Notes on Kenya land and freshwater snails
10. Variation in the Gulella ugandensis complex (Streptaxidae)

by

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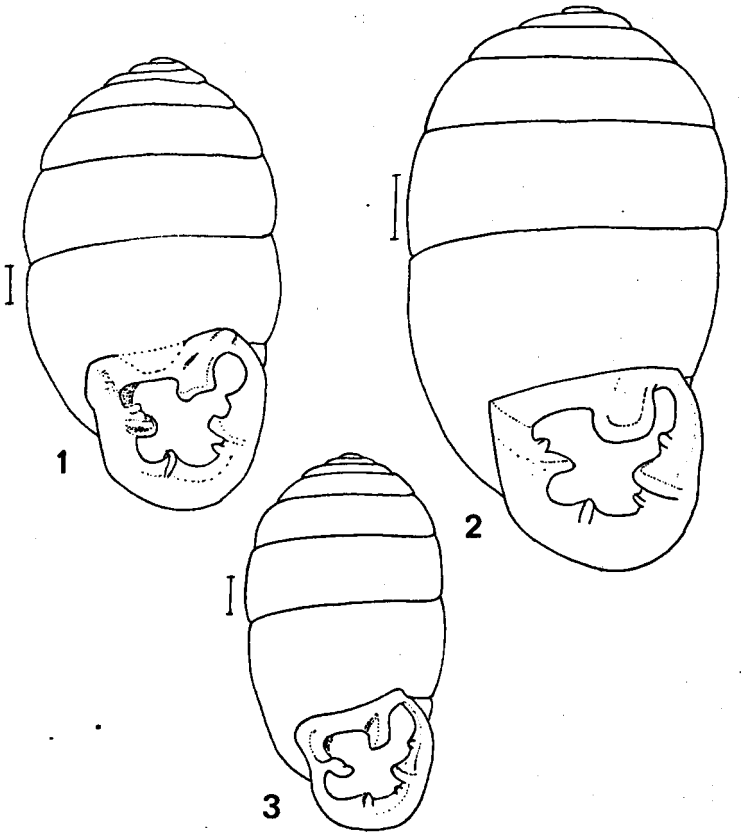
Gulella ugandensis (E.A. Smith, 1901) was described under *Ennea* from material collected in Kenya at the terminus of the Uganda Railway by Doherty between September 1900 and April 1901. At that time much of what is now western Kenya was included in Uganda, hence the specific epithet. Later some very similar shells were named *Ennea optata* by Preston (1911). These had been collected on Mt. Kenya at 6000-8000 ft; the same author later (Preston, 1913) also described a var. *obesa* and a var.*majuscula* based on material from the Kenangop, Aberdare Mts.

Gulella ugandensis s.l. is a common and characteristic component of the molluscan fauna of the Kenya highlands, easily recognised by the rather large, mostly smooth shell and, usually, a dental formula 1:3:1:1(2). As I have already pointed out (Verdcourt, 1962) there are difficulties concerning the circumscription of this species. There is variation in both sculpture and dentition and, in some lots, there are shells closely resembling *G. sellae* (Pollonera, 1906) which typically is more cylindrical, much more strongly striate and has the columellar process simple, not bifid, although the rest of the dentition is very similar to that of *G. ugandensis*. Comparing typical specimens of the two species one would not suspect there could ever be any difficulty in separating them. Examination of a range of material from many different localities shows that the difficulty is real enough. My attention was drawn again to the problem when Mr. Ioan Thomas of Oundle School, who accompanied a Brathay Exploration Group expedition to the Cherangani Hills in Kenya, collected a reasonable sample of a well-marked variant of this complex. Apart from this, Dr. W. Adam (1965) has recently described from four shells what he believes is a species distinct from *G. ugandensis* and it is also evident that he believes *G. optata* is yet another species. I doubt if he saw very much material. Little but the type material is available in the British Museum (Natural History)[1]

1 Abbrevations: BM = British Museum (Natural History), London; NM = National Museum, Nairobi, Kenya; TM = Musée Royal de l'Afrique Centrale, Tervuren, Belgium; UM = University of Moscow, U.S.S.R.

and other European museums. I therefore, through the kindness of the curator, borrowed from the National Museum, Nairobi, the material of the group, mainly comprising series of specimens I had presented to that museum between 1952 and 1964. Although still inadequate to solve the problem involved, it has thrown some light on the matter; the facts tabulated below should deter anyone from erecting new species in this group too hastily.

The columellar process consists of a lamella entering rather deeply which bears a nodule on its upper surface, the degree of



Figs. 1-3. *Gulella u. ugandensis* (E.A. Smith). 1. Details as for No. 1 in table. 2. Details as for No. 3 in table. 3. Details as for No. 5 in table. Scales 1 mm.

development of which naturally influences the bifid appearance of the process. It varies from very well developed to almost entirely absent.

In the collection from Nairobi there is also a specimen which according to the museum register was collected in the Chyulu Hills (locality 17 on map) by A.B. Percival; the worn shell was probably striate, measures 11.5 x 6 mm and has the formula 1:3:1:1(2). It is possible that the locality is correct but confirmation is needed. *Gulella moloensis* Adam was described from material collected by P. Basilewsky and N. Leleup at Molo on the Mau escarpment. The shell is slightly striate, measures 8.7-10.5 x 5.6-5.9 mm and has the usual formula 1:3:1:1(2), but the columellar process is by no means so

Tabulation of the variation of characters in the *Gulella ugandensis* complex

Number of locality on map	Material	Dental formula	Shell size in mm	Shell sculpture
1	Nyambeni Hills, Kirima, V. Hemming, P. Howland, & B. Verdcourt (NM)	1:3:1:1(2)	12 x 6.5-7	smooth and shining
2	Thiba R., H. Copley (NM 1265, 1267 & 1271)	1:3:1:1(2)	10.5 x 6	smooth and shining
3	Kikuyu Escarpment, Kerita Forest, 8000 ft., J. Newbould (NM)	1:3:1:1(2)	9 x 5	smooth and shining
4	W. Aberdares, 10.000 ft., R.M. Polhill 158 (NM)	1:3:1:1(2) (one of the 3 minute)	12.5 x 6	smooth and shining
5	Mau, Olokurto, on road to Narok, M. Gwynne (NM) (this shell agrees with *G. moloensis*)	1:3:1:1(2) (only one of the 3 is well developed; columellar process only just bifid)	10.5 x 5.3	more or less smooth, shining
6	Turi Forest D.C. Thomas (NM)	1:3(1+2minute): 1:1(2)	10 x 6	faintly striate

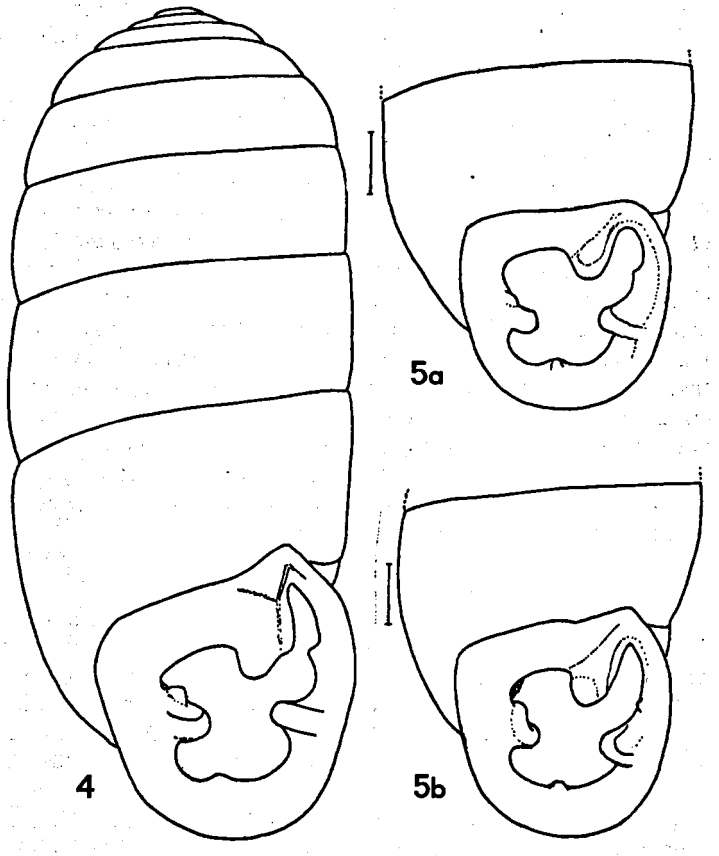
7	Kericho District Itare R., H. Copley (NM 2791)	1:3:1:1(2)	9-10 x 5.3	more or less striate
8	Kericho, C.W.P. Harries (NM)	1:3:1:1(2)	9-10 x 5-5.5	faintly striate
8	Kericho, H. Copley (NM)	1:3:1:1(2) 1:1:1:1(2)	9-11 x 5.3	more or less striate
9	Kabarnet, D. Powell (NM)	1:3:1:1(2)	12 x 7	finely striate
10	Kaptagat, W. Wilkinson (NM)	1:3:1:1(2)	10 x 5.5	more or less striate
11	Kerio Valley, 10-15 miles from Tot along Chebimet road, E.J. Brown (NM)	1:2:1:1(2)	9.5-10.5 x 5	striate
12	Cherangani Hills, Chepkotet, 11055 ft., I.F. Thomas, (BM, NM, TM, UM)	1:2:1:1(2) 1:T+1:1 or T:1 or 1(2T) (T=trace)	9.7-14 x 4.9-5.7	faintly striate
12	Cherangani Hills, J. Fowler (NM)	1:1+2T:1:1 (±2) (T=trace)	9.5-10 x 5-5.5	striate
13	Kapsabet, Nandi Forest, D. Powell (NM)	1:3:1:1(2)	12 x 6	distinctly striate
14	Kakamega Forest, D. Powell (NM)	1:3:1:1(2)	12 x 6	distinctly striate
14	Kakamega Forest, B. Verdcourt (NM)	1:3:1:1(2)	10.5-11 x 5.5-6	striate
15	Uganda, Mt. Elgon, Bugishu, 7-9000ft., G.D. Hale Carpenter (BM, NM)	1:3-4:1-2:1(2)	12.5-15 x 7.5	distinctly striate
15	Uganda, Mt. Elgon, 7-9000 ft., G.D. Hale Carpenter (BM, NM)	1:2:1:1(2)	12-13 x 6-6.5	smooth and shining

(all localities are in Kenya unless otherwise stated)

distinctly bilobed as it is in typical *G. ugandensis*. A good deal more material needs examining before the possibility that this is even a distinct race can be established. Certainly the only specimen I have seen from the Mau escarpment agrees exactly with the figures given by Adam. The Cherangani population previously mentioned appears to deserve racial recognition and is described below.

Gulella ugandensis cheranganiensis subsp. nov.

Differs from *G. ugandensis* s.s. in its more cylindrical form and dental formula 1:2:1:1(2) or 1:T+1:1 or T:1 or 1(2T) or



Figs. 4-5. *Gulella ugandensis cheranganiensis* subsp. nov. 4. Holotype. 5a-b Paratypes showing variation in dentition. Scales 1 mm.

1:T+1:1:1(2) where T means trace of a lobe or lobing. There is considerable variation in sculpture, some of the larger shells being glossy and practically smooth whereas the smaller ones are noticeably striate. The whole sample can be analysed as follows. Formula 1:2:1:1(2) – 14 x 5.5 mm (holotype); 12.5 x 5.7; 12.5 x 5.5 (two); 12 x 5.5 (two); 12 x 5; 11.5 x 5.5; 11 x 5; 10.5 x 5; 10 x 5.5; formula 1:T+1:1 or T:1 or 1(2T) – 11.2 x 4.9; 11 x 5; 10.3 x 5; 10.2 x 5.2; 9.7 x 5; formula 1:T+1:1:1(2) – 10.5 x 5.

Kenya: Cherangani Hills, Chepkotet, 11.055 ft., 12 August 1968, leg. I.F. Thomas (holotypes and paratypes in BM, paratypes in NM, TM, UM). Kerio Valley, 10-15 miles from Tot along Chebimet road, March 1963, leg. E.J. Brown (NM).

Uganda: Mt. Elgon, Bugishu, 7000-9000 ft. leg. G.D. Hale Carpenter (BM, NM) (this lot had been named by Connolly as *G. ugandensis* var. *obesa*).

The material collected on the Cherangani Hills by Fowler (unfortunately a more precise locality is not available) is intermediate between typical *G. ugandensis* and the above-discussed material.

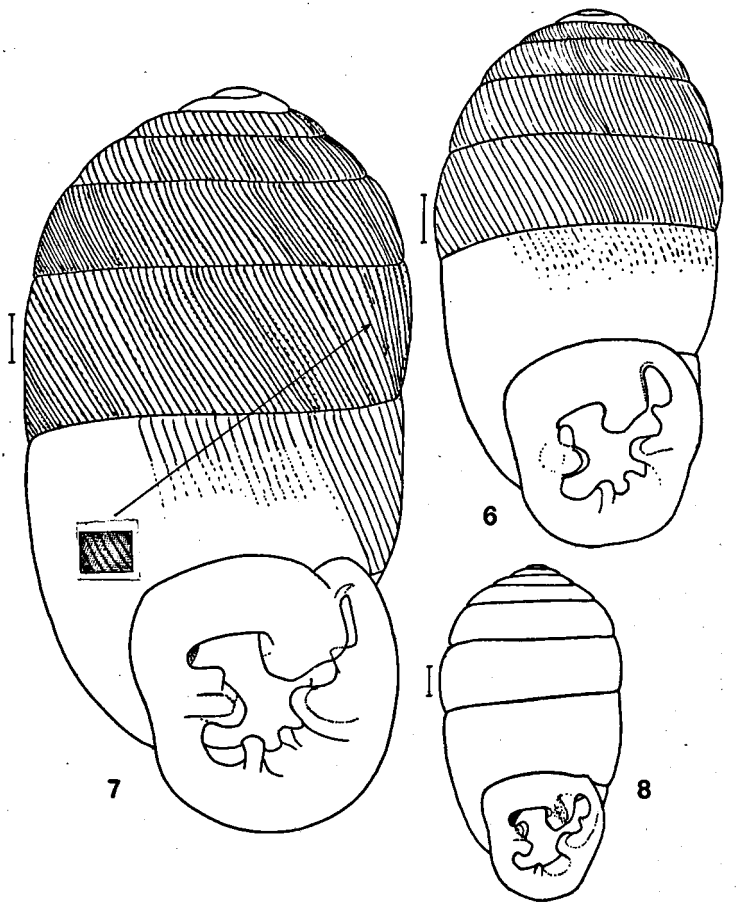
A further lot of material from Mt. Elgon labelled by Connolly as *G. ugandensis* forma *maxima* are sufficiently distinct to warrant a name. These were also collected by Hale Carpenter and, if the two Elgon lots alone are compared, it is difficult to avoid the conclusion that two distinct species are involved and it is certainly inviting criticism to suggest that two subspecies of one species occur on the same mountain at the same altitude. Bearing in mind the range of variation and the fact that nothing is known of the detailed habitats of the material involved, I am tentatively agreeing with Connolly in regarding it as a variant of *G. ugandensis.*

Gulella ugandensis elgonensis subsp. nov.

Differs from *G. ugandensis* s.s. in its larger size, 12.5-15 x 7.5 mm, and strong sculpture of transverse striae crossed by diagonal close fine scratch-like markings either in one direction or in two crossing each other. In a few specimens there is an additional denticle inset at the top of the outer part of the aperture and sometimes a trace of an extra nodule just to the right of the basal lamella.

Uganda: Mt. Elgon, Bugishu, 7000-9000 ft., leg. G.D. Hale Carpenter (holotype and paratypes in NM, paratypes in BM and MT).

As I have already pointed out, I consider that *G. sellae* is closely related to *G. ugandensis* despite the fact that they have been



Figs. 6-8. *Gulella ugandensis* (E.A. Smith). 6. Specimen verging to *G. sellae* (Poll.), details as for first entry of No. 14 in table. 7. *G. u. elgonensis* subsp. nov., holotype. 8. *G. u. cheranganiensis* subsp. nov., details as for second entry of No. 15 in table. Scales 1 mm.

assigned to different sections. The section *Molarella* Connolly, to which the second form is referred, is no more than a convenience for naming and therefore undoubtedley artificial. *G. sellae* was described from the Ruwenzori Massif, the original material having been collected by the Italian Ruwenzori expedition in the Mobuku Valley on the eastern slopes (Pollonera, 1906, 1909). Pilsbry (1919) later recorded the species from the western slopes in the Lamia Valley, both localities being at about 6500 ft. Between 1952 and 1964 I saw the following material which could be or indeed had been referred to *G. sellae*.

Uganda: Ruwenzori, Bwamba Pass, 6000 ft., G.D. Hale Carpenter (BM, NM). Entebbe, G.D. Hale Carpenter (BM, NM).

Kenya: Naivasha, G.D. Hale Carpenter (BM, NM). Mt. Marsabit, B. Verdcourt (NM) (locality 16 on the map).

The Naivasha record has never been confirmed and seems a little unlikely; the locality has been fairly well collected. The vicinity of the actual town and lake is unsuitable for this species and if the locality is accurate some forest area several miles to the east or west is indicated.

The *G. sellae-ugandensis* group does not appear to have migrated west beyond the Ruwenzori Massif, nor south into Tanzania and beyond, even though at the height of the pluvial periods forest cover was extensive in both directions; yet there is some evidence that the group is old since a small lot of fossil shells attributable to Miocene deposits from Gordon's Farm, Koru, Kenya, has been named *G. ugandensis* by Connolly but since the apertures are not preserved the determination is dubious. One would have expected a species which had existed for so long to be more widely distributed at the present time. Since the shells are of a fair size it seems unlikely that they have been overlooked in forest areas which have been worked over for molluscs. *G. sellae* is adapted to forests at lower attitudes than *G. ugandensis*, occurring between 3860 and 6200 ft. Its occurrence on Mt. Marsabit is of interest. According to Moreau (1966) even at the wettest time the isolated evergreen forest there, which at present is largely supported by mist, was scarcely less isolated than it is now. The map given by Carcasson (1964: 139, fig. 4) showing vegetation in Africa at the height of a pluvial period indicates a tongue of evergreen forest stretching up to near Mt. Marsabit; since the map is on a very small scale this may in fact extend only to Mt. Nyiro and Mt. Kulal. Even in the case of very isolated forest areas, the degree of isolation must have been reduced and methods of long range dispersal would have been correspondingly more efficient. The very

striate shells from Kakamega Forest (5500 ft.) have the facies of *G. sellae* and fit in with its distribution pattern, as do those from Kapsabet, despite the fact that the apertural dentition is that of *G. ugandensis*. Typical *G. ugandensis* occurs in higher areas up to just over 11.000 ft. and its present distribution probably results from dispersal that took place at the time of the last pluvial period; minor variants such as the subspecies *G. u. cheranganiensis* and *'Gulella moloensis'* have probably evolved due to isolation quite recently. The distribution of *G. sellae* may be the result of a more widespread

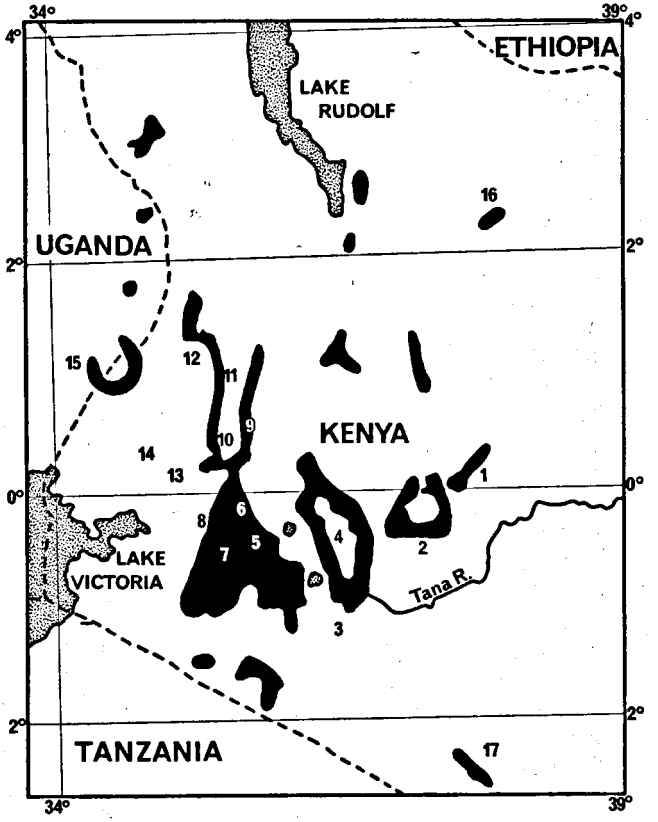


Fig. 9. Map showing localities mentioned in table with same numbering employed. Localities Nos. 16 and 17 are mentioned in the text. The black areas denote upland evergreen forest.

dispersal at an earlier date. I suspect that both species evolved from a *G. sellae*-like ancestor due to isolation and that the adaptation to different altitudes took place before widespread dispersal occurred. In certain areas the separation of the two species does not seem to be complete. A really detailed mapping of these two species throughout their ranges would probably throw light on the history of the forests in the area.

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