

**How to distinguish *Oxychilus cellarius* (Müller, 1774) easily from  
*Oxychilus draparnaudi* (Beck, 1837)  
(Gastropoda, Stylommatophora, Zonitidae)**

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Identification of the two most widespread European *Oxychilus* species, *O. cellarius* (Müller, 1774) and *O. draparnaudi* (Beck, 1837) is still mainly based on conchological features of controversial diagnostic value. Despite this, certain anatomical characters, known since Taylor's (1905-1921) excellent monograph, enable the two species to be readily distinguished. *O. cellarius* has a cylindrical penis, rather constant in width in the middle portion, whereas that of *O. draparnaudi* is divided by an abrupt constriction into a usually shorter slender proximal portion and a longer wider distal portion. The two parts communicate through a very slender 'bottle-neck', level with constriction. Obviously, apart from other differences in the internal ornamentation of the penis (fewer larger papillae in single rows, papillae sometimes fused to form wavy pleats in *O. cellarius*), most of the rows of papillae of the proximal penis of *O. cellarius* are continuous with the pleats of the distal penis, whereas in *O. draparnaudi* the rows of papillae of the proximal penis stop at the 'bottle-neck' and the pleats of the distal penis begin after it, without any continuity with the rows of papillae of the proximal penis.

Key words: Gastropoda, Pulmonata, Zonitidae, *Oxychilus*, Nomenclature, genital anatomy, Europe.

## INTRODUCTION

*Oxychilus cellarius* (Müller, 1774) and *O. draparnaudi* (Beck, 1837) are the two species of the genus *Oxychilus* most frequently reported in the faunistic, biogeographical and ecological literature on European land snails.

The former was described by Müller (1774) from Denmark (type locality: "In cellis vinariis Havniae [in the wine cellars of Copenhagen]"). The latter has a very complex nomenclatural history. It was first introduced by Draparnaud (1801) as *Helix lucida* (type locality not indicated; L. Forcart, in litt. 4.XII.1975, believed that "because Draparnaud lived in Montpellier, his specimens probably came from the environs of Montpellier"), but since this name was already preoccupied by *Helix lucida* Pulteney, 1799, it was first replaced by *Helix nitida*, Draparnaud, 1805, which was already preoccupied by *Helix nitida* Müller, 1774, and later by *Helix (Helicella) draparnaldi* [sic] Beck, 1837, by Kennard & Woodward (1926).

It is important to note that the early interpretation of *Helix draparnaudi* Beck, 1837, was puzzling because of the different meanings of the names *Helix lucida* and *Helix nitida* in the two books of Draparnaud (1801, 1805). The fact that *Helix lucida* Draparnaud, 1801 (p. 96, no. 46) was the same as *Helix nitida* Draparnaud, 1805 (p. 117, no. 54) [currently *Oxychilus draparnaudi* (Beck, 1837); cf. Locard, 1896], and *Helix nitida* Drapar-

naud, 1801 (p. 96, no. 47) was the same as *Helix lucida* Draparnaud, 1805 (p. 103; no. 34) [currently *Zonitoides nitidus* (Müller, 1774); cf. Locard, 1896] caused many misinterpretations (see Moquin Tandon, 1855; Locard, 1896; Taylor, 1907; Kennard & Woodward, 1926; Forcart, 1965; Manganelli & Giusti, 1997).

Moreover, although all subsequent authors since Moquin Tandon (1855) have accepted the correspondence between *Helix lucida* Draparnaud, 1801, and *Helix draparnaudi* Beck, 1837, through *Helix nitida* Draparnaud, 1805, no one realized that since Beck (1837) introduced the nominal species *Helix Draparnaldi* (corrected to *draparnaudi*; ICZN, 1955), without any description or definition but with only two indications, an action of a First Revisor (ICZN, 1985: Art. 24) was required to determine the indication to select for *Helix draparnaudi* Beck, 1837. In fact, Beck (1838) published a formal description of *Helix draparnaudi* only a year later in his "Specierum novarum in indice molluscorum praesentis aevi musei Principis Christiani Frederici". Of the two indications, the former ("a. gallica" "Drp. viii, 23-25") is referenced to figures 23-25 of plate 8 of Draparnaud (1805), depicting the French *Helix nitida* Draparnaud, 1805 (new name for *Helix lucida* Draparnaud, 1801), and the latter ("b. italica. - *H. cellaria*. var. Rossm." "Rossm. 22\*") to figure 22\* of plate 1 of Rossmässler (1835) depicting an Italian variety of *Helix cellaria* Müller, 1774.

Forcart (1965: p. 99) seems to have acted as First Revisor when he cited: "*Helix (Helicella) draparnaldi* (sic!) *gallica* Beck, 1837. Index Moll. Mus. Christ. Fred.: 6. Nom. nov. für *Helix nitida* Draparnaud, 1805", in the synonymy of *Oxychilus draparnaudi*, thus selecting only one of the two indications by Beck, namely that corresponding to a French species. This selection is in line with the current interpretation of *O. draparnaudi*.

## IDENTIFICATION OF THE TWO SPECIES

The first reliable data on the genitalia of *O. draparnaudi* and *O. cellarius* was provided by Taylor (1907: 20-21, figs. 40-41 as *Hyalinia lucida*; 33, figs. 61-63 as *Hyalinia cellaria*), who distinguished the two species anatomically. According to Taylor, *O. draparnaudi* was characterized by the fact that: "the EPIPHALLUS [= proximal penis] is long, slender, and twisted, and beset internally with longitudinal rows of rounded depressions [= papillae seen through the wall]; it narrows somewhat where it joins the PENIS-SHEATH [= distal penis], which is an inversely club-shaped organ, abruptly contracted at its junction with the vestibule [= genital atrium], and of a pearly-white colour, with opaque longitudinal stripes". On the other hand, *O. cellarius* was characterized by the fact that: "... the EPIPHALLUS [= proximal penis] is slightly fusiform, and is internally ridged and also beset with two or more longitudinal rows of rounded depressions [= papillae seen through the wall], the junction with the penis-sheath [= distal penis] being indicated by an indistinct constriction, the PENIS-SHEATH [= distal penis] is slightly but gradually widened below, but there is no indication of the marked and abrupt contraction at the junction with the vestibule [= genital atrium], which is so conspicuous in *H. lucida* [= *O. draparnaudi*] ...".

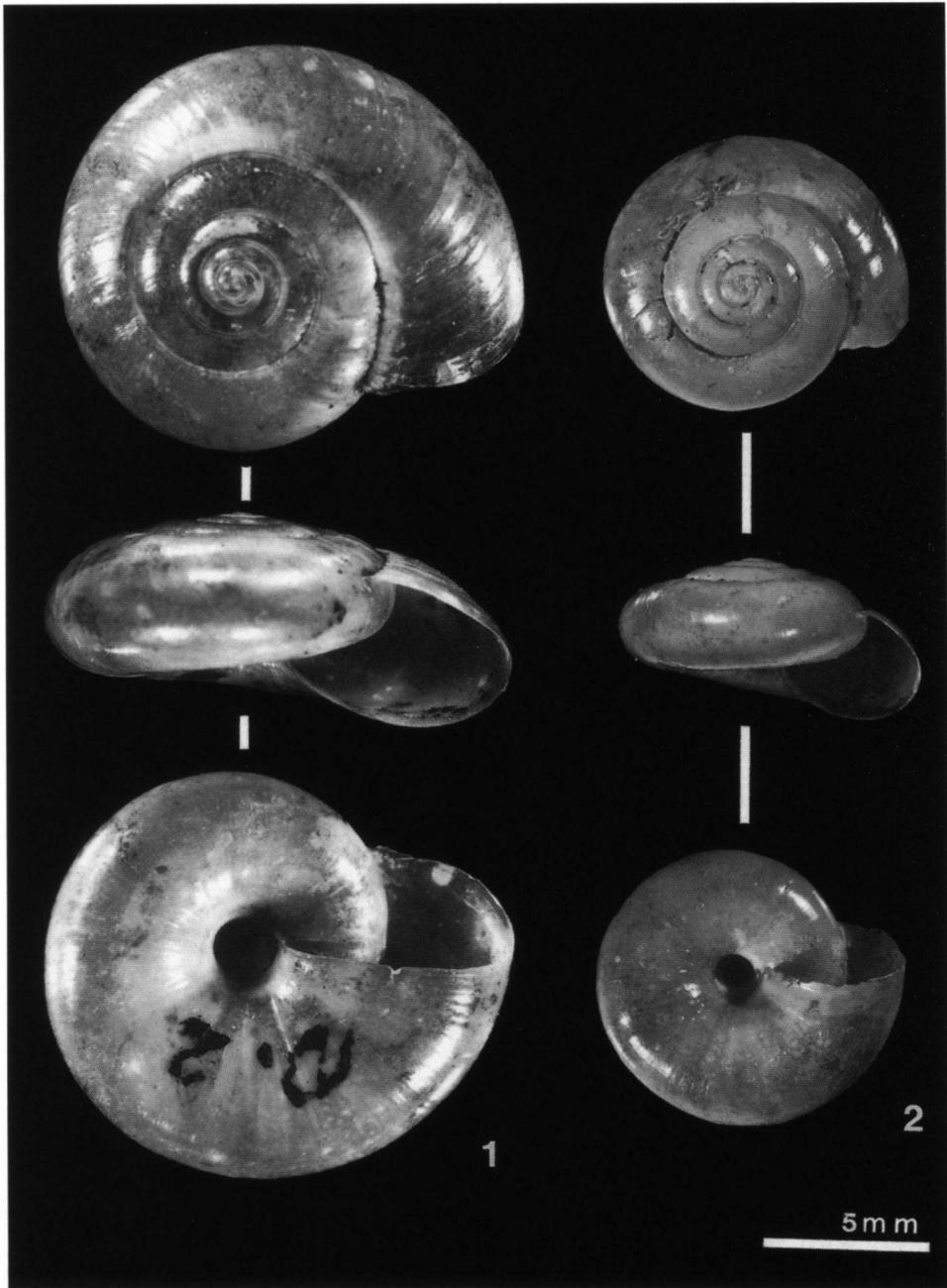
Unfortunately the diagnostic characters of the male genitalia described by Taylor for *O. draparnaudi* (proximal penis somewhat narrowed where it joins distal penis) and for *O. cellarius* (proximal penis separated from the distal penis by an indistinct constriction) were disregarded or overlooked by all subsequent authors.

Some years after, Mermod (1930: 67) wrote: "Il règne une grande confusion dans le groupe formé par *H. cellaria* et *H. draparnaldi*. Cela provient de ce que certains auteurs

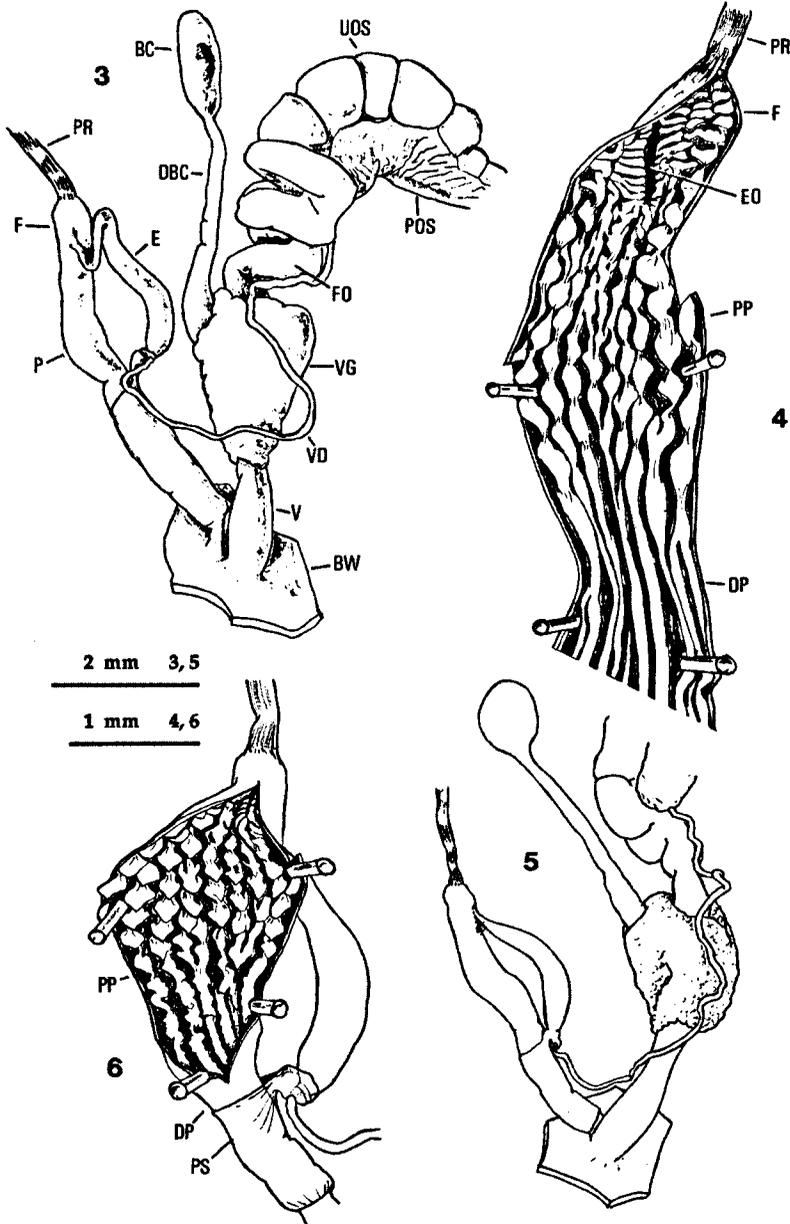
considèrent la seconde de ces espèces comme une variété de la première; parmi eux se trouve Wagner (1915). D'autres auteurs (Taylor, etc.), soutiennent la spécificité des deux formes. Il est difficile de se faire une opinion bien nette, les données anatomiques ne semblent pas être d'un grand secours ...". Other data on the genitalia of the two species (Mermod, 1930: 67, fig. 24; Pilsbry, 1946: 247-249, fig. 122a; Riedel, 1957: 408-409, figs. 19-21) was of uncertain attribution or not as detailed as that of Taylor and was therefore of no help for the identification of the species. Moreover, data from a paper of the same period by Forcart, a renowned specialist on the taxonomy of the zonitids, demonstrated that *O. cellarius* not only had a penis and epiphallus as long as that of *O. draparnaudi* but also the same ornamentation on the internal surface of proximal penis wall (rows of distinct papillae) (Forcart, 1957: 124, fig. 12).

Thus, their identification, as it emerges from descriptions and keys in the literature, continued to be mainly based on conchological features of little diagnostic value (see for example: Germain, 1930; Adam, 1960; Kerney & Cameron, 1979). Germain (1930: 148-149) described *O. cellarius* as having a "coquille convexe déprimée; ombilic seulement médiocre, peu évasé; spire formée de 5 1/2 - 6 tours peu convexes à croissance graduelle, le dernier un peu haut, non élargi, subdéclive; ouverture peu oblique, subcirculaire" and *O. draparnaudi* (as *O. lucidus*) as having a "coquille convexe tectiforme; ombilic large, évasé au dernier tour; spire formée de 6-7 tours à croissance graduelle, le dernier ... élargi à son extrémité, déclive; ouverture très oblique, ovale-transverse" and, finally, remarking that *O. cellarius* was "certainement voisine de l'*O. lucidus* Draparnaud. Elle s'en distingue par sa taille plus petite, sa spire moins convexe, son dernier tour non élargi et, surtout, son ombilic bien plus étroit. Les animaux des deux espèces sont à peu près identiques". Adam (1960: 254) described *O. cellarius* as having a shell smaller (SMD usually ranging from 9 to 12 mm in *O. cellarius*, amply overlapping with that reported for *O. draparnaudi*: 10-17 mm), flatter, with spire less rapidly widening and last whorl less dilated near the aperture than *O. draparnaudi*. Finally the popular Field Guide by Kerney & Cameron (1979) reported that *O. draparnaudi* has the "shell discoidal, with 5 1/2-6 whorls, the last widening rather rapidly, distinctly broader than *O. cellarius* ..." and *O. cellarius* has a "shell with 5 1/2-6 whorls, gradually and regularly increasing in breadth; last relatively narrower than in *O. draparnaudi*".

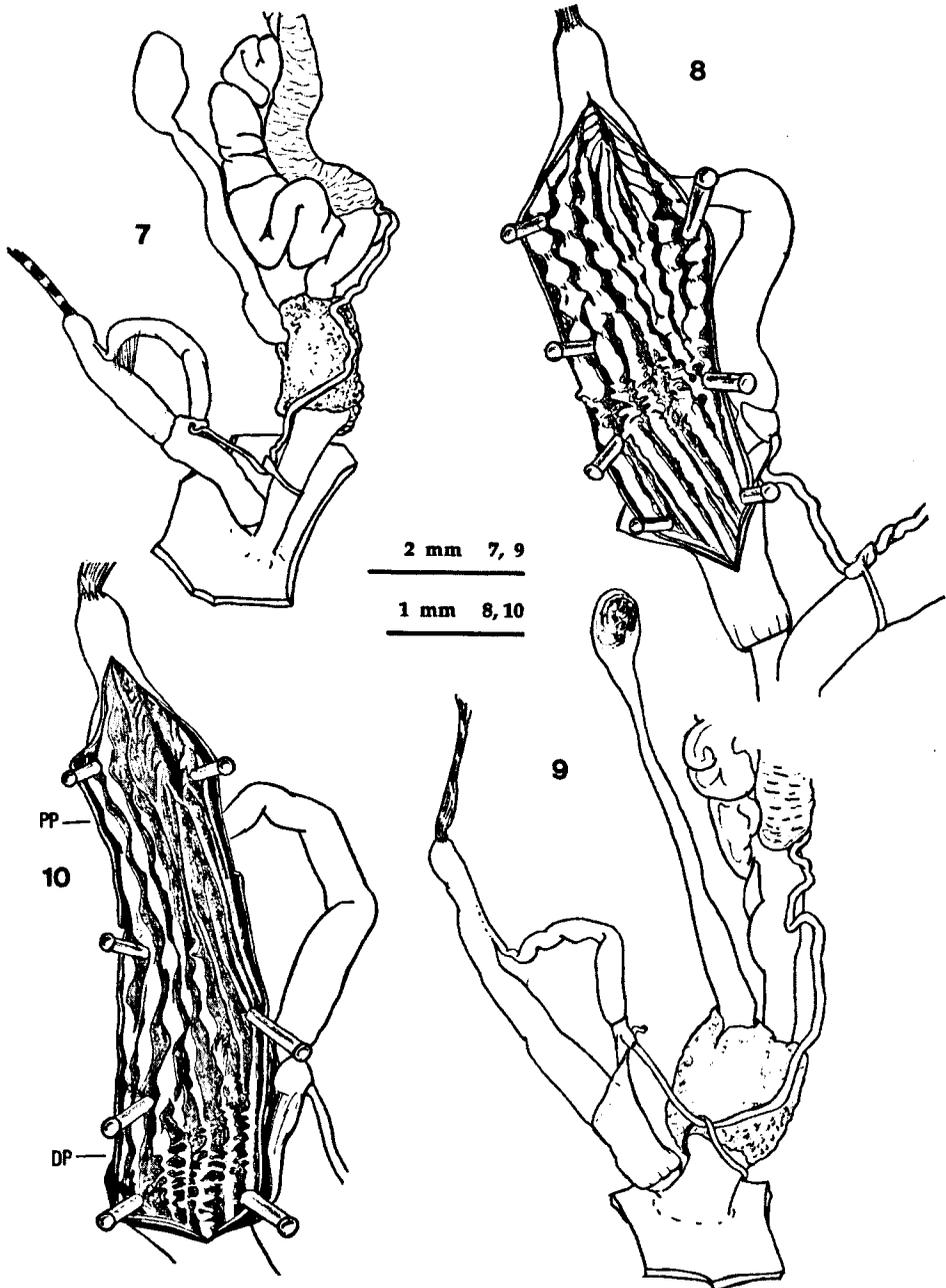
The problem was tackled again by Giusti (1976) while studying the *Oxychilus* of Elba Island (Tuscan Archipelago). Prof. E. Gittenberger (Leiden, The Netherlands) lent him some specimens, collected at San Ilario in Campo, similar to *O. cellarius* by virtue of their small size (maximum shell diameter: 8.6 - 10.5 mm), rather globose shell and rather short penis and epiphallus [Giusti, 1976: 186-191, fig. 16 F-G (anatomy), pl. 13, figs. 4-6 (shell)]. These specimens were at one end of a spectrum consisting of many specimens from other populations collected on the island, which were assignable, conchologically and anatomically, to *O. draparnaudi*. This forced Giusti to the hypothesis that the small specimens from Elba Island were *O. cellarius* and that *O. cellarius* and *O. draparnaudi* were therefore forms of a single species as hypothesized by Mermod (1930). However, the study of topotypical specimens of *O. cellarius* from Copenhagen, collected and determined by C. M. Steenberg, and of *O. draparnaudi* from near Montpellier, collected and determined by L. Forcart enabled Giusti to reject this hypothesis. Topotypes of *O. cellarius* turned out to be characterized by an internal ornamentation of the proximal penis consisting of rows of papillae of variable shape and size, but few in each row and very large, particularly on the proximal penis wall opposite the epiphallus opening (Giusti, 1976: 198-200, fig. 19). Moreover, the papillae were usually fused to one another in the same row, sometimes forming wavy pleats rather similar



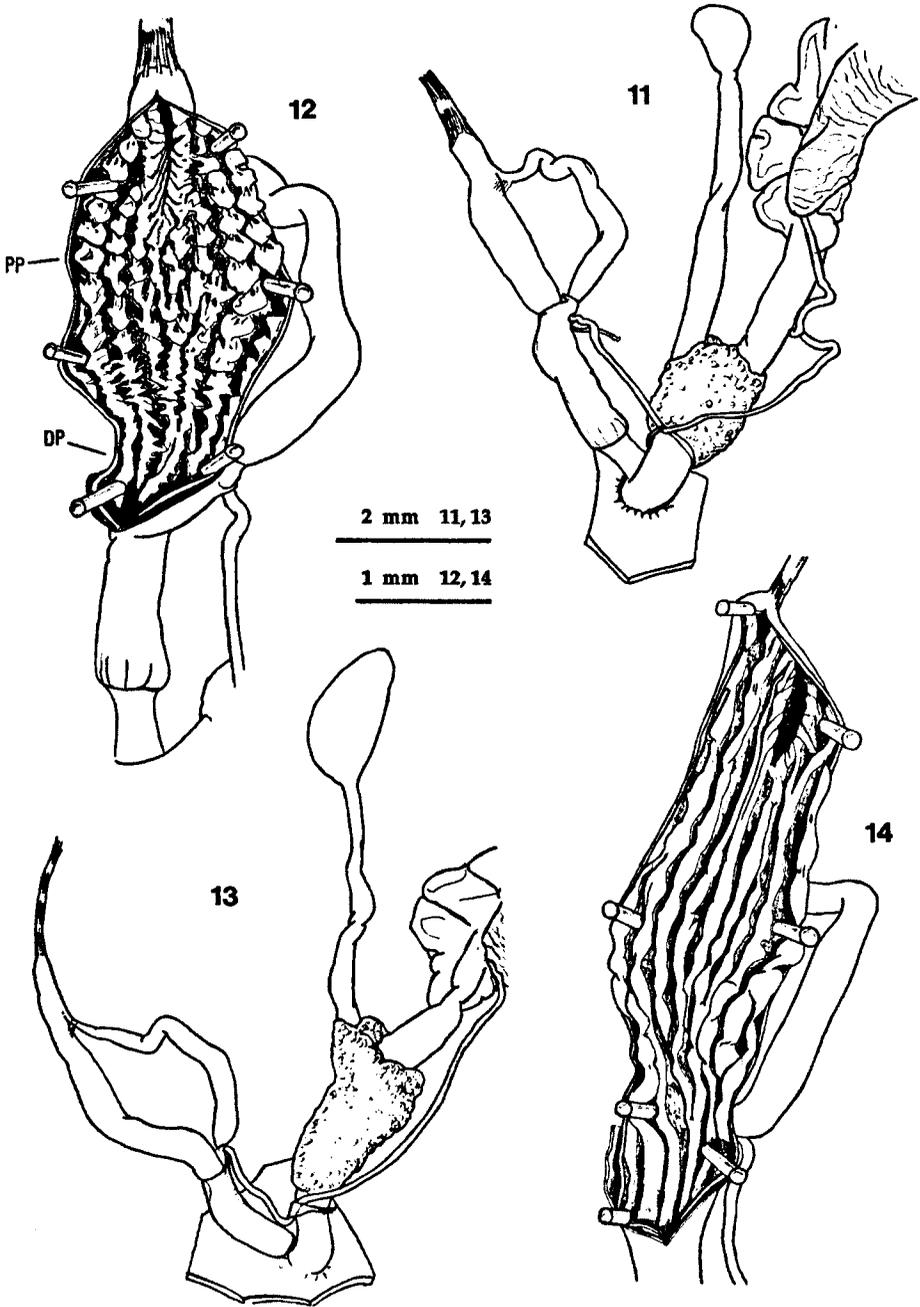
Figs. 1-2. Lectotypes of *Helix lucida* Draparnaud, 1801 (fig. 1; Naturhistorisches Museum Wien, no. 1820 XXVI 123) and of *Helix cellaria* Müller, 1774 (fig. 2; Copenhagen, no. GAS-307). The type material of *Oxychilus draparnaudi* and *O. cellarius* agrees very well with the classical conchological interpretation of the two species. For example, Kerney & Cameron (1979) reported that *O. draparnaudi* has a "shell discoidal, with 5 1/2-6 whorls, the last widening rather rapidly, distinctly broader than *O. cellarius* ..." and *O. cellarius* has a "shell with 5 1/2-6 whorls, gradually and regularly increasing in breadth; last relatively narrower than in *O. draparnaudi*".



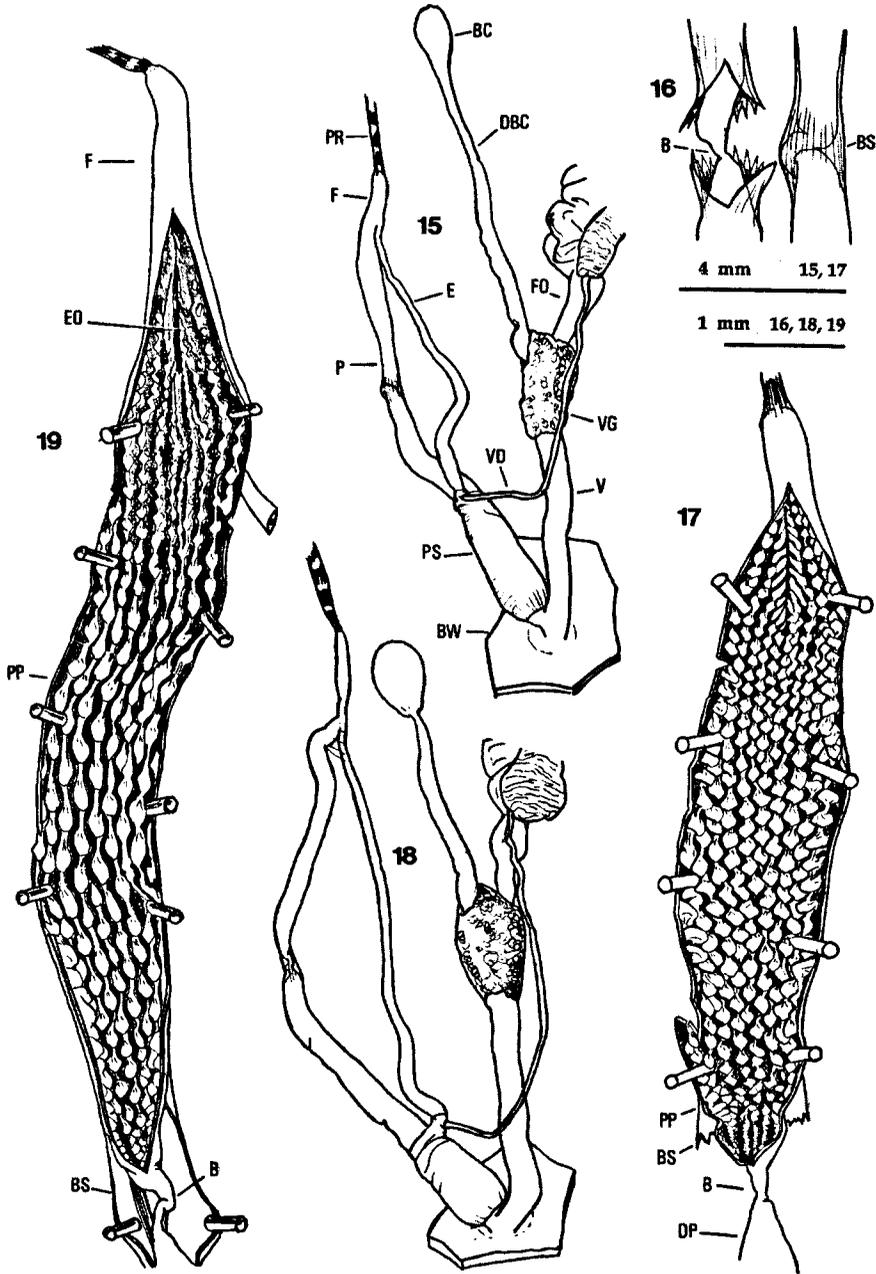
Figs. 3-6. Distal genitalia (figs. 3, 5) and the internal ornamentation of the flagellum and penis (figs. 4, 6) in specimens of *O. cellarius* from Copenhagen, Observatoriet (Denmark), C. M. Steenberg leg. VIII.1911 (figs. 3-4) and Nöttraby (Blekinge Lang, Sweden), H. Lohmander leg. 9.VI.30 (figs. 5-6). Key to the acronyms used in figs. 3-31: B 'bottle-neck', BC bursa copulatrix, BS 'bottle-neck' sheath, BW body wall, DBC duct of bursa copulatrix, DP distal portion of penis, E epiphallus, EO epiphallus opening, F flagellum, FO free oviduct, NPS nerve of the penial sheath, P penis, POS prostatic portion of ovispermiduct, PP proximal portion of penis, PR penial retractor, PS penial sheath, UOS uterine portion of ovispermiduct, V vagina, VD vas deferens, VG vaginal gland.



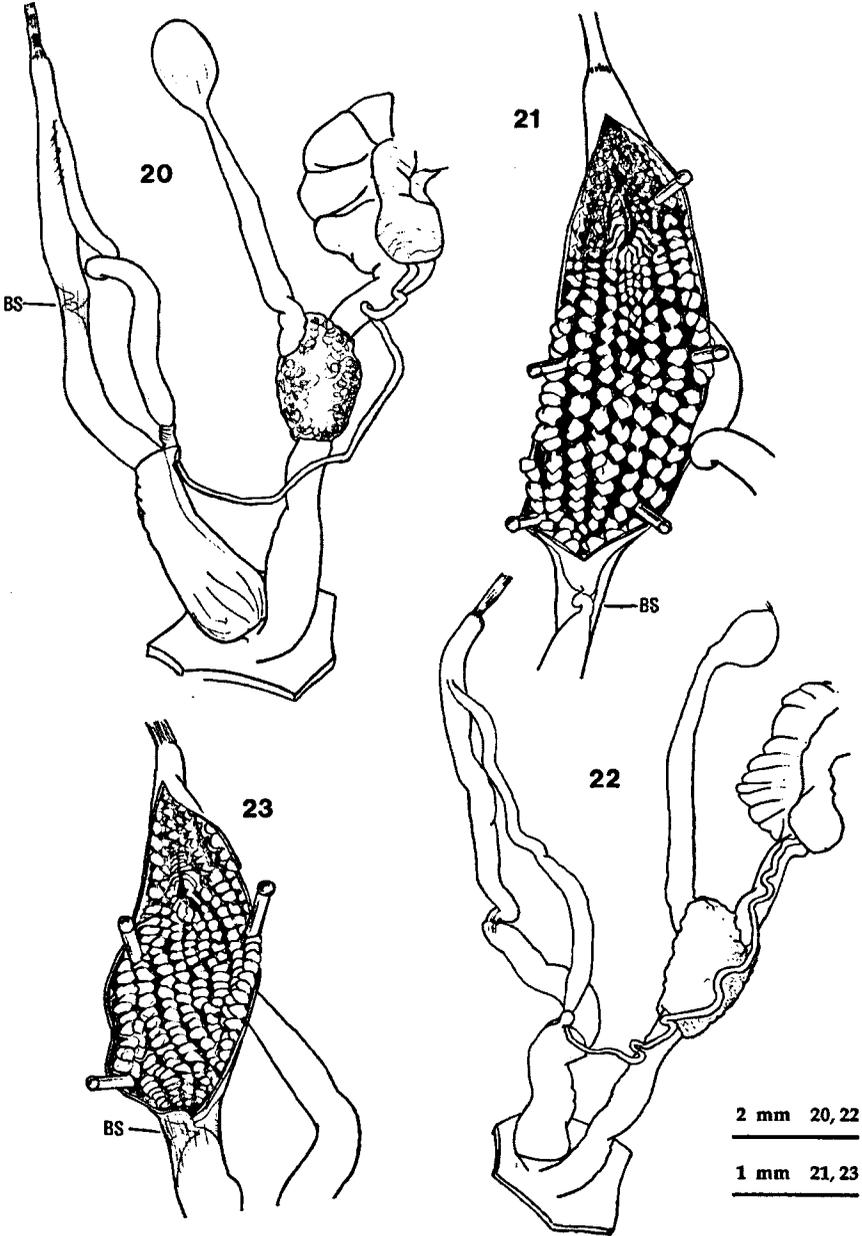
Figs. 7-10. Distal genitalia (figs. 7, 9) and the internal ornamentation of the flagellum and penis (figs. 8, 10) in specimens of *O. cellarius* from Karlstejn, cesky kras: sv jan pod Skalon (Stredoceski, Czech Republic), A. Riedel leg. 25.IX.60 (figs. 7-8) and Alnwick, Simpley Wood, N-Hulne Park (Northumberland, England, UK), A. Norris leg. 6.IX.74 (figs. 9-10).



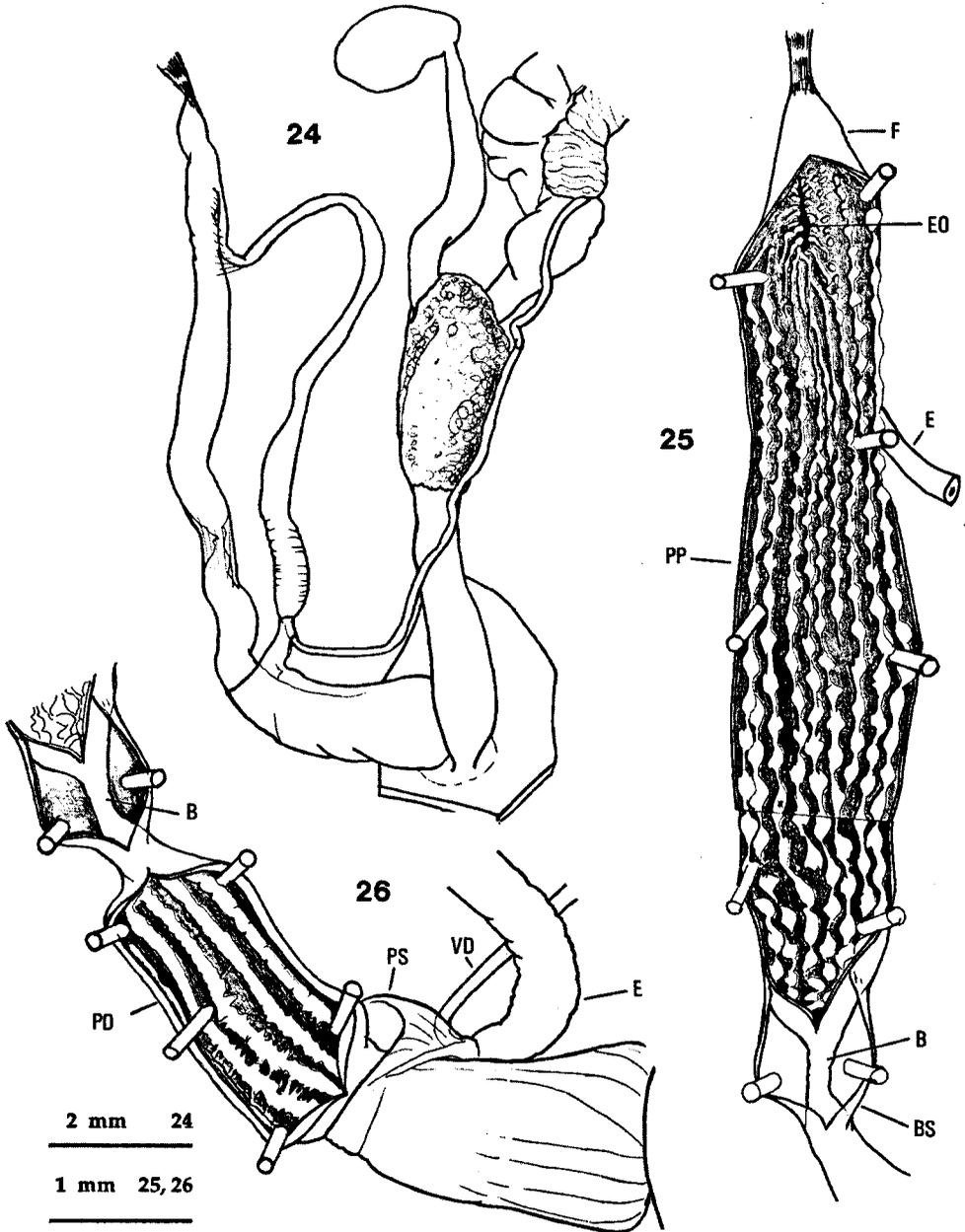
Figs. 11-14. Distal genitalia (figs. 11, 13) and the internal ornamentation of the flagellum and penis (figs. 12, 14) in specimens of *O. cellarius* from Aspet, Grotte de St. Paul near Pujos (Haute-Garonne, France), 32TLT2738, A. Riedel leg. 18.III.64 (figs. 11-12) and Frémondans (Doubs, France), 32TLT2738, M.J. Bishop leg. 30.VIII.74 (figs. 13-14).



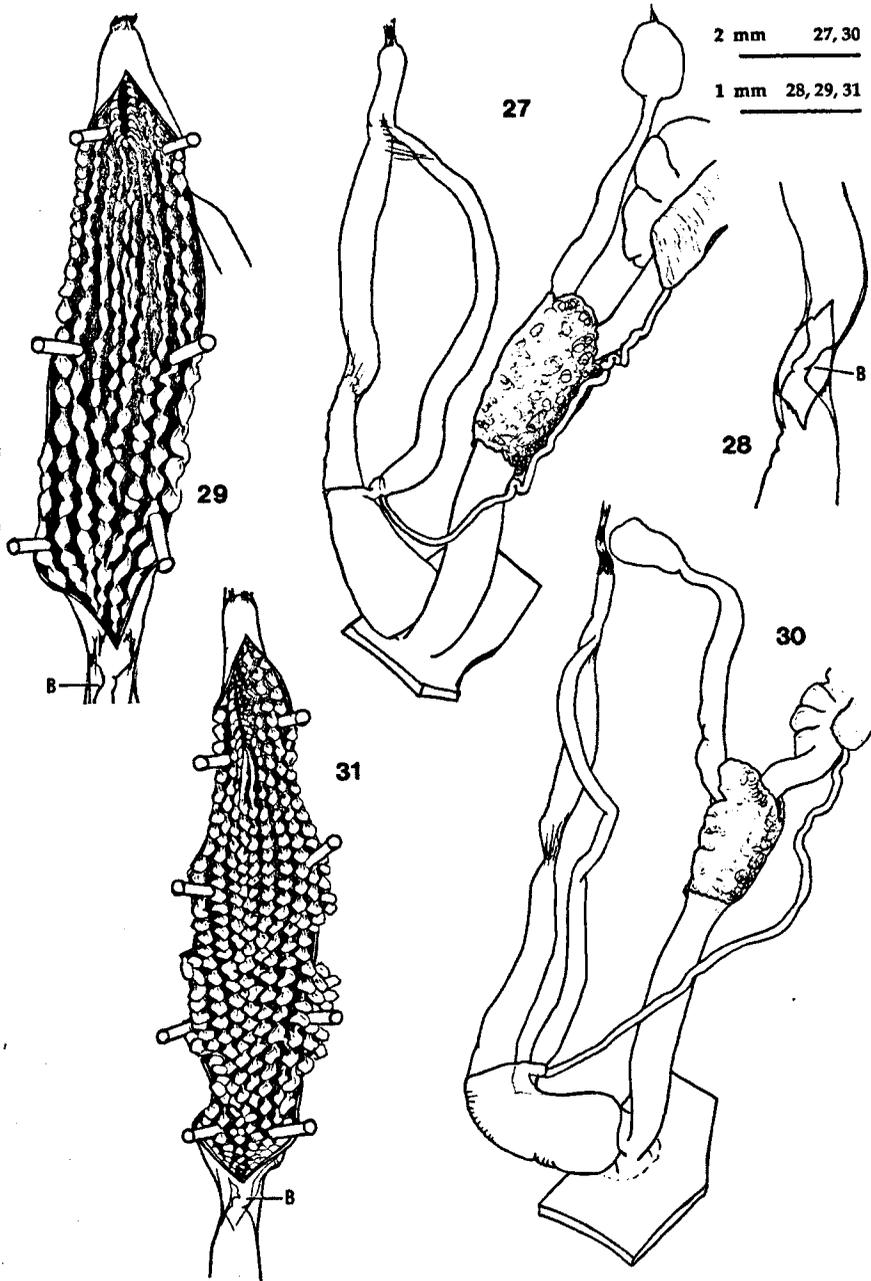
Figs. 15-19. Distal genitalia (figs. 15, 18), the 'bottle-neck' region (fig. 16) and the internal ornamentation of the flagellum and proximal penis (figs. 17, 19) in specimens of *O. draparnaudi* from Pont du Gard (Gard, France), L. Forcart leg. 1970 (figs. 15-17) and Il Conicchio, Capalbio (Grosseto, Italy), 32TPN9804, G. Manganelli & L. Favilli leg. 24.III.92 (figs. 18-19).



Figs. 20-23. Distal genitalia (figs. 20, 22) and the internal ornamentation of the flagellum and the proximal penis (figs. 21, 23) in specimens of *O. draparnaudi* from Lago Maggiore: Isola Bella (Stresa, Novara, Italy), 321MR6382 E. Gavetti leg. 3.1.86 (figs. 20-21) and Basel (Basel, Switzerland), L. Forcart leg. 1940 (figs. 22-23) (Naturhistorisches Museum Basel, no. 381 t). Forcart (1957) determined the latter as *O. cellarius* and based the redescription of *Oxychilus* (s.s.) on them.



Figs. 24-26. Distal genitalia (figs. 24), the internal ornamentation of the flagellum, proximal penis (figs. 25) and distal penis (fig. 26) in a specimen of *O. draparnaudi* from Haarlem (Noord-Holland, Netherlands), R. A. Bank leg. 28.VI.87.



Figs. 27-31. Distal genitalia (figs. 27, 30), the 'bottle-neck' region (fig. 28) and the internal ornamentation of the flagellum and proximal penis (figs. 29, 31) in specimens of *O. draparnaudi* from Västanå, Eskjö (Jönköpings Län, Sweden), F. A. Svalander leg. 13.VIII.37 (figs. 27-29) and Szczecin (Poland), A. Riedel leg. 20.V.51 (figs. 30-31).

to those in the species usually assigned to the subgenus *Ortizius*. Topotypes of *O. draparnaudi* had an ornamentation often consisting of more rows of smaller and more numerous papillae which were distinct, or at most joined at their bases by fine, root-like crests (Giusti, 1976: 196-201, figs. 15-18, 20). These characters were successfully utilized by Altonaga & Puente (1991) to distinguish Iberian populations of *O. cellarius* and *O. draparnaudi*.

## CONCLUSIONS

More recent anatomical research on the two species has led to the reconsideration and confirmation of at least one of the two diagnostic characters described by Taylor. *O. cellarius* has a penis (corresponding to the "penial sheath" of Taylor's fig. 61) cylindrical and rather constant in width in the middle portion (figs. 3-14) or sometimes with an indistinct constriction (between proximal and distal penis), whereas *O. draparnaudi* has a penis in which the usually shorter, slender proximal portion (corresponding to the "epiphallus" of Taylor's fig. 40) is separated by an abrupt constriction from the usually longer, wider distal portion (corresponding to the "penial sheath" of Taylor's fig. 40) (figs. 15-31). The two portions communicate through a very slender, twisted (0.08-0.14 mm in diameter; on many specimens from different European localities) 'bottle-neck' concealed by a thin translucent sheath so that it is easily overlooked (figs. 16, 17, 19, 20, 22, 24, 27, 30). This peculiar feature of the penis of *O. draparnaudi* had already been figured (Grossu & Riedel, 1968: figs. 6-7; Castillejo, 1985: fig. 7A) without anyone realizing its diagnostic value. In *O. cellarius* most of the rows of fused papillae in the proximal penis are continuous with the linear pleats of the distal penis, whereas in *O. draparnaudi* the rows of papillae of the proximal penis stop before the 'bottle-neck' and the pleats of the distal penis begin after it, without any continuity with the rows of papillae (fig. 26).

Revision of the diagnosis of *O. cellarius* and *O. draparnaudi* raises a new problem. What was the species that Forcart (1957: 124, fig. 12) named *O. cellarius* and used to describe the anatomical characters of *Oxychilus* (s.s.) in his revision of the Palaearctic zonitids? Direct examination of Präp. V-32 (kept in the malacological collection of the Naturhistorisches Museum Basel 381-t) confirms what can easily be observed in Forcart's (1957) fig. 12: the genitalia Forcart referred to as belonging to *O. cellarius* have a long penis abruptly divided into proximal and distal parts, connected by a very slender 'bottle-neck' (figs. 22-23). It therefore does not belong to the true *O. cellarius*, but to a specimen of *O. draparnaudi*. This was confirmed by examining Forcart's spirits material which revealed an intermediate portion similar to that of all the specimens of *O. draparnaudi* studied by us.

## ACKNOWLEDGMENTS

We thank Leonardo Gamberucci and Antonella Daviddi for technical assistance, Karl Edlinger (Vienna, Austria) and Leonardo Favilli (Siena, Italy) for preparing figs. 1-2, Helen Ampt for revising the English, Karl Edlinger (Vienna, Austria), Ambros Hänggi (Basel, Switzerland) and Tom Schiotte (Copenhagen, Denmark) for the loan of material from their respective museums and, finally, Adolf Riedel (Warsaw, Poland),

for comments. This research was supported by CNR, MURST 40% and MURST 60% grants.

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