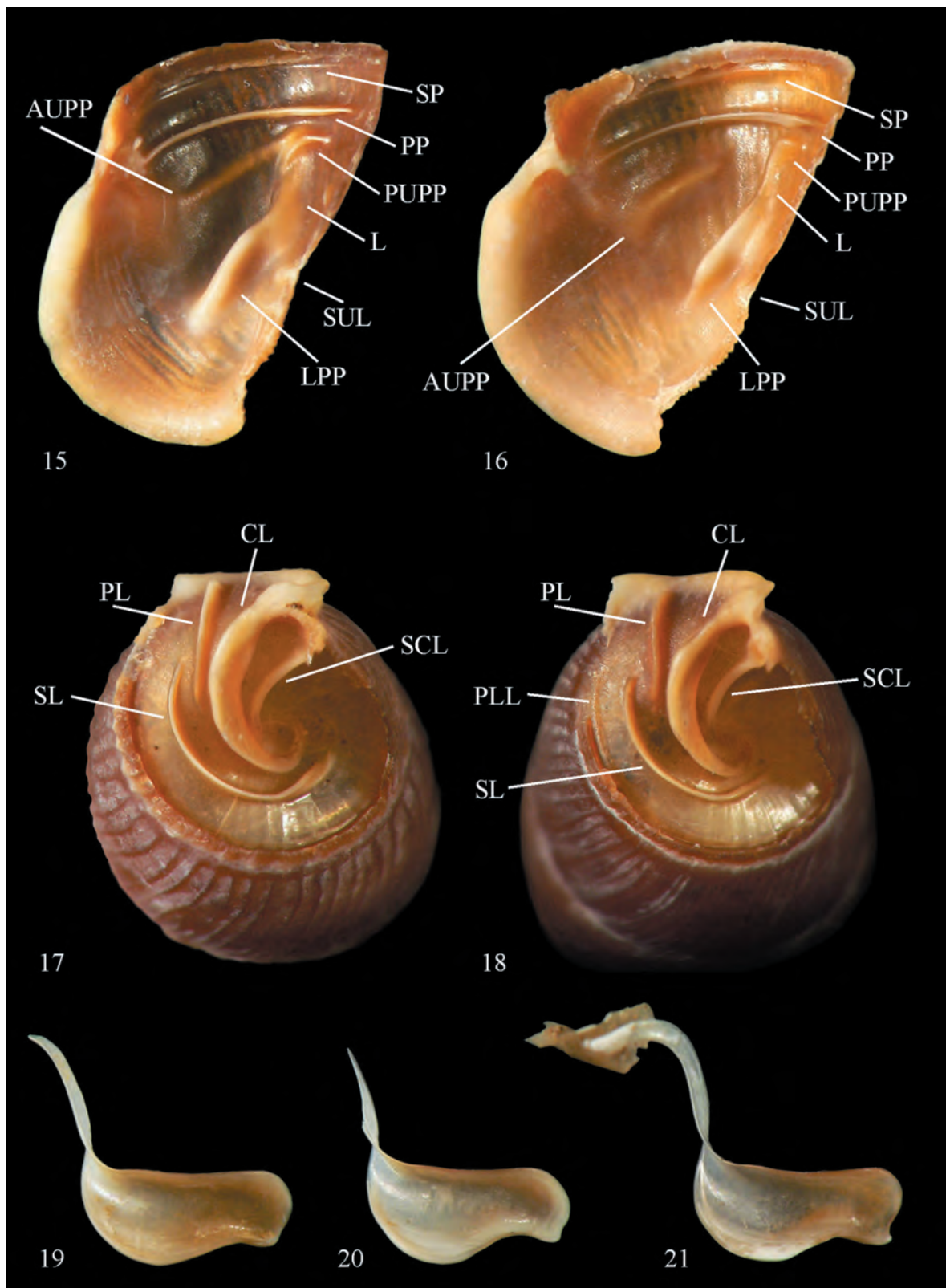
ORIGINAL DESCRIPTION. L. Pfeiffer (1856): “*T. rimata, fusiformis, truncata, solida, confertim plicato-costulata, purpurascenti-fusca; spira ventrosa, sublata decollata; sutura albo-papillata; anfr. superst. 7 1/2 convexiusculi, ultimus basi breviter cristatus; apertura piriformis; lamella supera exigua, marginem non attingens, infera valida, arcuatim ascendens; lunella distincta, angusta, flexuosa; plicae palatales 3, suprema elongata, secunda brevior, antice callosa, tertia infera, sub-columellari parallela; perist. hepaticum, continuum, breviter solutum, undique expansum et reflexiusculum. - Long. (trunc.) 17, diam. 5 mill. Ap. 5 mill. longa, 4 lata*”.

DIAGNOSIS. Terrestrial pulmonate snail with shell sinistral, fusiform, brown-purplish in color; aperture with five lamellae (on parietum and columellar side) and lunella and five plicae (on palatum); in particular high columellar (lower parietal) lamella, ascending in a double “S” curve; a wide anterior upper palatal plica; long basal plica; short sulcalis; genitalia are characterized by very short bursa copulatrix duct, short diverticulum of bursa copulatrix; penial papilla conic and short.

DESCRIPTION (Figs. 7–14). Shell sinistral, fusiform, elongated, generally decollated, rather thick and robust, brown-purplish in color, with apertural margin light brownish; obtuse apex; external surface with transverse ribs, 8.5 ribs per 2 mm of the penultimate whorl (10 specimens); spire with 9–10 slightly convex whorls (7 in decollate shells), slowly and regularly growing; sutures shallow, with slightly evident papillae (papillae more numerous along sutures from level with first 3–7 whorls); basal keel little distinct; umbilicus closed; aperture oval, with five lamellae (on parietum and columellar side) and lunella and five plicae (on palatum). On palatum there is a short lunella and starting from suture: a thin sutural plica very close to suture; a well raised principal plica; a wide anterior upper palatal plica, separated from or connected with upper palatal plica; long basal plica, internal beginning of which is joined to the base of lunella; a short sulcalis (Figs. 15, 16). A relatively conspicuous callosity on the upper external border of palatum embedding external apexes of upper palatal plica and principal plica. On parietum, starting from suture; there are: parallel lamella very thin or absent; non emergent spiral lamella in the centre of pari-



Figures 7–10. Shells of *Siciliaria (Siciliaria) scarificata* (L. Pfeiffer, 1856), Island of Marettimo, Sicily, Italy (CL 8032), H: 17.8 mm, D: 5 mm. Figures 11–14. *idem*, (CL 8033), H: 18.1 mm, D: 4.6 mm.



Figures 15–21. *Siciliaria (Siciliaria) scarificata* (L. Pfeiffer, 1856), Island of Marettimo, Sicily, Italy. Figures 15, 16: palatum (CL 8083, 8084). Figures 17, 18: parietum (CL 8085, 8088), Figures 19–21: clausilium (CL 8094-8096).

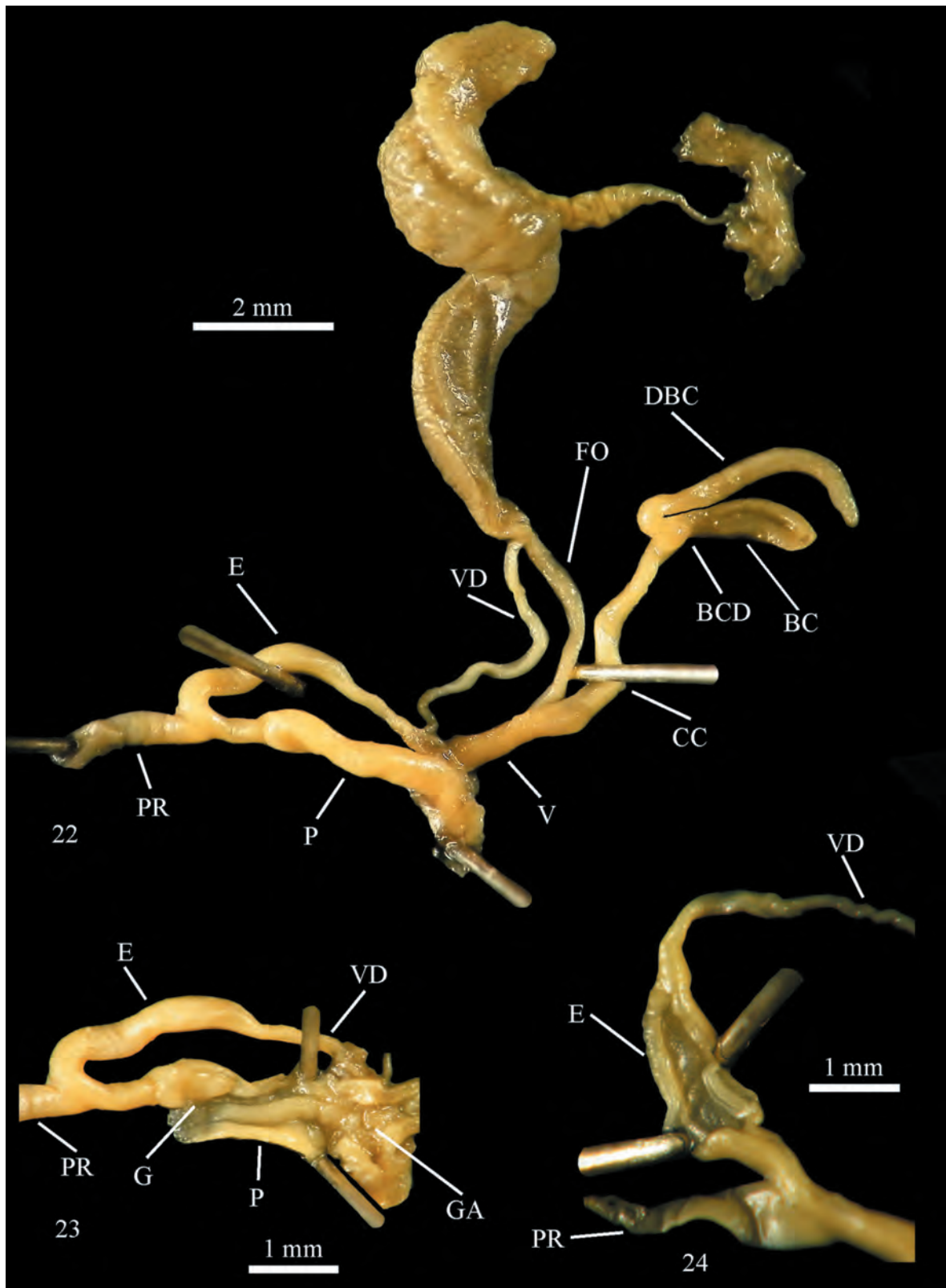


Figure 22. Genitalia of *Siciliaria (Siciliaria) scarificata* (L. Pfeiffer, 1856), Island of Marettimo, Sicily, Italy. Figure 23. Internal ornamentation of penis, with penial papilla (same specimen of Fig. 22). Figure 24. Internal ornamentation of epiphallus (CL 8022).

etum; tooth-like (upper) parietal lamella; high columellar (lower parietal) lamella, ascending in a double "S" curve; scarcely emergent subcolumellar lamella (Figs. 17, 18). Peristome continuous, thickened, reflected, fused above to last whorl wall. Normal type clausilial apparatus, with palatal edge of clausilium plate somewhat bent up, outer corner more or less pointed, sutural angle bent up (Figs. 19–21). The outer edge of the clausilium plate rests against the lunella and the sulcalis in the closed position.

Body. Animal narrow, posteriorly pointed, skin yellowish in color with brown-greyish tubercles; foot narrow with sole paler than body, bipartite by an indistinct longitudinal central groove and with margins divided by small parallel radial groove (5 specim. in alcohol preserved).

Genitalia (Figs. 22–24). General scheme of semidiaulic monotrematic type. Genitalia consisting of large ovotestis with many close acini; long thin, convoluted hermaphrodite duct; very large, albumen gland; well developed ovispermiduct, formed by female portion externally regularly subdivided and spaced by annular constrictions, large prostatic portion and seminal groove externally not visible; slender free oviduct (2.6 mm); bursa copulatrix complex consist of slender copulatory duct (2.9 mm) which branches in very short bursa copulatrix duct with leaf-like bursa copulatrix (2 mm), and slight longer diverticulum of bursa copulatrix (3.6 mm in length); vagina (1.8 mm in length) uniform in diameter for almost its entire length; vas deferens long and slender, entering epiphallus; epiphallus (3.9 mm) divided by point of insertion of robust penial retractor muscle into conical proximal portion and shorter cylindrical distal portion; a swelling is present at the transition penis-epiphallus; cylindrical penis (2.4 mm in length) slightly wider than vagina. Internal walls of penis with two furrows; relatively short, conic penial papilla with rounded apex (Fig. 23). Internal walls of epiphallus covered with small papille and crossed by two low pleats (Fig. 24).

DISTRIBUTION AND BIOLOGY. *Siciliaria scarificata* is endemic of the Island of Marettimo, the westernmost of the Egadi Islands, in Western Sicily (Fig. 2). It lives in limestone habitat with Mediterranean maquis, on walls and in the crevices of calcareous rocks, under stones, in conoids of debris and at the base of cliffs (Figs. 3–6).

REMARKS. Nordsieck (2002) classified the 12 species of *Siciliaria* s. str. in two groups, based on some shell characters. The first group is named "*nobilis-calcarae*" and is characterized by: columellar lamella (inferior lamella) low to moderately high, mostly only one anterior upper palatal plica present, clausilium plate distally not markedly narrowed, outer corner blunt to pointed. This group is further divided into two subgroups: "*nobilis*" subgroup (*S. nobilis*, *S. spezialensis*, *S. crassicostata*, and *S. eminens*) has palatal edge of clausilium plate not upbent; "*calcarae*" subgroup (*S. calcarae*, *S. tiberii*, and *S. leucophryna*) has palatal edge of clausilium plate more or less upbent. The second principal group is named "*grohmanniana*" (*S. grohmanniana*, *S. septemPLICATA*, and *S. scarificata*), it is characterized by columellar lamella high, two anterior upper palatal plicae present, clausilium plate distally narrowed with outer corner more or less pointed. *Siciliaria ferrox* and *S. riberothi* were not included in none of these groups because of ambiguous character combinations.

*Siciliaria scarificata* is considered transitional to the two principal groups, because it has inferior lamella less high, second anterior upper palatal plica missing, clausilium plate distally less narrowed. Nordsieck (2013) reaffirms *S. scarificata* is closely related to the other species of the "*grohmanniana*" group.

At present it is difficult to establish the real affinity between these species using only morphological observations. Consequently, discussion of the relationships of *S. scarificata* is postponed to when more data (molecular data in particular) will be available.

Here we add some morphological data for the "*grohmanniana*" group not considered by Nordsieck (2002; 2013). *Siciliaria grohmanniana* has a small "inserta lamella" (0.7 mm) placed between the columellar lamella and the spiral lamella, running from the point of arrest of clausilium outward. This lamella, reported by A. Schmidt (1868) for *S. grohmanniana* and also for *S. septemPLICATA*, is absent in *S. scarificata*. *Siciliaria grohmanniana* and *S. septemPLICATA* have a shorter sulcalis compared with *S. scarificata*. Welter-Shultes (2012) reports on a subclaustralis, which we don't recognize.

The genitalia of *S. scarificata* are similar to those of other species of *Siciliaria* s. str. known: *S.*



*septemplicata* (Wagner, 1913, pl. 572, fig. 14), *S. grohmanniana* (Wagner, 1925, pl. 1, fig. 8) *S. calcarae* (Wagner, 1925, pl. 3, fig. 25), *S. ferrox* (Brandt, 1961, p. 7, 13, fig. 1). The duct of the bursa copulatrix is very short, and the diverticulum is slightly longer of the duct of the bursa copulatrix + bursa copulatrix; cylindrical penis; slight swelling at the conjunction penis-epiphallus.

Westerlund (1892) described two varieties of *S. scarificata* (sub *confinata*): *C. confinata merens* Westerlund, 1892, locus typicus “Sicilien, in der Provinz Palermo”, which is a synonym of *S. leucophryna* (see Nordsieck, 2013), syntype in Göteborg Natural History Museum n° 2638, and *C. confinata commeata* Westerlund, 1892, locus typicus “Sicilien, bei Trabia” which is a probable older synonym of *S. ferrox* Brandt, 1961 (Reitano et al., 2007, Nordsieck, 2013).

CONSERVATION STATUS. Although *S. scarificata* has a scattered distribution over the whole island, its limited distribution to Marettimo justified an assessment as Lower Risk (Near Threatened) [NT, nt]. The Island of Marettimo is included in the SICp “Isola di Marettimo” (ITA 010002) and in the ZPS “Arcipelago delle Egadi - area marina e terrestre” (ITA010027), however *S. scarificata* is not protected by any specific regulation or law, although it should be strongly recommended. Suggested measures include sympathetic habitat management and population monitoring.

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