

# Notes on *Micractaeon*, a monotypic genus of African land snails (Gastropoda Pulmonata: Ferussaciidae?)

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Key words: Gastropoda; Pulmonata; Ferussaciidae; *Micractaeon*; Africa; Ghana; Cameroon; Zaïre; Kenya; Zambia; Malawi; taxonomy; distribution.

*Micractaeon kakamegaensis* Verdcourt, 1993 (type loc. Kenya, Kakamega Forest), is a synonym of *Pseudopeas koptawelilense* Germain, 1934 (type loc. Kenya, Mt. Elgon); the proper name is therefore *Micractaeon koptawelilensis* (Germain, 1934). New anatomical data are supplied, more or less confirming classification in the family Ferussaciidae. The shell is subject to some considerable variation in size, shape and sculpture. The species appears to be widely distributed in various types of forest in tropical Africa (Ghana, Cameroon, eastern and south-eastern Zaïre, Kenya, Malawi, and eastern Zambia); hypsometrical distribution is generally from c. 950 m to c. 2300 m, although in Ghana it has been collected at altitudes of between < 250 and c. 700 m.

## Introduction

When Verdcourt's description of *Micractaeon kakamegaensis* was published (1993), the senior author immediately realised (a) that the species is widely distributed in Malawi as shown by the collections in the Leiden Museum, and (b) that there was a professional drawing of a very similar shell with some manuscript notes among the papers of the late Dr. William Adam (1909-1988) in the Brussels Museum. Some time later, the junior author found kindred shells among his West African material.

The identity of the Malawi and Cameroon material was confirmed in May 1994 by the senior author by comparison with Verdcourt's paratype in the Natural History Museum, London. The shell figured in Adam's notes also proved to belong to this species. He had called his material '*Microglessula koptawelilensis*' (Germain, 1934). It appears that Adam's manuscript name *Microglessula* has no status; he was quite right in assigning Germain's species *Pseudopeas koptawelilense* to a new genus, but he failed to publish his findings, so that Verdcourt's genus stands. Therefore, the species should now be known as *Micractaeon koptawelilensis* (Germain, 1934). The new data below contribute to the knowledge of the species and thus, we think, warrant publication.

The following abbreviations have been used: BM for The Natural History Museum [formerly British Museum (Natural History)], London; IRSNB for Institut Royal des Sciences Naturelles de Belgique, Brussels; MNHN for Muséum National d'Histoire Naturelle, Paris; NMWC for National Museum of Wales, Cardiff, Wales, U.K.; RMNH for National Museum of Natural History (formerly Rijksmuseum van Natuurlijke Historie), Leiden; SMF for Forschungsinstitut und Museum Senckenberg, Frankfurt am Main; PNU for Parc National de l'Upemba and PNV for Parc National des Virungas (formerly Parc National Albert), both in Zaïre; HMM for H.M.

Meredith leg.; alc. for material kept in alcohol, l/d for the ratio length/major diameter of shells as an indication of the shape (l/d values have been calculated from micrometer readings and may therefore differ slightly from those calculated from the dimensions in mm). The width (major diameter) of the aperture has been measured to include the slightly developed columellar callus.

Assistance by museum staff is gratefully acknowledged: Dr J.L. Van Goethem (IRSNB), Dr P.B. Mordan & F. Naggs (BM), and Dr S. Tillier (& Th.E.J. Ripken) (MNHN). Fig. 1 represents the professional hand of the late Dr Adam's artist, Mrs J. van Melderden-Sergysels. The junior author is much indebted to Mr J.J. Wieringa (Department of Plant Taxonomy, Agricultural University, Wageningen) and Dr C. Jongkind (Accra, Ghana) for their sustained collecting efforts in western Africa. The manuscript was criticised and consequently improved by Ms H.M. Meredith (Newquay, U.K., formerly Zomba, Malawi), Dr & Mrs G.F. Mees (Busselton, W.Australia, formerly Leiden), and Dr B. Verdcourt (Royal Botanic Gardens, Kew, U.K.). Ms Meredith has also contributed most of the Malawi material. The authors owe a debt of gratitude to Mr J. Goud of the Mollusca section of the Leiden museum for the Scanning Electron Microscope (S.E.M.) photographs. Ongoing research on the land molluscs of Malawi by the senior author was continued under the aegis of Leiden University and subsidised by the Koninklijke Nederlandse Akademie van Wetenschappen (Amsterdam), WOTRO-NWO (Netherlands Foundation for the Advancement of Tropical Research, The Hague), and the Stichting tot Internationale Natuurbescherming (Van Tienhoven Stichting, Amsterdam).

### Systematic part

#### *Ferussaciidae (?)*

##### *Micractaeon* Verdcourt, 1993

*Micractaeon* Verdcourt, 1993: 82, type species by monotypy *Micractaeon kakamegaensis* Verdcourt, 1993.  
*Microglessula* Adam ined. (files in IRSNB, no manuscript description found), here published as a synonym, therefore not valid or available according to ICZN.

So far the only species recognized is the following.

##### *Micractaeon koptawelilensis* (Germain, 1934)

*Pseudopeas koptawelilensis* [recte *koptawelilense*] Germain, 1934b: 380, Kenya, "Mont Elgon: vallée de la Koptawelil, à 2.300 mètres d'altitude, au nord de la rivière Koitobbos" (holotype MNHN); Fischer-Piette, 1947: 95; Anonymous, 1952: 173, pl. VIII fig. 22 (diagnosis repeated verbatim, spelling "Koitoboss"<sup>1</sup>); Verdcourt, 1983: 218.

*Micractaeon kakamegaensis* Verdcourt, 1993: 82, figs. 1-12, Kenya, Kakamega Forest [holotype SMF 309788, paratypes SMF 309789/3, SMF 309790/4 (alc.), BM 1990124, P. Tattersfield colln. (dry and alc., to be deposited in NMWC)]; Tattersfield, 1994: 174.

*Microglessula koptawelilensis*, Adam ined. (files in IRSNB).

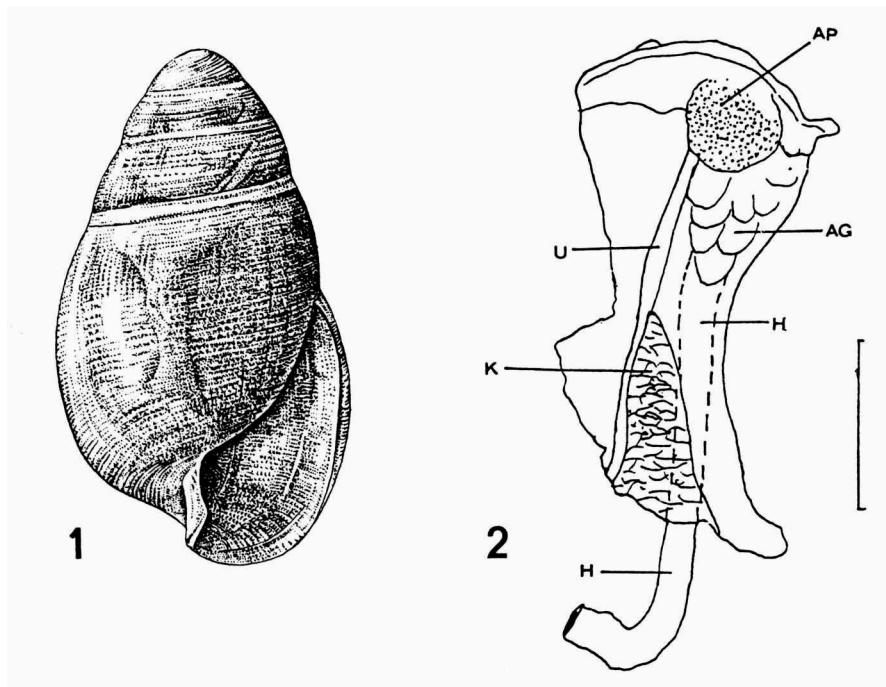
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<sup>1</sup>According to the gazetteer (Kenya, 1964) the correct spelling is "Koitobos". This spelling is also adhered to in the Atlas of Kenya (1970).

- Material.— GHANA, Ashanti Region, Tano Ofin Forest Reserve, 6°47'N 2°08'W, upland rain forest, 400-600 m, 30.xi.1994, leg. C. Jongkind; Eastern Region, Atewa Range Forest Reserve, between 6°08'-6°16'N and 0°30'-0°36'W, rain forest on plateau, 600-700 m, xi.1994, leg. C. Jongkind; Esen Epam Forest Reserve near Oda, 5°0'N 0°49'W, rainforest <250 m, iv.1994, leg. C. Jongkind (all A.J. de Winter colln. in RMNH).
- CAMEROON, South West Province, Buea, c. 4 km W. of Bokwango, 4°08'N 9°11'E, c. 1300-1340 m, 28.i.1994, leg. J.J. Wieringa; Mt. Etinde (small Mt. Cameroon), very steep slope in montane forest, 4°04'N 9°08'E, c. 1400 m, 29.i.1994, leg. J.J. Wieringa (all A.J. de Winter colln. in RMNH).
- ZAÏRE (all Zaire material identified by Adam, data ex Adam notes in IRSNB; specimens not checked by the present authors except for the figured shell and the PNV shells mentioned below), Shaba (formerly Katanga), PNU (all leg. W. Adam, Mission G.F. de Witte, 1947-1949, all IRSNB), locs. 512 (Kafwe, 1780 m, 17.iii.1948), 528 (Mukana, 1810 m, 18.iii.1948), 556 (Kamitunu, 1800 m, 19.iii.1948), 661 (Lubanga, 1750 m, 5.iv.1948), 697 (Bwalo, 1750 m, 9.iv.1948, alc.), 712 (Mukelengia, 1750 m, 12-13.iv.1948, alc.), 830 (Kabwe, 1320 m, 26.iv-25.v.1948, alc.), 842 (Luanana, 1495 m, 3.v.1948, alc.), 844 (affl. Musepagi R., 1500 m, 3.v.1948, alc.), 862/863 (Kabwe, 1320 m, 7.v.1948, alc.), 878 (Kabwe, 1400-1500 m, v.1948), 1114 (Fubidië, 1600 m, 13.vii.1948), 2051/2054 (Pelenge, 1250 m, 7-17.iii.1949, alc.), 2512/2514 (Mware, 950 m, 20.vi.1949); outside PNU, but close to its borders (all leg. W. Adam, Mission G.F. de Witte, 1947-1949, all IRSNB), locs. 488 (Dipidi, 1700 m, 15.iii.1948), 507 (Lufwa, 1700 m, 16.iii.1948, fig. 1), 1080 (Masombwe, 1120 m, 5-10.vii.1948), 1108 (Kenia, 1585 m, 12.vii.1948), 1440 (Kenia, 1585 m, 20-26.x.1948), 2139/2163 (Kenia, 1585 m, 24.iii.1949, alc.); PNV, loc. 432 (= N.16) (Ngamba/Semliki, route Beni-Kasindi, 900 m, iv.1953) (IRSNB); PNV, Ruwenzori, Kerere, between Mahungu (3300 m) and Kiondo (4300 m), in moss, ii. 1957 (IRSNB); PNV, Ruwenzori, between Kiondolire and Kalonge, 1750-2200 m, in moss on trees, ii.1957 (IRSNB, duplicates in RMNH; examined by senior author).
- KENYA, North Kavirondo Dist., Kakamega Forest, c. 2000 m (type locality of syn. *M. kakameagensis*, SMF, BM, Tattersfield colln. in NMWC) (Verdcourt, 1993); Trans Nzoia Dist., Mt. Elgon, valley of Koptawelil stream, 2300 m, 29.xii.1932, leg. Dr R. Jeannel (TYPE LOCALITY, holotype MNHNP<sup>2</sup>) (Germain, 1934b).
- MALAWI (fig. 18, all RMNH), Mulanje Dist., Phalombe Gorge, Mulanje, 1500 m, viii.1986, leg. J. Chapman; Lilongwe Dist., Dzalanyama Forest, 1600 m, 17.iii.1984, leg. Dr R.J. Dowsett; Rumphi Dist., Viphya Mts., Resthouse No. 1 (= Kasito Lodge, Chikangawa), riverine forest, c. 1650 m, 21.ix.1983, leg. HMM; Nkhata Bay Dist., S.Viphya Mts. (grid code WC 988109), riverine forest, c. 1300 m, 6.vi.1986, leg. HMM; Mzimba Dist., Kaningina Forest Reserve, c. 1300 m, 25.viii.1984, leg. Dr J.H. Seyani & H. Patel; Mzuzu, Lunyangwa Forest Reserve, c. 1250 m, 3.vi.1986, leg. HMM; Rumphi Dist., Nyika National Park, Kasyaula Forest, c. 1980 m, 6.iv.1981, leg. Dr B.J. Hargreaves; Nyika National Park, Zovo Chipolo Forest, c. 2200 m, 9.vi.1984, leg. HMM; ibidem, 22.ix.1986, leg. HMM (also alc.); Mafinga Mts., riverine forest between 1600 and 2200 m, ii.1982, leg. Dr R. Brummitt; Chitipa Dist., Misuku Hills, Mugesse Forest Reserve (HMM notes).
- ZAMBIA, Isoka Dist., Nyika National Park, Chowo Forest, c. 2180 m, i.1981, leg. Dr C.O. Dudley (RMNH); ibidem, 4-5.iv.1987, HMM (RMNH).

Description of shell (figs. 1, 3-16).— The description by Verdcourt (1993) is quite adequate and needs little emendation. Under low magnification, the surface pattern manifests itself as spiral sculpture (figs. 6-8); only under high magnification does it become clear that the spiral rows consist of spirally-arranged series of pits (figs. 9-16). The size, shape and arrangement of the pits is subject to a lot of variation. The variation on the surface of the individual shell is already considerable (figs. 3, 6, 9, 12; figs. 4, 7, 10, 13, 15; figs. 5, 8, 11, 14, 16), but there are also noticeable differences

<sup>2</sup>The single shell in the Paris museum must be the **holotype**. It is obvious that Germain had only the one shell at his disposal, because of the multiple measurements given for other species in his paper, whereas for this species, only single measurements are given.



Figs. 1-2. *Micractaeon koptawelilensis* (Germain). 1. Shell, Zaïre, PNU loc. 507c, size 2.0 × 1.2 mm (IRSNB), Mrs J. van Melderen-Sergysels del. 2. External view of part of the pallial organs, Malawi, Zovo Chipolo Forest, shell 1.6 mm long; A.J. de Winter del. Abbreviations: AP, anal pocket; AG, anal gland; H, hindgut; K, kidney; U, ureter. Scale 0.5 mm.

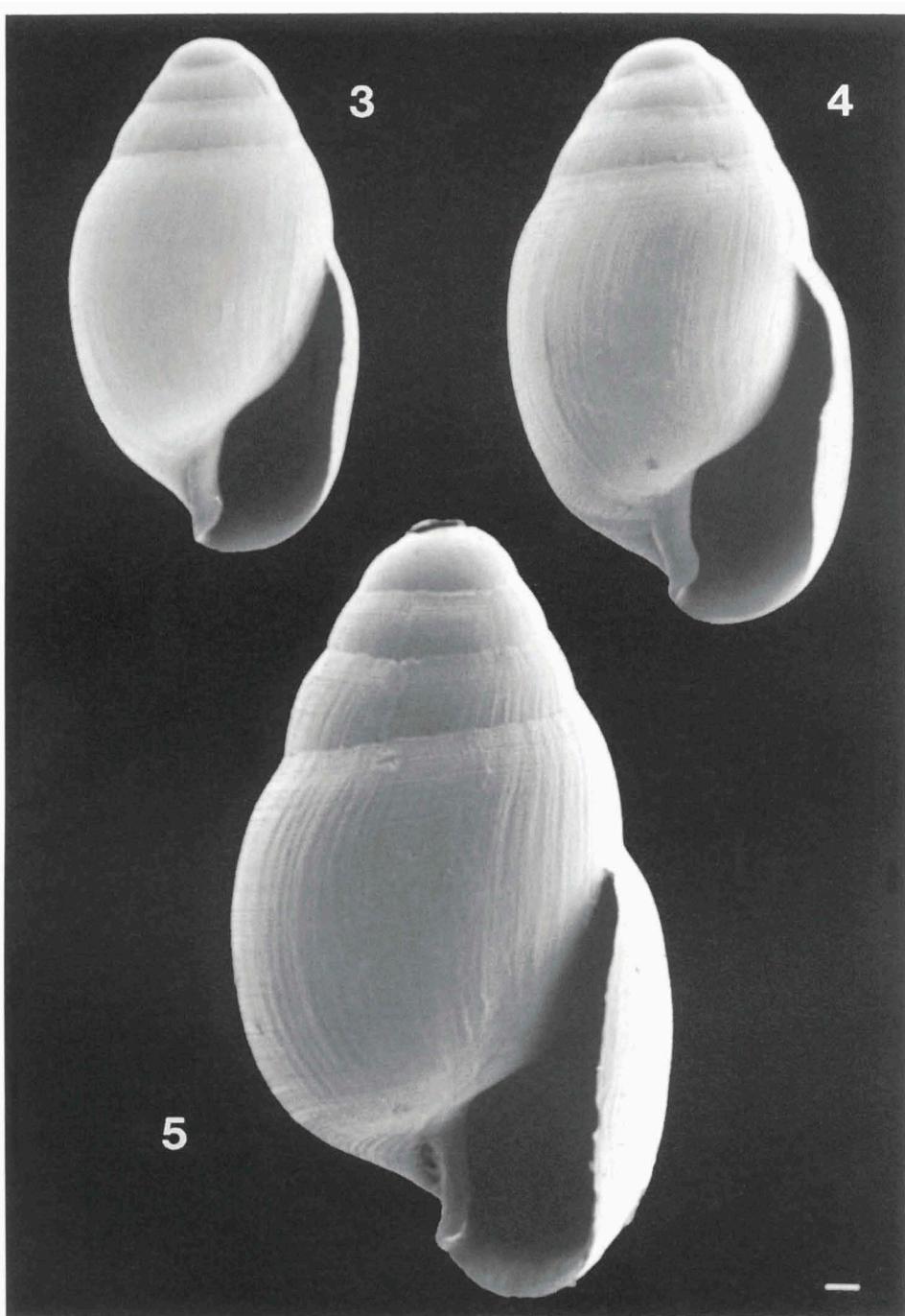
between shells of various widely separated populations (figs. 3-16 depict three shells from widely-distant localities in Ghana, Zaïre and Zambia respectively). The colour of fresh specimens is a pale chestnut brown, which probably soon disappears - empty shells are normally whitish semitransparent.

Measurements of shell (table 1): 1.1-2.2 × 0.7-1.3 mm, l/d 1.54-1.78, length of last whorl 0.9-1.6 mm, aperture height × width (major diameter) 0.7-1.2 × 0.3-0.7 mm, whorls (<3 to) 4<sup>1/4</sup>-6. See also table 2.

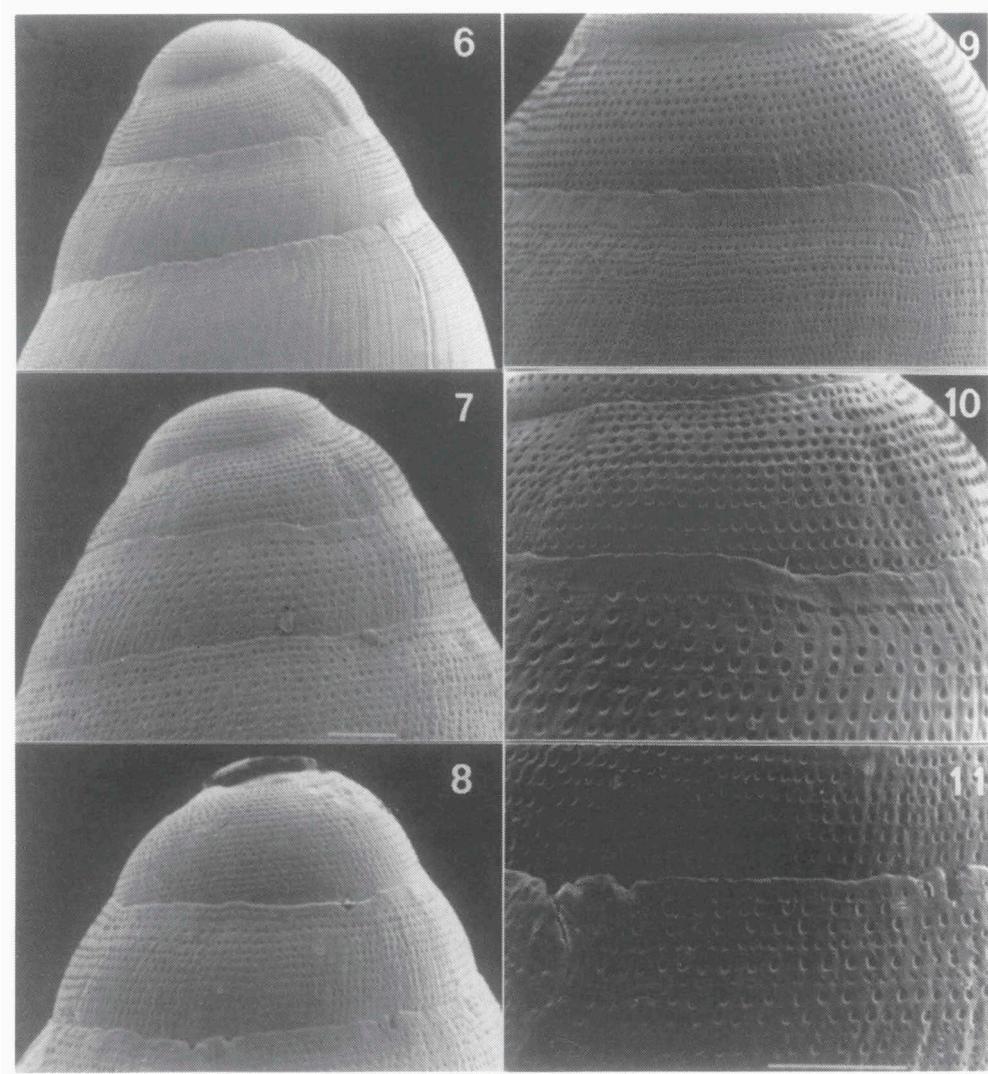
Anatomical data (fig. 2).— Verdcourt (1993) has already reported what anatomical details he could obtain. He gives external views of the animal (his figs. 4-5) and depicts the jaw (his fig. 6) and a part row of the radula (his fig. 7), the genitalia in some detail (his figs. 8-11), and, finally, part of the apical whorl with presumed ovo-testis (his fig. 12). His description on p. 82 gives further relevant data.

Only one specimen (shell height 1.6 mm; Malawi, Zovo Chipolo Forest) was available for dissection<sup>3</sup>. The animal was very much contracted and withdrawn into its shell. An attempt to remove the shell caused some damage to the pallial complex, notably the heart and basal part of the kidney. Therefore the pallial region could be insufficiently examined. However, two features of this region deserve mention: first-

<sup>3</sup>The Zaïre alcohol material (IRSNB) was not available for study.



Figs. 3-5. *Micractaeon koptawelicensis* (Germain), S.E.M. photographs of shells by J. Goud. 3. Ghana, Esen Epam Forest Reserve, 1.5 × 0.9 mm (RMNH). 4. Zaïre, PNV, 1.7 × 1.1 mm (IRSNB). 5. Zambia, Chowo Forest, 2.2 × 1.3 mm (RMNH). Scale 100 µm; all figures on the same scale.

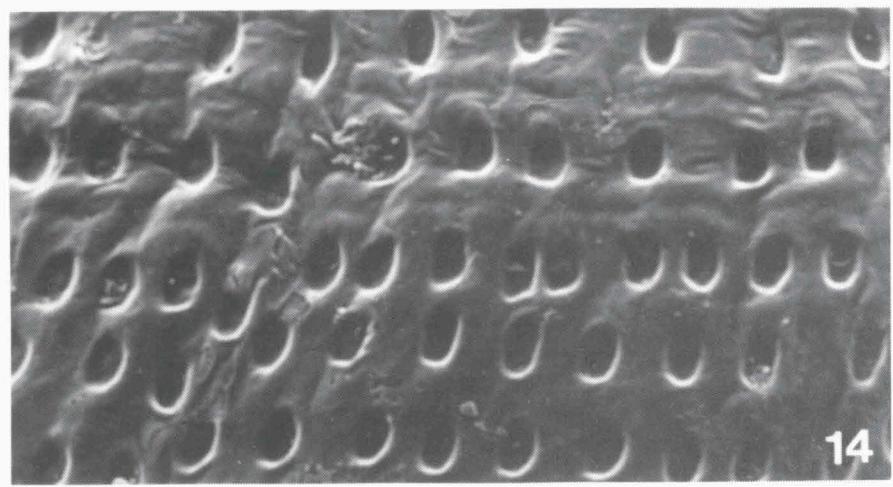
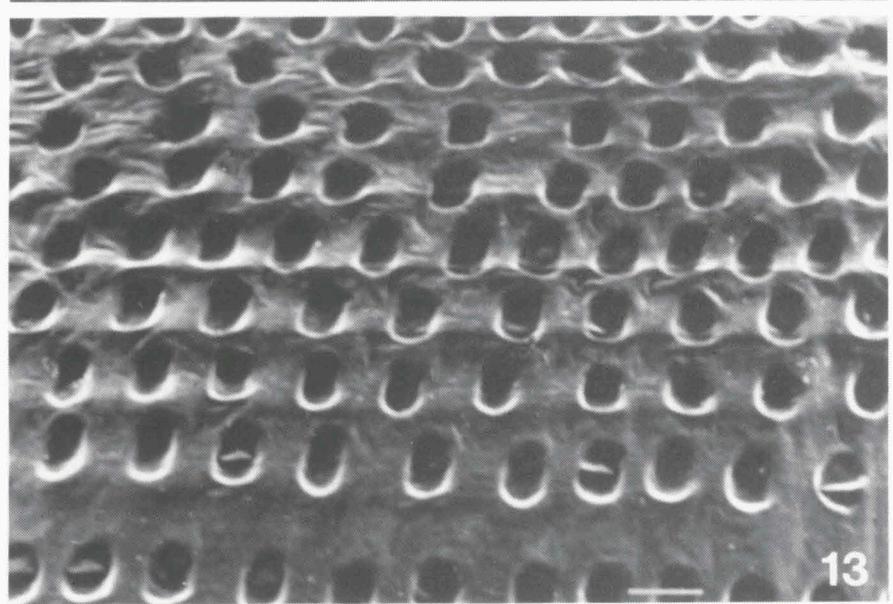
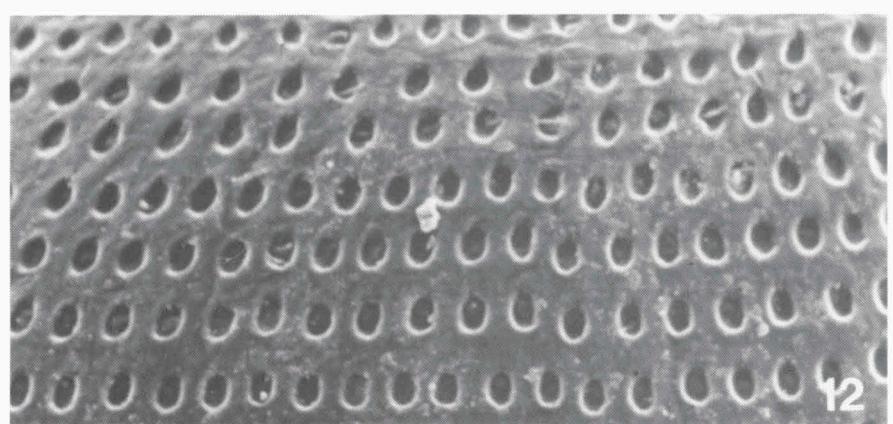


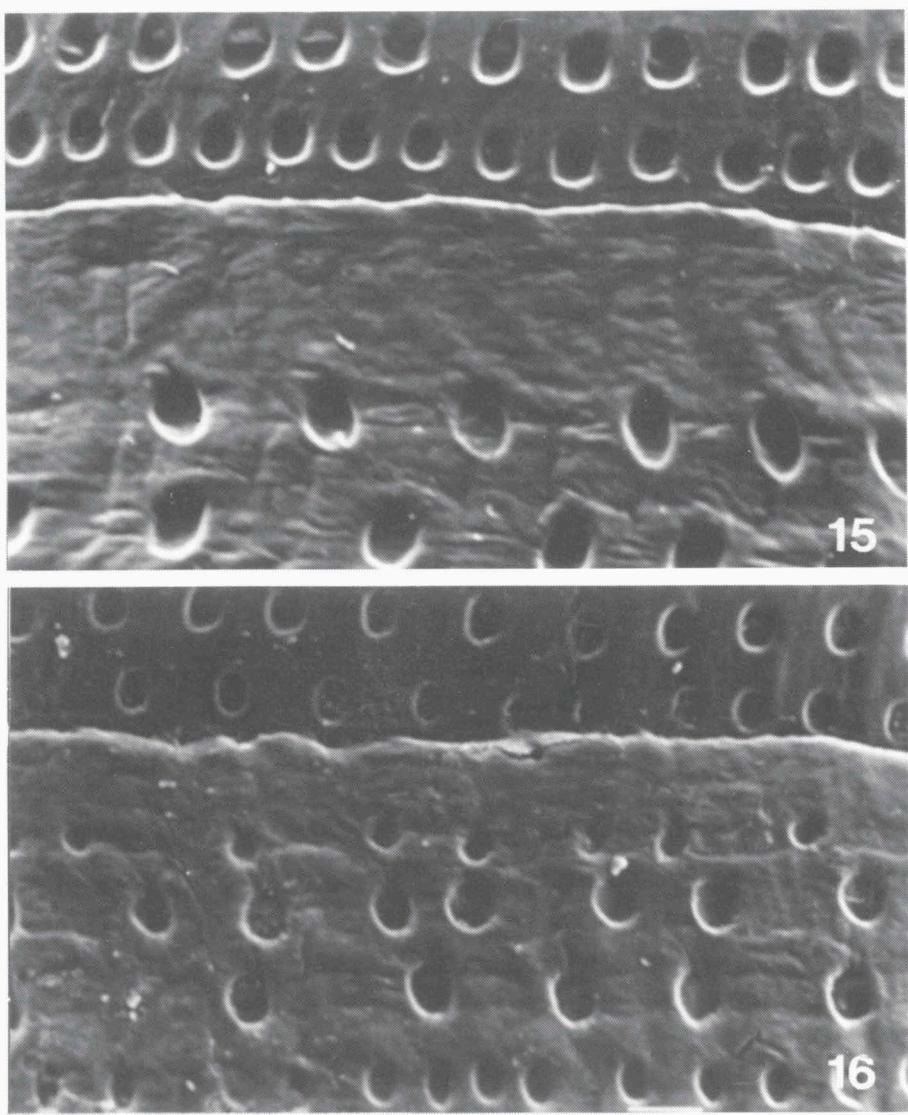
Figs. 6-11. *Micractaeon koptawelilensis* (Germain), S.E.M. photographs by J. Goud. 6-8. Apices of shells depicted in figs. 3-5. 9-11. Detailed photographs of upper whorls of the same shells (figs. 6, 9: Ghana; figs. 7, 10: Zaire; figs. 8, 11: Zambia). Scales 100 µm; figs. 6-8 and 9-11 on the same scale respectively.

ly the presence of a very conspicuous anal gland (termed "pallial gland" in Tillier, 1989: 182, fig. 358) with very large cells (best seen in external view in fig. 2), and, secondly, the ureter does not seem to reflect, but runs along the front margin of the kidney before extending towards the mantle edge. The animal dissected proved to be juvenile, with no recognizably developed genitalia. The radula agrees with

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Figs. 12-14. *Micractaeon koptawelilensis* (Germain), details of pit sculpture of the shells depicted in figs. 3-5 (fig. 12: Ghana; fig. 13: Zaire; fig. 14: Zambia), S.E.M. photographs by J. Goud. Scale 10 µm; all figures on the same scale.





Figs. 15-16. *Micractaeon koptawelilensis* (Germain), S.E.M. photographs by J. Goud. Details of sculpture in the region of the suture of the shells depicted in figs. 4-5 (fig. 15: Zaïre; fig. 16: Zambia). Scale 10  $\mu\text{m}$ ; both figures on the same scale.

Verdcourt's data; the jaw could not be studied.

Distribution (fig. 17).— Ghana, (W.) Cameroon, (E. and SE.) Zaïre, (W.) Kenya, Malawi, (NE.) Zambia.

As shown on the map (fig. 17), there are considerable gaps in the known distribution. Most likely this is due to insufficient sampling of a number of countries (e.g. Tanzania) and also to faulty collecting methods - these minute snails are normally only obtained by meticulously searching through samples of leaf litter from the for-

Table 1. Measurements of (adult?) shells of *Micractaeon koptawelilensis* (Germain) from throughout its range. The following additional abbreviations are used: C = Cameroon, F = Forest (Reserve), G = Ghana, K = Kenya, K.-K. = between Kiondolire and Kalonge (PNV), M = Malawi, Zm = Zambia, Zr = Zaïre. Notes: 1, holotype; 2, holotype of the synonym *M. kakamegaensis* (data ex Verdcourt, 1993); 3, see figs. 3, 6, 9, 12; 4, see figs. 4, 7, 10, 13, 15; 5, see fig. 1; 6, see figs. 5, 8, 11, 14, 16.

locality	length × maj.diam.	l/d	length last whorl	aperture length × maj.diam.	number of whorls
Atewa Range F (G)	1.1 × 0.7 mm	1.57	0.9 mm	0.7 × 0.3 mm	<3½
Mt. Etinde (C)	1.1 × 0.7 mm	1.64	0.9 mm	0.7 × 0.4 mm	<5
Tano Ofin F (G)	1.2 × 0.7 mm	1.60	1.0 mm	0.8 × 0.3 mm	<3
Kasyaula F (M)	1.2 × 0.8 mm	1.54	—	—	—
Mt. Etinde (C)	1.3 × 0.8 mm	1.65	1.2 mm	0.9 × 0.4 mm	5
Atewa Range F (G)	1.4 × 0.8 mm	1.70	1.2 mm	0.8 × 0.4 mm	3½
Buea (C)	1.4 × 0.8 mm	1.70	1.1 mm	0.9 × 0.4 mm	5
PNV K.-K. (Zr)	1.4 × 0.9 mm	1.63	1.2 mm	0.9 × 0.4 mm	4½
Esen Epam F (G)³	1.5 × 0.9 mm	1.75	1.2 mm	0.9 × 0.5 mm	<5
Esen Epam F (G)	1.6 × 0.9 mm	1.73	1.2 mm	0.9 × 0.5 mm	5
Zovo Chipolo F (M)	1.6 × 0.9 mm	1.73	1.2 mm	0.9 × 0.6 mm	4¾
Chowo F (Zm)	1.6 × 0.9 mm	1.71	1.3 mm	1.0 × 0.5 mm	>5
PNV K.-K. (Zr)	1.6 × 1.0 mm	1.63	1.2 mm	1.0 × 0.6 mm	<5
PNV K.-K. (Zr)	1.6 × 1.0 mm	1.61	1.2 mm	1.0 × 0.6 mm	5
PNV K.-K. (Zr)	1.7 × 1.1 mm	1.62	1.3 mm	1.0 × 0.6 mm	<5
PNV K.-K. (Zr)⁴	1.7 × 1.1 mm	1.62	1.3 mm	1.0 × 0.6 mm	5
PNV 432 (Zr)	1.8 × 1.1 mm	1.55	1.4 mm	1.1 × 0.6 mm	4¼
Mafinga Mts. (M)	1.8 × 1.0 mm	—	—	—	5¼
Chowo F (Zm)	1.8 × 1.0 mm	1.76	1.4 mm	1.1 × - mm	>5
Chowo F (Zm)	1.8 × 1.1 mm	1.71	1.4 mm	1.1 × 0.6 mm	>5
Chowo F (Zm)	1.8 × 1.1 mm	1.66	1.3 mm	1.1 × 0.6 mm	5¼
Chowo F (Zm)	1.8 × 1.1 mm	1.66	1.4 mm	1.1 × 0.6 mm	5¼
Zovo Chipolo F (M)	1.8 × 1.2 mm	1.57	1.4 mm	1.0 × 0.7 mm	4¾
Chowo F (Zm)	1.8 × 1.1 mm	1.71	1.4 mm	1.1 × 0.6 mm	>5
Chowo F (Zm)	1.9 × 1.1 mm	1.71	1.4 mm	1.1 × 0.6 mm	5¼
Lunyangwa F (M)	1.9 × 1.1 mm	1.77	1.4 mm	1.0 × - mm	>5
S.Viphya (M)	2.0 × 1.1 mm	1.75	1.4 mm	1.0 × 0.6 mm	5¾
Kanininga F (M)	2.0 × 1.2 mm	1.72	1.5 mm	1.1 × 0.6 mm	5¾
Chowo F (Zm)	2.0 × 1.1 mm	1.78	1.3 mm	1.1 × 0.6 mm	<6
Dzalanyama F (M)	2.0 × 1.1 mm	1.78	1.5 mm	1.1 × 0.6 mm	5½
Mt. Elgon (K)¹	2.0 × 1.1 mm	1.78	1.5 mm	1.1 × 0.6 mm	5¾
Phalombe Gorge (M)	2.0 × 1.2 mm	1.73	1.4 mm	1.1 × 0.6 mm	5¾
PNU 507c (Zr)⁵	2.0 × 1.2 mm	1.67	1.4 mm	1.2 × 0.7 mm	5
Chowo F (Zm)	2.0 × 1.2 mm	1.65	1.5 mm	1.1 × 0.6 mm	5½
Kakamega F (K)²	2.0 × 1.2 mm	1.67	1.5 mm	1.1 × 0.5 mm	6
Chowo F (Zm)	2.1 × 1.2 mm	1.72	1.5 mm	1.0 × 0.6 mm	5¾
Chowo F (Zm)⁶	2.2 × 1.3 mm	1.73	1.6 mm	1.2 × 0.6 mm	6

Table 2. Measurements of shells of *Micractaeon koptawilensis* (Germain) in various areas throughout Central Africa (data compiled from table 1). Abbreviations: Cam. = Cameroon, Mal.-Zamb. = Malawi-Zambia.

country	length × maj.diam.	1/d	length last whorl	n
Ghana-Cam.	1.1-1.6 × 0.7-0.8 mm	1.57-1.75	0.9-1.2 mm	8
E-NE. Zaïre	1.4-2.0 × 10.9-1.2 mm	1.55-1.67	1.2-1.4 mm	7
W. Kenya	2.0 × 1.1-1.2 mm	1.67-1.78	1.5 mm	2
Mal.-Zamb.	1.2-2.2 × 0.8-1.3 mm	1.54-1.78	1.2-1.6 mm	20

est floor. The extensive distribution probably dates from the time that the forest belt covered a much larger area in Africa than today (see e.g., Kingdon, 1990; Lovett, 1993; Sayer, Harcourt & Collins, 1992).

**Ecology.**— The following are published notes on the ecology: "in leaf litter in evergreen forest", and "on the undersides of dead logs" (Verdcourt, 1993: 82); "Five small litter-dwelling species, (*Micractaeon kakamegaensis* . . .) are significantly less frequent in plantation than in undisturbed, mature, indigenous forest; these may be taken, tentatively, to be indicators of established, indigenous forest." (Tattersfield, 1994: 174). Some Zaïre specimens are labelled as from 'moss' or 'moss on trees'. All other material was obtained from leaf litter. For Cameroon, one label reads 'montane forest'. In Zaïre this is detailed as 'bois marécageux' and 'galerie forestière', in Malawi as 'evergreen forest', 'riverine forest' and 'submontane forest'. The hypsometrical distribution covers a wide range, viz. from less than 250 m to as high as 2300 m. It is apparent that in Central and eastern Africa *M. koptawilensis* is a forest-dweller in the uplands. Only in Zaïre has it been found under 1000 m, and there in only two of the 19 localities (incidentally, in the area where the species is found in Zaïre, there is hardly any land under 1000 m). The detailed distribution is as follows: Ghana <250-700 m, Cameroon 1300-1400 m, Kenya 2000-2300 m, Zaïre 900-1810 m, Zambia 2180 m, Malawi 1250-2200 m.

**Etymology.**— In Germain's papers (1934a-b) on the land snails of the Omo expedition, two species were named after their type locality, viz., *Trachycystis koptaweliensis* (now *Elgonocyclus koptaweliensis*) and *Pseudopeas koptawelense*. Attention is drawn to the different spellings. The type locality of the latter is stated to be the valley of the Koptawelil stream. This name is not featured in the Kenya (1964) gazetteer or the Atlas of Kenya (1970). However, there is a map in the book by Chappuis (1935) on the Omo expedition, which clearly shows the name of the stream to be Koptawelil. Therefore the epithet of the species under discussion is indeed correctly spelled *koptawelensis*. Incidentally, the type locality of *Elgonocyclus koptaweliensis* (Germain, 1934a: 269) is "Vallée de la Koptaweli, . . .", but otherwise almost exactly the same wording is used. The correct epithet for the present species is *koptawelensis* because the gender of *Micractaeon* is masculine [vide Verdcourt, 1993: 82, and IZN, 1985, article 30(a)].

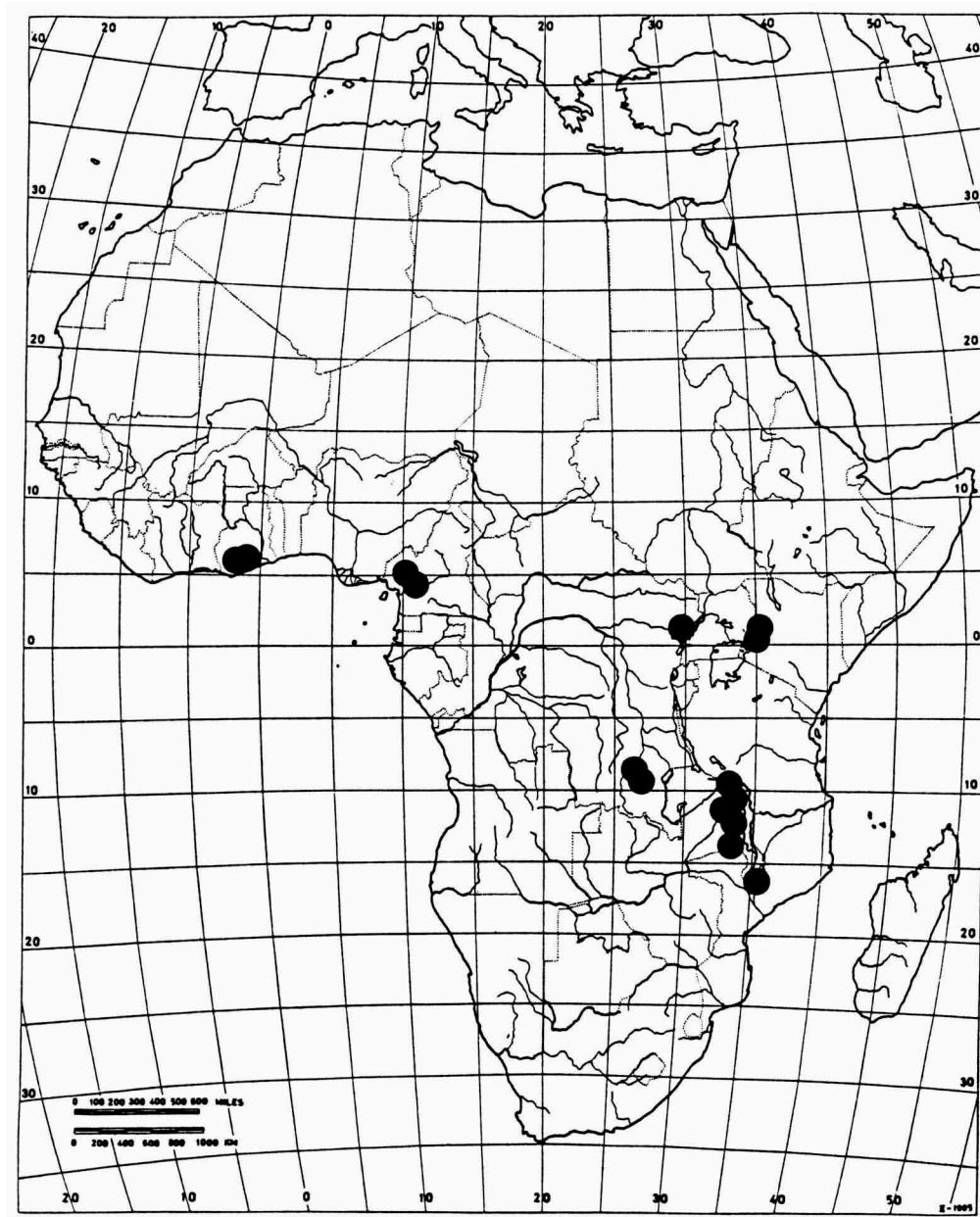


Fig. 17. General distribution of *Micractaeon koptawelensis* (Germain).

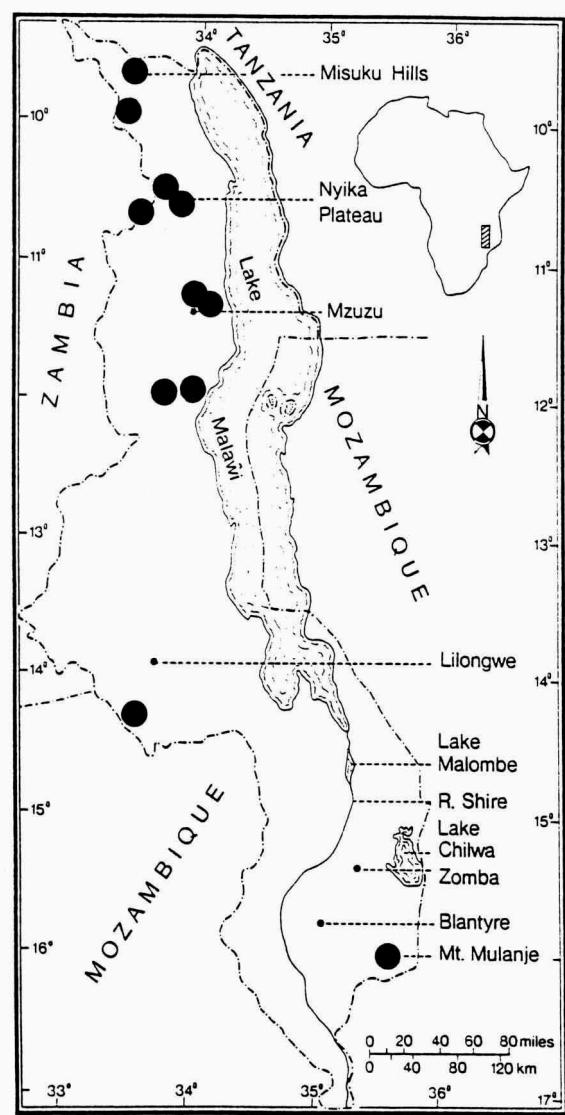


Fig. 18. Distribution of *Micractaeon koptawelilensis* (Germain) in Malawi/Zambia.

Notes.—The shell measurements shown above seem to be subject to some considerable variation. A warning as regards the drawing of conclusions from dimensions should be sounded here, because of the limited number of specimens measured: Ghana (5), Cameroon (3), Zaïre (7), Kenya (2), Zambia (11), and Malawi (9). For various reasons, the whorls are difficult to count with confidence. The sutures are shallow and sometimes the apex is somewhat corroded. Another difficulty is to decide which shells are really adult; in every sample, the largest specimens have been measured, but also some smaller ones. Shells which are obviously juvenile have not been recorded. Adult shells cannot be properly defined as such; there is no really

adult character such as a reflected labrum. This makes comparison difficult and therefore uncertain (table 2); the three Cameroon shells may well be juveniles or sub-adults. There is only one series, viz. one of the Chowo Forest collections (Zambia, leg. HMM, RMNH). This contains 4 juv. shells (<1.2 mm long), 3 subadult shells (1.2-  
<1.6 mm) and 10 shells which perhaps may be regarded as adult (1.6-2.2 mm). However, some of these may be sub-adult, because the 1.6 mm long dissected specimen from the Zovo Chipolo Forest proved to be immature. An additional Chowo shell (possibly from another microlocality, leg. Dudley, RMNH) agrees with the series of adult shells in all respects. Thus, eleven of the twenty (probably) adult shells available from Malawi/Zambia are from the Chowo Forest.

Another question to be addressed is, whether we are dealing with one or more than one species. Preliminary and cautious conclusions to be drawn from table 2 are that West African specimens are comparatively small and that material from Zaïre, Kenya and Malawi-Zambia is all more or less similar. Differences between shells of samples from widely-distant localities are to be expected. As far as can be judged from the material studied, there is no pattern in the variation in the surface sculpture. *M. koptawelilensis* is a small animal, the individuals probably never moving far from their place of birth, covering perhaps only one square metre (or less?) during their lifetimes. Of course, this has not been proven and is pure conjecture. Reasonable similarity of shells over a large range, variation in surface sculpture in the individual shell, and lack of comparative anatomical data has led to the tentative conclusion that for the time being the taxon *M. koptawelilensis* may be considered to be a single, widely-distributed species.

Verdcourt (1993) assigned the genus *Micractaeon* to the Ferussaciidae, but in view of the insufficient anatomical data, especially with respect to the pallial region, he modestly termed this "guesswork" (p. 83). The few additional data resulting from the above dissection strongly suggest he was correct. The presence of a conspicuous anal gland appears to be only known in the genera *Ferussacia* Risso, 1826 (Watson, 1928; Wächtler, 1935), *Cecilioides* Féruccac, 1814 (Watson, 1928; Wächtler, 1929), and *Connollya* Odhner, 1932 (Odhner, 1932). This has been claimed to be one of the characters that separate the Ferussaciidae from the Subulinidae (Watson, 1928), the latter family also being a potential candidate to accommodate *Micractaeon* because of its truncate columella. Although only part of the kidney could be studied, the position of the ureter described above suggests that the kidney is heterurethrous, as is the case in ferussaciid genera mentioned above, but not in the Subulinidae.

At present there are only four Afrotropical ferussaciid genera known: *Cecilioides*, *Geostilia* Crosse, 1867, *Connollya*, and *Micractaeon*. The last-mentioned genus, however, deviates strongly in shell characters from the others, especially in its peculiar sculpture. The jaw as shown by Verdcourt (1993) is also aberrant for this family. For want of a better suggestion *Micractaeon* is retained in the Ferussaciidae, at least for the time being.

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