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SOME STREPTAXIDAE (MOLLUSCA) FROM WEST AND SOUTHERN AFRICA WITH THE DESCRIPTION OF A NEW SPECIES OF GULELLA

by

A. C. VAN BRUGGEN

Department of Systematic Zoology of the University, c/o Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands

With 7 text-figures

Studies on representatives of the pulmonate gastropod family Streptaxidae in Africa have resulted in the data presented below. An initially unidentifiable West African streptaxid not represented in major African land mollusc collections such as in the museums at Berlin, London and Tervuren, and within a few years followed by a second shell of the same species, led to a revision of *Excisa*, a subgenus of *Ptychotrema* L. Pfeiffer, 1853. The second part of the present paper features the description of a new species of *Gulella* from Rhodesia.

The following abbreviations have been used: alc. for alcohol, l/d for the ratio length/major diameter of shells (this gives an indication of the shape of the shell; figures for l/d have been calculated from micrometer readings, so that these figures may not always agree with those calculated from the measurements in mm), BM for British Museum (Natural History) (London), IRSNB for Institut Royal des Sciences Naturelles de Belgique (Brussels), NM for Natal Museum (Pietermaritzburg, South Africa), PM for Muséum National d'Histoire Naturelle (Paris), RMNH for Rijksmuseum van Natuurlijke Historie (Leiden), SM for Naturhistoriska Riksmuseet (Stockholm), SMF for Naturmuseum Senckenberg (Frankfurt am Main), and TM for Musée Royal de l'Afrique Centrale (Tervuren, Belgium).

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I. A REVISION OF EXCISA, A SUBGENUS OF PTYCHOTREMA

Excisa d'Ailly, 1896

Excisa d'Ailly, 1896: 20 "Sectio Excisa n. sectio gen. Enneae."; Germain, 1916: 194; Pilsbry, 1919: 198 (as synonym of *Ptychotrema*), 200 (in key as section of subgenus *Ptychotrema*), 201 ("*P. boangolense*" designated type species); Thiele, 1931: 734 (as section of *Ptychotrema, P. boangolense* mentioned as an example); Zilch, 1960 (1959-1960): 576 (as subgenus of *Ptychotrema*).

Type species (designated by Pilsbry, 1919: 201): *Ennea Boangolensis* d'Ailly, 1896.

Diagnosis. — Shell clavate, tapering towards the apex, rimate, costulate, creamy white or transparent when fresh. Spire produced, sides somewhat convex, tapering from penultimate whorl to a blunt, somewhat acuminate apex. Whorls 6¾ to 9, slightly convex, sculptured with regular, somewhat curved, rather prominent costulae which are slightly oblique to the right in frontal view; interstices wider than costulae, somewhat granulate. Sutures impressed, subcrenellate. Apical whorls granulate and smooth. Aperture almost square, peristome reflected, white and glossy; sinulus present, narrow and long, forming a pleurotomoid sinus almost parallel to the suture. Dentition six- to eight-fold, consisting of an uninterrupted angular lamella, three to four palatal lamellae, a denticle to the left of the base (sometimes absent), and a columellar lamella, which may bear an additional supracolumellar denticle. Juvenile shell with apertural dentition. Measurements of shell: 5.1-10.7 × 2.0-3.7 mm, l/d 2.39-2.90. Radula and genitalia as for the genus *Ptychotrema*.

Attention has to be drawn to the direction of the costulae on the shell. In most costulate streptaxids when seen in front view the direction is towards the left or the riblets are placed perpendicularly. Checking on numerous published figures and plentiful material has revealed that the costulation of *Excisa* is rather unusual in the family. D'Ailly (1896: 20) has already emphasized this in his diagnosis of *Excisa*, looking at the ribs from the apex, thus considering them to run to the left: "anfr. .... costis *oblique ad sinistram abeuntibus ornati*;" (italics by d'Ailly).

The most characteristic feature is the pleurotomoid sinus (a term introduced by Pilsbry, 1919: 200, in key) at the apex of the aperture (fig. 4). This character combined with the shape of the shell, the unusual costulation, the uninterrupted angular lamella, the number and location of the other dental processes, and the armed aperture of juvenile shells is sufficient to clearly define the subgenus *Excisa*. Obviously it occupies a somewhat isolated position among the rather heterogeneous components of the genus *Ptychotrema* L. Pfeiffer, 1853 (see Zilch, 1960: 575).

The two species may be distinguished as follows:

Aperture with three palatal lamellae, a denticle to the left of the base, columellar lamella a simpe inrunning ridge . . . . *P.* (*E.*) *duseni*
Aperture with four palatal lamellae, denticle on the base hidden under columellar lamella, frequently poorly developed, columellar lamella with an additional supracolumellar process . . . . *P.* (*E.*) *boangolense*

Ptychotrema (Excisa) boangolense (d'Ailly, 1896) (figs. 1, 2, 5)

Ennea Boangolensis d'Ailly, 1896: 21, pl. 1 figs. 26, 27; Boettger, 1905: 161 (*boangolensis*); Germain, 1911: 233, footnote (*boangoleusis*, sic!); Germain, 1916: 155, 161, 166, 194, pl. 9 figs. 2, 3 (*boangolensis*); Pilsbry, 1919: 198 (*boangolensis*).

Ptychotrema boangolense, Pilsbry, 1919: 201; Spence, 1928: 212 (*boangolensis*); Thiele, 1931: 734; Ortiz de Zárate, 1956: 90, 103, fig. 15 (*boangolensis*); Zilch, 1960: 576, fig. 2018; Zilch, 1961: 110.

The species (fig. 1) is sufficiently characterized by the subgeneric description combined with the key characters discussed above. The four palatal lamellae are well-marked, the upper forming a suprapalatal tooth at the end; the second lamella may do the same. The outside impressions of the palatal ridges are rather weak. The basal denticle of this species is situated far to the left and in front view is hidden by the columellar lamella; also it is not very well developed, being a mere swelling in the Congo specimen (IRSNB) and absent in the shell from Kitta (SM). The columellar lamella is an inrunning ridge, above which there is a well-developed dental process.

The adult shell from the Congo is accompanied by a juvenile of 4.1 × 2.0 mm, aperture 1.6 × 1.1 mm, last whorl 2.4 mm, with 6 whorls (fig. 2). The dentition of this specimen is eight-fold, consisting of an angular lamella above which there are two supra-angular denticles, three palatal folds, and a simple inrunning columellar lamella under which a mere swelling may be observed. This is quite different from the pattern shown by the adult shell; it is to be expected that the two supra-angular processes will be resolved when growth proceeds. Ortiz de Zárate (1956) has already drawn attention to the very distinct juvenile apertural dentition, being aberrant to such a degree that juveniles seem to belong to an altogether different species.

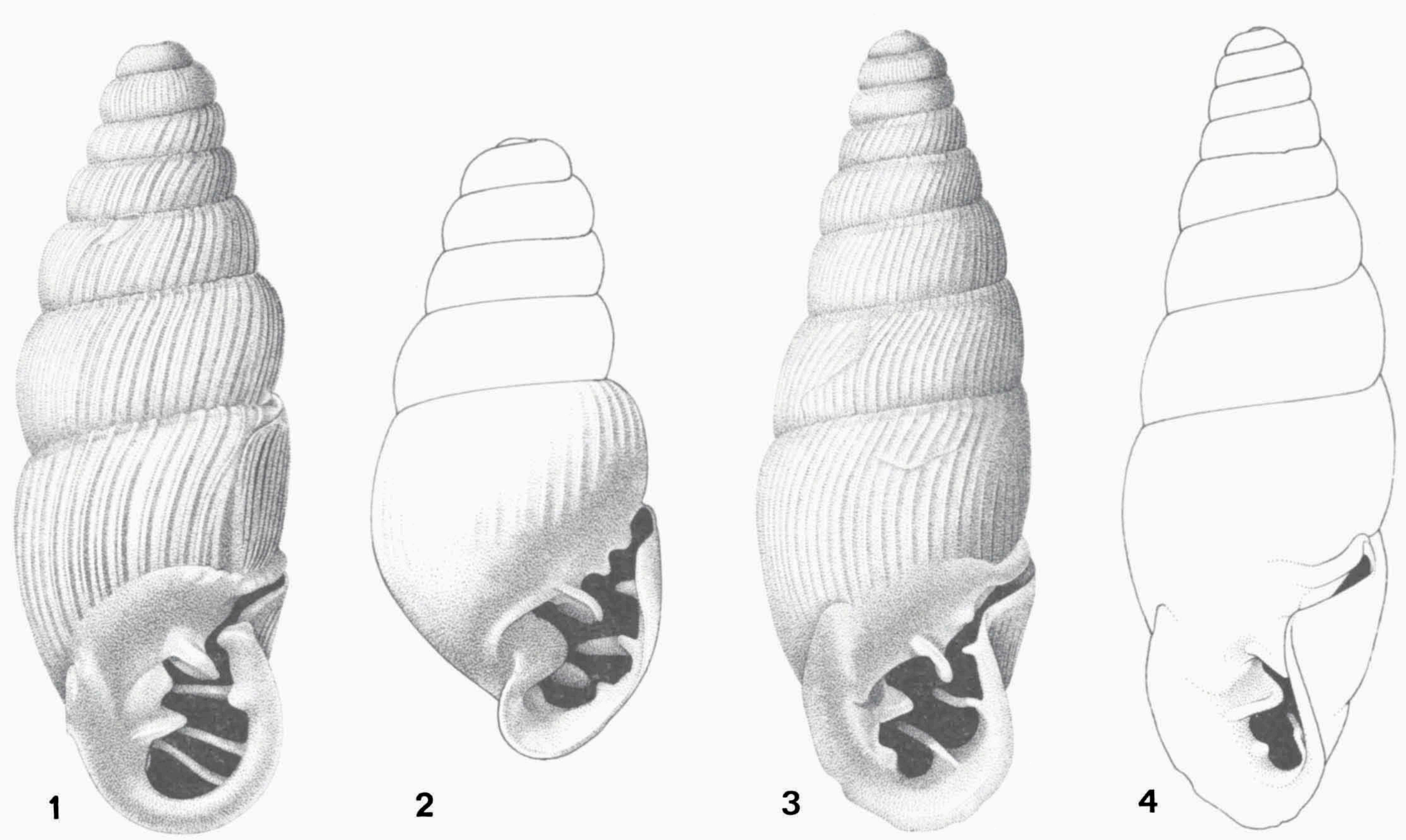
The sculpture, which is absent on the nepionic whorls, begins to become noticeable at quite different points in the various shells examined. It begins on the second whorl of the Congo juvenile (IRSNB) and one of the Fernando Poo shells (SMF), on the third whorl of the Kitta (SM) and adult Congo specimens (IRSNB), on the fourth whorl of the other Fernando Poo shell (PM), and on the fifth whorl of the type specimen (SM).

The measurements may be summarized as follows: 5.2-6.3 × 2.0-2.2 mm, l/d 2.60-2.90. The following table with measurements in mm enumerates the specimens examined together with data extracted from the literature:

locality	length × maj. diam.	l/d	aperture	last whorl	number of whorls
Barumbu (IRSNB)	5.5 × 2.1	2.67	1.6 × 1.5	2.9	7
Fernando Poo (PM)	5.9 × 2.1	2.79	1.8 × 1.6	3.1	7
Kitta (SM)	6.2 × 2.2	2.78	1.7 × 1.7	3.1	7¼
Fernando Poo (SMF)	6.2 × 2.2	2.86	1.9 × 1.7	3.2	7¼
Boangolo (type, SM)	6.3 × 2.2	2.90	1.7 × 1.6	3.3	7¼
Fernando Poo (cf. Ortiz de Zárate, 1956: 103)	5.2-6.2 × 2.0-2.2	2.60-2.82	—	—	—

Anatomical data have been supplied by Ortiz de Zárate (1956: 104-105, fig. 15). These authors describe the radula as being very small, length 1.1 mm. The formula is 24—1—24, while the number of transverse rows could not be counted or estimated in the single available radula. The transverse rows are shaped like an inverted V. The central tooth has a very small cusp, while all other teeth are also unicuspidate. The paragraph on the genitalia reads in translation as follows: "The stimulatory spinules in the penis, which is very large, are small, but (still) visible under comparatively low magnification; they are not as numerous as in other (species of) *Ptychotrema* and are arranged along the ejaculatory duct as will be seen in figure 15 *Pa.*". Fig. 15 also shows that the musculus retractor penis is apically inserted on the penis, while the vas deferens is inserted below the apex. This shows that at least as far as radula and genitalia are concerned the species and subgenus do not differ materially from those few species of *Ptychotrema* and closely allied genera (*Ennea* H. & A. Adams, 1855, and *Parennea* Pilsbry, 1919) which are anatomically known (cf. e.g., Degner, 1934, and Ortiz de Zárate, 1956).

Distribution (fig. 5). — Ghana, Bunso Plantation, 0° 28′ W 6° 18′ N, under dead wood, leg. F. M. Dyke (specimen not traced, not in the Spence collection in the Manchester Museum, cf. Spence, 1928: 212); Cameroon,



Figs. 1-4, The species of *Excisa*. 1, 2, *Ptychotrema* (*Excisa*) *boangolense* (d'Ailly). 1, shell from Fernando Poo (SMF), actual length 6.2 mm; 2, juvenile shell, Barumbu (IRSNB), actual length 4.1 mm. 3, 4, *P.* (*E.*) ***duseni*** (d'Ailly). 3, shell from N'Kolbisson (RMNH), actual length 10.7 mm; 4, the same, to show pleurotomoid sinus. Figs. 2 and 4 are half-schematic; all figures are highly enlarged. Note traces of early apertures with the pecular sinus in figs. 1 and 3.

Boangolo (type locality, shown on map in Dusén, 1894), leg. P. Dusén, 1890-1892, don. A. d'Ailly (SM: holotype, cf. d'Ailly, 1896: 21, pl. 1 figs. 26, 27); Cameroon, Kitta (shown on same map), leg. Y. Sjöstedt, March 1891, det. N. H. Odhner (SM, alcohol, No. 641 : 1) ; Fernando Poo, "Moka, entre 1300 et 1500 mètres d'altitude", leg. L. Fea, February 1902 (PM: 1, cf. Germain, 1916: 194, pl. 9 figs. 2, 3) ; Fernando Poo, Pico de Santa Isabel, „término de Bonyoma altò," between 1300 and 1400 m.s.m., leg. A. Ortiz de Zárate, 27 February 1954, don. do. (SMF No. 155635: 1 (fig. 1), cf. Ortiz de Zárate, 1956: 103; Zilch, 1960: 576, fig. 2018; Zilch, 1961: 110); Fernando Poo, "en el kilómetro 12" of the road from "Moca", 700 m.s.m., leg. A. Ortiz de Zárate, March 1946 (specimens not traced, cf. Ortiz de Zárate, 1956: 103); (ex-Belgian) Congo, Barumbu, Aruwimi River (near Basoko), don. P. Dupuis, det. W. Adam (IRSNB No. I.G. 9.109: 1 + 1 juv. (fig. 2), originally s.n. *P.* (*Ennea*) *paradoxulum* Mts.).

Ptychotrema (Excisa) duseni (d'Ailly, 1896) (figs. 3-5)

Ennea Duséni d'Ailly, 1896: 20, pl. 1 figs. 22-25; Boettger, 1905: 161 (*duseni*); Germain, 1911: 233, footnote (*Duseni*); Germain, 1916: 195 (*Duseni*); Pilsbry, 1919: 198 (*duseni*).

The species (figs. 3, 4) is again sufficiently characterized by the subgeneric description combined with the key characters discussed above. The three palatal lamellae are well-marked, the upper at the end forming a suprapalatal tooth; the second lamella may do the same only to a much lesser degree. The outside impressions of the palatal ridges are weak, but probably a trifle less so than in *P.* (*E.*) *boangolense*. The basal denticle is small and situated to the left of the base, but almost always plainly visible in front view. The columellar lamella is a simple inrunning ridge; there is no dental process above this ridge. Both the holotype (SM) and the N'Kolbisson shell (RMNH) show a supra-angular or sinular process in the form of a small but noticeable swelling (fig. 3). In this species the beginning of the costulation is also subject to variation; it starts on the third whorl of the type and Nkolkoumou forest specimen (TM), and on the fourth whorl of the N'Kolbisson shell (RMNH).

The measurements may be summarized as follows: 5.1-10.7 × 2.1-3.7 mm, l/d 2.39-2.87. The following table with measurements in mm enumerates the three specimens examined:

locality	length × maj. diam.	l/d	aperture	last whorl	number of whorls
"Camerunia" (type, SM)	5.1 × 2.1	2.39	1.5 × 1.5	2.8	6¾
Nkolkoumou forest (TM)	9.4 × 3.5	2.68	3.2 × 2.9	5.1	8¼
N'Kolbisson (RMNH)	10.7 × 3.7	2.87	3.2 × 2.9	5.6	9

Anatomical data are not available for *P.* (*E.*) *duseni*.

Distribution (fig. 5). — "Camerunia" (D. [= P. Dusén], ubi?)." (d'Ailly, 1896: 20), "Kamerun", leg. P. Dusén, 1890-1892, don. A. d'Ailly (SM: holotype, d'Ailly, 1896: pl. 1 figs. 22-25); Cameroon, Nkolkoumou forêt (15 km W. Yaoundé), about 750 m.s.m., "forêt secondaire haute, parfois inondée" (Amiet in litt.), leg. J. Amiet, 25 May 1958, don. J. J. van Mol (TM No. 795.212: 1); Cameroon, N'Kolbisson (7 km SW. Yaoundé), about 600 m.s.m., in dry humus under shrubs on boulder, leg. W. J. J. O. and B. E. E. de Wilde, December 1963, don. do. (RMNH Moll. no. d 54768: 1, figs. 3, 4).

It is interesting to note the size differences in the three known specimens of *P.* (*E.*) *duseni*, while more abundant data on *P.* (*E.*) *boangolense* seem to show a much more moderate variation in size. This, however, is not unusual in the Streptaxidae which appear to be subject to a good deal of variation in characters such as size, costulation, and dentition. In Southern Africa the genus *Gulella* frequently shows geographical size-clines (cf. Van Bruggen, 1969: 38 sqq., and unpublished data), which only become clear when abundant material from a series of localities is available for study.

When discussing relationships one has to consider the possibility that both nominal species belong to a single taxonomic unit. Because of the presence of a juvenile dentition one might think that *P.* (*E.*) *duseni* is a juvenile stage of *P.* (*E.*) *boangolense*. This may, however, be excluded because of the large size to which *P.* (*E.*) *duseni* may grow. On the other hand juveniles may show more dental processes than adults, because of resorption during further growth. The two supra-angular processes of juvenile *P.* (*E.*) *boangolense* (fig. 2) are absent in adult shells. The single juvenile examined may in principle also result in an adult shell with the dentition of *P.* (*E.*) *duseni*. For the time being the two species are considered separate taxonomic units which have obviously sprung from a common ancestor.

The two species of *Excisa* are sparsely distributed throughout the forest belt of West Africa from just west of the Volta River in Ghana to about 24°E. in Congo-Kinshasa, including the island of Fernando Poo. This is an immense area stretching over more than 2500 km (fig. 5). There are large gaps in the distribution pattern such as between Ghana and Cameroon, and between Cameroon and Congo-Kinshasa. This is almost certainly due to a dearth of collectors, although a major zoogeographical feature, the Dahomey Gap, very probably plays a role here. This is a notable interval in the forest belt, which interrupts or otherwise disturbs the distribution of many West African animals and plants (see e.g., Booth, 1958). Therefore it is

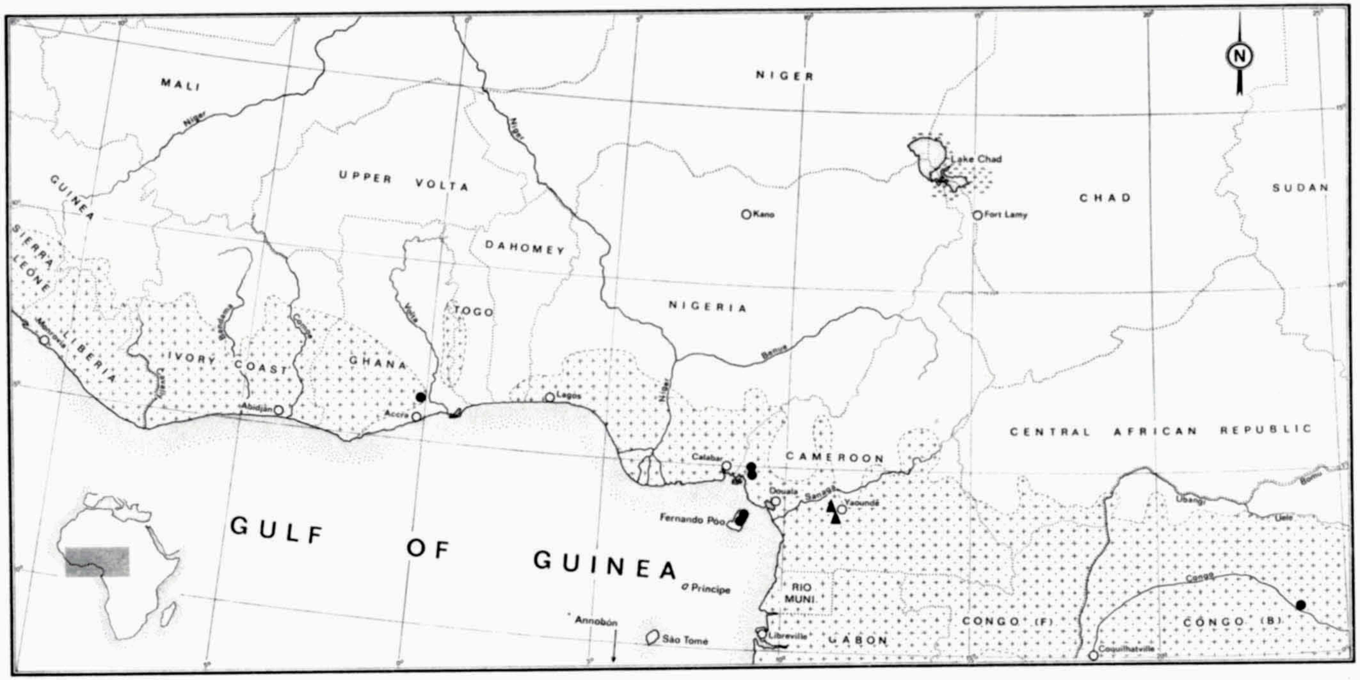


Fig. 5. Distribution of the species of *Excisa*. Dots denote *Ptychotrema* (*Excisa*) *boangolense* (d'Ailly), triangles *P.* (*E.*) *duseni* (d'Ailly). The rain forest areas have been indicated by + + + shading. Congo (F) and Congo (B) stand for (ex-French) Congo or Congo-Brazzaville and (ex-Belgian) Congo or Congo-Kinshasa respectively.

to be regretted that the Ghana shell, the only specimen from west of this gap (Spence, 1928: 212), was not available for examination; much to our disappointment it is possibly irretrievably lost (see above sub 'Distribution' of *P.* (*E.*) *boangolense*). Most records centre around Cameroon or are from Fernando Poo, although the subgenus very probably is represented in the forests of southern Nigeria too. There is also a considerable gap between the distribution records of *Excisa* in Cameroon and that in the (ex-Belgian) Congo, which at first gives rise to suspicions about accuracy of labelling. However, there is nothing inherently abnormal in a distribution throughout the forest from West to Central Africa. This is shown by e.g., *Ennea silvatica* (Pilsbry, 1919), which streptaxid is known from Liberia, the Ituri forest, and Mt. Ruwenzori (Degner, 1934: 242). All localities of *Excisa* are within the forest belt; the type of forest along the West African coast is usually called High Forest, which is a loose term encompassing various kinds of rain forest. According to the above locality records the species occur from sea level to about 1000 m.s.m., while on Fernando Poo *P.* (*E.*) *boangolense* has been collected from between 700 and 1500 m.s.m. The above-mentioned *Ennea silvatica* is even known from about sea level to 2200 m.s.m., which, incidentally, implies that it occurs in very different types of vegetation.

According to our present knowledge *P.* (*E.*) *boangolense* does not occur on the island of Annobon (cf. Ortiz de Zárate & Alvarez, 1960). It has been recorded as known from that island by Germain (1916) in his table on p. 161. However, a close scrutiny reveals that in this table some lines have partly been accidentally transposed. These lines actually read (first column "Cameroun", second "Fernando Poo", third "Ile du Prince", fourth "San Thomé", fifth "Ile d'Anno-Bon"):

Ennea (*Excisa*) *boangolensis* d'Ailly . . . . + + ... +
Ennea (*Sphinctostrema*) *Bocagei* Girard . . . . +
Ennea (*Sphinctostrema*) *Joubinl* [sic] Germain . . . .

These lines hould have run as follows:

Ennea (*Excisa*) *boangolensis* d'Ailly . . . . + +
Ennea (*Sphinctostrema*) *Bocagei* Girard . . . . +
Ennea (*Sphinctostrema*) *Joubini* Germain . . . . +

Germain (1911: 232, fig. 53) has described *Ennea* (*Excisa*) *lamollei* collected by Lt. Lamolle "aux environs du poste français de Querké, sur la frontière française du Liberia" (Germain, 1911: 227). To the present author's knowledge the species has only been mentioned twice since that date (Germain, 1916; Degner, 1934). Unfortunately the type cannot be found in the collections of the Paris museum (H. Chevallier, in litt.). The type depository is not known for certain; there are no indications to that effect in Germain's paper, although the fact that it was published in the museum bulletin makes one surmise that it may have been deposited in the Muséum National d'Histoire Naturelle. Personal examination might have revealed the real identity of the species, which very probably does not at all belong to *Excisa*; indeed, it is likely that it is not even a *Ptychotrema*. Judging from the description and figure it may belong to the genus *Gulella*, which opinion is shared by Dr. W. Adam of the Brussels museum. Degner (1934: 250) even somewhat sarcastically writes that Germain's species doubtlessly belongs to *Gulella*: ".... (die übrigens keinesfalls in diese d'Ailly'sche Untergattung von *Ptychotrema* gehört, sondern eine echte *Gulella* ist, woher sich auch der Mangel an Übereinstimmung zwischen ihr und den d'Ailly'schen *Excisa*-Arten höchst einfach erklärt); ...". Obviously the slit at the apex of the aperture characteristic for *Excisa* is absent here; it is not shown in the figure nor mentioned in the description. However, Germain's concluding remark on *Ennea lamollei* reads as follows: "Les deux *Ennea* connus appartenant au sous-genre *Excisa* sont très différents de cette espèce." After that a footnote refers to the species described by d'Ailly. Germain was a malacologist of no mean ability and it is hard to reconcile these final notes on *Ennea lamollei* with his description and figure. Moreover Germain (1916: 195) later refers again to *Ennea lamollei* as being allied to *Ennea boangolensis*. Pending examination of the type of the species it is now removed from the subgenus *Excisa* and provisionally considered a *Gulella*.

II. A new species of Gulella from Rhodesia

Continued revisionary work on Southern African species of the genus *Gulella* L. Pfeiffer, 1856, has revealed the existence of a new species on the Eastern Escarpment of Rhodesia. Originally it was collected by the present author and his wife in 1963 during a C.S.I.R. (Council for Scientific and Industrial Research, Pretoria)-sponsored expedition. Thanks to the efforts of Mrs. Cécile Granville of Hectorspruit (Transvaal) additional material has now been obtained from another locality so that the species can be based on satisfactory material.

Gulella ceciliae nov. spec. (figs. 6, 7)

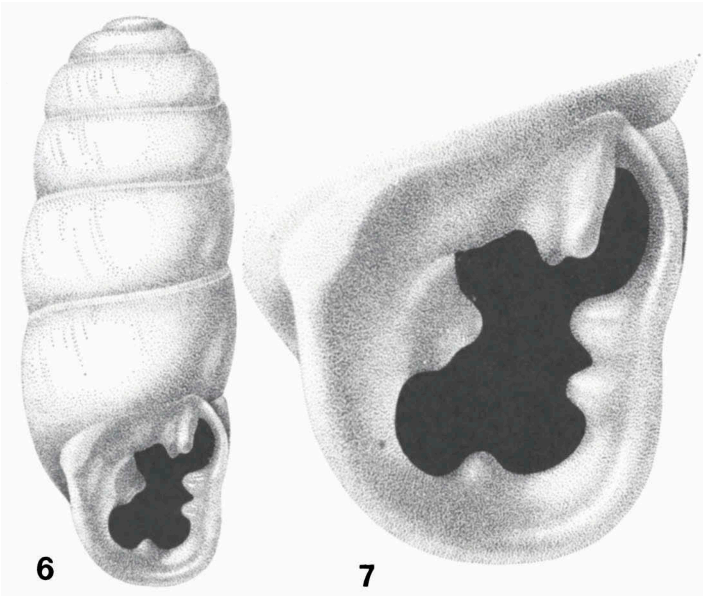
Diagnostic characters. — A medium-sized, smooth species with slender shell and five-fold dentition consisting of angular lamella, two labral and one basal processes, and columellar lamella.

Description of shell. — Shell (fig. 6) medium-sized, slender, cylindrical, always more than two and a half times as long as wide, narrowly rimate or with closed umbilicus. Spire produced, sides parallel, apex obtusely conical, somewhat flattened. Whorls 6¼-7, flattish, smooth and without noticeable sculpture, except for faint growth striae; sutures shallow, simple. Aperture (fig. 7) oblong, peristome somewhat reflected, white and glossy, dentition five-fold: a fairly short, almost vertical, angular lamella, sometimes slightly indented below, scarcely connected to apex of labrum; two subequal mid-labral denticles, upper usually slightly larger than lower and sometimes somewhat bicuspid, labral processes corresponding to weak outside depression; a denticle almost in the middle of the base, corresponding to hardly noticeable outside depression; columellar lamella large and prominent, mammillate.

Measurements of shell: 4.6-6.3 × 1.7-2.1 mm, l/d 2.58-3.16. The table on p. 254 shows the range of variation in measurements in mm and in dentition (dentition is complete unless otherwise mentioned).

Distribution. — *Gulella ceciliae* is so far only known from the forest districts of the Rhodesian Eastern Escarpment.

Rhodesia: Mount Vumba near Umtali, Vumba Circular Drive, Zonwi River bridge, 2500 ft., 17 February 1963, leg. A. C. and W. H. van Bruggen (NM, three paratypes in alcohol and one juvenile: sample no. 1); Farm



Figs. 6-7. *Gulella ceciliae* n. sp., holotype (RMNH), Rhodesia, Farm Uitkyk between Melsetter and Chipinga. 6, shell, actual length 5.2 mm; 7, aperture of shell, actual measurements 1.7 × 1.5 mm. Both figures are highly enlarged.

length × maj. diameter	l/d	length last whorl	aperture length × width	number of whorls	particulars
4.6 × 1.7	2.74	2.4	1.6 × 1.2	6¾	sample no. 1, alc.
4.6 × 1.7	2.74	2.4	1.6 × 1.3	6¾	sample no. 1, alc.
5.0 × 1.9	2.67	2.7	1.9 × 1.4	6½	sample no. 3, dry
5.0 × 1.9	2.58	2.7	1.7 × 1.4	6¼	sample no. 3, alc.
5.0 × 1.9	2.58	2.7	1.7 × 1.5	6¼	sample no. 2, alc. dentition immature, lower labral denticle as yet a mere tubercle, basal denticle hardly visible as yet
5.0 × 1.9	2.58	2.8	1.8 × 1.4	6¼	sample no. 3, alc.
5.1 × 1.9	2.73	2.7	1.7 × 1.4	6½	sample no. 3, dry
5.2 × 1.8	2.86	2.6	1.7 × 1.4	6¾	sample no. 1, alc.
5.2 × 1.9	2.68	2.7	1.7 × 1.4	6½	sample no. 3, alc., no basal denticle, labral denticles poorly developed
5.2 × 2.0	2.59	2.7	1.7 × 1.5	6½	HOLOTYPE, figs. 6, 7; sample no. 2, dry
5.4 × 1.9	2.87	2.7	1.7 × 1.4	6¾	sample no. 2, dry
5.4 × 1.9	2.81	2.8	1.7 × 1.5	6½	sample no. 3, dry
5.4 × 1.9	2.81	2.9	1.7 × 1.6	6½	sample no. 2, alc., dentition immature, i.e., denticles present but poorly developed
5.4 × 2.0	2.69	2.9	1.8 × 1.5	6¾	sample no. 2, dry
5.6 × 1.9	2.90	2.7	1.7 × 1.5	6¾	sample no. 3, alc.
5.7 × 2.0	2.87	2.9	1.9 × 1.6	7	sample no. 2, dry
5.8 × 2.1	2.82	2.8	1.7 × 1.4	7	sample no. 3, alc. lower labral and basal denticles poorly developed
5.9 × 1.9	3.03	2.9	1.9 × 1.4	7	sample no. 3, dry
6.3 × 2.0	3.16	2.9	1.9 × 1.6	7	sample no. 3, alc., basal denticle small

Uitkyk between Melsetter and Chipinga, about 3000 ft., indigenous forest, June 1969, leg. Mrs. C. Granville (RMNH, holotype dry, Moll. no. d 54769, figs. 6, 7), three dry paratypes (no. d 54770) and two paratypes (no. a 8828) in alcohol: sample no. 2); ibidem, December 1969, leg. Mrs. C. Granville (RMNH, 23 dry paratypes (no. d 54771), 16 paratypes (no. a 8829) in alcohol, and 11 juveniles (no. a 8830) in alcohol; BM, two dry paratypes; MT, two dry paratypes: sample no. 3). All specimens have been taken on the ground in leaf mould. Juvenile specimens are excluded from the type material.

The species has been named after Mrs. Cécile Granville as a token of gratitude for her collecting efforts on behalf of the author.

It is surprising to find another species belonging to Connolly's group 4ii (Connolly, 1939: smooth species with five-fold dentition consisting of one tooth each on paries, base and columella, and two on the labrum). Group 4 is already rich in species of which fourteen have been described as being smooth. The possibilities of variation on this theme are, however, almost endless; apart from shape and size of the shell the dentition offers a host of combinations. Only three species are profitably compared to the newly described one, viz., *Gulella ingens* (Sturany, 1898) from Durban, *G. planidens* (Von Martens, 1881) from South and East Africa, and *G. polita* (Melvill & Ponsonby, 1893) from the Eastern Cape Province. Of these only *G. planidens* is sympatric with *G. ceciliae,* occurring from Rhodesia and Mozambique to as far north as Tanzania, Uganda and Congo-Kinshasa. *G. planidens* is immediately distinguished by its much larger size (length 6.7-10.0 mm) and lower l/d, while length and width of the aperture are subequal; labral and columellar processes are at the same time much more prominent than in the new species. *G. ingens* is also much larger (9.1 mm long), has more whorls (8½), a bituberculate columellar lamella and a different labral complex. Finally *G. polita* is usually smaller and much more obese (l/d never more than 2.50). In this species the lower labral process is always larger than the upper, the basal denticle is placed more to the left of the base, while the columellar lamella is also different.

Checking on species north of the Zambesi (cf. Smith, 1893; Smith, 1899; Melvill & Standen, 1907; Pilsbry, 1919; Verdcourt, 1962), particularly running down the keys provided by Verdcourt, one meets few species with which *G. ceciliae* may be compared. About the only species to be compared are *G. insolita* (Smith, 1903) and *G. duncani* Connolly, 1930, both from Kenya. The former species is, however, decidedly smaller (2.5-3.5 mm long) than the new species, while it is also faintly striate and considerably less slender; Smith's figure shows that the lower labral process is larger than the upper, which never occurs in *G. ceciliae*. *G. duncani* is comparatively obese with larger dental processes in the aperture, particularly the labral and basal denticles; here again the lower basal denticle is larger than the upper. The columellar lamella also differs in size and shape.

Field notes extracted from the author's diaries record *G. ceciliae* as a "small yellow Gulella" obtained in "typical gallery forest next to the (Zonwi) river", while weather conditions are described as "warm and humid". Mrs. Granville collected her specimens also in very humid indigenous forest.

A comparison of the material from different populations obtained by Mrs. Granville, and the author and his wife shows that the Vumba specimens represent a population with comparatively small and somewhat slender shells. However, the small number of specimens should be taken into account when assessing these potential differences:

Vumba, sample no. 1:	4.6-5.2 × 1.7-1.8 mm, l/d 2.74-2.86 (3 shells)
Melsetter, sample no. 2:	5.0-5.7 × 1.9-2.0 mm, l/d 2.58-2.87 (6 shells)
Melsetter, sample no. 3:	5.0-6.3 × 1.9-2.1 mm, l/d 2.58-3.16 (10 shells)

The range of variation in dentition is shown in the table of measurements following the description of the shell. In addition to the above recorded specimens, sample no. 3 contains 23 other specimens. The dentition of these is as follows: 13 of these have a complete dentition, while the ten remaining shells have a reduced dentition, mainly concerning the lower labral and the basal processes. In some specimens the basal process may be absent altogether, in which case identification of odd specimens may become unreliable. Many species of *Gulella* show a very constant dentition, while others such as the above species exhibit a fair range of variation. In this context one may think about *G. lawrencei* Van Bruggen, 1964, from Mount Gorongosa in Mozambique. This species has only four apertural denticles and should be compared to quadridentate shells of *G. ceciliae*. General features of the unique holotype shell of *G. lawrencei*, such as size and sculpture, agree with those of the new species, while the dentition is reasonably close to that of some quadridentate shells of *G. ceciliae*. However, it is by no means certain that the final stage of *G. lawrencei* (if any: the single type may well be fully adult with a complete set of dental processes in the aperture) is identical to that of *G. ceciliae*. For the time being both nominal species are considered separate taxa. Anyway, it would be dangerous practice to attach the name *G. lawrencei*, founded on one specimen and consequently without any data on individual variation, to the abundant and variable material discussed above. The range of variation of the Mozambique species may well include shells with fewer apertural processes than at present known for *G. ceciliae*.

Another interesting feature of *G. ceciliae* is the size at which the dentition has become finalized. Shells of streptaxids are usually considered mature when the peristome has been fully formed (and reflected as the case may be). Very frequently this is reached at a certain age when most shells have approximately the same size; at the same time the dentition is also final and no more changes are made, except perhaps such as resulting in the increase in thickness of certain processes or repairs having become necessary. In the species under discusion this varies widely as shown by the table of measurements. While the length of the shell varies from 4.6 to 6.3 mm, specimens of 5.0, 5.2, 5.4, 5.8 and even 6.3 mm long show an as yet incomplete dentition. Dental processes in the aperture are formed by the animal's mantle depositing calcareous mater on the inside of the labrum, so that mere initial tubercles may grow into thick and prominent processes.

Among Southern African *Gulella* at least it is normal to expect the largest specimens to have the most complete and prominent dentition. *G. ceciliae* is therefore certainly in this respect a remarkable new species.

REFERENCES

AILLY, A. D', 1896. Contributions à la connaissance des mollusques terrestres et d'eau douce de Kaméroun. — Bih. K. Svenska Vet.-Akad. Handl., 22 (4) (2): 1-137.

BOETTGER, O., 1905. Beitrag zur Kenntnis der Land-, Süsswasser- und Brackwasser-Mollusken von Kamerun (zugleich Aufzählung aller von dort bekannten Arten). Nachr. Bl. Dtsch. Malakozool. Ges., 37: 153-184.

BOOTH, A. H., 1958. The zoogeography of West African primates: a review. — Bull. Inst. Franç. Afr. Noire, (A) 20: 587-622.

BRUGGEN, A. C. VAN, 1964. On some molluscs from Mount Gorongosa, Portuguese East Africa, with descriptions of two new streptaxids. — Rev. Zool. Bot. Afr., 70: 113-122.

——, 1969. Studies on the land molluscs of Zululand with notes on the distribution of land molluscs in Southern Africa. — Zool. Verh. Leiden, 103: 1-116.

CONNOLLY, M., 1930. Descriptions of new molluscs from Central Africa, with notes on other species. — Proc. Malac. Soc. London, 19: 37-48.

——, 1939. A monographic survey of South African non-marine Mollusca. — Ann. S. Afr. Mus., 33: 1-660.

DEGNER, E., 1934. Westafrikanische Landschnecken. I. Streptaxiden, Helicarioniden, Vaginuliden. — Zool. Jahrb. Syst., 65: 209-308.

DUSÉN, P., 1894. Om nordvästra Kamerunområdets geologi. — Geol. Fören. Förh. Stockholm, 16: 29-63.

GERMAIN, L., 1911. Contributions à la faune malacologique de l'Afrique équatoriale. XXVI. Mollusques recueillis par M. le Lieutenant Lamolle à Querké, sur la frontière française du Libéria. — Bull. Mus. Nat. Hist. Nat. Paris, 17: 227-240.

——, 1916. Études sur les mollusques terrestres et fluviatiles recueillis par L. Fea pendant son voyage en Afrique Occidentale et aux Iles du Golfe de Guinée. — Ann. Mus. Civ. Stor. Nat. Genova, 47: 150-336.

MELVILL, J. C., & R. STANDEN, 1907. Notes on a collection of terrestrial and fluviatile Mollusca, made in North-Eastern Rhodesia, during 1905, by Mr. Sheffield A. Neave, M.A., B. Sc. — Mem. Proc. Manchest. Lit. Phil. Soc., 51 (4): 1-16.

ORTIZ DE ZÁRATE, A. & A., 1956. Contribucion al conocimiento de la fauna malacológica terrestre de la Isla de Fernando Poo. — Bol. Real. Soc. Esp. Hist. Nat., (Biol.) 53: 75-140.

ORTIZ DE ZÁRATE, A. & J. ALVAREZ, 1960. Resultados de la expedición Peris-Alvaraz a la isla de Annobón (Guinea Española). I. Los gastropodos terrestres. — Bol. Real. Soc. Esp. Hist. Nat., (Biol.) 58: 87-103.

PILSBRY, H. A., 1919. A review of the land mollusks of the Belgian Congo chiefly based on the collection of the American Museum Congo Expedition, 1909-1915. — Bull. Am. Mus. Nat. Hist., 40: i-x, 1-370.

SMITH, E. A., 1893. On a collection of land and fresh-water shells communicated by H. H. Johnston, C. B., from British Central Africa. — Proc. Zool. Soc. Lond., 1893: 632-641.

——, 1899. On a collection of land shells from British Central Africa. — Proc. Zool. Soc. Lond., 1899: 579-592.

——, 1903. Descriptions of new species of land shells from Central Africa. — J. Conch., 10: 315-319.

SPENCE, G. C., 1928. Non-marine Mollusca from West Africa. — J. Conch., 18: 211-216.

THIELE, J., 1931. Handbuch der systematischen Weichtierkunde, 1 (2): 377-778. (Jena).

VERDCOURT, B., 1962. Preliminary keys for the identification of the species of the genus Gulella Pfr. occurring in East Africa. — Ann. Mus. R. Afr. Centr., (8°) (Sci. Zool.) 106: 1-39.

ZILCH, A., 1959-1960. Gastropoda Euthyneura. — Handb. Paläozool., (6) 2: i-xii, 1-834. (Berlin-Nikolassee).

——, 1961. Die Typen und Typoide des Natur-Museums Senckenberg, 24: Mollusca, Streptaxidae. — Arch. Molluskenk., 90: 79-120.