

Studies on the Streptaxidae (Mollusca: Gastropoda Pulmonata) of Malaŵi  
6. *Gulella sursum* spec. nov., a new streptaxid from the eastern rim of the Nyika Plateau<sup>1</sup>

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*Gulella sursum* spec. nov. is described from the eastern rim of the Nyika Plateau in northern Malaŵi. Although it displays a suite of characters which in themselves are not diagnostic, the combination of these (particularly the comparatively high number of whorls combined with a four-fold apertural dentition) seems to be as yet undescribed. The new species is probably a localized endemic as it is not represented in the otherwise comprehensive Malaŵi material gathered by other collectors and studied by the author.

Key words: Gastropoda, Pulmonata, Streptaxidae, *Gulella*, taxonomy, Africa, Malaŵi.

INTRODUCTION

The herpetologist Arthur Loveridge (1891-1980) made an extensive collecting trip to Malaŵi in the years 1948-1949 for and on behalf of the Museum of Comparative Zoology, Cambridge (Mass., U.S.A.). As a byproduct of his explorations a lot of mollusc material was obtained, including many members of the Streptaxidae, a pulmonate family dominant in tropical Africa. By courtesy of the staff of this institution much of the material was submitted for study. A few notes on this collection are found in Van Bruggen (1990: 98). Loveridge himself has vividly described his expedition in a popular book (1954) and has also supplied a list of stations visited (1953).

Although the Loveridge collection is limited in size, it does contain species not obtained during the nationwide Malaŵi land mollusc survey by Ms. Hazel M. Meredith and her many co-workers in the period 1975-1988. The Meredith collection forms part of the mollusc holdings of the National Museum of Natural History, Leiden.

The most interesting Loveridge discovery so far has been that of a species of *Ptychotrema*, *P. loveridgei* Van Bruggen, 1990, in the Misuku Hills in northern Malaŵi. In addition *Gulella microrutshuruensis* Van Bruggen, 1995, and *Gulella* (?*Plicigulella*) *loveridgei* Van Bruggen, 1996 (both also from the Misuku Hills) have been described from the Loveridge collection. This paper contains the description of two (somewhat indifferent) shells as a new species of *Gulella* from the eastern rim of the Nyika Plateau in northern Malaŵi, which taxon also is not represented among the prolific Meredith material. However, an additional specimen was obtained by Dr. Rudi Jocqué in 1981.

The abbreviation l/d stands for the ratio length/major diameter of shells as an indica-

<sup>1</sup>For No. 5 in this series (Description of *Gulella meredithae* spec. nov.) vide *Zoologische Mededelingen*, Leiden 74 (15): 225-235, 2000.

tion of their shape; lw denotes the length of the last whorl measured on the shell in front view. Note that measurements are taken by micrometer readings, which are subsequently translated into mm; l/d values are calculated from these micrometer readings, so that values obtained from the measurements in mm do not always exactly agree. BM is the acronym for The Natural History Museum [formerly British Museum (Natural History)], London; MCZ for the Museum of Comparative Zoology, Cambridge (Mass.), U.S.A.; MRAC for Musée Royal de l'Afrique Centrale, Tervuren, Belgium.

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## DESCRIPTIVE PART

### *Gulella sursum* spec. nov. (figs 1, 2)

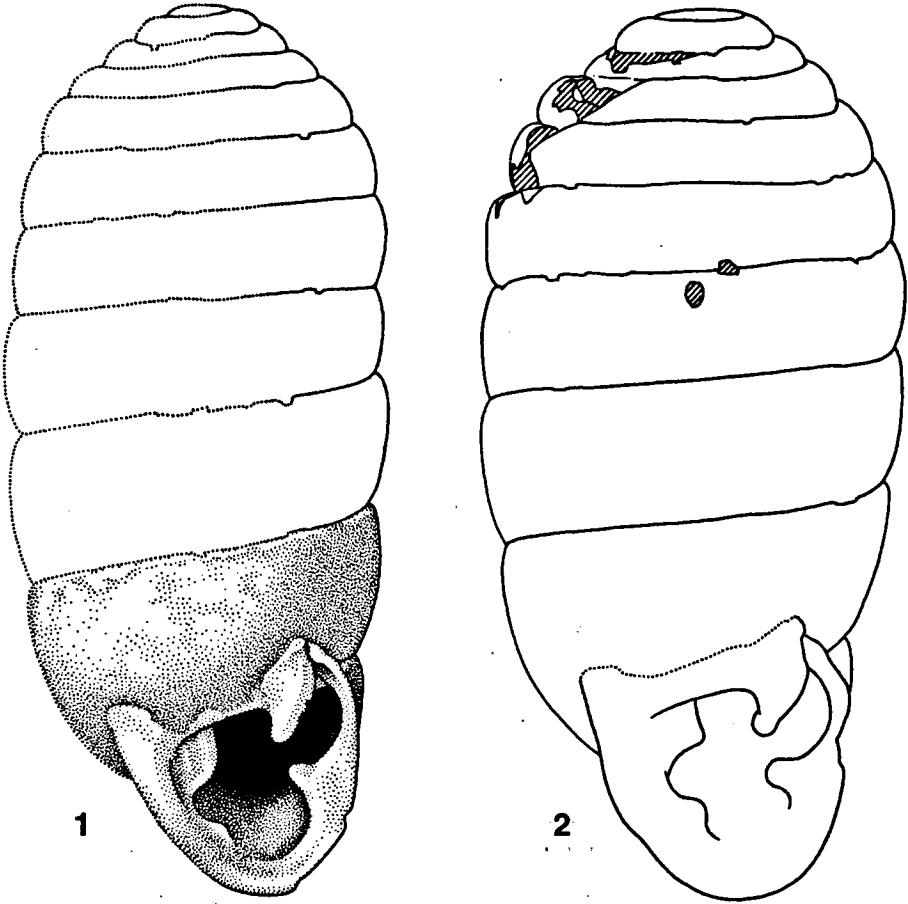
**Diagnosis.** — A species of *Gulella* with a medium-sized, smooth shell with about ten whorls and a four-fold apertural dentition consisting of an angular lamella, a labral process and two columellar processes.

**Description.** — Shell (figs 1-2) medium-sized, cylindrical to cylindrical-subovate, greatest width somewhat below the middle, creamy white, (semi)transparent when fresh. Umbilicus subrimate to completely closed. Spire produced, sides almost parallel and hardly convex, apex flattened, obtusely conical. Whorls about ten, slightly convex, smooth (inclusive of apex), but with faint traces of obsolete costulation below the sutures, more marked behind the labrum. Sutures impressed, shallow, simple, filiform. Aperture (sub)ovate, peristome incrassate and reflected, aperture mildly obstructed by four-fold dentition: a fairly strong, almost perpendicular angular lamella, just touching apex of labrum, so that there is no marked sinus; a well-developed superficial, triangular, labral process at about the middle of labrum, corresponding to a modest, shallow outside depression; a small lower columellar process, a mere tubercle, to the left of the base; a fairly large, somewhat deeply situated, more or less mamillate inner columellar lamella.

Measurements: 5.5-6.1 x 2.6-2.7 mm, l/d 2.00-2.39, length last whorl 2.4 mm, aperture height x major diameter (outside measurements) 1.6-1.7 x 1.6 mm, whorls 10 (see table 1).

specimen	length x maj. diam.	l/d	lw	aperture	number of whorls
holotype	6.12 x 2.56 mm	2.39	2.37 mm	1.68 x 1.62 mm	10+
paratype 1	5.5 x 2.56 mm	2.15	2.37 mm	1.62 x 1.62 mm	c. 10 apex damaged
paratype 2	5.5 x 2.75 mm	2.00	2.37 mm	1.75 x 1.62 mm	<10

Table 1. Measurements of available material of *Gulella sursum* nov. spec.



Figs 1-2. Holotype (fig. 1, half-schematic, actual length 6.1 mm) and paratype 1 (outline, actual length 5.5 mm) of *Gulella sursum* spec. nov., Malaŵi, "Nyika Plateau above Nchenachena" (MCZ 298204), highly enlarged. H. Heijn del.

Animal unknown; the MRAC specimen has not been dissected as this would involve destruction of the shell because the animal is completely withdrawn.

Distribution. — Malaŵi, eastern rim of Nyika Plateau.

Material examined. — Malaŵi, Rumphu District, Nyika National Park, "Nyika Plateau above Nchenachena. 10°10'S., 33°35'E. Alt. 7500 feet" [= about 2500 m], 27.x-19.xi.1948, leg. A. Loveridge c.s. (Loveridge, 1953: 461) [MCZ 298204, Acc. 532, A. Loveridge 8-29-'49: holotype (fig. 1) and paratype no. 1 (fig 2)] (for discussion on the type locality see below); "Mwenembwe Forest, 2300 m" leaf litter, 17.xii.1981, leg. R. Jocqué (MRAC 801.113, alc., paratype no. 2).

Derivatio nominis. — *sursum* is a Latin adverb meaning 'uphill' in reference to the climb made by the Loveridge party from Nchenachena at '4600 ft.' to the Nyika Plateau at '7500 ft.' (see discussion on the type locality below).

## DISCUSSION

The combination of characters of this shell seems to be unique. Although the characters in themselves are of little significance, i.e. a smooth, cylindrical shell with c. 10 whorls and a four-fold apertural dentition (formula according to Verdcourt's 1962 system 1; 1; 0; 2; another interpretation might be 1; 1; 1; 1), the fact that these are shown at the same time makes for an unusual picture.

For comparison we will check through the literature and available material from south to north. In Connolly's monographic treatise for southern Africa (1939) the Malaŵi shells key out to group 3ii on p. 33. Four of these species have a four-fold dentition: *G. kraussi* (Pfeiffer, 1855), *G. subkraussi* Connolly, 1932, *G. juxtidentis* (Melvill & Ponsonby, 1899), and *G. digitalis* Connolly, 1939). All have lengths of 4.3-9.4 mm with 6 1/2-8 1/2 whorls. Moreover, the dentition may be interpreted as 1; 1; 1 rather than 1; 1; 0; 2, i.e. the third denticle is normally in a (left) basal position and not on the lower columella. The shells of southern African *Gulella* species described since also do not match that of *G. sursum* spec. nov.

In Verdcourt (1962) the Nyika shells key out to *G. aequidentata* (Smith, 1890) via Key 9. The Nyika shells differ from the holotype of this taxon (BM 90.7.16.128, Tanzania, Mkata, leg. Emin Pasha) in many details, but chiefly in the columellar lamella, which is mamillate and deeply situated, while in *G. aequidentata* it is superficial, lamella-like and almost horizontal. Also, the shell of *G. aequidentata* has only 6-7 whorls. Another option in Key 9 would be *G. baccata* (Preston, 1913), which, however, is finely striate and has fewer whorls, e.g. only 7 1/4 whorls in a shell of 5.4 x 2.9 mm, l/d 1.86 (topotype, see Adam, 1965: 24, pl. I fig. 9). Moreover, the configuration of the columellar denticles in the aperture is markedly different, e.g. the upper columellar lamella being much more superficial than in the new taxon. There are no East African species published after 1962 that have shells similar to that of the new species here discussed.

Pilsbry's Congo overview (1919) does not lead to any conclusions and subsequent work on *Gulella* in the Democratic Republic of the Congo (e.g. Van Bruggen & Van Goethem, 1997, 1999) also is of no assistance here. The same applies to the literature on Angola and the largely unpublished streptaxid material from that country in the Leiden Museum.

## THE TYPE LOCALITY

The original label of the MCZ specimens reads in Dr. J.C. Bequaert's handwriting: "Gulella/Nyika Plateau/7000 ft./Nyasaland" The type locality of the new species is difficult to interpret on the base of present day knowledge of the geography of Malaŵi (see Atlas of Malaŵi, 1983). Loveridge's 1953 data ( $10^{\circ}10'S$   $33^{\circ}35'E$ ) are wildly inaccurate - according to modern standards these coordinates indicate a locality to the north-west of the Nyika Plateau. The Atlas of Malaŵi gives the following data for Nchenachena and Nchenachena River:  $10^{\circ}45'15''S$   $34^{\circ}02'15''E$  and  $10^{\circ}43'30''S$   $33^{\circ}58'00''E$ , respectively. A map of the Nyika National Park published by the Department of National Parks (1983) locates the "Mwenembwe and Kasaramba Forests" above Nchenachena, the former forest north-east of, but adjacent to, the latter. This is not confirmed by the coordinates for these forests in Benson & Benson (1977: Kasaramba 1040/3358, Mwenembwe 1041/3401). Ansell & Dowsett (1988: Mwenembwe  $10^{\circ}41'S$   $34^{\circ}00'E$ , "peak is 2450 m") unfortunately give no data for the Kasaramba Forest. Benson & Benson therefore show the Mwenembwe Forest ( $10^{\circ}41'S$ ) to be south of the Kasaramba Forest ( $10^{\circ}40'S$ ) and not the other way round. According to the maps in the Atlas of Malaŵi (1983) this area is between 2200 and 2500 m a.s.l. Incidentally, all this completely agrees with the locality of paratype 2, i.e. the Mwenembwe Forest at 2300 m.

Ms. Meredith kindly went into the matter of Loveridge's locality by consulting the Malaŵi forestry expert Mr. J. Chapman. He intimated that the coordinates are: Mwenembwe Forest  $10^{\circ}40'S$   $34^{\circ}01'E$ , and Kasaramba Forest  $10^{\circ}44'S$   $33^{\circ}59'E$ . This confirms the position as shown on the above-mentioned Department of National Parks map. He also wrote about the Kasaramba Forest "There is a path to the foot of the escarpment down the Nchenachena spur."

It is likely that Loveridge went up through the Kasaramba Forest, therefore it is almost certain that the holotype and paratype 1 were found here, making this forest the type locality of *Gulella sursum* spec. nov. The fact that the Jocqué paratype (paratype 2) is slightly different from the others, suggesting the possibility of another population, adds weight to the idea that Kasaramba is the type locality, although the numbers of specimens are far too small to draw reliable conclusions.

The Mwenembwe-Kasaramba Forest complex on the eastern rim of the Nyika Plateau at first sight appears to be isolated from kindred types of vegetation. Of course, many of the now isolated forests on the Nyika Plateau almost certainly are the remnants of a more or less continuous forest cover not all that long ago. However, there is the possibility that discontinuities in this forest cover may have caused isolation of long standing, having resulted in the origin of molluscan endemics.

*Gulella araneorum* Van Bruggen, 1986, the species with the largest shell (length up to 14.4 mm) in the genus in Malaŵi, has been described from Jocqué's material from the Mwenembwe Forest (Van Bruggen, 1986); it has subsequently been recorded from the Loveridge collection (MCZ) from somewhat below this forest (Van Bruggen, 1993). The fact that this striking snail has not been found during the extensive survey of the Nyika Plateau forests by Ms. Meredith and collaborators (1975-1988) is, to say the least, remarkable. This is the reason why for the time being *G. sursum* spec. nov., together with *G. araneorum*, is considered endemic to this part of the Nyika Plateau forests.

## REFERENCES

- ADAM, W., 1965. Mission zoologique de l'I.R.S.A.C. en Afrique orientale (P. Basilewsky et N. Leleup, 1957). LXXXV. - Streptaxidae. — Annales du Musée Royal de l'Afrique Centrale (8°) Sciences Zoologiques 138: 1-50.
- ANSELL, W.F.H., & R.J. DOWSETT, 1988. Mammals of Malawi. An annotated check list and atlas: 1-170 + 53 unnumbered pp. St. Ives.
- ATLAS OF MALAWI, 1983. The National - : i-vi, 1-79. Lilongwe.
- BENSON, C.W., & F.M. BENSON, 1977. The birds of Malawi: 1-263. Limbe.
- BRUGGEN, A.C. VAN, 1986. *Gulella araneorum* n. sp., the largest representative of the genus in Malawi (Gastropoda Pulmonata: Streptaxidae). — Revue de Zoologie Africaine 100: 259-262.
- , 1990. Studies on the Streptaxidae (Mollusca, Gastropoda Pulmonata) of Malaŵi 1. A new species of *Ptychotrema* from northern Malaŵi. — Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen 93: 97-104.
- , 1993. Studies on the terrestrial molluscs of Malaŵi, an interim progress report with additions to the check-list. — Archiv für Molluskenkunde 122 (Adolf Zilch-Festschrift): 99-111.
- , 1995. Studies on the Streptaxidae (Mollusca, Gastropoda Pulmonata) of Malaŵi 3. *Gulella microrutshuruensis* n. sp., a new species resembling *G. rutshuruensis* Pilsbry. — Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen 98: 243-250.
- , 1996. Studies on the Streptaxidae (Mollusca, Gastropoda Pulmonata) of Malaŵi 4. A review of the subgenus *Plicigulella* of the genus *Gulella* in Malaŵi. — Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen 98: 329-341 (officially dated "December 18, 1995", but published in February 1996).
- , 2000. Studies on the Streptaxidae (Mollusca, Gastropoda Pulmonata) of Malaŵi 5. Description of *Gulella meredithae* spec. nov. — Zoologische Mededelingen Leiden 74: 225-235.
- , & J.L. VAN GOETHEM, 1997. Dr William Adam's iconography of Central and West African *Gulella* species (Gastropoda, Pulmonata, Streptaxidae). Part 1: nominal taxa. — Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie 67: 5-30.
- , & J.L. VAN GOETHEM, 1999. Dr William Adam's iconography of Central and West African *Gulella* species (Gastropoda, Pulmonata, Streptaxidae). Part 3: nine new species from the D.R. Congo. — Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie 69: 31-45.
- CONNOLLY, M., 1939. A monographic survey of South African non-marine Mollusca. — Annals of the South African Museum 33: 1-660.
- LOVERIDGE, A., 1953. Zoological results of a fifth expedition to East Africa VII. Itinerary and conclusions (with an appendix on the avifauna by C.W. Benson). — Bulletin of the Museum of Comparative Zoology at Harvard College 110: 445-487.
- , 1954. I drank the Zambezi: (i-xiv +) 1-296. London.
- PILSBRY, H.A., 1919. A review of the land mollusks of the Belgian Congo chiefly based on the collections of the American Museum Congo Expedition, 1909-1915. — Bulletin of the American Museum of Natural History 40: i-x, 1-370.
- VERDCOURT, B., 1962. Preliminary keys for the identification of the species of the genus *Gulella* Pfr. occurring in East Africa excluding the sections *Primigulella* Pilsbry and *Plicigulella* Pilsbry. — Annales du Musée Royal de l'Afrique Centrale (8°) Sciences Zoologiques 106: 1-39.
- , 1983. A list of the non-marine Mollusca of East Africa (Kenya, Uganda, Tanzania, excluding Lake Malawi). — Achatina 11: 200-239.