

Report on a collection of terrestrial molluscs (Gastropoda, Pulmonata)
from central/north-western Namibia with the description of a new species of
Sculptaria (Sculptariidae)

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Land mollusc material collected by the second author in 2001 in central and north-western Namibia is discussed; it contains the new species *Sculptaria fumarium* (Gastropoda, Pulmonata: family Sculptariidae/Corillidae) from the southern margin of Etosha National Park. This species is characterized by a peculiar sculpture that might have survival value in arid surroundings. The collection contains 17 species, among which two alien taxa (*Zonitoides arboreus* and *Deroceras leave*), and encompasses a number of new distribution records.

Key words: Gastropoda, Pulmonata, Subulinidae, *Opeas*, Sculptariidae, Corillidae, *Sculptaria*, Zonitidae, *Zonitoides*, Agriolimacidae, *Deroceras*, taxonomy, faunistics, alien species, Africa, Namibia.

INTRODUCTION

Namibia, an immense state (824,292 sq. km) situated in the south-western corner of Africa (fig. 1), is essentially an arid country which harbours a limited but interesting terrestrial malacofauna with a marked endemism at various levels. In 2001 the second author visited a number of localities in central/north-western Namibia where few molluscs had been gathered before. The collection contains 17 species of terrestrial molluscs among which 2 alien species. It contains interesting distribution records and also, surprisingly, a new species of *Sculptaria*, obtained in an area where this was not expected, i.e., a much-visited national park. Some species are represented by (sometimes large) series as part of the material is derived from stream drift. Namibia is subject to erratic but at times torrential rains which may cause (empty) land shells to be deposited massively in easily accessible localities where the snails probably do not naturally occur. Obtaining live material is, of course, much more difficult, although living snails may also be washed out of their natural habitat. A representative series (mostly dry, a few in alcohol) of the various species identified by the senior author is deposited in the Leiden Museum; the other material is kept in the private collection of the second author.

Major publications on the malacofauna of Namibia are Connolly (1931, 1939), Zilch (1939, 1952), and Van Bruggen (1970, 1980; see also 1978: 907-910). A biodiversity assessment of the terrestrial molluscs of Namibia by the senior author is in preparation.

Abbreviations used are the following: l/d, the ratio length(height)/major diameter of

shells as an indication of the shape of the shell (for small shells this is calculated from micrometer readings before translating these into mm); MNCNM, Museo Nacional de Ciencias Naturales (Madrid); RMNH, National Museum of Natural History (Leiden, Nationaal Natuurhistorisch Museum, formerly Rijksmuseum van Natuurlijke Historie).

The assistance of Drs E. Gittenberger and A.J. de Winter (both RMNH) with the identification of the alien species is gratefully acknowledged here. Dr W.D. Haacke and Ms L. Scott of the Transvaal Museum (Pretoria) are acknowledged for their help with data on some localities and supplying a basic map, but Mr. E.J. Bosch (RMNH) is responsible for the professional presentation of the map (fig. 1). All SEM photographs have been made by the second author in the Centro de Apoyo Científico y Tecnológico a la Investigación (CACTI) of the University of Vigo with the assistance of Mr Jesus Méndez; all figured specimens are in the E. Rolán collection.

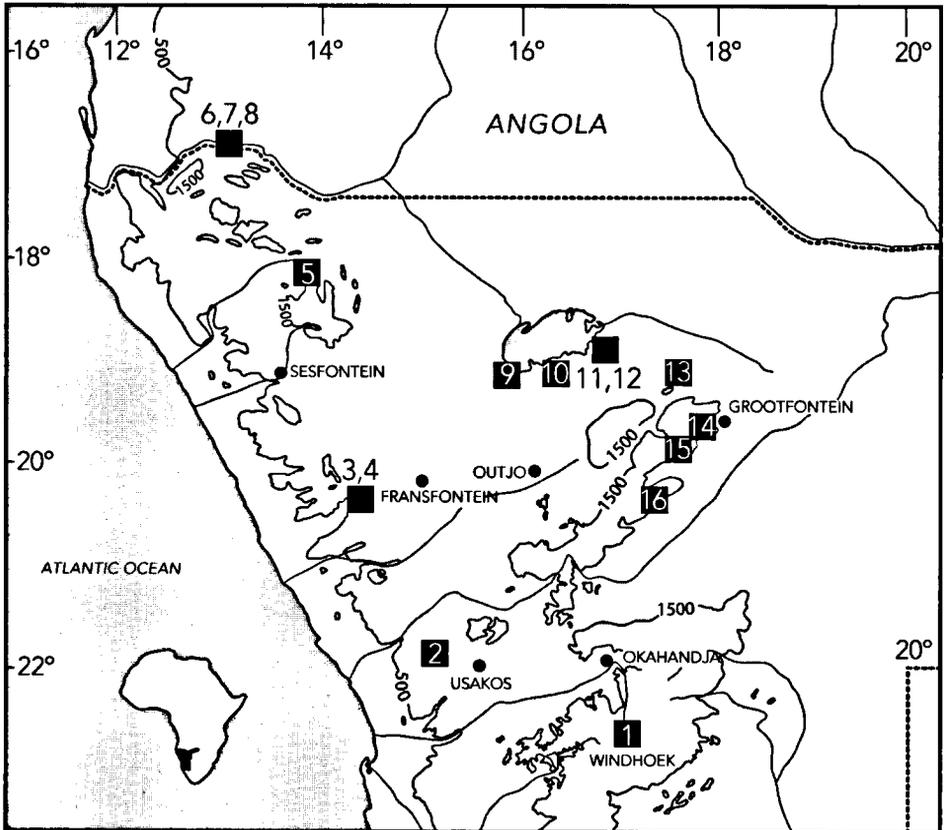


Fig. 1. Map of central and north-western parts of Namibia with the localities of the Rolán collecting trip 2001 (quarter degree squares) indicated. Numbers refer to the station list. E.J. Bosch del.

LIST OF LOCALITIES WITH SPECIES COLLECTED

The following station list (fig. 1; modern names of the provinces are shown between brackets) enumerates the land mollusc species collected.

(1) 03NA01. – (Komas) Windhoek, near the city, in the front garden of the Farida Hill Crest Hotel, spring/stones/trees, c. 1700 m, 3.vi.2001: *Gastrocopta damarica*, *Subulina vitrea*, *Dorcasia alexandri*, *Zonitoides arboreus*, *Deroceras leave*.

(2) 10NA01. – (Erongo) Spitzkoppe [Spitzkopje], Erongo Mts., 21°50'S 15°08'E, mountain stream sediment near the White Lady rock paintings, 600-650 m, 10.vi.2001: *Microstele noltei*, *Cecilioides pergracilis*, *Subulina vitrea*, *Opeas* spec.

(3) 11NA01-1. – (Kunene) Twyfelfontein, north of the Brandberg Nature Reserve, in the mountains near the rock paintings tourist area, 650-700 m, 11.vi.2001: *Microstele noltei*, *Gastrocopta damarica*, *Subulina vitrea*, *Cecilioides pergracilis*, *Xerocerastus burchelli*, *X. hottentotus*.

(4) 11NA01-2. – (Kunene) Twyfelfontein, rock paintings area, near the camp site, (dry) river sediment, 650-700 m, 11.vi.2001: *Pupoides calaharicus*, *Microstele noltei*, *Gastrocopta damarica*, *Cecilioides pergracilis*.

(5) 13NA01. – (Kunene) Opuwo, near camp site, 1000-1100 m, 13.vi.2001: *Achatina* juv. [unid.].

(6) 14NA01-1. – (Kunene) Epupa Falls in the Cunene [or Kunene] River, 16°55'S 13°10'E, c. 5 km before camp site, under rocks in semi-desert area, 650-700 m, 14.vi.2001: *Pupoides calaharicus*, *Microstele noltei*, *Achatina* *dammarensis*.

(7) 14NA01-2. – (Kunene) Epupa Falls, near the river, on camp site, under rocks and palms and among roots of trees in humid localities, c. 170 m, 14.vi.2001: *Pupoides calaharicus*, *Microstele noltei*, *Gastrocopta damarica*, *Cecilioides pergracilis*, *Succinea* *arboricola*.

(8) 14NA01-3. – (Kunene) Epupa Falls, about 1 km westward of the camp site, sediment of stream, 600-650 m, 14.vi.2001: *Microstele noltei*, *Gastrocopta damarica*, *Cecilioides pergracilis*, *Xerocerastus burchelli*.

(9) 16-17NA01. – (Kunene) Etosha National Park, Okaukuejo, camp site, 1100-1200 m, 16-17.vi.2001: *Pupoides calaharicus*, *Microstele noltei*, *Gastrocopta damarica*, *Subulina vitrea*, *Cecilioides pergracilis*, *Achatina* juv. [unid.].

(10) 17NA01-3. – (Kunene) Etosha National Park, Halali, between Okaukuejo and Namutoni, on hill near camp site, 1100-1200 m, 17.vi.2001: *Pupilla fontana*, *Pupoides calaharicus*, *Microstele noltei*, *Afriboysidia regiusi*, *Gastrocopta damarica*, *Cecilioides pergracilis*, *Subulina vitrea*, *Achatina* juv. [unid.] + 3 epiphragms, *Sculptaria* nov. spec.

(11) 18NA01-1. – (Kunene) Etosha National Park, Namutoni, camp site, 1050-1100 m, 18.vi.2001: *Achatina* juv. [unid.].

(12) 18NA01-2. – (Kunene) Etosha National Park, Namutoni, leaf litter among group of trees near camp site, 1100-1200 m, 18.vi.2001: *Pupoides calaharicus*, *Microstele noltei*, *Gastrocopta damarica*.

(13) 19NA01-1. – (Oshikoto) On the way to Grootfontein via Tsumeb, near a small karstic lake (Lake Otjikoto), 1200-1250 m, 19.vi.2001: *Pupoides calaharicus*, *Gastrocopta damarica*, *Subulina vitrea*.

(14) 19NA01-2. – (Otjozondjupa) In the area of the Hoba Meteorite, 18 km W. of Grootfontein, 1450-1500 m, 19.vi.2001: *Pupoides calaharicus*, *Gastrocopta damarica*.

(15) 20NA01-3. – (Otjozondjupa) Omatako Camp, near Omajeke bushman village, in an area shaded by trees with some ground cover by scanty vegetation, about 2 km west of the village, 1300-1500 m, 20.vi.2001: *Achatina* *dammarensis*.

(16) 22NA01. – (Otjozondjupa) Waterberg Plateau, on the base of the escarpment, c. 1400 m, 22.vi.2001: *Pupoides calaharicus*, *Gastrocopta damarica*, *Ceciloides* spec., *Subulina vitrea*, *Gulella caryatis diabensis*.

A number of samples is also (partly) preserved in alcohol; however, the specimens have been simply immersed and therefore are not properly stretched. Some samples contain freshwater molluscs in the form of two species of the basommatophoran family Planorbidae; obviously many of these have also been washed out of their original habitat. The richest station in terms of number of species appears to be 17NA01-3 with 9 species of terrestrial molluscs.

CHECKLIST OF TAXA IDENTIFIED

The following list gives identification, classification, and notes where appropriate of the taxa inclusive of the description of a new species of *Sculptaria*. Taxa marked with an asterisk * are endemic to Namibia.

Gastropoda, Pulmonata, Stylommatophora
Family Pupillidae Turton, 1831

Microstela noltei (Boettger, 1886) (figs 2-6)

This is a common and widely distributed species. All Rolán material may be summarized as 3.1-4.1 x 1.3-1.6 mm, l/d 2.10-2.68, 5 $\frac{1}{4}$ -6 whorls. According to the literature (Van Bruggen, 1970: 47) the maximum recorded length is 4.5 mm. Adult specimens of 3.7 x 1.6 mm and 3.9 x 1.6 mm both exhibit a noticeably flaring labrum.

Pupilla (Gibbulinopsis) fontana (Krauss, 1848) (figs 7-10)

This species was only present in sample 17NA01-3. The material shows the following measurements: 2.4-3.1 x 1.5-1.7 mm, l/d 1.62-1.82, 5-6 whorls. *Pupilla fontana* appears not to be common in Namibia; so far we had only records from Gobabis, Farm Friedland (Marienthal-Aus) and Aiais. It is probably much more widely distributed but its small size precludes it being picked up by casual collectors.

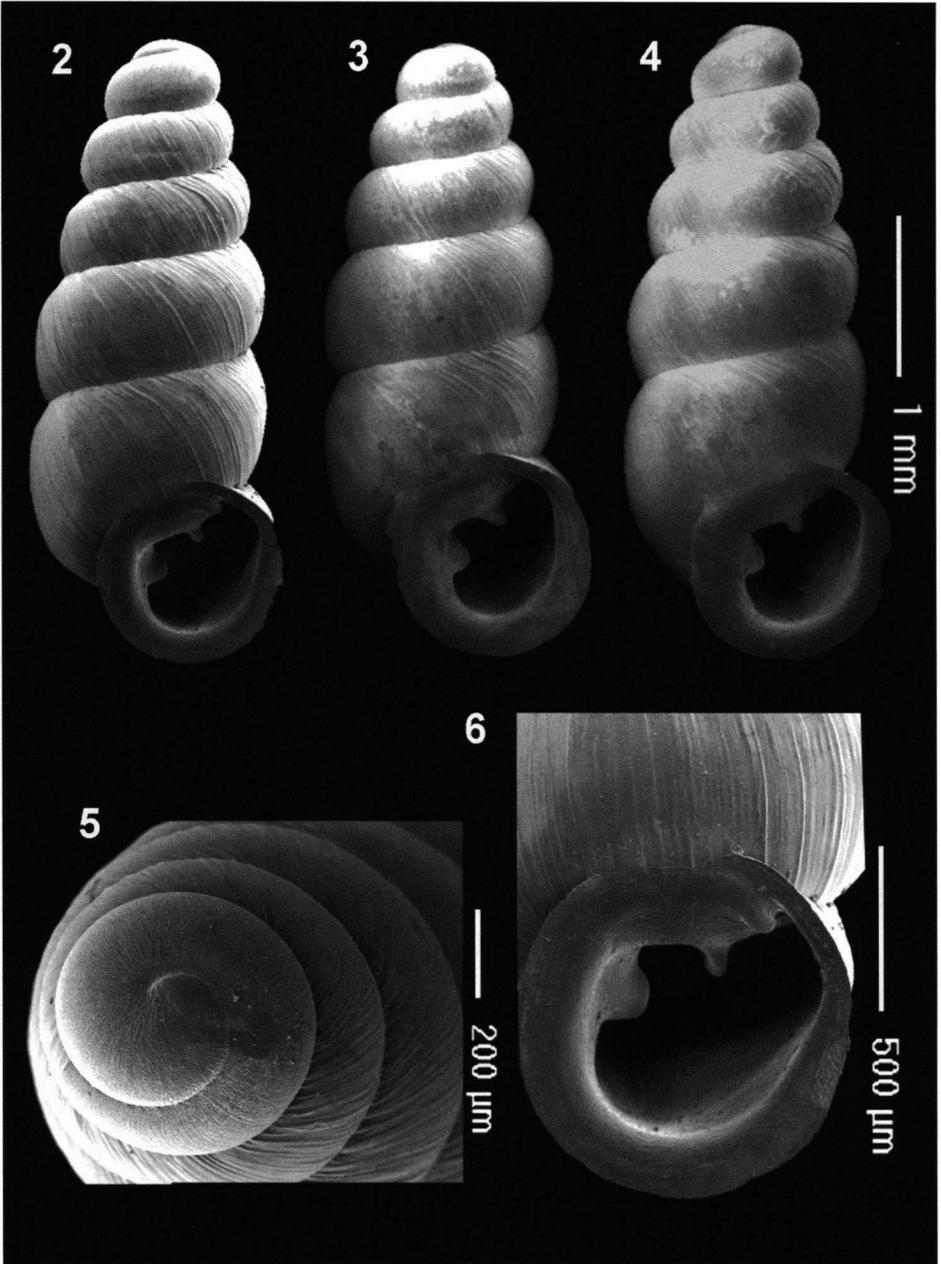
Pupoides calaharicus (Boettger, 1886) sensu lato (figs 11-12)

This is a very widely distributed (complex of) species, mainly recorded from arid areas. For a discussion on taxonomy and nomenclature vide Van Bruggen (1966: 328).

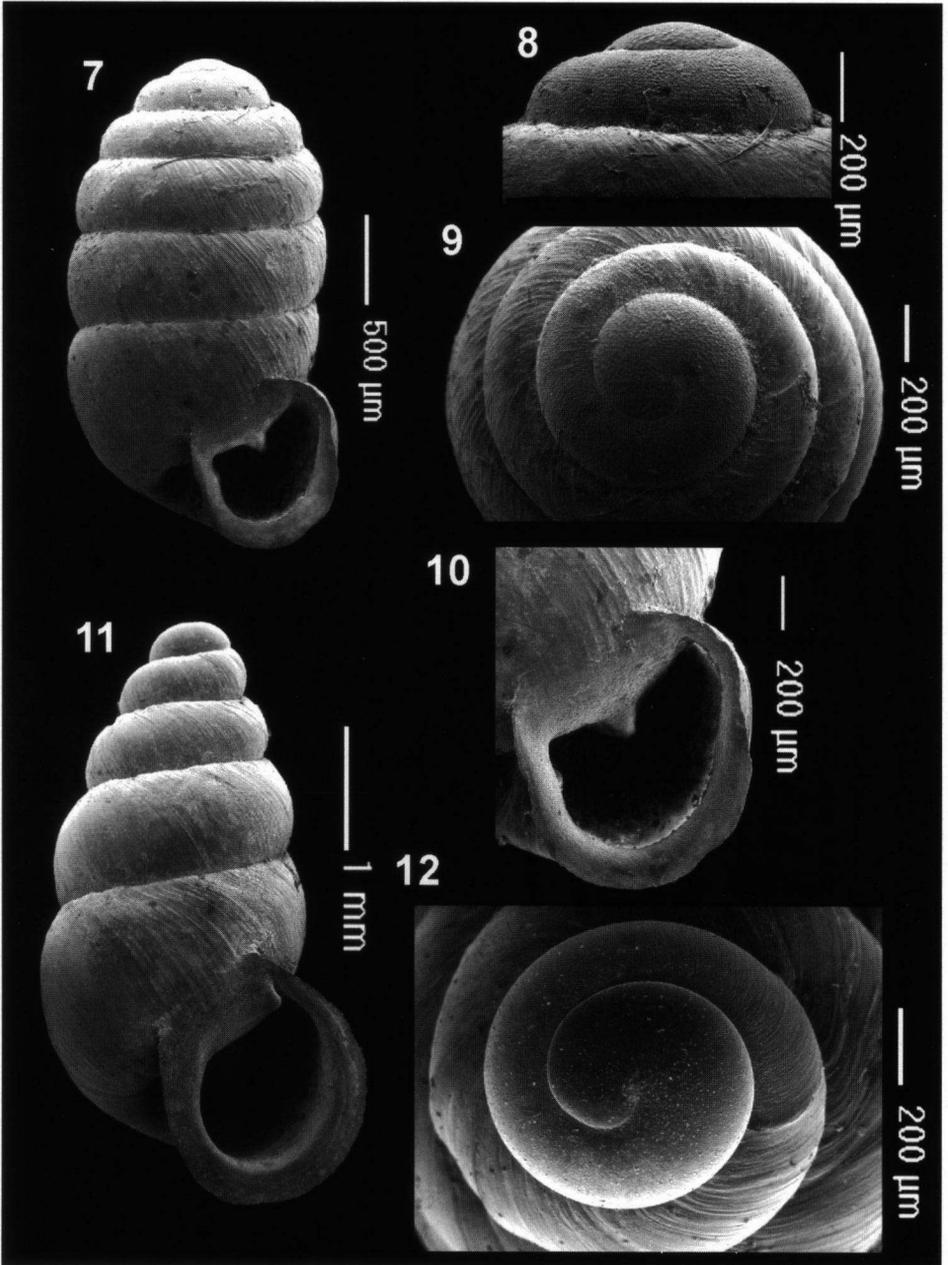
Family Orculidae Pilsbry, 1918

**Afriboysidia regiusi* Zilch, 1939 (figs 13-16)

The Rolán collection contains one sample of this rare species from Sta. 17NA01-3, only the second locality recorded in print. Largest, smallest and intermediate shell measurements are compared to Zilch's holotype measurements and those of two paratypes



Figs 2-6. SEM photographs of *Microstela noltei* (Boettger, 1886), 17NA01-3; 2-4, front view; 5, apex; 6, aperture enlarged.



Figs 7-12. SEM photographs of *Pupilla* and *Pupoides*. 7-10, *Pupilla fontana* (Krauss, 1848), 17NA01-3; 7, front view; 8-9, apex; 10, aperture enlarged. 11-12, *Pupoides calaharicus* (Boettger, 1886), 17NA01-3; 11, front view; 12, apex enlarged.

(RMNH). All shells have about 5 whorls, but the smallest shell has only $>4\frac{1}{2}$ whorls.

17NA01-3	2.4 x 1.6 mm	l/d 1.50
17NA01-3	2.4 x 1.9 mm	l/d 1.26
17NA01-3	2.6 x 1.9 mm	l/d 1.37
17NA01-3	2.7 x 2.2 mm	l/d 1.22
paratype RMNH 55336	2.8 x 1.9 mm	l/d 1.46
paratype RMNH 55336	2.8 x 1.9 mm	l/d 1.50
17NA01-3	3.0 x 2.2 mm	l/d 1.37
holotype: Zilch, 1939	3.1 x 2.1 mm	l/d 1.48

This may be summarized as 2.4-3.1 x 1.6-2.2 mm, l/d 1.22-1.50 which shows that there is a not inconsiderable variation in size and shape of the shell, probably due to the fact that local populations are quite scattered and therefore isolated from each other.

Family Chondrinidae Steenberg, 1925

Gastrocopta damarica (Ancey, 1888) (figs 17-20)

Gastrocopta damarica is widely distributed and at times common throughout many areas of Namibia. It varies considerably in size of the shell. The Rolán material may be summarized as 1.8-2.6 x 0.9-1.2 mm, l/d 1.78-2.24, $4\frac{1}{2}$ - $5\frac{1}{2}$ whorls. Incidentally, this is a very large variation in view of the small size of the shell – the largest shell is slightly less than one-and-a-half times (to be precise: x 1.44) as long as the smallest shell and the most slender specimen is one-and-a quarter times (x 1.25) as slender as the squattest shell. Much of this variation is probably due to widely scattered populations not necessarily in contact with each other, i.e., without exchange of genetic material.

Family Ferussaciidae Bourguignat, 1883

Cecilioides pergracilis Connolly, 1939 (fig. 21)

The species of *Cecilioides* lead a subterranean life and shells regularly turn up in various places in Namibia, obviously washed out by rainfall. All adult material in the Rolán collection has been identified with *C. pergracilis*. Adult shells may be tabulated as follows:

17NA01-3	3.9 x 1.1 mm	l/d 3.44	c. 5 whorls
11NA01-2	4.0 x 1.1 mm	l/d 3.55	<5 whorls
11NA01-1	4.2 x 1.1 mm	l/d 3.78	c. $5\frac{3}{4}$ whorls
10NA01	4.4 x 1.2 mm	l/d 3.68	6 whorls
14NA01-3	4.7 x 1.4 mm	l/d 3.45	c. 6 whorls
11NA01-2	4.8 x 1.3 mm	l/d 3.67	c. 6 whorls
14NA01-3	4.8 x 1.4 mm	l/d 3.50	c. 6 whorls

This may be summarized as 3.9-4.8 x 1.1-1.4 mm, l/d 3.44-3.78, <5-6 whorls. This agrees well with the Namibia material (Okaukuejo) recorded by Van Bruggen (1970: 49): 4.1-4.7 x 1.1-1.2 mm, l/d 3.61-3.78. *C. pergracilis* is characterized by its slender contour [l/d always >3.40 ; incidentally, Connolly's fig. 13 on pl. 8 shows an l/d of >3.50 , although the l/d calculated from his measurements (4.4 x 1.3 mm) is only 3.38], narrow aperture and oblique sutures. The Rolán material shows that the distribution in Namibia is much more extensive than the single locality quoted by Van Bruggen (1970), even reaching the

Cunene River in the north. Apparently this species is widely distributed in Africa, records stretching from Namibia to KwaZulu-Natal and Zanzibar. One of the specimens collected by Rolán exhibits a beautiful white epiphragm (17NA01-3), which shows the adaptation to an arid environment.

A recent discussion with figures of a number of African *Cecilioides* is found in Van Bruggen & Van Goethem (2001: 155-158, figs 2-12).

Family Subulinidae Crosse & Fischer, 1877

Opeas spec. indet.

The Rolán collection contains an unidentifiable subulinid (10NA01, RMNH) here referred to the genus *Opeas* Albers, 1850. The slightly damaged shell is small and measures 2.9 x c. 0.8 mm, l/d 3.77, length last whorl 1.2 mm, aperture 0.7 x 0.5 mm, and has 6 whorls. The apex is smooth and the remainder of the spire is costulate; the columella merges smoothly into the labrum.

There are no comparable nominal taxa in southern Africa. A search through the literature on Angola, Zambia, Malaŵi, and the D.R. Congo has not led to any result. It is not unlikely that this shell represents an as yet unknown taxon. More and better material is needed for a proper evaluation.

**Subulina vitrea* (Mousson, 1887)

This species has been treated in detail by Van Bruggen (1970: 52-56, figs 16-21).

Xerocerastus (Xerocerastus) burchelli (Gray, 1834)

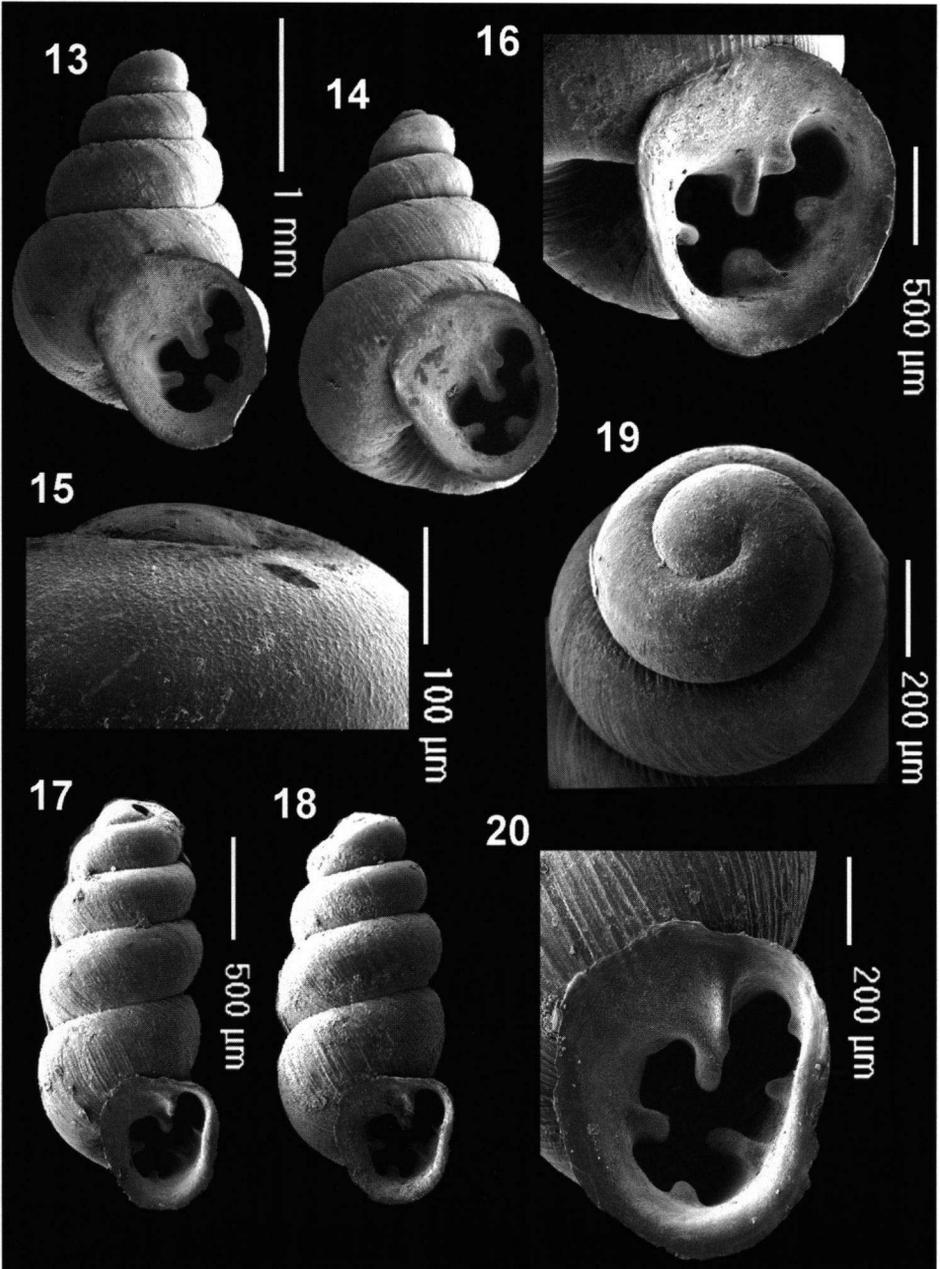
This species is represented in two samples, viz. 14NA01-3: 14.0 x 5.8 mm, l/d 2.41 (n = 1); 11NA01-1: 15.5-18.6 x 5.8-7.0 mm, l/d 2.51-2.85 (n = 7). Both samples in the Rolán collection represent new distribution records, bringing the limits northward to the Cunene River, but still within the 50 mm isohyet (see Van Bruggen, 1964b). This poses an interesting question: does this species (and therefore the genus) occur in south-western Angola? The distribution of e.g., the genus *Sculptaria* [vide Van Bruggen, 1970: 54 (fig. 21), 69] shows that the Cunene River is not a biogeographical boundary. Incidentally, there are no records of *Xerocerastus* in the extensive material of Angola terrestrial molluscs in the Leiden Museum.

**Xerocerastus (Namibiella) hottentotus* (Gray, 1838)

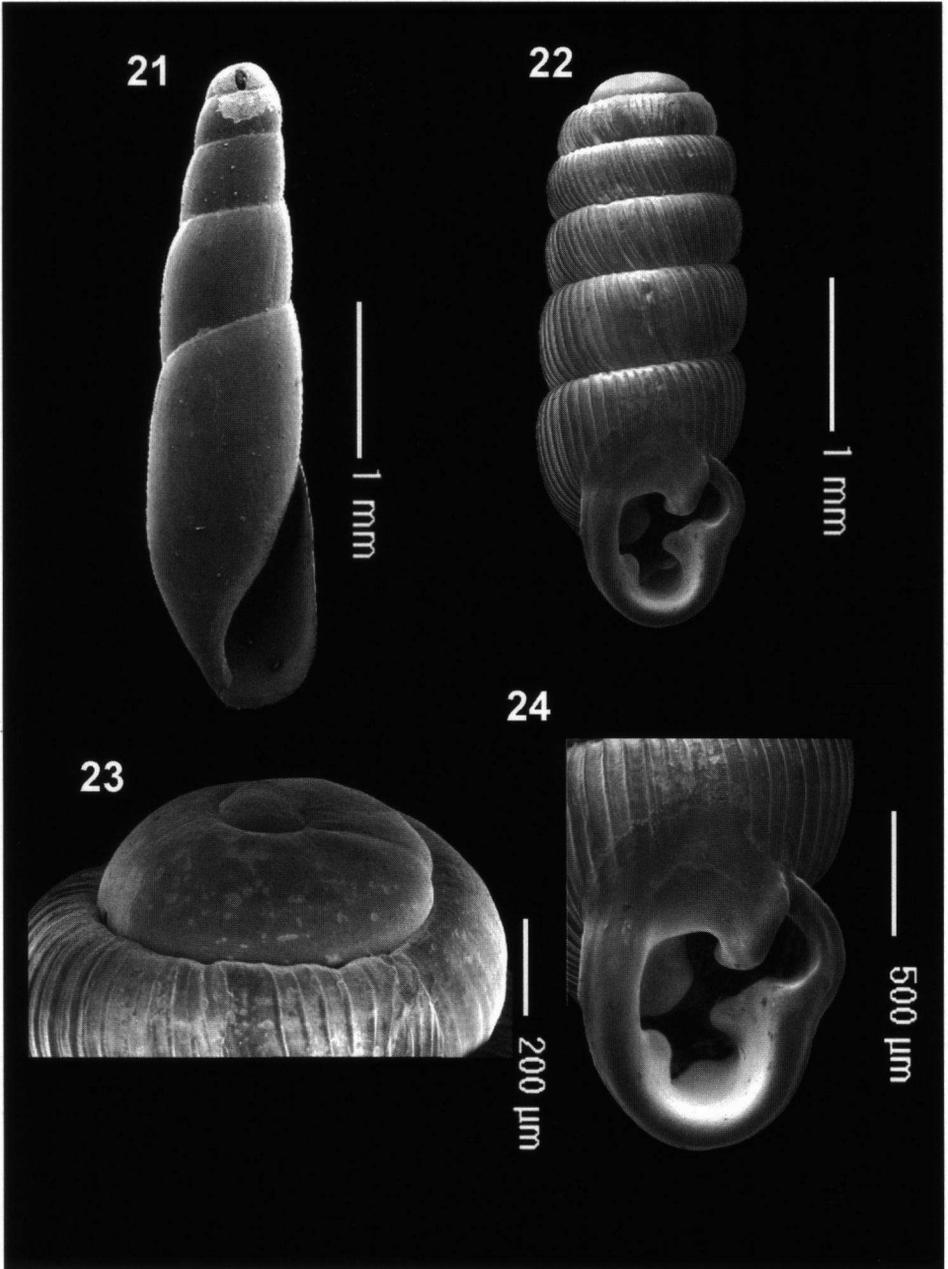
This species is abundantly represented in sample 11NA01-1. It does vary to a certain degree and it is not always quite clear whether a shell is adult with incrassate outer lip, or not quite adult with a less incrassate lip. Measurements of shells in this sample are 11.1-12.4 x 7.5-8.5 mm, l/d 1.39-1.47 (n = 10). The subgenus *Namibiella* is characterized by apical spiral sculpture; this is not always easily seen as it tends to wear off, even in the living animal.

Family Achatinidae Swainson, 1840

A number of samples includes juvenile shells of '*Achatina*' spec. which cannot be iden-



Figs 13-20. SEM photographs of *Afriboysidia* and *Gastrocopta*. 13-16, *Afriboysidia regiusi* Zilch, 1939, 17NA01-3; 13-14, front view; 15, apex; 16, aperture enlarged. 17-20, *Gastrocopta damarica* (Ancey, 1888), 17NA01-3; 17-18, front view; 19, apex; 20, aperture enlarged.



Figs 21-24. SEM photographs of *Cecilioides* and *Gulella*. 21, *Cecilioides pergracilis* Connolly, 1939, 17NA01-3, front view. 22-24, *Gulella caryatis diabensis* Connolly, 1939, 22NA01; 22, front view; 23, apex; 24, aperture enlarged.

tified as to species. Some samples contain achatinoid epiphragms which are thick and fairly large; the largest specimen (17NA01-3) has a height (length) of 24.6 mm. The size and shape makes it conform to the apertural measurements of the following species.

Achatina' dammarensis Pfeiffer, 1870

Shells of achatinids from south-western Africa, particularly old and weathered specimens, are generally difficult to identify. The Rolán collection contains a few worn shells that may be considered adult. The two largest specimens measure c. 58.0 (lower lip damaged) x 28.6 mm, l/d 2.03, c. 7 whorls (14NA01-1) and 51.9 x 26.4 mm, l/d 1.97, <8 whorls (20NA01-3). The former has remains of a uniform greenish-yellow colour and the latter displays remnants of a reddish flame pattern. Checking through the achatinids known to occur in Namibia, these shells are most likely to represent *A. ' dammarensis*, which also agrees with the distribution in central-northern Namibia. This taxon is treated in some detail by Van Bruggen (1970: 63-65), who stresses the wide variation in shell size, shape and pattern (see also Zilch, 1939: 238). The above numerical data fit in with what is recorded in Van Bruggen (1970: 63-65): 36.0-58.7 x 19.0-31.0 mm, l/d 1.53-2.02.

The generic nomenclature of the southern African Achatinidae is in a state of flux following recent genital anatomy studies by Prof. A.R. Mead of the University of Arizona (Tucson, U.S.A.). Pending his publications on this subject, the species is here simply recorded as *Achatina' dammarensis*.

Family Streptaxidae Gray, 1840

**Gulella caryatis diabensis* Connolly, 1939 (figs 22-24)

This taxon, the only one of an otherwise in southern Africa very speciose 'genus' (almost certainly a polyphyletic group), is decidedly rare in Namibia and has turned up in the Rolán collection in one sample: 22NA01. The few known localities of *G. caryatis diabensis* appear to cluster in north-eastern Namibia, while the type locality is in Great Namaqualand: "about a hundred miles SW. of Windhoek" (Van Bruggen, 1970: 69).

Family Dorcasiidae Connolly, 1915

Dorcasia alexandri Gray, 1838

Zilch (1969) has extensively dwelt on the variation of this extremely variable and widely distributed taxon.

Family Sculptariidae Degner, 1923

A sample of shells of *Sculptaria* Pfeiffer, 1855, in the Rolán collection appears to represent a very characteristic new taxon. This is somewhat unexpected as this subendemic genus seemed well-known in all its astonishing and at times confusing diversity, even more so because of the easily accessible locality. Formerly the genus *Sculptaria* was classified with the family Corillidae Pilsbry, 1905 (vide Schileyko, 1999).

**Sculptaria fumarium* spec. nov. (figs 25-29)

Material studied. – Namibia, Kunene Province, Etosha National Park, Halali on the southern margin of Etosha Pan, on hill near camp site, 1100-1200 m, 17.VI.2001, leg. E. Rolán (Sta. 17NA01-3: holotype RMNH 94988 and 7 paratypes RMNH 94989 + 4 juvenile/immature shells; 5 paratypes in MNCNM15.05/46596; 45 paratypes in Emilio Rolán colln + 11 juvenile/immature shells). Juveniles and immature shells are expressly excluded from the type series.

Diagnosis. – A species of *Sculptaria* with a small, comparatively depressed, shell, characterized by dense radial costulae and a marginal sculpture consisting of a keel composed of an irregular row of chimney-like vertical tubules, open at the top.

Description. – Shell (figs 25-29) small, sub-discoid, widely umbilicate, light buff in colour. Spire flattish, apex sub-mamillate. Whorls about five, initially depressedly convex, later more convex, last becoming solute just before aperture. First one-and-a-half whorls smooth (fig. 28), very slightly pitted, remainder with increasingly marked dense and oblique radial sculpture; from about the beginning of the third whorl on the outside margin with an irregular upper peripheral keel-like row of chimney-like vertical tubules open at the top, which become stronger and longer towards the aperture (figs 25-27); the radial sculpture consisting of oblique, close and fine costulae. Sutures deep and crenelate. Bottom of last whorl with the above-mentioned radial sculpture limited by the peripheral keel consisting of the chimney-like tubules. Umbilicus very wide and deep, width somewhat more than one-third of major diameter of shell, revealing almost all whorls of the spire. Aperture much deflected (fig. 27), more or less ovate in shape, peristome expanded and continuous, hardly reflected; with four-fold dentition, i.e. a strong emergent parietal lamella (fig. 29) with more deeply situated and weaker upper, central and basal palatal plicae.

Measurements of shell: 2.5-2.9 x 5.9-6.9 mm (height x major diameter), l/d 0.36-0.45, c. 5 to slightly more than 5 whorls. Aperture measurements are (height x width) 2.2-2.3 x 2.4-2.6 mm, holotype: 2.2 x 2.6 mm.

Detailed individual measurements of seven shells are as follows (no. 5 is the holotype):

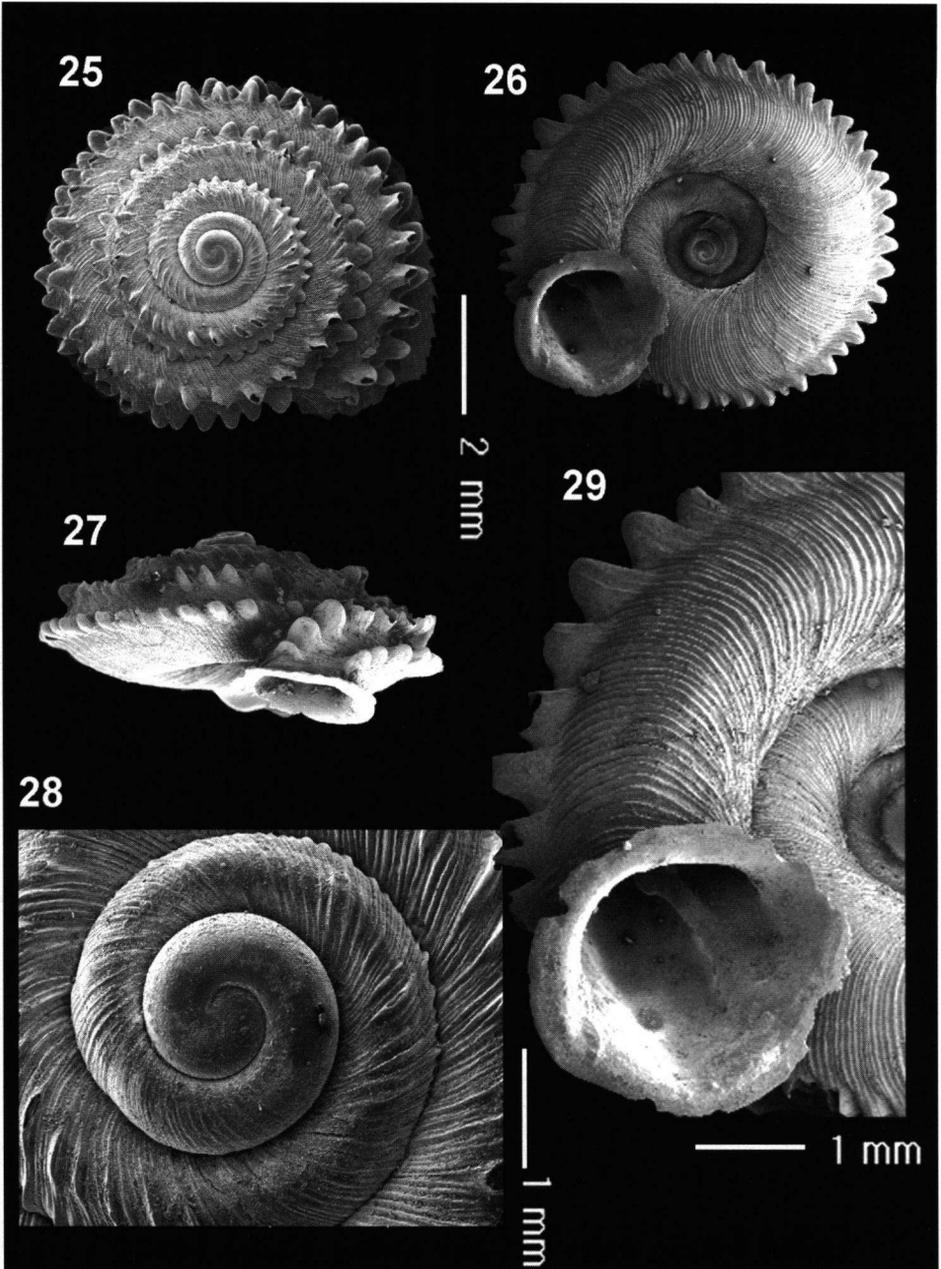
1	2.5 x 5.9 mm	l/d 0.42	c. 5 whorls
2	2.7 x 6.4 mm	l/d 0.42	c. 5 whorls
3	2.8 x 6.6 mm	l/d 0.43	<5 ¹ / ₄ whorls
4	2.9 x 6.6 mm	l/d 0.45	>5 whorls
5	2.6 x 6.7 mm	l/d 0.39	c. 5 whorls
6	2.5 x 6.9 mm	l/d 0.36	<5 ¹ / ₄ whorls
7	2.6 x 6.9 mm	l/d 0.38	<5 ¹ / ₄ whorls

Anatomy. – Unknown.

Etymology. – *fumarium*, Latin, smoke chamber, smoke channel or chimney, as a reference to the main character of the shell, here used as a noun in apposition.

Distribution. – So far only known from the type locality on the southern borders of the Etosha Pan, northern Namibia.

Discussion. – *Sculptaria fumarium* spec. nov. is easily recognized because of the peripheral keel of curious chimney-like tubules in combination with the radial sculpture and the small size of the shell. This curious sculpture pattern is variably expressed, but always quite noticeable. By virtue of the presence of a four-fold apertural dentition and the



Figs 25-29. SEM photographs of a paratype of *Sculptaria fumarium* spec. nov., in E. Rolán colln, 17NA01-3; 25, top view; 26, bottom view; 27, side view; 28, apex; 29, aperture enlarged, bottom view.

absence of reticulate sculpture the new taxon belongs to Connolly's (1939: 260) group (i) "Sculpture consisting mainly of tranverse [sic] striae", which is more or less equivalent to Zilch's (1939: 241) group (b) "Die Skulptur besteht nur aus Radialstreifen. Mündung mit 4 Falten." In this group the major diameter varies from 5.7 to 10.4 mm, with only 5 of the c. 14 taxa having a major diameter equivalent to that of the new species. These are *S. damarensis minor* Degner, 1922 (6.7-8.5 mm, 5 whorls), *S. d. pygmaea* Zilch, 1952 (5.9-7.3 mm, 4³/₄-5 whorls), *S. framesi* Burnup, 1922 (5.7-6.9 mm, 4³/₄ whorls), *S. namaquensis* Zilch, 1939 (syn. *S. edlingeri* Connolly, 1939; 5.5-6.1 mm, 5 whorls – for this synonymy see Zilch, 1943; Van Bruggen, 1963, 1964a), and *S. sculpturata* (Gray, 1838) (6.2-8.4 mm, 5 whorls). The first four are easily discriminated by their little pronounced sculpture.

The last-mentioned species is classified with different groups by Zilch (1939) and Connolly (1939); it has a strong spiral element in its sculpture. It rightly features in Zilch's group (b), but Connolly (op. cit.: 260) defines his group (i) as having a sculpture "consisting mainly [sic] of transverse striae". Zilch, however, adds another character, i.e. the four pleats in the aperture. Connolly could not include this character in the diagnosis of his group (i) because *S. sculpturata* has only three apertural pleats.

S. sculpturata may at times display a "foliated peripheral keel" (Burnup, 1923), a type of sculpture that comes fairly close to what is described above for the new form. However, the shell of *S. sculpturata* always has a strong spiral element in its sculpture which is utterly lacking in *S. fumarium* spec. nov.

The function of the line of little chimneys on the shell may be connected with the moisture regime of the habitat of the snail in question. Almost all land molluscs in Namibia live under inhospitable conditions for land gastropods in a basically arid country (Van Bruggen, 1978: 907-910). A drop of water on one of the (empty) shells of the new *Sculptaria* taxon was immediately completely absorbed and it took a long time before all traces of moisture had disappeared by means of evaporation. Is this a vital moisture-retaining mechanism for the living animal?

Family Succineidae Beck, 1837

'Succinea' arboricola Connolly, 1912

Sample 14NA01-2 contains a number of specimens of *Succinea* sensu lato. The five largest shells, all with about 3¹/₄ whorls, have the following measurements:

7.1 x 4.9 mm	l/d 1.46
7.2 x 4.9 mm	l/d 1.49
7.2 x 5.0 mm	l/d 1.45
7.4 x 4.9 mm	l/d 1.51
7.6 x 5.2 mm	l/d 1.45

This may be summarized as 7.1-7.6 x 4.9-5.2 mm, l/d 1.45-1.51. A smaller shell with about 3 whorls measures only 4.9 x 3.2 mm, l/d 1.52.

Two nominal species may be involved here, i.e. *'S'. arboricola* and *S. striata* Krauss, 1848. The Rolán material is here identified with *'S'. arboricola* (as discussed and figured by Van Bruggen, 1966: 340); hitherto published measurements are 7.2-9.0 x 4.6-5.7 mm, l/d 1.56-1.63 (fide Van Bruggen, op. cit.). This shows that the shells under discussion are comparatively very squat. *S. striata* shells are generally larger (at least up to 12 mm) and are only exceptionally as squat as showing an l/d of 1.50. The Rolán specimens kept in spirits are unfortunately completely withdrawn and therefore hardly suitable for anatomical

investigation.

A warning should be sounded here because succineids are poorly defined by shell characters so that study of the genitalia is imperative. It is even uncertain whether '*S. arboricola*' belongs to the genus *Succinea* s.s.

Family Zonitidae Mörch, 1864 (alien family)

Zonitoides (Zonitoides) arboreus (Say, 1816)

A small series from the Windhoek locality (hotel garden: a typically synanthropic site!) was identified with this originally North American species that has been widely dispersed in the wake of Man. There is a large number of southern African records (Van Bruggen, 1964c), but the species is new to Namibia.

Family Agriolimacidae Wagner, 1935 (alien family)

Deroceras laeve (Müller, 1774) (alien species)

A number of small slugs was obtained at Station 03NA01 (Windhoek). These were simply dropped in alcohol, which made anatomical examination somewhat difficult; the largest specimens measure 14-15 mm in alcohol. Drs E. Gittenberger and A.J. de Winter (both RMNH) kindly examined these specimens and found them to belong to *Deroceras laeve* (euphallic form).

Three taxa of *Deroceras* are known as synanthropic species from southern Africa (Van Bruggen, 1964c; Altena, 1966): *D. reticulatum* (Müller, 1774), *D. caruanae* (Pollonera, 1891), and *D. laeve* (Müller, 1774). Only *D. caruanae* has so far been recorded (with a question mark) from Namibia s.n. *Agriolimax laevis* var. *grisea* Taylor, 1906: "Alt Seis, Windhoek District". Altena (1966: 294) specifically states: "It seems possible that the animals recorded as '*Agriolimax laevis* (Müll.) var. *grisea* Taylor' by Connolly (1939: 179), of which the identification has not been based on anatomical characters, belong to the present species [i.e. *D. caruanae*]." At present *D. caruanae* is considered a synonym of *D. panormitanum* (Lessona & Pollonera, 1882). This is the only published slug record from Namibia (see also Van Bruggen, 1964c: 164). Unfortunately Wiktor's monograph of the Agriolimacidae (2000) does not refer in detail to distribution of these species outside their natural range. Also, Wiktor (op. cit.) does not discuss *D. laeve* var. *grisea*.

As regards (alien) slugs, Namibia may be an under-collected country – all other southern African records for synanthropic slugs belonging to various non-African families are from the Southern, Northern and Eastern Cape, Free State, Gauteng, Kruger National Park, KwaZulu-Natal, and Swaziland. Incidentally, Namibia should also harbour indigenous slugs such as e.g. Veronicellidae of the genus *Laevicaulis*. For example, Forcart (1953) does not record Veronicellidae from Namibia, but includes at least three species from Angola. Presence of the family here is confirmed by alcohol material in the Leiden Museum (RMNH).

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