

# On Cyprian Helicellinae (Mollusca: Gastropoda Pulmonata: Helicidae), making a new start

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Our fragmentary knowledge concerning the Cyprian Helicellinae is revised and summarized, while new data are added. "*Helicella (Xerotricha) conspurcata distinguenda*" Haas, 1936, is a *Helicopsis* species that has to be called *H. cypriola* (Westerlund, 1889) as a consequence of the selection of a neotype for Westerlund's poorly described nominal taxon. "*Helicella (Xerotricha) conspurcata arrouxi*" sensu Haas, 1934 (not Bourguignat, 1863) is described as *Helicella juglans* spec. nov. This species stands apart among the Helicellinae by the lack of a separate penis. Neither material nor reliable records of *Xerotricha conspurcata* (Draparnaud, 1801) could be traced; only *X. apicina* (Lamarck, 1822) is known from Cyprus. The wide-spread "*arrouxi*" has also been found on the island; for nomenclatural reasons it should be called *Microxeromagna armillata* (Lowe, 1852). *Xeropicta akrotirica* spec. nov. is distinguished from small specimens of *X. krynickii* (Krynicky, 1833). By the selection of a neotype for *Helix cyparissias* Pfeiffer, 1847, this nominal taxon is stabilized as a junior synonym of *Xeropicta krynickii*. *Xeropicta ledereri* (Pfeiffer, 1856) is hypothesized to be a polytypic species with *X. l. mavromoustakisi* (Haas, 1933) as a subspecies. The status of *Helicella (Jacosta) syrensis carinatoglobosa* Haas, 1934, remains unclear. Two species that are mentioned in the literature under incorrect names, are described as new: *Trochoidea (Xerocrassa) nicosiana* spec. nov. and *Pseudoxerophila confusa* spec. nov.

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## Contents

Introduction .....	99
Provisional conchological key .....	100
Systematic review .....	102
<i>Helicopsis</i> Fitzinger, 1833 .....	102
<i>Xeropicta</i> Monterosato, 1892 .....	107
<i>Pseudoxerophila</i> Westerlund, 1879 .....	113
<i>Xeromunda</i> Monterosato, 1892 .....	115
<i>Helicella</i> Férussac, 1821 .....	115
<i>Xerotricha</i> Monterosato, 1892 .....	119
<i>Microxeromagna</i> Ortiz de Zarate, 1950 .....	120
<i>Trochoidea</i> Brown, 1827 .....	122
<i>Cochlicella</i> Férussac, 1821 .....	125
Acknowledgements .....	126
References .....	126
Index of epithets .....	128

## Introduction

In the Helicellinae sensu auct. there is hardly any correlation between the shell characters and the structure of the genitalia. It has been suggested (e.g. Schileyko,

1978) that these conchological similar species, characterized anatomically by a right ommatophoran retractor that runs next to the genital ducts instead of crossing between penis and vagina, do not constitute a monophyletic group. The present author agrees that most arguments are in favour of a polyphyletic origin indeed. Nevertheless the classical definition of the Helicellinae is maintained, because a stable alternative classification and nomenclature cannot be presented yet. This general problem is not dealt with further in the present paper. It suffices to emphasize that the (sub)generic position of Helicellinae species cannot be based reliably on only their shell characters, since it has been demonstrated convincingly that convergent evolution with regard to shell size, shape and sculpture has occurred frequently in this subfamily.

While trying to identify some samples of Helicellinae from the island of Cyprus, this turned out to be impossible in several cases. The literature on the subject proved to be highly incomplete and not of much help, especially because data concerning the structure of the genitalia are scarce. Haas (1934, 1936) exemplifies the risk of purely conchological research in Helicellinae by uniting what proved to be species belonging to three different genera (*Helicopsis*, *Xeropicta* and *Helicella*) as only two subspecies of a species that most probably does not occur on Cyprus (*Xerotricha conspurcata*).

In the newly collected material by far not enough samples with well preserved specimens were available to enable the composition of a satisfactory monograph concerning the systematics and distribution of the Cyprian Helicellinae. However, some problems can be outlined better now and several confusing errors in the literature can be corrected. This is the main purpose of the present paper, in which the taxa are dealt with more or less profoundly, depending upon the amount of easily accessible information in the literature and the state of our actual knowledge.

It turned out that even on a relatively small island like Cyprus, distributional patterns may occur that are relevant for the interpretation of taxonomic relationships.

For collections the following abbreviations are used: Bar, collection Z. Bar (Hilversum); Hem, collection J. Hemmen (Wiesbaden); MHNG-Bgt, collection J.R. Bourguignat in Muséum d'Histoire Naturelle (Genève); Muséum National d'Histoire Naturelle (Paris); Neu, collection W. H. Neuteboom (Heemskerk); NMG, Naturhistoriska Museet (Göteborg); RMNH, Rijksmuseum van Natuurlijke Historie (Leiden); SMF, Forschungs-Institut Senckenberg (Frankfurt am Main); Smi, collection D. Smits (Woudenberg).

### Provisional conchological key

The key is of limited value because several problematical forms that are mentioned in the text, are not included. It should also be kept in mind that some species are extremely variable in size and shape. Single specimens cannot always be identified, therefore. This is especially so in *Xeropicta krynickii* and *X. ledereri*.

1. Shell higher than broad ..... 2
- Shell width and height about equal, or shell clearly broader than high ..... 4

2. With prominent radial ribs ..... *Trochoidea (T.) liebetruiti*
- Without ribs ..... 3
3. Shell clearly more than twice as high as broad ..... *Cochlicella acuta*
- Shell clearly less than twice as high as broad ..... *Cochlicella conoidea*
4. Shell globular, relatively thin; radial colour pattern dominating; umbilicus measuring less than 1/10 of the shell width ..... *Xeromunda candiota*
- Different ..... 5
5. Spire conical, with straight sides; periphery of at least the final quarter of the body-whorl regularly rounded, and (initial) teleoconch whorls provided with fine regular riblets ..... *Xeropicta krynickii*
- Different ..... 6
6. Shell rounded conical in front view; apertural height less than half the total height; umbilicus measuring less than 1/7 of the shell width ..... *Trochoidea (T.) pyramidata*
- Different ..... 7
7. Shell width over 9 mm ..... 8
- Shell width less than 9 mm ..... 14
8. Umbilicus measuring less than 1/6 of the shell width ..... 9
- Umbilicus measuring over 1/6 of the shell width ..... 12
9. Shell relatively thin, very globular, with a circular aperture ..... *Xeropicta akrotirica*
- Different ..... 10
10. Sculpture obsolete, very irregular ..... 11
- Sculpture prominent, rather coarse and not very irregular; width 10-13 mm ..... *"Helicella" carinatoglobosa*
11. Umbilicus measuring 1/10 of the shell width, or less; aperture elliptical, with an internal rib ..... *Trochoidea (Xerocrassa) nicosiana*
- Umbilicus more widely open; aperture roundish, with a weak internal rib ..... *Trochoidea (Xerocrassa) cretica*
12. Body-whorl, both in juvenile and in full-grown specimens, conspicuously keeled; the inner border of the aperture follows the angle of the keel ..... *Xeropicta ledereri ledereri*
- Different ..... 13
13. Whorls increasing very gradually in width, all of them separated by indented sutures ..... *Pseudoxerophila confusa*
- Body-whorl dominating the shell, separated from the penultimate one by an indented suture; initial teleoconch whorls with flattened sutures, accompanied by (traces of) a slight indentation, resulting from the keel of young specimens ..... *Xeropicta ledereri mavromoustakisi*
14. Shell covered with hairs or prominent hair-scars ..... 15
- Neither hairs nor hair-scars are clearly visible ..... 16
15. Hairs very short and densely covering the shell; aperture elliptical ..... *Microxeromagna armillata*
- Hairs long and widely spaced; aperture circular and relatively large ..... *Xerotricha apicina*
16. Aperture in both juvenile and full-grown specimens with a prominent angle, corresponding with the sharp peripheral keel ..... *Xeropicta ledereri ledereri*

- Different ..... 17
- 17. Umbilicus measuring 1/4-1/5 of the shell width ..... 18
- Umbilicus measuring 1/6-1/7 of the shell width ..... 19
- 18. Juvenile shells with a peripheral keel, that is accentuated by (traces of) a slight, upper indentation and a flattened part of the whorls (small specimens, only known from the eastern half of Cyprus) ..... *Xeropicta ledereri mavromoustakisi*
- Juvenile shells angular at the periphery, but whorls evenly rounded between the sutures and (strongly) inflated; western half of Cyprus ..... *Helicopsis cypriola*
- 19. Aperture circular ..... *Xeropicta akrotirica*
- Aperture elliptical ..... *Helicella juglans* (or *Helicopsis* spec.)

### Systematic review

[Following the (sub)generic names, the diagnostic characters of the genitalia are summarized.]

#### *Helicopsis* Fitzinger, 1833

Genitalia with two dart-sacs, accompanied by accessory sacs.

#### *Helicopsis cypriola* (Westerlund, 1889)

(figs. 1-4, 16, 17, 20)

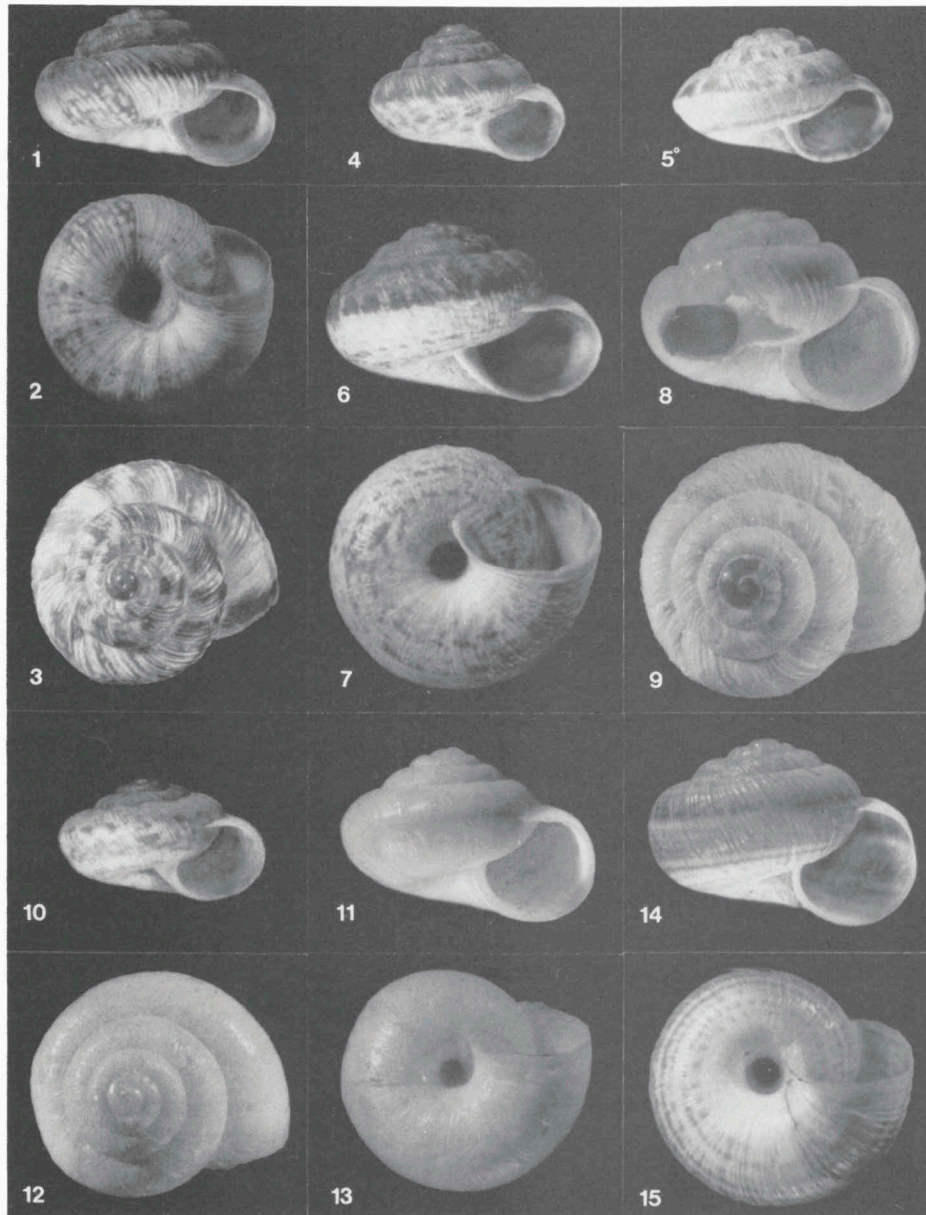
*Helix cyparissias* var. *cypriola* Westerlund, 1889: 252 (without locality); neotype (design. nov.): NMG.

*Helix (Xerophila) cyparissias* var. *cypriola* [sic!]; Rolle & Kobelt, 1896: 55.

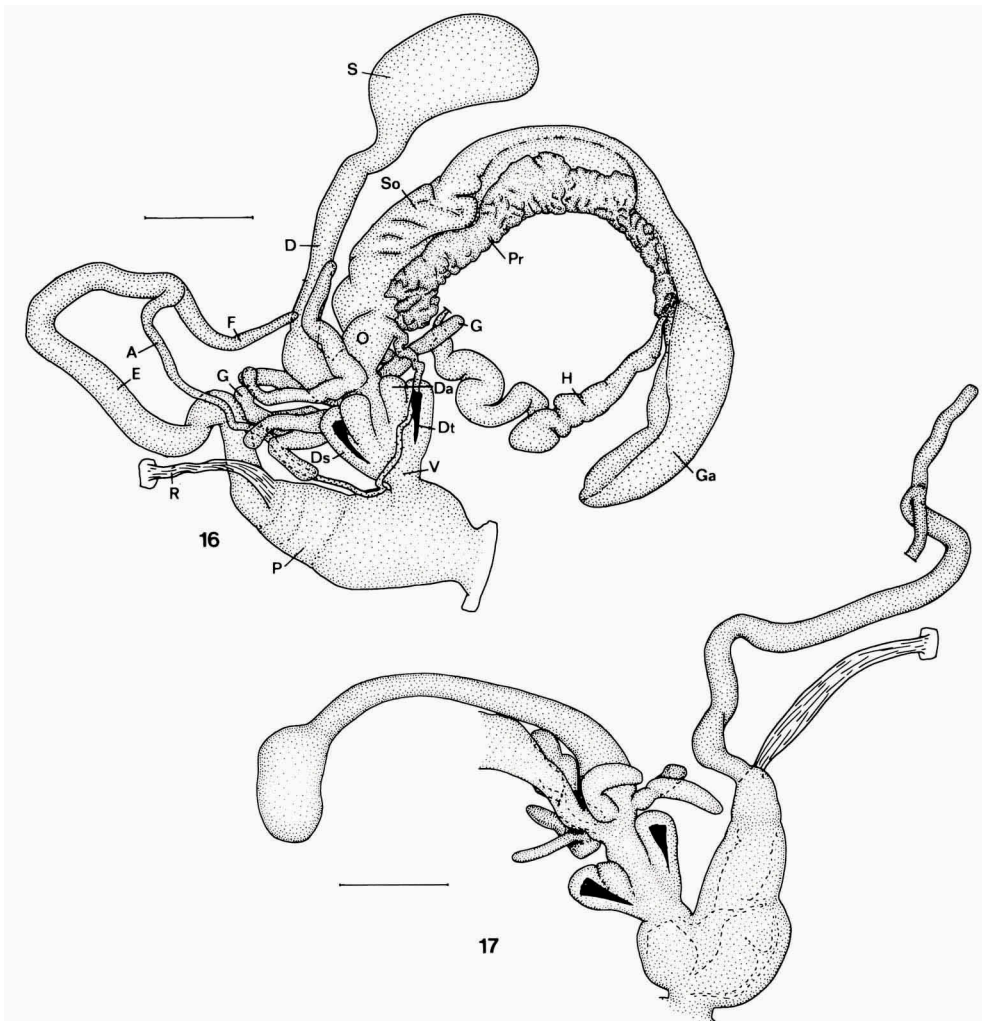
*Helicella (Xerotricha) conspurcata distinguenda* Haas, 1936: 300, fig. 8 ("Limassol", SMF 10418/holotype, 10419/5 paratypes).

Material (fig. 20).— 1.5 km NW. of Coral Bay (= 12 km NW. of Paphos), VD35 (Hem); Cape Lara, VD36 (Hov; RMNH); Ayios Yeorgios, VD36 (Hov; RMNH); 3 km N. of Ayios Yeorgios (= 20 km NNW. of Paphos), VD36 (Hem); "Baths of Aphrodite" (= 4.5 km NW. of Neokhorio, = Neon Chorion), VD38 (Bar; RMNH); Paphos, near the Technical School, VD44 (Neu); Kato Paphos, E. of the main road, VD44 (Bar; RMNH); Peyia, VD45 (Bar); 1 km NE. of Coral Bay (= 10 km N. of Paphos), 100 m alt., VD45 (Hem; RMNH); 0.5 km W. of Kissonerga, 30 m alt., VD45 (Hem); 2 km NW. of Peyia, VD46 (Bar; RMNH); archeological site of Kouklia, 100 m alt., VD53 (Hem; Neu); Ayia Marina (= 2 km N. of Yialia), VD58 (Hem); 5 km WSW. of Pissouri, 100 m alt., VD63 (Hem); "Petra tou Romiou", ravin opposite the "Venus rock" (= 14 km SE. of Paphos), VD63 (Neu); 1 km SW. of Nikoklia, 80 m alt., VD64 (Hem); 2 km NE. of Nikoklia, 200 m alt., VD64 (Hem); 1 km S. of Pissouri, 250 m alt., VD73 (Hem; RMNH); 2 km N. of Pissouri Bay, 100 m alt., VD73 (Hem); 0.5 km N. of Pissouri Bay, VD73 (Hem); archeological site of Kourion, 10 km W. of Limassol, 80 m alt., VD83 (Hem); Episkopi, VD83 (Neu); 1 km NW. of Kantou (= 3.5 km N. of Episkopi), VD83 (Hem); Akrotiri forest, VD92 (SMF 98261/3, 10420b/2 [of 4] "*distinguenda*"); Limassol, WD03 (NMG/neotype *cypriola*; RMNH; SMF 10418/holotype *distinguenda*, 10419/5 paratypes *distinguenda*).

Shell (figs. 1-4).— Shell more or less depressed conical, with 4-5 (very) convex whorls, separated by deep sutures and increasing slowly and regularly in width. The teleoconch is sculptured with coarse, rather irregular transverse ribs. Maybe there are vague hair-pits, but specimens with hairs have not been observed. The body-



Figs. 1-4. *Helicopsis cypriola* (Westerlund). 1-3, Limassol, iv.1935, G. A. Mavromoustakis leg. (actual width 6.4 mm) (RMNH); 4, neotype, idem (actual width 5.1 mm) (NMG). Fig. 5. *Helicopsis* spec., 1 km W. of Analioudou, 8.iv.1985, A. Hovestadt leg. (actual width 5.8 mm) (RMNH). Figs. 6, 7. *Helicella juglans* spec. nov., holotype, Nicosia, iv.1935, G. A. Mavromoustakis leg. (actual width 7.3 mm) (RMNH 56404). Figs. 8, 9, 14, 15. *Xeropicta akrotirica* spec. nov. 8, 9, holotype, Akrotiri forest, 1938, G. A. Mavromoustakis leg. (actual width 7.4 mm) (RMNH 56409); 14, 15, paratype, Episkopi, 2.xi.1981, W. H. Neuteboom leg. (actual width 7.0 mm) (RMNH 56410). Fig. 10. *Microxeromagna armillata* (Lowe), Nicosia, under rind of a conifer in the garden of the Armenian School, x.1978, D. Smits leg. (actual width 5.5 mm) (RMNH). Figs. 11-13. *Xeropicta krynickii* (Krynicky), neotype of *cyparissias*, Larnaca, Artemis Avenue, 8.xi.1981, W. H. Neuteboom leg. (actual width 6.7 mm) (RMNH 56412).



Figs. 16-17. *Helicopsis cypriola* (Westerlund), proximal genitalia. 16, archeological site of Kouklia, 6.xi.1981, W. H. Neuteboom leg. (RMNH slide 958); 17, Cape Lara, 5.iv.1985, A. Hovestadt leg. (RMNH slide 956). Scale lines 1 mm. Abbreviations: A, vas deferens; Ap, appendage (see e.g. fig. 24); D, spermathecal duct; Da, accessory sac; Ds, dart-sac; Dt, dart; E, epiphallus; F, flagellum; G, mucous gland; Ga, albumen gland; H, hermaphroditic duct; O, oviduct; P, penis; Pr, prostate; R, penial retractor muscle; S, spermatheca; So, spermoviduct; V, vagina.

whorl may be regularly rounded to more or less clearly angular, or even carinate, at the periphery, especially above the aperture. Near the aperture the body-whorl is not or hardly descending in front. The umbilicus usually measures between  $1/4$  and  $1/5$  of the total shell width; it is slightly eccentric to symmetrical. The aperture is slightly broader than high and provided with a simple, moderately prominent, internal rib. The colour pattern is extremely variable, whitish with an irregular corneous spotting, which is often at least partially arranged into one or more interrupted spiral bands.

Width 5.0-6.6 mm; height 3.3-4.3 mm.

Generally this species can be recognized by its wide, symmetrical umbilicus and

the convex whorls with a coarse sculpture. Very small specimens of *Xeropicta ledereri mavromoustakisi*, known from near Cape Greco, may look very similar, differing only by the shallower sutures that are accompanied by a slight, parallel indentation.

Genitalia (figs. 16, 17).— The penis is gradually increasing in width towards the genital atrium; its proximal part is about twice as long as the distal part and in line with a somewhat inflated part of the genital atrium. The flagellum is as long as the penis (fig. 16) or shorter (fig. 17), measuring less than 1/3 of the length of the epiphallus. The vagina is as long as the penis or slightly shorter. The spermathecal duct is somewhat shorter than the epiphallus. The dart-sacs insert close to the genital atrium.

Notes.— Syntypes of *Helix cyparissias* var. *cypriola* could be traced neither in the Naturhistoriska Museet, Göteborg (Von Proschwitz, in litt. 4.10.1988), nor in the Naturhistoriska Riksmuseet, Stockholm (A. Warén, in litt. 6.11.1988). The original description of the taxon is insufficient; the variety is said to be smaller than "*cyparissias*", with a rather conical spire, an angular periphery accompanied by a spiral band just above it and some finer spiral banding below. This may apply to more than one Cyprian species. Therefore, to stabilize the nomenclature of the small Cyprian Helicellinae, a neotype is selected for *cypriola* from a sample from Limassol and deposited in the part of the Westerlund collection housed in Göteborg. While introducing *Helicella* (*Xerotricha*) *conspurcata distinguenda*, which becomes a junior synonym by this action, Haas (1936) referred neither to *Helix cyparissias* nor its variety *cypriola*.

Haas (1936: 300) mentioned a specimen of *distinguenda* also from the Akrotiri forest (SMF 10420/paratype). In an earlier paper (Haas, 1934: 19, fig. 6) this specimen had been figured. The shell in question is very globular, with a circular aperture and a relatively large body-whorl. It could be restudied in SMF and proved to belong to the sympatric *Xeropicta akrotirica*.

A sample from Kato Paphos (shells only) contains very small, keeled specimens. The smallest probably full-grown shell, with 3 1/4 whorls, measures only 3.8 mm in width and 2.3 mm in height.

In the sample from Ayia Marina the umbilicus is relatively narrow, measuring c. 1/6 of the shell width. Specimens collected 1.5 km NW. of Coral Bay are more depressed than usual and have an umbilical width of nearly 1/3 of the total shell width.

#### **Helicopsis spec.**

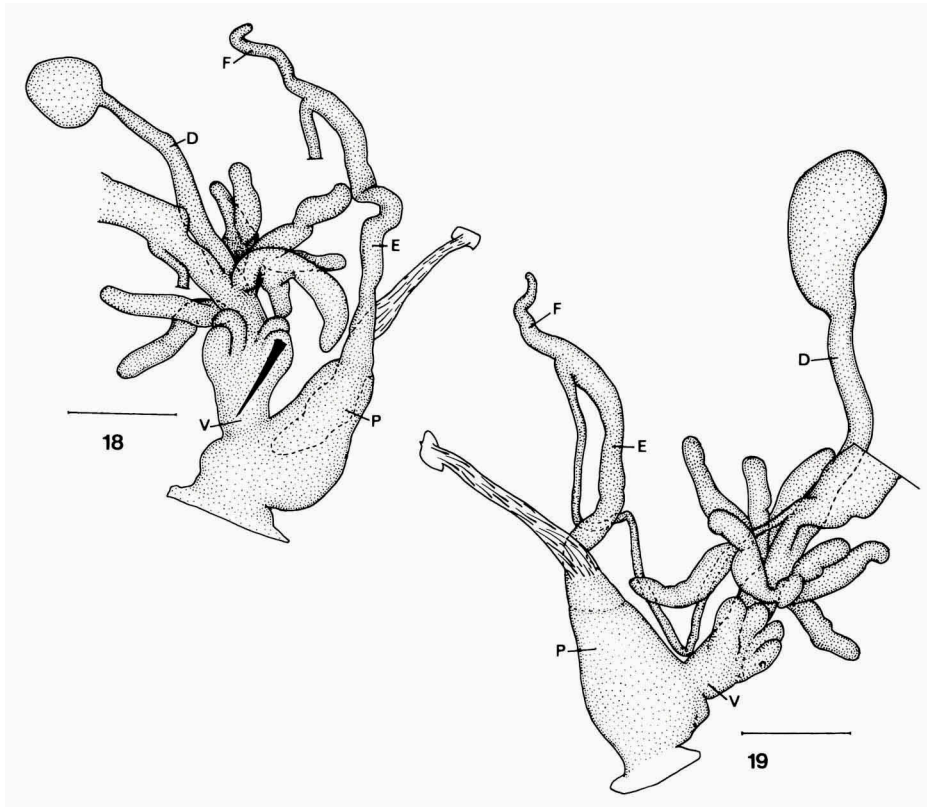
(figs. 5, 18-20)

Material.— 2 km S. of Vizalea, WD07 (Hov/5; RMNH/1); 1 km W. of Analiondou, WD27 (Hov/4; RMNH/1); Moni Ayios Heracleidos, WD27 (Hov/4; RMNH/1).

Shell (fig. 5; see "Notes").— The shells have 3 1/2 to 5 whorls. They are relatively fragile and provided with a sculpture which is less prominent than that of *H. cypriola*. The whorls of the conical spire are much more flattened and separated by less deep sutures. The body-whorl is angled. The umbilicus measures 1/9 to less than 1/6 of the total shell width and the aperture may be somewhat more descending in front. Width 5.3-7.2 mm; height 3.4-5.4 mm.

Genitalia (figs. 18, 19).— The genitalia that could be studied are very similar to those of *H. cypriola*.





Figs. 18-19. *Helicopsis* spec., proximal genitalia. 18, 1 km W. of Analiondou, 8.iv.1985, A. Hovestadt leg. (RMNH slide 960); 19, Moni Ayios Heracleidos, 8.iv.1985, A. Hovestadt leg. (RMNH slide 959). Scale lines 1 mm. For abbreviations, see legends to figs. 16, 17.

Notes.— From three localities (fig. 20) outside the range of *Helicopsis cypriola* specimens of a *Helicopsis* spec. are known, which differ conspicuously from the preceding species. A name for this form could not be traced in the literature. The shells look hardly adult, but the animals dissected from them proved to be full-grown, or nearly so, anatomically.

Although the shells listed above look all very similar, the possibility that a more variable taxon is involved, has to be taken into consideration. At two of the localities some additional, somewhat deviating, empty shells were found: two specimens collected near Analiondou that differ slightly in having less markedly flattened whorls (resembling *Helicopsis cypriola*) and two specimens collected at Moni Ayios Heracleidos (more similar to *Helicella juglans*).

#### Xeropicta Monterosato, 1892

Genitalia with two dart-sacs, accompanied by accessory sacs that surpass the dart-sacs in length, and a conspicuous appendage.

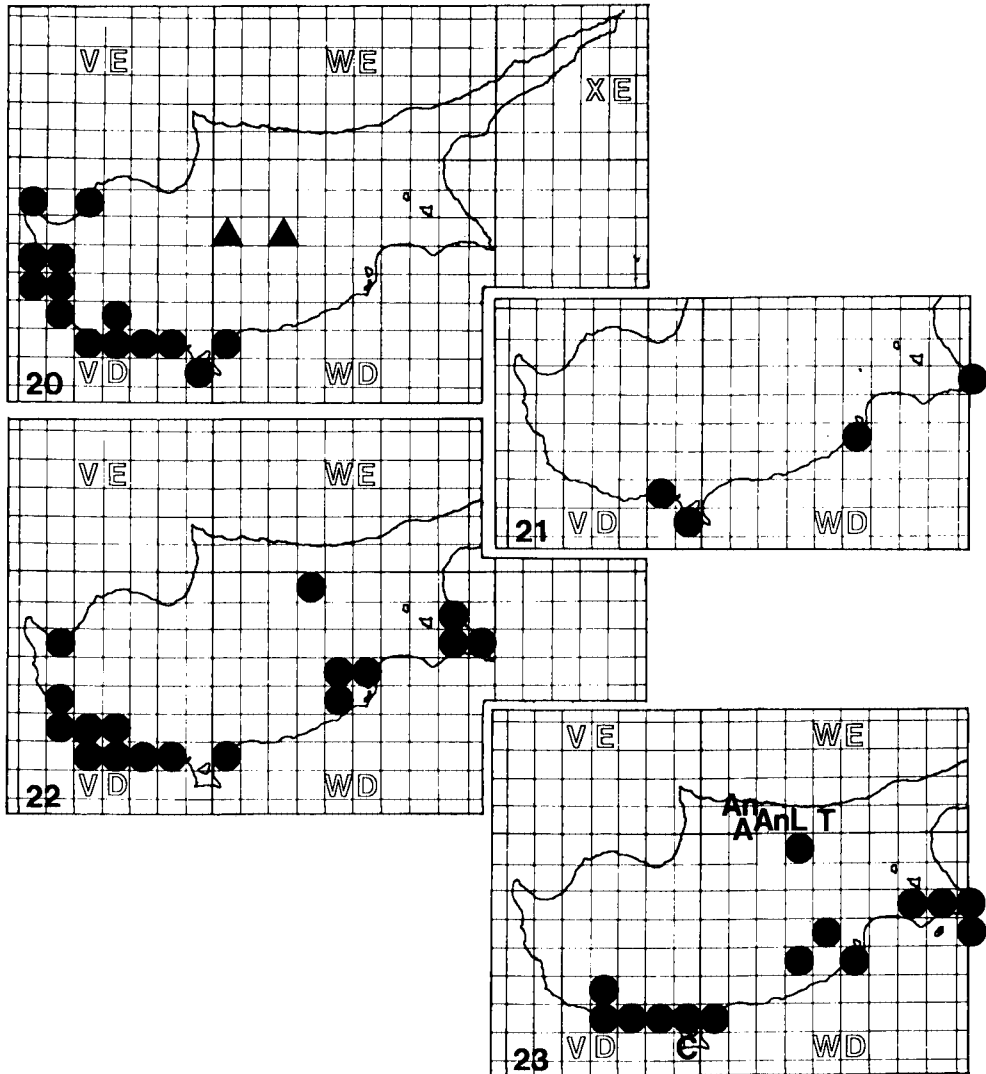


*Xeropicta akrotirica* spec. nov.

(figs. 8, 9, 14, 15, 21, 26)

*Helicella (Xerotricha) conspurcata arrouxi*; Haas, 1934: 20 [part.], fig. 6 (Akrotiri forest). Not *arrouxi* Bourguignat, 1863.

Material (fig. 21).— Holotype: Akrotiri forest, VD92 (RMNH 56409 "*Helicella akrotirica* Tomlin"; G. A. Mavromoustakis leg.). Paratypes: type locality (RMNH 56411/2 [with the holotype]; SMF 10420a/3, 10420b/2 [of 4] "*distinguenda*"; Episkopi, VD83 (Neu/14; RMNH 56410/2); Hala Sultan Tekkesi (= 5 km SW. of Larnaca), WD55 (Hem/4); 3 km NE. of Paralimni (= c. 5 km SE. of Famagusta), WD97 (Hem/1).



Figs. 20-23. UTM 10 km-grid distribution maps. 20, *Helicopsis cypriola* (Westerlund) [dots] and *Helicopsis* spec. [triangles]; 21, *Xeropicta akrotirica* spec. nov.; 22, *X. krynickii* (Krynicky); 23, *X. ledereri mavromoustakisi* (Haas) [dots], with *aulostoma* [A], *andrewi* [An], *ledereri sensu stricto* [L], *tremithensis* [T], and "*Helicella*" *carinatoglobosa* [C].

Shell (figs. 8, 9, 14, 15).— Shell globular, with 4 1/4-5 inflated whorls, sculptured with irregular, rather coarse riblets. Aperture hardly descending in front, circular, with a simple, (very) weakly developed internal rib. Umbilicus symmetrical, measuring 1/6-1/7 of the total shell width. Colour pattern variable, spirally arranged.

Shell width 6.0-9.8 mm; height 4.6-7.4 mm.

*X. akrotirica* differs from the congeneric species by the globular, relatively small shells, with an irregular sculpture, and a narrow umbilicus.

Genitalia (fig. 26).— The proximal part of the genitalia of the holotype was studied superficially after having softened dry remains of the animal with sodium phosphate. The flagellum is relatively short, as in *X. ledereri* and *X. derbentina* (Krynicky, 1836). The appendage is very prominent.

Notes.— The species has been found in sympatry with *X. ledereri mavromoustakisi*.

As far as known, the epithet "*akrotirica*" has never been published in connection with this species.

### **Xeropicta krynickii** (Krynicky, 1833) (figs. 11-13, 22, 24, 33)

*Helix cyparissias* Pfeiffer, 1847: 32 ("insulo Cypro"): neotype (design. nov.): RMNH 56412.

*Helix lauta* sensu Bourguignat, 1853: 29. Not Lowe, 1831.

*Helix larnacensis* Rolle & Kobelt, 1896: 55, pl. 22 figs. 10, 11.

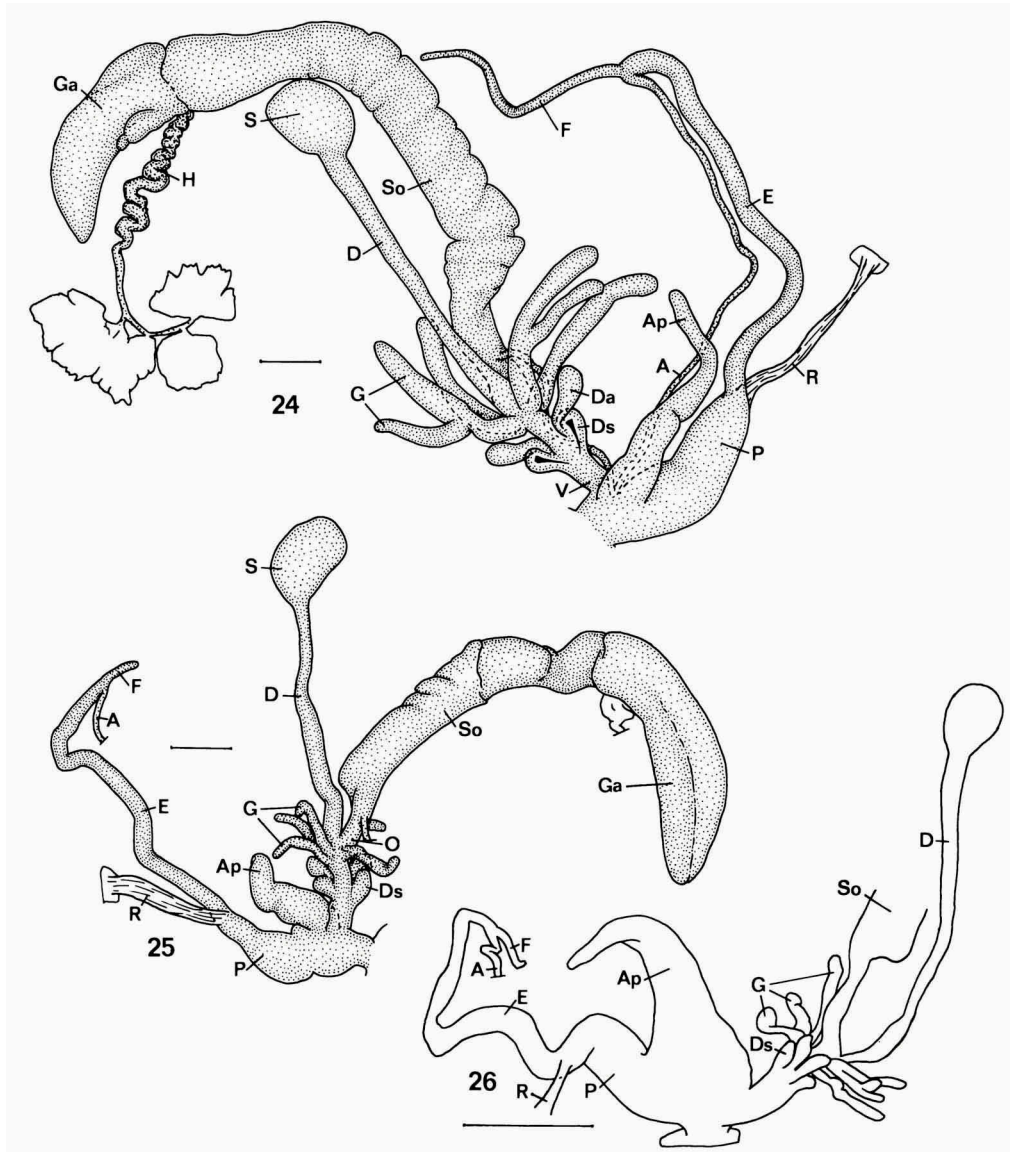
*Helix cretica* var. *littoralis* Mousson, 1854: 378 ("Cypre").

*Helicella cyparissias* var. *cypricola* sensu Hesse, 1934: 29, pl. 6 fig. 51 (genitalia). Not Westerlund, 1889.

*Helicella larnacensis*; Hesse, 1934: 30, pl. 6 fig. 52 (genitalia).

Material (fig. 22).— Kato Paphos, (a) "Apostle Paulus Avenue", (b) "Tombs of the Kings", and (c) near the "Odeion Gymnasium", VD44 (Neu); Paphos, near the Technical School, VD44 (Neu); Paphos, near the lighthouse, 20-30 m alt., VD44 (Hem); 1 km N. of Peyia, 7 km NNW. of Paphos, 300 m alt., VD45 (Hem); Peyia, VD45 (Bar); 2.5 km W. of Polis, 50-80 m alt., VD47 (Hem); Polis, direction "Baths of Aphrodite", VD47 (RMNH; Smi); archeological site of Kouklia, 100 m alt., VD53 (Hem); Yeroskipos, VD54 (Bar); "Petra tou Romiou", ravin opposite the "Venus rock" (= 14 km SE. of Paphos), VD63 (Neu); 2 km NE. of Nikoklia, 200 m alt., VD64 (Hem); 1 km S. of Pissouri, 250 m alt., VD73 (Hem); 2 km N. of Pissouri Bay, 100 m alt., VD73 (Hem); 1 km N. of Evdhimou Bay, 3 km E. of Pissouri, 100 m alt., VD73 (Hem); archeological site of Kourion, 10 km W. of Limassol, 80 m alt., VD83 (Hem); Limassol, WD03 (RMNH "*cretica littoralis*, G. A. Mavromoustakis leg."); Nicosia, WD39 (RMNH); Limassol — Larnaca, 10 km SW. of Larnaca near Agkleisides, WD45 (RMNH; Smi); 2 km W. of Kalokhorio (= Kalon Chorion) (= 10 km W. of Larnaca), WD46 (Hem); Larnaca, WD56 (Bar; RMNH; SMF 67374/1, 289611/6, 67378/10 "*cyparissias*"); Larnaca, "Artemis Avenue", WD56 (Neu; RMNH 56412/neotype "*cyparissias*"); 1 km NW. of Phrenaros, 3.5 km W. of Paralimni, 100 m alt., WD87 (Hem); 3 km S. of Liopetri (= 10 km W. of Ayia Napa), WD87 (Hem); Famagusta, WD88 (SMF 67367/1, 67371/3, 67376/31, 67379/48 "*cyparissias*"); Ayia Napa, northern side, WD97 (Hem); 2.5 km NE. of Ayia Napa, WD97 (Hem).

Shell (figs. 11-13, 33).— The conical spire of the shell is usually somewhat elevated, not strongly depressed; the whorls are separated by indented sutures. Aperture roundish to slightly elliptical, not or shortly descending in front; palatal lip inserting at the periphery or just below it. The initial teleoconch whorls are sculptured with regular, sharp and fine, transverse riblets, similar to those of for example the western European *Candidula gigaxii* (Pfeiffer, 1850). On the body-whorl this very characteristic sculpture may be somewhat less regular. The eccentric umbilicus measures less than



Figs. 24-26. Proximal genitalia of *Xeropicta* spec. 24, *X. krynickii* (Krynicky), Kato Paphos, near the "Odeion Gymnasium", 5.xi.1981, W. H. Neuteboom leg. (RMNH slide 955); 25, *X. ledereri mavromoustakisi* (Haas), Nicosia, 11.v.1984, Z. Bar leg. (RMNH slide 954); 26, *X. akrotirica* spec. nov., holotype, Akrotiri forest, 1938, G. A. Mavromoustakisi leg. (RMNH slide 952). Scale lines 1 mm. For abbreviations, see legends to figs. 16, 17.

1/5 of the total shell width.

The dimensions of full-grown shells vary considerably. Shell width 6.7-13.0 mm; height 4.5-9.1 mm.

Genitalia (fig. 24).— A specimen from Cyprus was dissected and proved to have a flagellum that is slightly longer than the penis, which is usual in this species (Hesse, 1934: pl. 6 figs. 48 "*krynickii*", 52 "*larnacensis*"; Shilejko, 1978: 219, fig. 245).

Notes.— *X. krynickii* is an extremely variable species with regard to shell shape and size. It resembles *Cerņuella* (*C.*) *virgata* (Da Costa, 1778) in this respect.

There are no syntypes of *Helix cyparissias* Pfeiffer in the British Museum (Natural History), (Mordan, in litt. 26.9.1988). Because the vague original description may apply to several species ["Diam. 6, alt. 4 mill." .. "fast kreisrunde Mündung"], a neotype has been selected (figs. 11-13) with a nearly circular aperture and dimensions that are little more than indicated in the original diagnosis [6.7 × 4.5 mm].

A sample in RMNH, labelled "*Helicella* (*Xerocrassa*) *cretica* var. *littoralis*", collected by G. A. Mavromoustakis at Limassol, clearly belongs to this species.

Judging from the original description and figures and many topotypic specimens, there can be no doubt that *Helix larnacensis* is a junior synonym.

The species mentioned from Larnaca as *Helix lauta* by Bourguignat (1853: 29) and reported to be very common in Cyprus, is most probably *X. krynickii*. *H. lauta* Lowe, 1831, described from the island of Porto Santo (Madeira Is), is closely related to or identical with *Cerņuella virgata* (Da Costa, 1778).

#### *Xeropicta ledereri* (Pfeiffer, 1856)

(fig. 23)

This extremely variable species, especially the taxon supposed to be the nominate subspecies, remains poorly known. The interpretation of the present author is mainly based on conchological and distributional data. In both subspecies the initial teleoconch whorls are provided with a prominent keel, accentuated by a slight upper indentation which accompanies the flattened sutures. In contrast, the body-whorl may (partially) be regularly rounded and accompanied by an indented suture. The radial sculpture is prominent. The umbilicus is widely open.

Anatomically, the wide-spread *X. derbentina* cannot be clearly distinguished from *X. ledereri*. In the former species, however, juvenile shells have a far less prominent keel, whereas in full-grown specimens the initial teleoconch whorls are slightly convex and separated by indented sutures.

#### *Xeropicta l. ledereri* (Pfeiffer, 1856)

(fig. 23)

*Helix ledereri* Pfeiffer, 1856: 43 ("in insula Cypro"). Kobelt, 1877: 105, pl. 145 fig. 1455.

*Helix usticensis* sensu Zelebor, 1865: 591. Not Calcara, 1842.

*Jacosta andrewi* Rolle, 1898: 165 ("in monte Chrysostomo ins. Cyprus").

*Helicella* (*Jacosta*) *syrensis andrewi*; Haas, 1933: fig. 7.

*Helix* (*Xerophila*) *peregrina* Nägele, 1910: 149 ("Armenierberg, nordöstlich von Nikosia, Cypern. Höhe 3065 Fuss").

*Xerophila tremithensis* Hesse, 1914: 59. Nomen novum for *Helix peregrina* Nägele, 1910, not Locard, 1894.

*Helicella* (*Jacosta*) *syrensis cypria* Haas, 1933: 27, figs. 5, 6 ("Mt. Pentadactylos").

*Helicella* (*Jacosta*) *syrensis tremithensis*; Haas, 1934: fig. 5.

*Helicella* (*Jacosta*) *syrensis aulostoma* Haas, 1936: 298, fig. 5 ("Nordhang des Kornos-Berges auf Zypern, in 660-830 m H.").

Material (fig. 23).— Sina monastery, 5 km S. of Lapithos, WE10 (SMF 6832/lectotype *andrewi*, 6919/4 paralectotypes *andrewi*); northern slope of Mt. Kornos near Lapithos, 660–830 m alt., WE10 (Haas, 1936: 299 “*aulostoma*”); Kyrenia, WE20 (SMF 64351/2 “*andrewi*”); Kyrenia — Nicosia, 330 m alt., WE20 (SMF 64350/2 “*andrewi*”); Agios Ilarion Mt., WE20 (SMF 64352/2 “*andrewi*”); Mt. Chrysos-tomos, WE30 (Haas, 1933: 27 “*cypria*”); Mt. Pendahaktylos (= 4.5 km N. of Kythrea), WE30 (Haas, 1933: 27 “*cypria*”); Mt. Armenica, 20 km NE. of Nicosia, WE40 (SMF 7033a/lectotype *tremithensis*, 7033b/4 paralectotypes *tremithensis*).

Shell.— Body-whorl with a (very) prominent keel; aperture elliptical, its border following the curvature of the keel; umbilicus measuring nearly 1/3 to 1/6 of the total width of the shell; sculpture fine but prominent.

Notes.— From the northern, mountainous part of the island several forms with prominently keeled shells have been described, that have not been collected more recently. Anatomical data are unknown and the distributional data are rather vague. These nominal taxa, some of which were apparently overlooked by Haas, are provisionally considered synonymous in the present paper. According to Forcart (1976: 159), *Helix ledereri*, originally described from Cyprus (Pfeiffer, 1856: 43 [“in insula Cypro”]), is a senior synonym of *Helicella (Jacosta) syrensis cypria* Haas, 1933, and the oldest name for this form.

Zebebor (1865: 591) most probably referred to this subspecies (“in den Gebirgen des St. Croce und des Pentadactylon”) as *Helix usticensis* Calcara, 1842, a species from the isolated island of Ustica, 65 km N. of Palermo, characterized by depressed shells with a sharp keel (see Kobelt, 1877: 103, pl. 145 fig. 1451).

### *Xeropicta ledereri mavromoustakisi* (Haas, 1933)

(figs. 23, 25, 31, 34)

? *Helix profuga* sensu Zebebor, 1865: 592. Not Schmidt, 1854.

*Helicella (Xeropicta) protea mavromoustakisi* Haas, 1933: 26, figs. 1, 2 (“Limassol”).

*Helicella (Jacosta) syrensis torocincta* Haas, 1933: 27, fig. 8 (“zwischen Xylophago und Capo Greco”).

Material (fig. 23).— “Petra tou Romiou”, ravine opposite the “Venus rock” (14 km SE. of Paphos), VD63 (Neu); 2 km NE. of Nikokleia (= 5 km NE. of Koukليا), 200 m alt., VD64 (Hem); 1 km S. of Pissouri, 250 m alt., VD73 (Hem); 1 km N. of Evdhimou, road to Prastion, VD83 (Hem); N. of Ypsonas, VD93 (RMNH; Smi); Limassol, WD03 (RMNH; SMF 6271/holotype, 6272/29 paratypes, 6324/13 paratypes); N. of Kophinou along the road Limassol — Nicosia, WD35 (RMNH; Smi); Nicosia, WD39 (RMNH); c. 10 km SW. of Larnaca near Agkleisides (= Anglisidhes), WD45 (RMNH; Smi); 2 km W. of Kalokhorio (= Kalon Chorion) (= 10 km W. of Larnaca), WD46 (Hem); Ayia Anna (= 14 km W. of Larnaca), WD46 (RMNH; Smi); W. of Tekke, near Larnaca airport, WD55 (Smi); Ormideia, WD77 (RMNH; SMF 6274/4 paratypes); Xylophagou — Cape Greco, WD86 (Haas, 1933: 27 “*torocincta*”); 3 km S. of Liopetri (= 10 km W. of Ayia Napa), WD87 (Hem); Cape Greco, WD96 (Hem); Protaras (= 5 km N. of Cape Greco), WD97 (Hem); 3 km NE. of Paralimni (= c. 5 km SE. of Fama-gusta), WD97 (Hem).

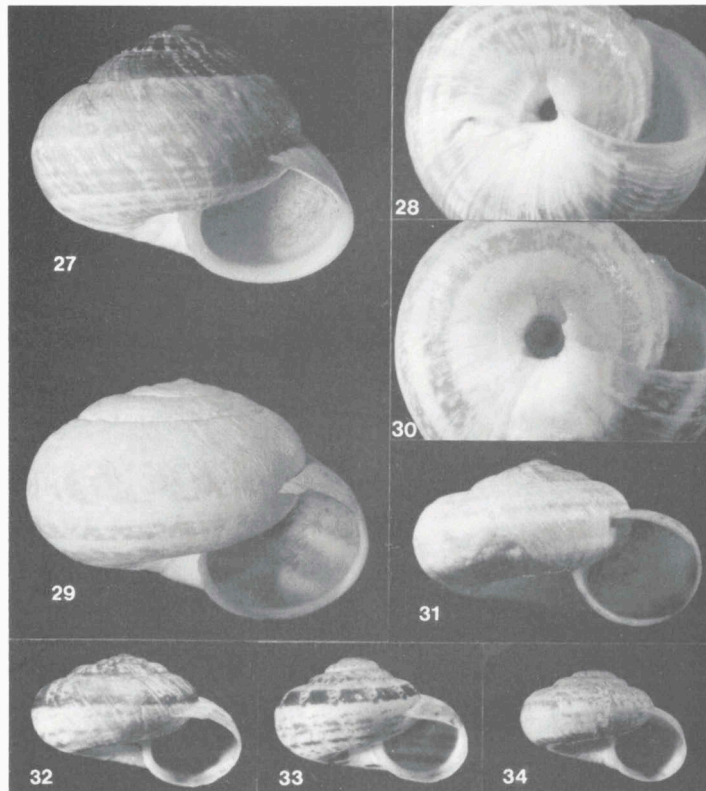
Shell (figs. 31, 34).— Shell depressed, with a low conical spire and a roundish aperture, which is not or hardly descending in front. The dimensions of full-grown shells vary considerably, with the largest specimens being (much) more depressed than the smallest ones. The shell is densely covered by rather coarse, irregular, radial riblets. Juvenile specimens have a prominent keel, accentuated above the periphery

by a slight indentation. In full-grown specimens the periphery is usually rounded. As a consequence, the suture along the body-whorl is clearly indented, whereas it is much shallower along the initial whorls, where the slight furrow above the hidden keel is seen. The wide, symmetrical umbilicus measures 1/4 to 1/5 of the total shell width. The spirally arranged colour pattern is very variable.

Shell width 8.9-14.9 mm; height 5.6-8.7 mm.

In *X. krynickii* the umbilicus is narrower, the sculpture is finer and more regular and the suture is somewhat indented along all the whorls and not accompanied by a slight furrow.

Genitalia (fig. 25).— Only a single specimen that was preserved in alcohol could be dissected. In *X. ledereri mavromoustakisi* the flagellum is about as long as the distal part of the penis, which is somewhat shorter than it is in *X. derbentina*, judged upon after Bonavita (1965: 95, fig. 12 "arenosa"), Hesse (1934: pl. 6 fig. 47) and Shilejko (1978: 221, fig. 248). The spermathecal duct is shorter than the epiphallus, which is



Figs. 27-33. *Trochoidea (Xerocrassa) nicosiana* spec. nov., holotype, Nicosia, 11.v.1984, Z. Bar leg. (actual width 16.1 mm) (RMNH 56413). Figs. 29, 30. *Trochoidea (Xerocrassa) cretica cretica* (Férussac), Paphos, "Gladstone Street", 4.xi.1981, W. H. Neuteboom leg. (actual width 17.1 mm) (RMNH). Figs. 31, 34. *Xeropicta ledereri mavromoustakisi* (Haas). 31, Limassol, xii.1935, G. A. Mavromoustakis leg. (actual width 14.0 mm) (RMNH); 34, Nicosia, iv.1936, G. A. Mavromoustakis leg. (actual width 8.4 mm) (RMNH). Fig. 32. *Pseudoxerophila confusa* spec. nov., holotype, Parapedhi — Platres, x.1978, D. Smits leg. (actual width 10.4 mm). Fig. 33. *Xeropicta krynickii* (Krynicky), Limassol, xi.1935, G. A. Mavromoustakis leg. (actual width 9.3 mm).

indicated also for *X. derbentina* by Shilejko, whereas Bonavita and Hesse figure a relatively (much) longer spermathecal duct.

Notes.— This subspecies is extremely variable in shape and size. A sample from 1 km W. of Ayia Napa, provisionally classified with it, is very variable in general shape, sculpture, umbilical width and convexity of the whorls. The largest specimen of this sample, with 4 3/4 whorls, is only 8.2 mm broad and 5.9 mm high. The identification could be verified anatomically using dry remains of specimens that were softened in sodium phosphate.

In specimens from (near) Cape Greco ("*torocincta*"), the shells may be provided with a more or less obsolete keel along the entire body-whorl, reaching the aperture as a thickened, peripheral line, without interrupting the regularly rounded, inner border of the aperture. Dry remains of two specimens, softened with sodium phosphate, enabled an anatomical confirmation of the identification. The exact distribution of this relatively small, keeled form is unknown; if it occurs in separate populations, one might distinguish *X. ledereri torocincta* as a separate subspecies. However, near Cape Greco only relatively small shells of *X. l. mavromoustakisi* have been collected recently, some of which with an obsolete keel along the periphery of the body whorl.

Most probably, the species reported as *Helix profuga* by Zelebor (1865: 592) from Cape Greco belongs to the species here discussed. Specimens of the closely related if not conspecific *Cernuella virgata* (Da Costa, 1778) are not known from Cyprus.

#### ***Pseudoxerophila* Westerlund, 1879**

Genitalia with two, relatively small dart-sacs, accompanied by prominent, clearly higher accessory sacs; without an appendage.

#### ***Pseudoxerophila confusa* spec. nov. (figs. 32, 35)**

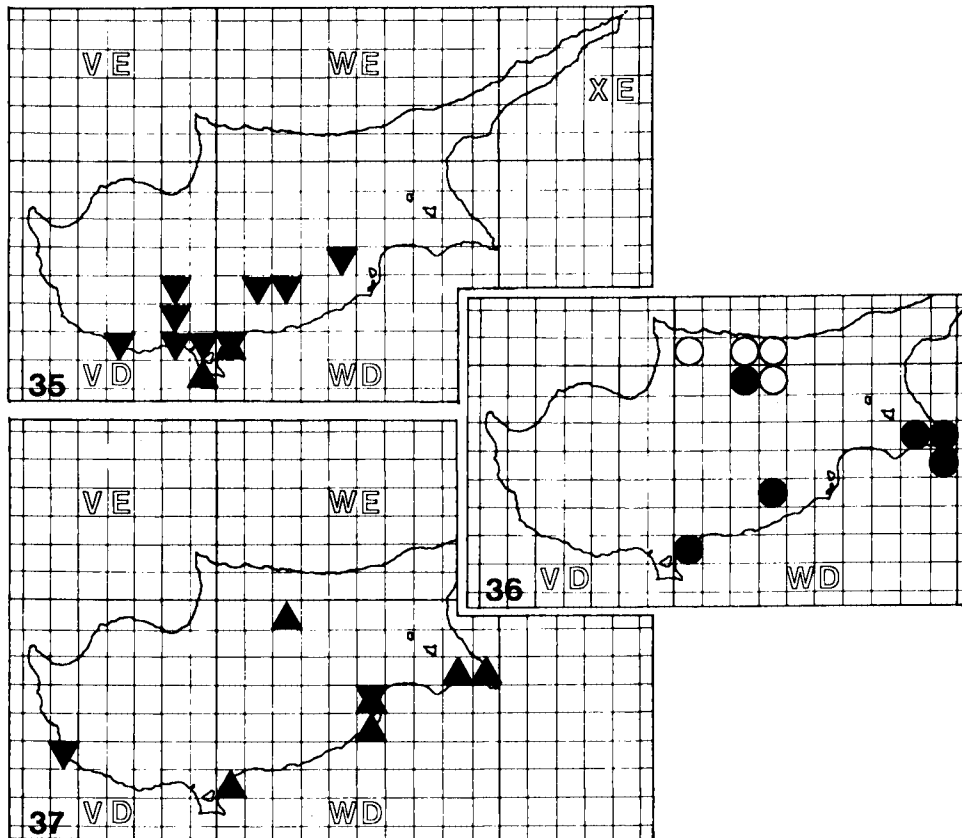
*Helicella (Xeropicta) cretica sitiensis* sensu Haas, 1933: 25. Not Maltzan, 1887.

*Helicella sitiensis* sensu Hesse, 1934: 26, pl. 5 fig. 43 (genitalia). Not Maltzan, 1887.

Material (fig. 35).— Holotype: Parapedhi - Platres, VD85 (RMNH 56418). Paratypes: 5 km W. of Pissouri, VD63 (Hem/1); Paramali, some km W. of Limassol, VD83 (RMNH 56423/6); 1 km N. of Evdhimou, road to Prastion, VD83 (Hem/1); Pano Kividhes, VD84 (RMNH 56422/1; Smi/3); type locality (RMNH 56419/2; Smi/5); N. of Ypsonas, VD93 (Smi/1); Sphalagiotissa monastery, 5 miles from Limassol, c. WD03 (SMF 66735/8, 66736/14); Kellaki - Arakpas, WD15 (Smi/2); Levkara, WD25 (SMF 66737/2); 2 km W. of Kalokhorio (= Kalon Chorion) (= 10 km W. of Larnaca), WD46 (Hem/5).

Shell (fig. 32).— Shell depressed, with a low conical, dome-shaped spire; with 4 3/4 to 5 1/4 slightly convex whorls, all separated by equally indented sutures. Aperture elliptical, with a weak internal rib, somewhat descending in front. Umbilicus symmetrical, measuring between 1/4 and 1/5 of the total width of the shell. In juvenile specimens of up to four whorls the periphery is angular; usually the periphery





Figs. 35-37, UTM 10 km-grid distribution maps. 35, *Xeromunda candiota* (Mousson) [triangles pointing up] and *Pseudoxerophila confusa* spec. nov. [triangles pointing down]; 36, *Helicella juglans* spec. nov., open circles indicate problematic forms; 37, *Xerotricha apicina* (Lamarck) [triangles pointing down] and *Microxeromagna armillata* (Lowe) [triangles pointing up].

of (most of) the body-whorl is evenly rounded. Teleoconch whorls sculptured with irregular, fine to rather coarse riblets. A microsculpture is not clearly developed. The shells are provided with a spirally arranged colour pattern of more or less frequently interrupted bands that differ in width.

Width 9.2-11.0 mm; height 5.2-6.9 mm.

The species differs from *X. krynickii* by the irregular sculpture and the in front view more dome-shaped, not straight-sided conical, spire. In *X. ledereri mavromoustakisi* the aperture is more roundish and the initial teleoconch sutures are very shallow, whereas the suture is clearly indented along the body-whorl; in the various forms of *Trochoidea* (*X.*) *syrensis* the sutures are developed the same way.

Genitalia.— See Hesse, 1934: 26, pl. 5 fig. 43.

Notes.— According to Haas (1933: 25), *Helix sitiensis* Maltzan, 1887, originally described from eastern Crete, occurs on Cyprus as well. This view could not be confirmed. Five true syntypes from Maltzan, ex collection O. Boettger (SMF 10360/5), collected near the Toplou monastery ESE. of Sitia in E. Crete, belong to a species

which is conchologically similar to *Xerolenta obvia* (Menke, 1828) and *Xeromunda vulgarissima* (Mousson, 1859). The largest full-grown shell has five whorls and measures 11.6 mm in width and 7.5 mm in height; the umbilical width is about 1/4 that of the shell. This Cretean species differs clearly from the Cyprian taxa.

Most probably Haas has been misled by another sample in SMF (289599/7), which is also labelled as syntypes of *Helix sitiensis* from Sitia, although Maltzan is not indicated as the collector of these shells. This material is clearly not conspecific with the sample SMF 10360/5. The shells cannot be distinguished from the Cyprian *sitiensis* sensu Haas; most probably they were not collected in Crete but in Cyprus. As a consequence the Cyprian species needs a new name. Here should be added that Haas (1936: 305), not referring to his 1933 paper, mentioned *sitiensis* as a species from Crete, closely related with *Helix hierapetrana* Maltzan, 1887.

Hausdorf (1988: 22), while re-defining *Pseudoxerophila*, suggested that *Helix sitiensis* sensu Hesse, 1934, belongs to this genus.

Shells from "Davlo" [? = Davlos, WE82] (SMF 66738/4), also labelled as *sitiensis*, are relatively small and resemble large *Helicella juglans* (8.5-8.6 x 5.3-5.9 mm; 4 3/4-5 whorls); they are not considered paratypes of *P. confusa*, therefore.

#### **Xeromunda Monterosato, 1892**

Genitalia with a single dart-sac and an accessory sac that is transformed into an inflated part of the vagina.

#### **Xeromunda candiota** (Mousson, 1854) (fig. 35)

*Helicella candiota*; Hesse, 1934: 8, pl. 1 fig. 9 (genitalia)

*Xeromunda candiota*; Hausdorf, 1988: 25, figs. 18, 19 (genitalia).

*Xeromunda* cf. *durieui*; Manganelli & Giusti, 1989: 8, fig. 5B, C (genitalia).

Material (fig. 35).— Akrotiri, VD92 (Hesse, 1934: 8; Manganelli & Giusti, 1989: 12); Limassol, WD03 (Smi).

Note.— This central and eastern Mediterranean, disjunctly distributed species, is apparently not common in Cyprus. Its nomenclature is still a matter of debate (see Manganelli & Giusti, 1989).

#### **Helicella Férussac, 1821**

Genitalia with two dart-sacs, not accompanied by externally prominent, accessory sacs.

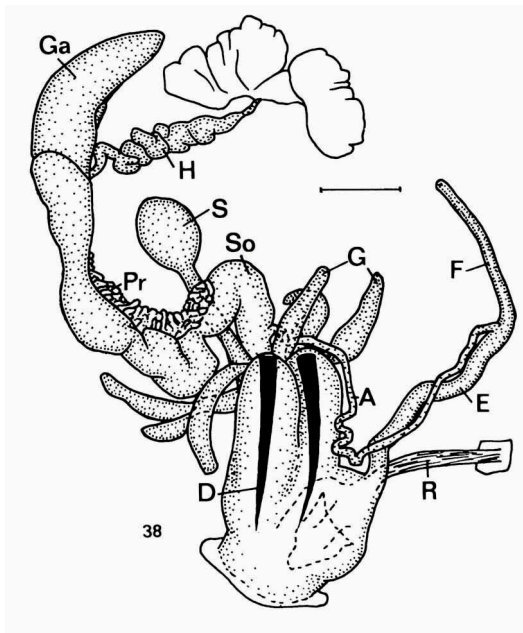


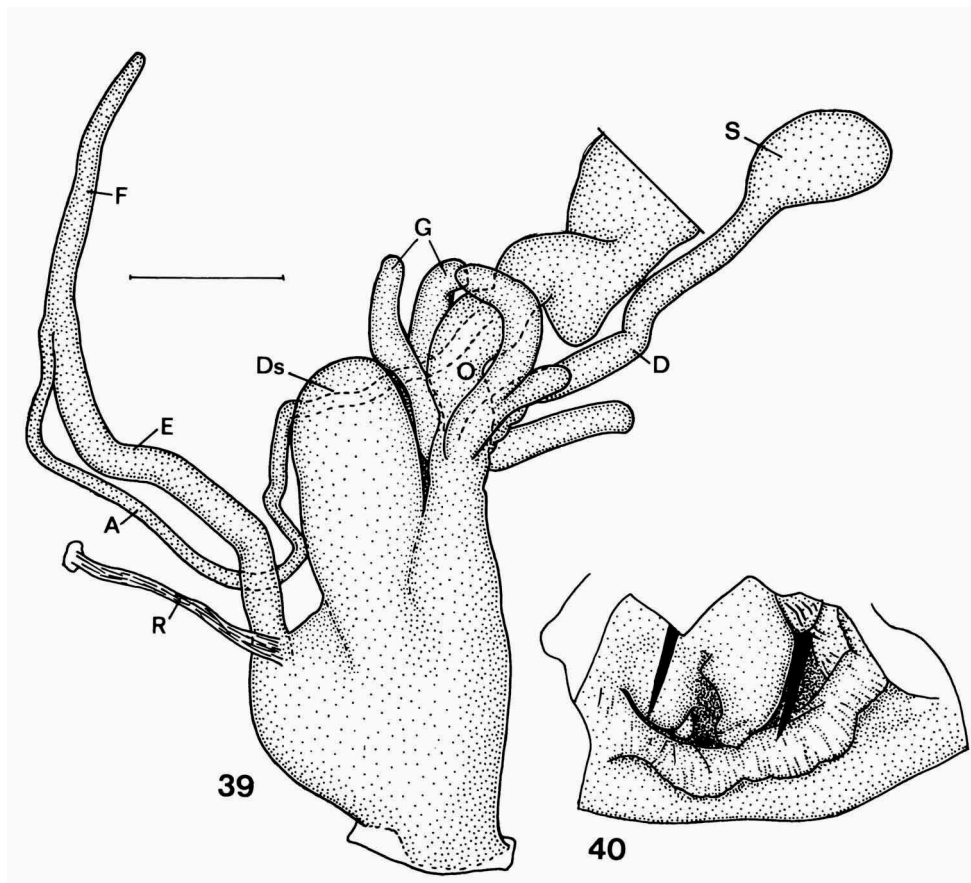
Fig. 38. *Helicella juglans* spec. nov., paratype, proximal genitalia, with darts and penial papilla indicated; Nicosia city park, on trees, 8.xi.1981, W. H. Neuteboom leg. (RMNH slide 950). Scale line 1 mm. For abbreviations, see legends to figs. 16, 17.

***Helicella juglans* spec. nov.**  
(figs. 6, 7, 36, 38-42)

*Helicella* (*Xerotricha*) *conspurcata arrouxi* sensu Haas, 1934: 20 [part.], fig. 7 (SMF 66184a "Nicosia"). Not *arrouxi* Bourguignat, 1863.

Material (fig. 36).— Holotype: Nicosia, WD29 (RMNH 56404). Paratypes: Limassol, castle, WD03 (Neu/17); type locality (RMNH 56405/8; SMF 66147/6 "*arrouxi*", 66184a/1 "*distinguenda*", 66184/9 "*distinguenda*", 289502/17 "*distinguenda*"); Nicosia, city park, on trees, WD29 (Neu/69, 66 specimens in alc.; RMNH 56408/7, alc. 9293/9, 4 genitalia slides); Nicosia, garden of the Armenian School, under rind of *Eucalyptus* spec., WD29 (RMNH 56406/6; Smi/many); Nicosia — Limassol, N. of Kophinou, WD35 (RMNH 56407/1; Smi/9); 3 km S. of Liopetri (= 10 km W. of Ayia Napa), WD87 (Hem/4); Cape Greco, WD96 (Hem/1); 2 km WNW. of Cape Greco, WD97 (Hem/19; RMNH 56433/2); Ayia Napa, northern side, WD97 (Hem/42; RMNH 56434/5, with a genitalia slide from one of these specimens); Protaras (= 5 km N. of Cape Greco), WD97 (Hem/16; RMNH 56432/2).

Shell (figs. 6, 7).— Shell globular, with a depressed, somewhat dome-shaped spire, and 3 1/2 to 5 moderately convex whorls, increasing regularly in width, except for the slightly descending and somewhat enlarged final, apertural part of the body-whorl. Aperture elliptical and provided with a (strongly) thickened internal rib. Umbilicus symmetrical to slightly eccentric, measuring 1/6 to 1/7 of the total width of the shell. Juvenile specimens are keeled; in full-grown shells the body-whorl may be keeled at its beginning. The teleoconch whorls are sculptured with prominent, rather regular riblets. The shell has an irregular colour pattern; some (traces of) spiral bands or lines are often discernible.



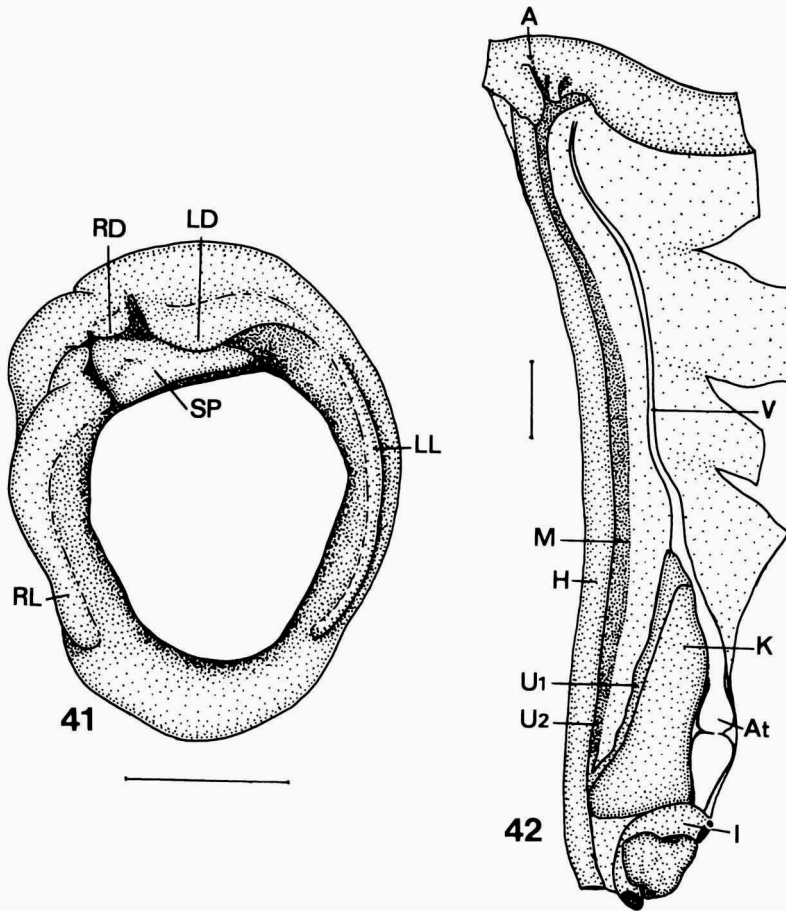
Figs. 39-40. *Helicella juglans* spec. nov., paratypes. Proximal part of the genitalia [39], with a detail [40] of the opened genital atrium; Nicosia city park, on trees, 8.xi.1981, W. H. Neuteboom leg. (RMNH slide 948). Scale line 1 mm. For abbreviations, see legends to figs. 16, 17.

Width 4.8-7.5 mm; height 2.9-4.7 mm.

Conchologically *Helicella juglans* differs from *Helicopsis cypriola* in several characters, but none of these differences is very conspicuous. The latter species can be distinguished best by its coarser and more irregular sculpture, the in outline more conical spire, and deeper sutures. The other *Helicellinae* from Cyprus with shells measuring less than 1 cm in width, can more easily be distinguished by general shape and sculpture. Similar *Helicella* species are known from the Iberian peninsula; they can be distinguished by other combinations of partly the same characters.

Genitalia (figs. 38-40).— The right tentacular retractor muscle runs next to the genitalia, not in between the male and the female parts. The penial nerve runs from the pedal ganglion to a site close to the insertion of the penial retractor muscle.

The entire penis and the most proximal parts of both the dart-sacs and the vagina are united into a large and complex genital "atrium". The penial retractor muscle inserts where the epiphallus borders this structure. When the genitalia have been



Figs. 41-42. *Helicella juglans* spec. nov., paratypes. Mantle collar [41] and pallial region [42] (RMNH slides 946, 947). Abbreviations: A, anus; AT, atrium of the heart; H, hindgut; I, intestine; K, kidney; LD, left dorsal mantle lobe; LL, left lateral mantle lobe; M, margin along the open part of the secondary ureter; RD, right dorsal mantle lobe; RL, right lateral mantle lobe; SP, subpneumostomal mantle lobe; U1, primary ureter; U2, secondary ureter; V, principal pulmonary vein.

made translucent, the homologues of both a distal and a proximal part of the penis, with a conical penial papilla inside the latter (fig. 38), can be recognized. When the genital "atrium" is opened (fig. 40), some irregular swellings are seen, opposite the entrance of the penial papilla, as well as an erect crenulate margin, which largely encircles the proximal part of the "atrium".

The flagellum measures nearly 3/4 of the length of the epiphallus. There are two large dart-sacs, both with a simple, long, slightly curved dart; the free parts of the dart-sacs are about as long as the segments that are united with the genital atrium. In situ the darts are nearly parallel. The free distal part of the vagina is very short; the oviduct is somewhat longer. There are four mucous glands, one or two of which are split up, resulting in five or six extremities; they insert just below the beginning of the spermathecal duct, which is slightly shorter than the epiphallus. The spermathe-

ca is elliptical unless deformed by remains of spermatophores.

Mantle collar (fig. 41) and pallial region (fig. 42).— The mantle collar has a low, long, left lateral lobe, which is nearly continuous with the more conspicuous, higher but shorter, left dorsal lobe. The right lateral mantle lobe is obsolete, whereas the more or less triangular subpneumostomal lobe is well developed and comparable to the left dorsal one in size.

The pallial region extends for about 3/4 whorl apically. Irregular blackish pigment spots are confined to the outside of the mantle collar; they are lacking on the lung roof proper. The heart is about half as long as the kidney, which is somewhat longer than 1/3 of the length of the lung roof. The primary ureter is situated on the kidney and running apically. The secondary ureter opens c. opposite the middle of the ventricle of the heart and continues anteriorly as a vaguely discernible zone along the hindgut; close to the mantle collar the secondary ureter becomes more conspicuous again because of a low margin bordering it opposite the hindgut. If the part of the mantle collar encircling the pneumostome is cut and turned back (as is shown in fig. 42), a bifurcation of the anterior, open, secondary ureter becomes visible; there is a narrow groove running along the anus, and a broader groove running obliquely to a ureteric pore (not figured).

Notes.— A specimen from Ayia Napa that could be studied anatomically by using dry remains of the animal, softened with sodium phosphate, cannot be distinguished from material from the type locality. Thus the unusual structure of the male part of the genitalia is not restricted to a single population.

Several samples from Cyprus contain shells that might belong to *H. juglans*, although they differ more or less clearly from the shells that were collected in and near Nicosia and near Cape Greco. Whether these specimens are conspecific or not, will remain uncertain as long as the conchological variability of *H. juglans* has not been studied in more detail. This can only be done by using material identified on the basis of anatomical characters, which at present is not available for study. It is considered premature to describe all these samples in detail. They are only shortly mentioned.

Shells from Mt. Pentadactylos, WE20 (SMF 217623/1 + 17 "*arrouxi*") have a more prominent apertural lip. Those from Diorios forest, WE00 (SMF 66143/3) are more conical, with a narrower umbilicus. A sample collected between Kyrenia and Nicosia, WE20, 330 m alt., (SMF 67373/2) contains a typical *H. juglans* and a larger, problematic specimen. Samples from the following localities differ more or less in shape and sculpture: Kyrenia, WE20 (SMF 67377/8 "*cyparissias*"); Mt. Chrysostomos, WE30 (SMF 67368/6, 289543/7 "*cyparissias*"); Bellapais, WE30 (SMF 288545/7).

Etymology.— This species is dedicated to Mr. W. H. Neuteboom ("*neuteboom*" = walnut tree, *Juglans* spec.).

#### Xerotricha Monterosato, 1892

Genitalia with two dart-sacs, accompanied by accessory sacs that may be hardly distinguishable.

***Xerotricha apicina* (Lamarck, 1822)**  
(fig. 37)

*Helicella apicina*; Kerney & Cameron, 1979: 182, pl. 15 fig. 4.

Material (fig. 37).— Paphos, "Gladstone Street", 50 m alt., VD44 (Neu); Kato Paphos, "Apostle Paulus Avenue", VD44 (Bar; Neu); Larnaca, "Artemis Avenue", WD56 (Neu); Larnaca, Kition, WD56 (Neu).

Shell.— Because of (1) long hairs (especially in young specimens), leaving conspicuous hair-scars, (2) a large, circular aperture and (3) the very asymmetrical general shape, resulting from a strongly inflated, relatively large body-whorl, which increases quickly in size, this Mediterranean species can relatively easily be recognized conchologically.

***Xerotricha conspurcata* (Draparnaud, 1801)**

*Helicella conspurcata*; Kerney & Cameron, 1979: 182, pl. 15 fig. 8.

Notes.— This species is not known from Cyprus, although it has been reported from the island.

According to Haas (1936), who judged upon conchological characters only, there are two subspecies of *Helicella* (*Xerotricha*) *conspurcata* (Draparnaud, 1801) represented in Cyprus. While dissecting specimens belonging to these two forms, it turned out that they represent two different species, belonging to the genera *Helicopsis* Fitzinger, 1833, and *Helicella* Férussac, 1821, respectively. Haas (1936: 300) introduced the epithet "*distinguenda*" for the former species. The latter one proved to be new to science; it is described below. Haas (1936: 301) incorrectly mentioned it as "*conspurcata*-Rasse *arrouxi* (Bgt.)". In fact, *Helix arrouxi* Bourguignat, 1863, belongs to *Microxeromagna* Ortiz de Zarate, 1950, a third genus. *Helix arrouxi* Bourguignat, 1863 (= *Helix armillata* Lowe, 1852), is a wide-spread species, which has often been confused with *H. (X.) conspurcata*. The former species can be reported with certainty from Cyprus now, but reliable records concerning the latter are not known. However, the congeneric *Xerotricha apicina* (Lamarck, 1822) occurs on the island.

***Microxeromagna* Ortiz de Zarate, 1950**

Genitalia with a dart-sac, accompanied by an accessory sac. [*Microxeromagna* is given generic status, following Manganelli & Giusti (1987)].

***Microxeromagna armillata* (Lowe, 1852)**  
(figs. 10, 37, 43, 44)

*Helix armillata*. Lowe, 1852: 113, 114 ("in Madera"); lectotype (design. nov.): RMNH 56265.

*Helix arrouxi* Bourguignat, 1863: 44, pl. 7 figs. 4-8 ("proche de la rivière de Beyrouth, à 5 ou 6 kilomètres de son embouchure"); lectotype (design. Forcart, 1976: 140, fig. 2A): MHNG-Bgt.



*Helix vestita* Rambur, 1868: 267 ("In Gallia meridionali, in Corsica et in Hispania"); syntypes in MNHN (Fischer-Piette, 1950: 73, pl. 4 figs. 59-61).

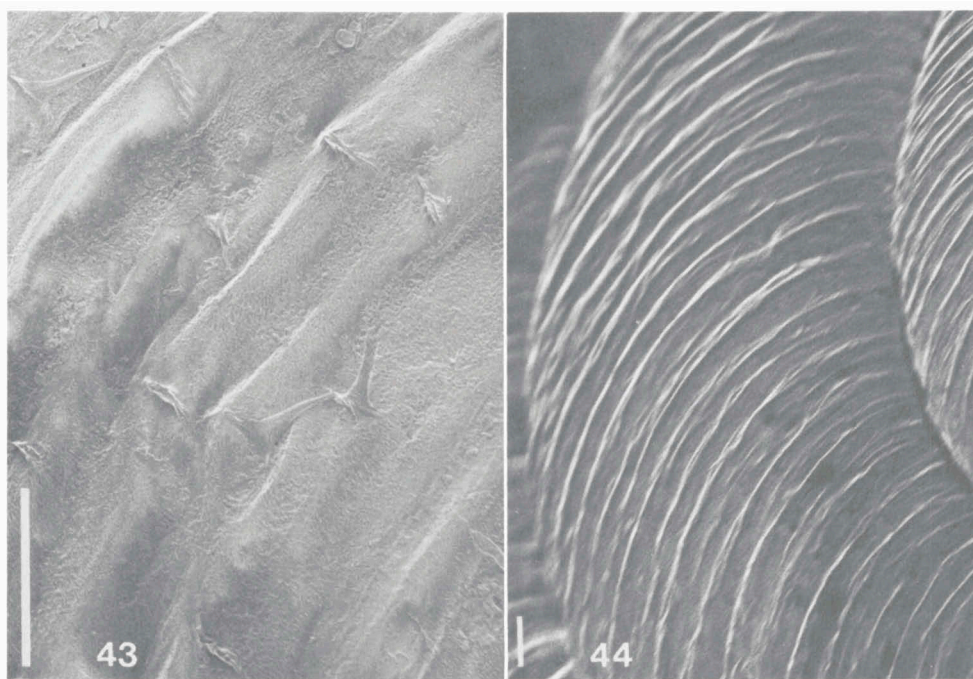
*Helix stolismena* Servain, 1880: 78; new name for *Helix vestita* Rambur (see Clerx & Gittenberger, 1977: 50).

*Cerneuella (Microxeromagna) vestita*; Kerney & Cameron (edition Gittenberger), 1980: 243, fig. Kerney, Cameron & Jungbluth, 1983: 301, fig.

Material (fig. 37).— Limassol, on wood near the beach, WD03 (Hem); Nicosia, under rind of both a conifer and an *Eucalyptus* spec. (few) in the garden of the Armenian School, WD29 (RMNH; Smi); 1 km E. of Larnaca airport, WD55 (Hov); Larnaca, behind the cultural centre, WD56 (Neu); Larnaca, Kition, WD56 (Hov); 1 km NW. of Phrenaros (c. 3.5 km W. of Paralimni), 100 m alt., WD87 (Hem); 1 km W. of Ayia Napa, WD87 (Hem); Protaras (= 5 km N. of Cape Greco), WD97 (Hem); 3 km NE. of Paralimni (= c. 5 km SE. of Famagusta), WD97 (Hem).

Shell (figs. 10, 43, 44).— Fresh specimens of this species can be identified with certainty because the entire shell surface is densely covered with very short hairs, measuring c. 50  $\mu\text{m}$  in length. When rubbed off they leave numerous small hair-scars.

Notes.— *Microxeromagna armillata* is one of the most wide-spread species of Helicellinae, occurring from the Canary Islands and Madeira in the West to Israel and the Libanon in the East, with many records from the northern part of the Mediterranean area. Partly because of this wide range its nomenclatural history is somewhat complicated. For a long time it remained unknown that the same species occurs in SW. Europa and in the Libanon and Israel. Meanwhile, it turned out that specimens from the two areas cannot be distinguished and intermediate localities



Figs. 43-44. *Microxeromagna armillata* (Lowe), paralectotype, details of the shell surface with short hairs [43] and hair-scars [44]; Madeira, Lowe & Wollaston, 1907 (RMNH 56265). Scale lines 100  $\mu\text{m}$ .

became known.

Four syntypes of *Helix armillata* in RMNH belong to a single species. In one of the specimens some periostracal hairs are still present (fig. 43). In another shell dry remains of the soft parts were present; these were softened with sodium phosphate and dissected, revealing the location and shape of the dart-sac and the accessory sac which proved to be typical for *Xerosecta* (RMNH slide 963). A third specimen that could partly be dissected (RMNH 56265) is selected as lectotype to stabilize the nomenclature of the species; there are three paralectotypes (RMNH 56266/3).

Confusion has also been caused by the fact that *Xerotracha conspurcata*, which is conchologically similar to *Microxeromagna armillata*, is about equally widely distributed. Both species are largely sympatric and may be found in mixed populations.

Wollaston (1878: 32, 115, 506) listed "*Helix armillata*" from various Macaronesian archipelagos, viz. the Azores, Madeira and the Cape Verde Islands. He and later authors might (partly) have confused *Microxeromagna armillata* with *Xerotracha conspurcata*. Groh (1983: 189) mentioned the latter species from the Cape Verde Islands, as an alien element that became extinct after an incidental introduction; to what species the two juvenile specimens recorded by Morelet (1873: 236 "*Helix conspurcata*") belong, remains unknown. Waldén (1983: 267) mentioned "*Helicella (Xerotracha) conspurcata*" from Madeira; this record is incorrect if it is based on Lowe's *Helix armillata* only. Backhuys (1975: 204-207) reported *Xerotracha conspurcata* from various localities in the Azores, meanwhile illustrating a specimen as *conspurcata* that most probably does not belong to this species (pl. 30 fig. 93); nevertheless the records cannot concern *armillata* because (p. 206) "very conspicuous hairs" are mentioned (the material cannot be restudied at present). In RMNH there are samples of both *Xerotracha conspurcata* and *Microxeromagna armillata* from the Canary Islands.

### Trochoidea Brown, 1827

#### Subgenus Trochoidea Brown, 1827

Genitalia.— With only two rudimentary "dart-sacs", and with a prominent appendage.

#### *Trochoidea (T.) liebetruti* (Albers, 1852)

(figs. 45, 47)

*Helix liebetruti* Albers, 1852: 124 ("in insula Cypro").

*Helix idaliae* Bourguignat, 1854: 660, pl. 14 figs. 1-6 [58, pl. 3 figs. 1-6] ("l'intérieur de l'île de Chypre").

Lectotype, selected from the Bourguignat collection (Muséum d'Histoire naturelle, Genève).

Material (fig. 47).— 0.5 km W. of Kissonerga, 2.5 km NNW. of Paphos, 30 m alt., VD45 (Hem); Akrotiri forest, VD92 (SMF); Limassol, WD03 (RMNH); Larnaca, WD56 (SMF; Smi); Ormidhia, WD77 (SMF).

Notes.— The subgeneric assignment of this conchologically very characteristic (fig. 45) species is based on the description and figures of the genitalia published by Hesse (1934: 13, pl. 2 fig. 17).

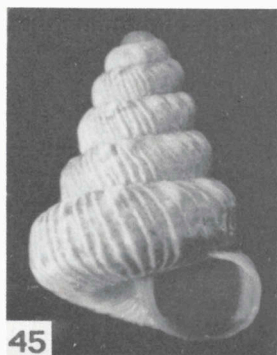


Fig. 45. *Trochoidea (T.) liebetruti* (Albers), Limassol, xii. 1935, G. A. Mavromoustakis leg. (actual width 5.3 mm).

Two syntypes of *Helix idaliae* Bourguignat, 1854, in the Muséum d'Histoire naturelle, clearly belong to this species. The specimen in which the lower keel on the body whorl is the least prominent, is here selected as the lectotype; it is 6.0 mm high and 4.3 mm broad and has 6.0 whorls.

The recently collected samples suggest that this species is restricted to the coastal area. This is not supported by Bourguignat (1854: 660), who reported his *Helix idaliae* from the dry central parts of the island, without mentioning any localities.

***Trochoidea (T.) pyramidata* (Draparnaud, 1805)  
(fig. 47)**

*Trochoidea (Trochoidea) pyramidata*; Kerney & Cameron (edition Gittenberger), 1980: 243, fig.

Material (fig. 46).— Limassol — Nicosia, N. of Kophinou, WD35 (Smi).

Notes.— This well-known Mediterranean species is apparently not common in Cyprus (fig. 47), where its niche might be largely occupied by the congeneric *T. (T.) liebetruti*.

***Trochoidea (T.) syrensis* (Pfeiffer, 1846)**

*Helix syrensis* Pfeiffer, 1846: 69 ("Insula Syra").

Notes.— According to the literature (Fuchs & Käufel, 1936; Haas, 1933, 1934, 1936) this is a polytypic species, represented by several subspecies in Cyprus. This view, as far as it is based on conchological characters of Cyprian taxa, is not accepted by the present author.

Both morphologically and geographically the so-called Cyprian subspecies can be arranged into three groups, the most problematic one of which is mentioned below. See *Xeropicta ledereri* for the other two groups of taxa that have been classified with *T. (X.) syrensis* up till now.

**The following nominal taxon cannot be classified**

*Helicella (Jacosta) syrensis carinatoglobosa* Haas, 1934: 18, figs. 1-4 ("Akrotiri-Wald").

Records (Haas, 1934: 20) (fig. 23): Akrotiri forest (type locality), VD92; Cape Gata — Cape Zevgari, VD92.

Shell.— Body-whorl with an obsolete keel, or regularly rounded at the periphery; aperture slightly elliptical; umbilicus measuring less than 1/6 of the total width of the shell; sculpture rather coarse. Shell width 10-13 mm.

Notes.— This is most probably a separate species, restricted to a small area in the southern part of the island. Its generic position is unclear.

Subgenus *Xerocrassa* Monterosato, 1892

Genitalia.— Without an appendage.

*Trochoidea (Xerocrassa) cretica cretica* (Férussac, 1821)

(figs. 29, 30, 46)

Material (fig. 46).— Kato Paphos, "Apostle Paulus Avenue", VD44 (Neu); Kato Paphos, "Tombs of the Kings", VD44 (Neu); Paphos, "Gladstone Street", VD44 (Neu); Coral Bay, 30-50 m alt., VD45 (Hem); 2 km NW. of Peyia, VD46 (Bar); Yeroskipos, VD54 (Bar); 1 km S. of Pissouri, 250 m alt., VD73 (Hem).

Notes.— In the various, partly large samples from the Paphos district the shells are rather similar at first sight to those of the sample from Nicosia, mentioned as *T. (X.) nicosiana*. However, in all the shells the spire is slightly more flattened and the umbilicus is clearly wider and deeper, measuring over 1/10 of the total width of the shell (figs. 29, 30).

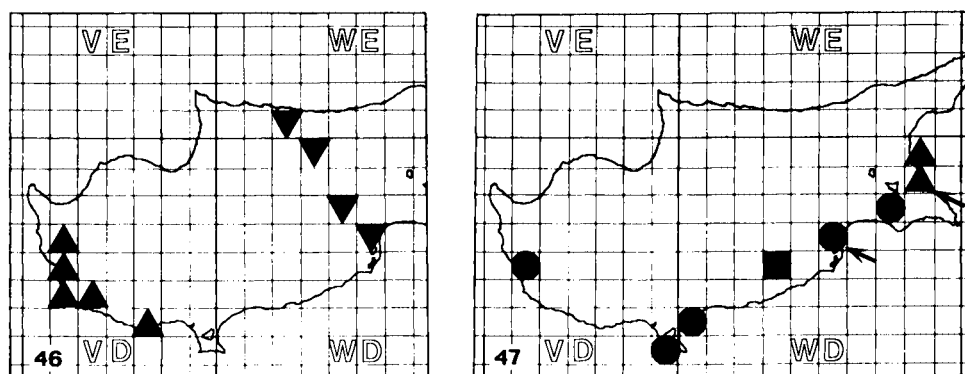
See also the remarks on *T. (X.) nicosiana*.

*Trochoidea (Xerocrassa) nicosiana* spec. nov.

(figs. 27, 28, 46)

*Helicella (Xerocrassa) cretica cretica* Übergang zu *cretica seetzeni*; Fuchs & Käufel, 1936: 628, pl. 9 fig. 29.

Material (fig. 46).— Holotype: Nicosia, WD29 (RMNH 56413). Paratypes: type locality (RMNH 56414/5, 56417/4, alc. 9294/26); Larnaca, WD56 (RMNH 56415/2); "Cyprus" (RMNH 56416/2). Additional localities, after Fuchs & Käufel (1936: 619): Larnaca — Nicosia, c. WD47; Nicosia — Kyrenia, mountain-pass, c. WE20.



Figs. 46-47. UTM 10 km-grid distribution maps. 46, *Trochoidea (Xerocrassa) cretica cretica* (Férussac) [triangles pointing up] and *T. (X.) nicosiana* spec. nov. [triangles pointing down]; 47, *Trochoidea (T.) liebetruiti* (Albers) [dots], *T. (T.) pyramidata* (Draparnaud) [squares], *Cochlicella acuta* (Müller) [indicated by arrows] and *C. conoidea* (Draparnaud) [triangles].

Shell (figs. 27, 28).— Shell globular, with a low conical spire and 5 1/4 to 6 flattened whorls. Body-whorl descending in front. Umbilicus eccentric and very narrow, measuring 1/10 or less of the total width of the shell. Juvenile specimens have an angular periphery which may persist along about the first half of the body-whorl in adult shells. Aperture roundish to slightly elliptical; apertural lip clearly thickened inside. Teleoconch whorls rather densely sculptured with irregular and frequently interrupted riblets. The shells are rather glossy and usually provided with a more or less clearly spirally arranged, irregular and frequently interrupted pattern of light corneous bands.

Width 11.6-18.3 mm; height 8.8-14.7 mm.

Conchologically *T. (X.) nicosiana* differs from *T. (X.) cretica cretica* by (1) a narrower and more eccentric umbilicus, (2) a slightly lower aperture provided with a thicker internal rib, (3) a somewhat more glossy shell, and (4) a slightly higher spire [in material from Cyprus]. In *T. (X.) seetzenii* (Pfeiffer, 1847), with a larger shells, the umbilicus is nearly completely closed (see Forcart, 1976: 144, pl. 10 fig. 1).

Notes.— According to Forcart (1976: 144), *T. (Xerocrassa) seetzenii* differs from *T. (X.) cretica* (Férussac, 1821) anatomically by the relative length of the vagina, which is said to be approximately twice as long as the penis instead of being about equally long. A similar observation was published by Fuchs & Käufel (1936), who considered the species here described an intermediate form between *T. (X.) cretica* and *T. (X.) seetzenii*. These authors dissected *T. (X.) seetzenii* from the Near East and similar material from Cyprus; they reported (p. 628) in both forms a relatively long vagina and a simple elliptical spermatheca, contrasting with the condition in *T. (X.) cretica*.

In a large sample from Nicosia, collected 11.iv.1984, the very globular, rather glossy shells look full-grown considering the shape of the aperture, descending somewhat in front, and the thickened apertural lip. However, the genitalia prove to be largely undeveloped in all specimens. The subgeneric assignment could already be ascertained, however. The immature vagina is about twice as long as the penis. This is in agreement with the data published for full-grown specimens by Fuchs & Käufel (1936: 628).

### *Cochlicella* Férussac, 1821

Genitalia with a complicated appendage; without dart-sacs.

### *Cochlicella acuta* (Müller, 1774) (fig. 47)

*Bulimus acutus*; Zelebor, 1865: 593.

*Cochlicella acuta*; Kerney & Cameron, 1979: 183, pl. 24 fig. 2a, b.

Material (fig. 47).— Larnaca, WD56 (Zelebor, 1865: 593); Famagusta, WD88 (RMNH).

Note.— This well-known species is apparently not common in Cyprus. The

author had only two samples from Famagusta and one from "Cyprus" at his disposal (Liebetrut leg.; RMNH).

***Cochlicella conoidea* (Draparnaud, 1801)**  
(fig. 47)

*Cochlicella conoidea*; Kerney & Cameron (edition Gittenberger), 1980: 244, fig.

Material (fig. 47).— Famagusta, WD88 (SMF "*idaliae*"); Salamis, WD89 (Smi).

Note.— This easily recognizable Mediterranean species is apparently not common in Cyprus.

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## Index of epithets

Valid names of taxa represented in Cyprus are in italics. Page numbers in bold type refer to the main references.

<i>acuta</i> .....	125
<i>akrotirica</i> .....	107, 108
<i>andrewi</i> .....	110, 111
<i>apicina</i> .....	120
<i>arenosa</i> .....	113
<i>armillata</i> .....	120, 121
<i>arrouxi</i> .....	108, 116, 119, 120
<i>aulostoma</i> .....	111
<i>candiota</i> .....	115
<i>carinatoglobosa</i> .....	123
<i>conspurcata</i> .....	102, 105, 108, 116, 120
<i>confusa</i> .....	113, 115
<i>conoidea</i> .....	126
<i>cretica</i> .....	108, 110, 113, 124, 125
<i>cyparissias</i> .....	102, 105, 108, 110, 119
<i>cypria</i> .....	111
<i>cypricola</i> .....	102
<i>cypriola</i> .....	102, 105, 106, 108, 117
<i>derbentina</i> .....	108, 110, 113
<i>distinguenda</i> .....	102, 105, 108, 116, 120
<i>durieui</i> .....	115
<i>gigaxii</i> .....	109
<i>hierapetrana</i> .....	115
<i>idaliae</i> .....	122, 126
<i>juglans</i> .....	106, 115, 116
<i>krynickyi</i> .....	108, 112, 114
<i>larnacensis</i> .....	108, 110
<i>lauta</i> .....	108, 110
<i>ledereri</i> .....	104, 108, 110
<i>liebetruti</i> .....	122
<i>littoralis</i> .....	108, 110
<i>mavromoustakisi</i> .....	104, 108, 111, 114
<i>nicosiana</i> .....	124
<i>obvia</i> .....	115
<i>peregrina</i> .....	110
<i>profuga</i> .....	111, 113
<i>protea</i> .....	111
<i>pyramidata</i> .....	123
<i>seetzenii</i> .....	124, 125
<i>sitiensis</i> .....	113, 114, 115
<i>stolismena</i> .....	121
<i>syrensis</i> .....	110, 111, 114, 123
<i>torocincta</i> .....	111, 113
<i>tremithensis</i> .....	111
<i>usticensis</i> .....	110, 111
<i>vestita</i> .....	120
<i>virgata</i> .....	110, 113
<i>vulgarissima</i> .....	115