Studies on the Streptaxidae (Mollusca: Gastropoda Pulmonata) of Malaŵi 10. Description of *Gulella systemanaturae*, a new species from Dedza Mountain

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Key words: Gastropoda; Pulmonata; Streptaxidae; *Gulella*; taxonomy; Malaŵi.
Gulella systemanaturae spec. nov. is described from Dedza Mt. in South-Central Malaŵi. The medium-sized shell is characterized by little prominent costulation and a four-fold apertural dentition consisting of angular lamella, labral process, and outer and inner columellar processes. The labrum is sharply angulate at its point of attachment to the body whorl near the angular lamella.

Systema Naturae 1758-2008

Introduction

The year 2008 marks the 250th anniversary of the 10th Edition of Linnaeus' Systema Naturae, the basis of zoological nomenclature and the onset of structured biodiversity studies. The first major work on African molluscs was that of Krauss, 1848 (90 years later), now 160 years ago. Studies on the molluscs of the country today known as Malaŵi date only from 1865 (Dohrn, 1865), *i.e.* 17 years after Krauss and 107 years after the vital edition of Systema Naturae. Meantime significant progress has been made in African terrestrial malacology. Today, two-and-a-half centuries since the birth of systematic zoology and 143 years after the beginning of work on the molluscs of Malaŵi, it therefore seems fitting to describe a new species as a memento to the publication of the masterwork of Linnaeus: *Gulella systemanaturae* spec. nov.

This paper is part of a series[1] devoted to the description of the species of the diverse pulmonate gastropod family Streptaxidae in Malaŵi. Among the many taxa of the very diverse genus *Gulella* L. Pfeiffer, 1865 (*sensu lato*), in Malaŵi, there is a complex of taxa centred around Dedza Mt. with a comparatively simple apertural dentition. This group represents an as yet undescribed taxon. Notwithstanding extensive collecting around Malaŵi, particularly by Ms Hazel M. Meredith and her collaborators, representatives of this group have not been found elsewhere in the country.

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[1] For no. 9 in this series *vide* Bruggen, A.C. van, 2007. Studies on the Streptaxidae (Mollusca: Gastropoda Pulmonata) of Malaŵi 9. Description of *Gulella streptostelopsis*, a new *Streptostele*-like species of *Gulella*.— Zool. Med. Leiden 81 (1): 1-9, figs 1-6.

The Malaŵi checklist (van Bruggen & Meredith, 1984) originally enumerated only six named species of *Gulella s.l.* and the first supplement (van Bruggen, 1993) added four more (among which one newly described). To date another 6 new species have been added, bringing the total to sixteen identified taxa. This has by far not exhausted the diversity of the genus in this Central African country. Initially van Bruggen & Meredith (*loc. cit*.: 161) expected an estimated total of 21 species (six identified ones and "probably about 15 other species") to occur in Malaŵi. In material at hand there are at least five more undescribed taxa so that the 1984 estimate is certainly reasonably correct.

Notwithstanding recent research efforts our knowledge of the streptaxids inhabiting Malaŵi is still limited. In addition, unfortunately the malacofauna of neighbouring countries is seriously under-researched resulting in extremely low figures, such as fourteen *Gulella* spp. for Mozambique (Connolly, 1939, updated) and five (*sic*!) for Zambia (van Bruggen, 1988) – on the other hand a figure of 86 has been extracted from Verdcourt (2006) for Tanzania. Of course, the countries surrounding Malaŵi are all substantially larger but not necessarily more diverse as regards physical geography, a factor basically influencing molluscan diversity.

The following abbreviations have been used: l/d for the ratio length/major diameter of shells (this ratio is calculated from micrometer readings and may therefore differ from that calculated when these measurements are first converted into mm); lw for length of last whorl in front view; MRAC for Musée Royal de l'Afrique Centrale, Tervuren, Belgium; RMNH for National Museum of Natural History, Leiden (Nationaal Natuurhistorisch Museum, formerly Rijksmuseum van Natuurlijke Historie).

Description

Gulella systemanaturae spec. nov.
(fig. 1)

Material examined.— Malaŵi (all localities are in the Dedza District): leaf litter *Syzygium* forest, Dedza Mt. slopes, c. 1700 m, 23.ii.1985, leg. Ms H.M. Meredith (paratype no. 7 in table 1, RMNH 109049); Dedza Mt., on road by fallen boulders several hundred feet below summit, c. 1900 m, 23.ii.1985, leg. Ms H.M. Meredith (paratype no. 14, RMNH 109050); Dedza Mt., leaf litter evergreen summit forest (loc. no. 4), c. 2000 m, 23.ii.1985, leg. Ms H.M. Meredith (paratype no. 3, RMNH 109051); Dedza Mt., montane grassland near evergreen forest (loc. no. 4), c. 2000 m, 23.ii.1985, leg. Ms H.M. Meredith (paratype no. 5, RMNH 109052); Dedza Mt., leaf litter evergreen summit forest (loc. no. 5), c. 2000 m (type locality), 23.ii.1985, leg. Ms H.M. Meredith (**holotype**, fig. 1, no. 11 in table 1, RMNH 109053; paratypes nos. 1, 6, 9, 10, RMNH 109055; paratypes nos. 2 and 8 in alcohol, RMNH 109056); Dedza Mt., leaf litter evergreen summit forest (loc. no. 7), c. 2100 m, 23.ii.1985, leg. Ms H.M. Meredith (paratype no. 13, RMNH 109054); Mt. Dedza, 14º20'S 34º24'E, 2095 m, 7.xii.1975, leg. R. Jocqué (paratypes nos. 4 and 12, MRAC 800.303).

Diagnosis.— A species of *Gulella* characterized by a medium-sized shell with little prominent costulation, seven to seven and three-quarter whorls and four-fold apertural dentition consisting of angular lamella, labral process, and outer and inner columellar processes; labrum sharply angulate at its point of attachment to the body whorl near the angular lamella.

Description.— Shell (fig. 1) medium-sized, cylindriform to subcylindriform, greatest width at about the middle of the shell, glossy and transparent when fresh, with narrowly open umbilicus to more or less rimate. Spire produced, sides straight to very slightly convex and (sub)parallel, apex obtusely conical. Whorls seven to seven and three-quarters, very slightly convex, covered with fairly close, straight, oblique and little prominent costulae, interstices wider than (at most as wide as) costulae, smooth but with clear traces of spiral sculpture, apical whorls smooth with faint traces of spiral engraving; sutures fairly shallow to somewhat incised, crenellate. Labrum incrassate and reflected, sharply angulate at its point of attachment to the body whorl near the angular lamella. Aperture fairly large, roughly triangular in shape, little obstructed by fourfold dentition: a strong, almost perpendicular, inrunning angular lamella, (almost) free from apex of labrum; a more or less horizontal, triangular mid-labral process, protruding as far as angular lamella, corresponding to noticeable outside depression; a small, but noticeable superficial tubercle above or on the middle of the columella; a deeply situated, little prominent, almost vertical, inside columellar process.

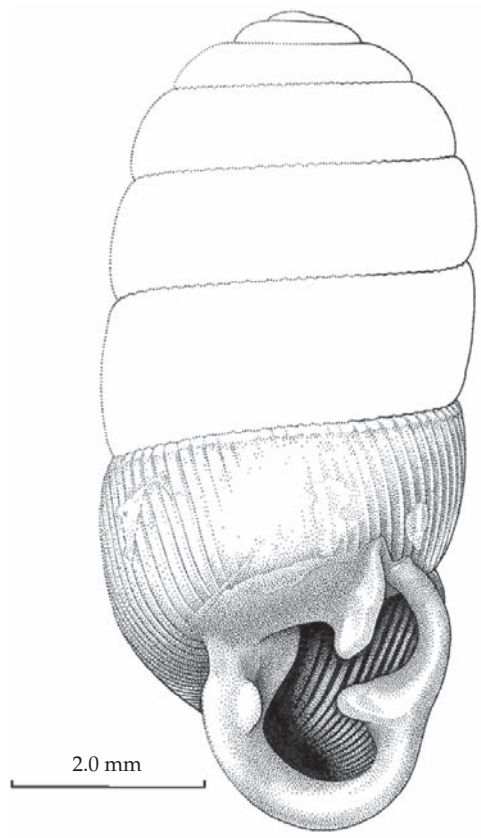

Fig. 1. *Gulella systemanaturae* spec. nov., holotype shell (half-schematic), Malawi, Dedza Mt., RMNH 109053; highly enlarged, actual length 7.9 mm. H. Heijn *del.*

Measurements of shell (table 1): 7.1-8.2 × 3.2-3.6 mm, l/d 2.05-2.50, length last whorl 3.7-4.2 mm, aperture 2.4-3.0 × 2.1-2.5 mm, 7-7 ¾ whorls.

Animal.— Field notes: "red tentacles, cream body" (Meredith, *in litt*., 23.x.2007; this refers to paratype no. 5).

Anatomy so far undescribed.

Distribution.— The new species seems to be restricted to altitudes between c. 1700 and c. 2100 m on Dedza Mt. in South-central Malawi (SE of Lilongwe).

Derivatio nominis.— The epithet *systemanaturae* is derived from the name of Systema Naturae, the masterwork of Carolus Linnaeus, and should therefore be treated as a noun in apposition.

Discussion

The new species is particularly characterized by its double columellar processes in the apertural dentition, a splendid discriminating character in shell morphology in this

Table 1. Measurements of shells in mm of *Gulella systemanaturae* spec. nov. All are from Malawi, Dedza Mt.; damage to some shells is reflected by absence of certain measurements. The holotype (no. 11) has been indicated by an *; all material in RMNH bar the specimens shown as MRAC.

no	Locality	length × max. maj. Diam.	l/d	lw	aperture length × diam.	number of whorls
1	evergreen summit forest no. 5	7.1 × 3.2	2.19	-	2.4 × 2.1	7
2	evergreen summit forest no. 5 (alcohol specimen)	7.2 × 3.5	2.07	3.7	2.6 × 2.2	7¼
3	evergreen summit forest no. 4	7.4 × 3.4	2.15	3.9	2.7 × 2.3	7
4	MRAC	7.4 × 3.4	2.18	3.9	2.6 × 2.4	7¼
5	grassland near evergreen forest no. 4	7.4 × 3.6	2.05	3.7	2.7 × 2.5	7¼
6	evergreen summit forest no. 5	7.5 × 3.4	2.22	3.9	2.6 × 2.4	7¼
7	*Syzygium* forest slopes	7.5 × 3.5	2.14	3.7	2.7 × 2.4	7
8	evergreen summit forest no. 5 (alcohol specimen)	7.6 × 3.2	2.35	4.0	2.7 × 2.4	7½
9	evergreen summit forest no. 5	7.7 × 3.2	2.36	4.0	3.0 × 2.2	7¼
10	evergreen summit forest no. 5	7.7 × 3.4	2.25	4.0	2.9 × -	7¼
11*	evergreen summit forest no. 5	7.9 × 3.5	2.25	3.9	2.7 × 2.4	7¼
12	MRAC	8.0 × 3.3	2.41	4.2	2.9 × 2.4	7½
13	evergreen summit forest no. 7	8.1 × 3.2	2.50	3.7	2.9 × 2.2	7¾
14	boulders below summit	8.2 × 3.5	2.36	4.1	3.0 × 2.5	7¾

group. In addition, the labrum is sharply angulate at its point of attachment to the body whorl near the angular lamella. This may be an overlooked character as this has not been checked or noticed in other taxa with similar types of shell. Also, sometimes the labrum is very slightly concave where it joins the body whorl on the columellar side.

The first classical general works to be consulted are Pilsbry (1919), Connolly (1939), Verdcourt (1962), and Herbert & Kilburn (2004). In Connolly's southern African review it keys out to *Gulella craterodon* (Melvill & Ponsonby, 1903), an Eastern Cape Province restricted endemic. This taxon differs considerably in all details (size, shape, shape of aperture, details of apertural dentition, etc.) so that relationship seems remote. The keys and illustrations in Herbert & Kilburn's invaluable book covering part of Connolly's southern Africa confirm absence of shells kindred to *G. systemanaturae* in eastern South Africa. Species described since from southern Africa are also dissimilar.

Pilsbry (1919) and subsequent papers on the D.R. Congo (formerly Zaïre/Belgian Congo) by a limited number of authors too does not supply any clues at all.

The new taxon does not key out satisfactorily in Verdcourt's tables for East African species attributed to *Gulella*. A fairly large number of taxa in this genus *sensu lato* has since been described from eastern Africa (mostly enumerated in Verdcourt's 2006 checklist), but there are no species with shells sufficiently similar to consider here in a differential diagnosis. The formula for the apertural dentition in Verdcourt's 1962 key for the new species is 1; 1; 0; 2. Attention is drawn to *G. camerani* (Pollonera, 1906) (*vide* van Bruggen & Van Goethem, 1997: 11, figs 10-14); the shell of this species is subject to a good deal of variation encompassing apertural dentition looking like that of *G. systemanaturae* spec. nov. However, the general aspect of the shell is abundantly different. *G. camerani* is widely distributed in Central-East Africa: "Eastern D.R. Congo

mountains eastward to Uganda" (van Bruggen & Van Goethem, *loc. cit.*).

Shells somewhat similar to those of *G. systemanaturae* are present in Malawi material of the Hazel M. Meredith collection (RMNH). These specimens have not yet been studied in detail, but it appears that there are significant differences such as *e.g.*, size. In due course this will be properly evaluated.

According to Chapman & White (1970: 147) all localities where the new species has been found are above the *Brachystegia* woodland belt. For descriptions of the forests of Dedza Mt. the student is referred to the above treatise (Chapman & White, *loc. cit.*: 147-151). The colour photo on the top of p. 34 in Dowsett-Lemaire & Dowsett (2006) gives a good impression of the area, depicting "Low-canopy montane forest near the summit of Dedza Mountain (2150 m).". In view of the geographic position of Dedza Mt. it is not unlikely for the species to occur in neighbouring Mozambique as well.

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