

Six new species of Streptaxidae (Gastropoda Pulmonata) from West Africa

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Descriptions of six new species of West African Streptaxidae are provided: *Ptychotrema* (*Ennea*) *ankasana*, *Gulella atewana* and *G. jongkindi*, all from Ghana, *Ptychotrema* (*Haplonepion*) *vroomi* and *Gulella bancoensis* from Côte d'Ivoire, and *Ptychotrema* (*Ennea*) *okei* from Nigeria.

Key words: Gastropoda, Pulmonata, Streptaxidae, *Ptychotrema*, *Ennea*, *Haplonepion*, *Gulella*, taxonomy, West Africa, Ghana, Côte d'Ivoire, Nigeria.

INTRODUCTION

The present paper, which is intended to be the first of a series of contributions devoted to the taxonomy, distribution, and ecology of western African Streptaxidae, provides the formal descriptions of some West African taxa of the genera *Ptychotrema* Pfeiffer, 1853 s.l. and *Gulella* Pfeiffer, 1856 s.l. These are the first of a larger number of supposedly new taxa I have encountered, the only reason for describing them in the same paper being their provenance (West Africa s.s.).

At all levels the knowledge of the Afrotropical streptaxids is vastly insufficient. During my attempts to identify recently collected West African streptaxid material it proved in some instances difficult to resolve whether certain samples represent specifically distinct entities or merely cases of geographic variation of already known species. In view of the poverty of anatomical and distributional data, the decision to describe a new species is sometimes inevitably somewhat arbitrary.

The appearance of this paper, and some forthcoming ones, is partly prompted by three recent contributions to the knowledge of the very heterogeneous genus *Ptychotrema* (Adam et al., 1993, 1994, 1995) in which much of the scattered information in the literature is reviewed and new information added. I have provisionally followed Adam et al. in treating *Ennea* and *Haplonepion* as subgenera of *Ptychotrema*. However, it would probably be more correct to treat most subgenera/sections of *Ptychotrema* s.l. as full genera because the taxonomic affinities among these taxa and the numerous infrageneric taxa of the genus *Gulella* are as yet very uncertain.

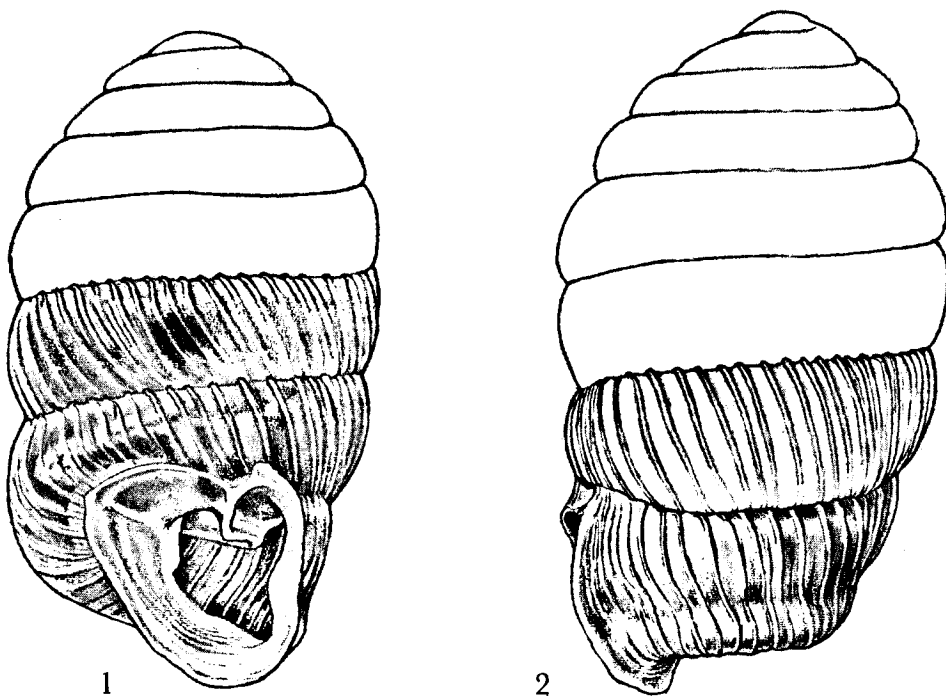
I am indebted to Drs. C. Jongkind (Wageningen) and O.C. Oke (Benin City, Nigeria) who collected part of the material described below, to Dr. P. Bouchet (MNHN, Paris) for the loan of material, and to Drs. Th. Heijerman (Wageningen) and A.C. van Bruggen (NNM) for taking the photographs and commenting on a draft of the manuscript, respectively. The drawings are acknowledged to the skills of E.J. Bosch and S.B. Blankevoort, artists at the NNM.

The following abbreviations have been used: NNM for Nationaal Natuurhistorisch Museum, Leiden, formerly Rijksmuseum van Natuurlijke Historie (RMNH), and MNHN for Muséum National d'Histoire Naturelle, Paris, H for shell height, D for maximum shell diameter measured at right angles to the shell's axis.

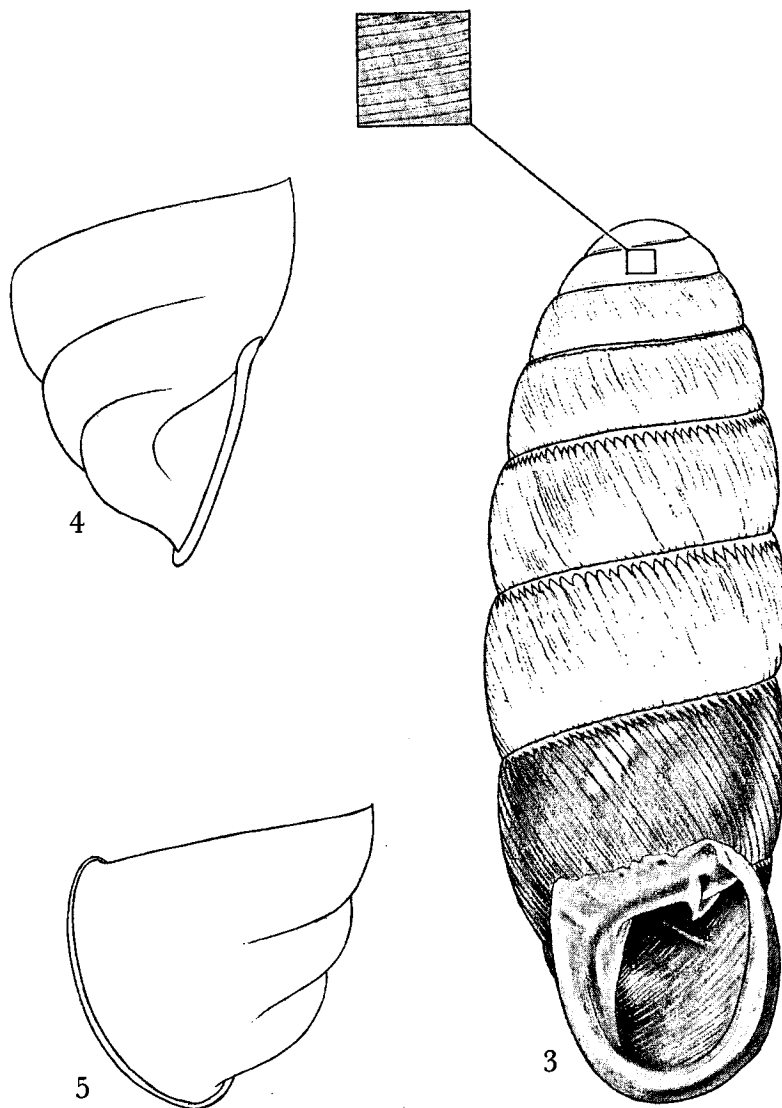
***Ptychotrema (Ennea) ankasana* nov. spec. (figs. 1-2)**

Material: Holotype (RMNH 57236) and paratypes (RMNH 57237/2) (all adult shells), Ghana, Western Region, Ankasa Game Reserve, rain forest near main entrance, leaf litter sample from forest floor, c. 150 m a.s.l., 5°13'N 2°39'W, 1.III.1995, C. Jongkind leg.

Description.— Shell small (H 3.8-4.0 mm, D 2.1-2.2 mm, H/D 1.8-1.9), subcylindric to elongate oval in shape. Whorls slightly over seven, little convex. Apex rounded. About the first two whorls appear to be smooth (not studied with SEM), embryonic whorls not well set off against later whorls. Fresh shells partly transparent. Axial riblets on the early postembryonic whorls somewhat irregular and obliquely curved, more regular and straight on the last two whorls; they are sharp and strong on the upper part of the whorl but become less prominent towards the lower suture. Suture crenulated. Peristome continuous and reflexed. Angular lamella high and prominent, deeply inrunning. Palatal margin with a blunt tooth which continues inwards as a barely visible, seemingly short palatal fold, which however reappears in a much stronger fashion deep inside the aperture (only visible through transparency in fresh specimens). Last whorl with a conspicuous sharp comb-like keel, surrounded by a well defined spiral furrow above and a much more faint one below (i.e. at the base of the shell); this second shallow furrow is associated with a deeply immersed second palatal fold only visible



Figs. 1-2. *Ptychotrema (Ennea) ankasana* n. sp. 1, holotype shell, Ghana, Western Region, Ankasa Game Reserve (RMNH); actual height 3.9 mm. 2, paratype shell (RMNH); actual height 4.0 mm. E.J. Bosch del.



Figs. 3-5. *Ptychotrema (Ennea) okei* n. sp., holotype shell, Nigeria, Ogun State, Shagamu (RMNH). 3, front view actual height 12.2 mm. 4-5, different views of body whorl. S.B. Blankevoort del.

with difficulty in transparent specimens. Columella straight, without denticles or callosities. Base of the shell concave with closed umbilicus. The three available specimens are rather similar in all characters mentioned.

Remarks.— In many respects *P. (E.) ankasana* is similar to *P. (E.) subtusangulatum* Degner, 1934, and may eventually turn out to represent a local race of this species.

The latter, which is so far only known from three localities in north-western Liberia, is larger (4.4-5.5 x 2.3-2.5 mm), has a callus-like projection on the columella, a more oval (less cylindrical) shell and much weaker axial ribs; moreover, the blunt tooth present on the palatal labrum in *P. ankasana* seems to be virtually absent in *P. subtusangulatum* (Degner, 1934; Adam et al., 1994). In view of the large distance between the Liberian and Ghanaian localities (about 900 km), it seems best to formally name the Ghanaian specimens. It is unfortunate that no alcohol-preserved material is available for dissection which could possibly settle the affinities between both taxa, since the penial morphology of *P. (E.) subtusangulatum*, as described by Degner (1934), is rather peculiar.

Because of the presence of a faint second palatal furrow and corresponding fold Adam et al. (1994) transferred *P. subtusangulatum* from *Parennea* to the subgenus *Ennea*. This opinion is followed here for *P. ankasana*.

***Ptychotrema (Ennea) okei* nov. spec. (figs. 3-5)**

Material.— Holotype shell (RMNH/57238) and paratypes (Benin University/2), Nigeria, Western, Ogun State, Shagamu, primary forest remnant, among leaf litter on forest floor, c. 150 m a.s.l., 6°51'N 3°39'E, 7.IX.1991, O.C. Oke leg.

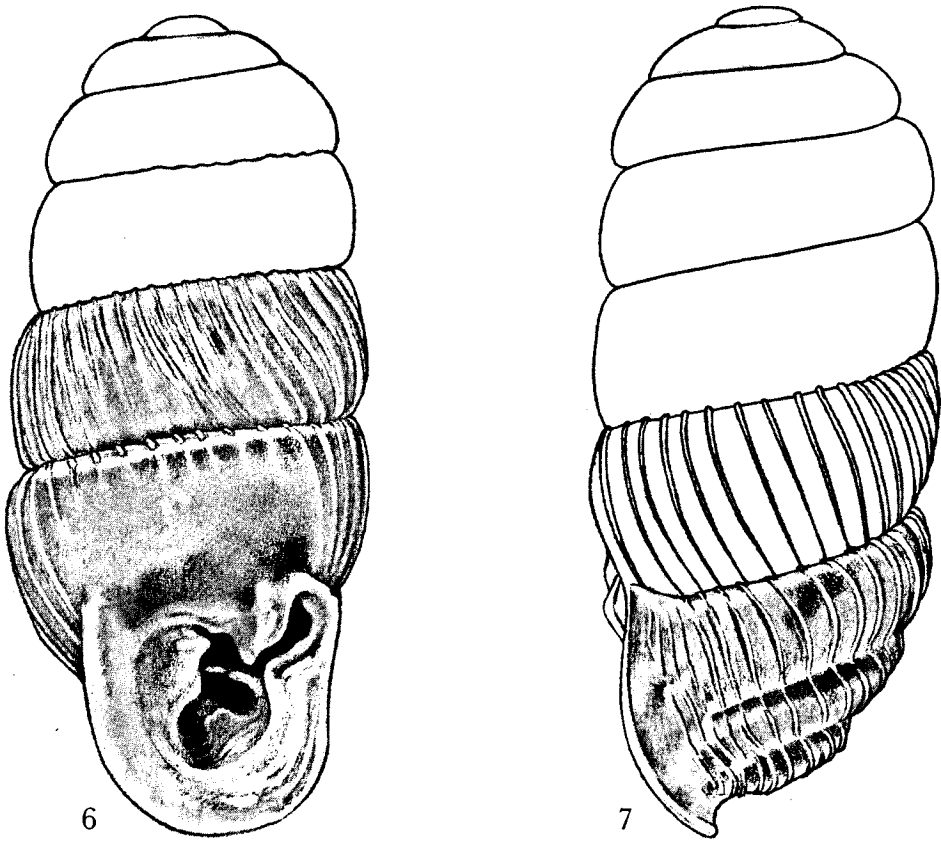
Description.— Shell comparatively large (H 10.0-12.2 mm, D 3.9-4.1 mm, H/D 2.6-2.9), elongate cylindrical, glossy, partly transparent, pale yellowish, with 7-7 1/2, little convex whorls. Embryonic whorls slightly more than two, smooth and glossy; only at high magnification extremely delicate, distant spiral lines visible. Suture of postembryonic whorls with a rather conspicuous band of oblique serrations, and more or less irregular, superficial growth lines or faint ribs further down the whorl. Whorl increase very regular. Apertural lip reflexed, but little expanded. Aperture somewhat rectangular, very little obstructed by three weak lamellae and sometimes a blunt palatal swelling at about the middle of the labrum (one paratype only). Angular lamella simple, thin, deeply inrunning; inside the aperture it rapidly becomes rather low for a while and then higher again. Upper palatal lamella high and relatively conspicuous, the lower one hardly raised and barely visible in frontal view. None of the two palatal lamellae reaches the outer lip. Each palatal lamella in the aperture corresponds to a marked, but not very deep spiral furrow on the body whorl, which ends some distance behind the outer lip. Columella almost straight. Umbilicus closed.

Remarks.— In general outline and serrated suture *P. okei* resembles *P. serratum* (d'Ailly, 1896) which was described after a single specimen from Cameroon (without a more precise locality). However, *P. serratum* has more whorls while being much smaller (7 x 2 2/3 mm), is narrowly umbilicate, and has a more obstructed aperture and a more complicated angular lamella; besides, its upper palatal lamella continues to just before the outer lip (and likewise the corresponding furrow on the body whorl) (fide d'Ailly, 1896: 17, pl. I figs. 38-41).

The species is named in honour of its collector, Dr. Chris Oke, Benin City, Nigeria.

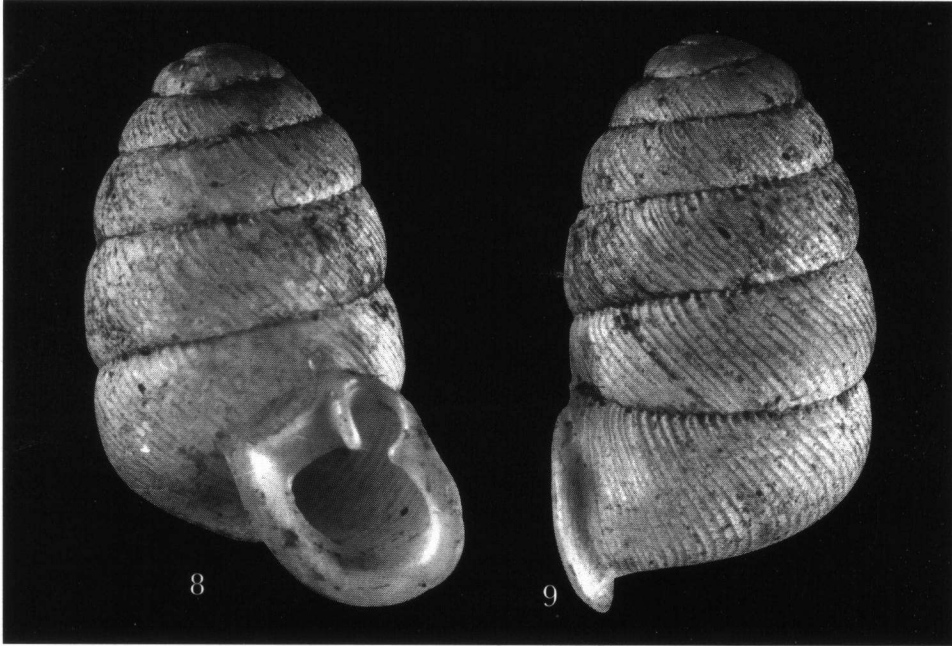
***Ptychotrema (Haplonepion) vroomi* nov. spec. (figs. 6-7)**

Material.— Holotype (RMNH 57239), and one juvenile (RMNH): Côte d'Ivoire, 'Sokrolaye', c. 10 km W. of Bouaflé, banana plantation, on decaying tree trunk, c. 250 m a.s.l., 7.I.1989, A.J. de Winter leg.



Figs. 6-7. *Ptychotrema (Haplonepion) vroomi* n. sp., holotype shell, Côte d'Ivoire, c. 20 km W. of Bouaflé (RMNH); actual height 5.6 mm. E.J. Bosch del.

Description.— Shell comparatively small (H 5.6 mm, D 2.6 mm), glossy, whitish, almost cylindrical in shape, with 6 1/4 little convex whorls. Apex rounded. At first sight the first c. two whorls appear to be smooth and glossy, but at higher magnification exhibit an extremely faint and superficial spiral sculpture. The rest of the whorls is ornamented with somewhat oblique, thin (much less wide than the interstices), sharp, low ribblets, which extend over the entire height of the whorl but are strongest near the upper suture, giving the shell a somewhat crenulate appearance. Apertural lip expanded and reflexed. The prominent, high and sinuous angular lamella, which does not seem to enter very deeply, is connected to the outer lip. Palatal side with two folds, corresponding with two spiral furrows on the outside of the shell. The upper palatal fold high and prominent, ending just before the thickened labrum; the lower palatal fold wider and not very marked, except for a conspicuous bifid nodule (possibly an individual aberration) just before the lamella ends well before the outer lip. The elongate suprapalatal tooth descends obliquely, with a somewhat bifid apex, forming the



Figs. 8-9. *Gulella bancoensis* n. sp., holotype shell, Côte d'Ivoire, Forêt du Banco near Abidjan (MNHN); actual height 7.0 mm. Photographs by Th. Heijerman.

lateral-lower edge and canal of a well defined roundish sinulus. Columella with two prominent blunt denticles, the lower one of which is best seen in oblique view. Umbilicus closed.

The juvenile shell (not considered as paratype) of about $2\frac{3}{4}$ whorls lacks any apertural barriers, and has an open umbilicus.

Remarks.— The present species is assigned to the rather heterogeneous (with respect to size and shape, see Adam et al., 1993) subgenus *Haplonepion* Pilsbry, 1919, on account of its rounded sinulus, and lack of apertural barriers in the juvenile shell. It most resembles *P. (H.) walikalensis* Pilsbry, 1919, from eastern Zaire. This species is generally larger, has a more tapering spire, and its axial ribs are more irregular and weaker and tend to fade out towards the lower suture (Pilsbry, 1919; Adam et al., 1993). *P. (H.) loveridgei* Van Bruggen, 1990, differs among others in having relatively more whorls, and by lacking any columellar denticles.

The subgenus *Haplonepion* is known to occur in Central Africa, especially in eastern Zaire, but also in the western parts of Uganda, Kenya, Tanzania, and in Malawi (Adam et al., 1993). Zilch's (1959-1960: 277) assertion that the subgenus is distributed from West Africa to Senegal is obviously erroneous. So far only one species, *P. (H.) anceyi* (Nevill in Ancey, 1890), was known from western Africa (Cameroon and South-East Nigeria) (Adam et al., 1993). At present *Ptychotrema vroomi* is the westernmost known member of *Haplonepion*.

This species is named in honour of Mr. D. Rob Vroom, former technical assistant

at the Molluscan Department of the NNM, Leiden, at the occasion of his retirement after many years of dedicated work on the collections.

***Gulella bancoensis* nov. spec. (figs. 8-9)**

Material.— Holotype (MNHN) and one subadult paratype (MNHN), Côte d'Ivoire, 'le Banco' (=Forêt du Banco near Abidjan), 9.VII and 18.VIII.1945, R. Paulian leg.

Description.— Shell small (holotype H 7.0 mm, D 4.3 mm), cylindric-oval in shape. Apex rounded. Suture of postembryonic whorls deep and crenulate. Whorls c. 6 1/4, slightly convex, gradually increasing in height; the first two smooth, well set off against the ribbed later whorls. In the paratype, at higher magnifications, the embryonic whorls exhibit a microsculpture of very fine spiral lines crossed by axial riblets, which is probably worn off in the holotype. Postembryonic whorls with fine, sharp, rather oblique and somewhat sinuous ribs which extend over the entire height of the whorl. The paratype has fine spiral threads in the interstices, which are largely worn off in the holotype. Aperture obliquely positioned, peristome expanded. Dentition two-fold: a strong, but not deeply entering angular lamella and an equally strong tooth on the outer lip, cutting off a circular sinus. Umbilicus at end of umbilical groove virtually closed in the holotype, narrowly open in the subadult paratype.

Remarks.— None of the western African *Gulella* species described to date seems to be obviously related to *G. bancoensis*. By virtue of the position of its few apertural barriers it might be related to a large group of species often referred to as the subgenus *Paucidentina* Von Martens, 1897, especially *Gulella arthuri cardiostoma* Degner, 1934. However, these have glossy shells, are at best bluntly ribbed, and have the labrum arching forward. In shape and both embryonic and postembryonic sculpture it more resembles *Pupigulella pupa* (Thiele, 1933) (possibly a complex of species) which, however, characteristically is edentate.

Apart from 'le Banco' and the remark 'battage', the label does not provide more precise locality data. According to De Koning (1983: 45, fig. 15) the entomologist Paulian studied an area with a diameter of c. 500 m situated in the central part of this forest reserve of c. 3000 ha (5 X 6 km). The term 'battage' implies that the species was obtained by beating the understory vegetation of small trees and shrubs over a sheet or an umbrella, a well known technique for collecting insects. This means that the species probably has arboreal habits.

The species is named after its type locality, the Forêt du Banco, now Parc National du Banco, in the hope that such will contribute to the conservation of this tiny remnant of forest at the outskirts of the expanding city of Abidjan. It is the type locality of many invertebrate species, for example the semi-slugs *Amatarion verrucosus* Van Mol, 1970, and *Sylvation brieni* Van Mol, 1970, which, like *G. bancoensis*, have never been found elsewhere.

***Gulella atewana* nov. spec. (figs. 10-11)**

Material.— Holotype (RMNH 57240) and one paratype (RMNH 57241), Ghana, Eastern Region, Atewa Range Forest Reserve, primary forest on slope W. of road Asiakwa-Kibi, 300-500 m a.s.l., November 1994, C. Jongkind leg.

Description.— Shell very small (H 2.9-3.0 mm, D 1.6 mm), cylindric-oval in outline,

narrowly but distinctly perforate, whitish, glossy and semi-transparent when fresh. Whorls $5 \frac{1}{3}$, rather convex, the first $1 \frac{1}{2}$ - $1 \frac{2}{3}$ with very fine axial microsculpture. Postembryonic whorls with vertical, high, widely spaced, regular ribs, which extend over the entire height of the whorl. Suture largely eroded, but probably simple. Aperture relatively small, round, obstructed by four major and two to three smaller barriers. Angular lamella high and sinuous, but not deeply entering. The obliquely positioned palatal lamella does not enter deeply. Basal tooth a conspicuous, somewhat oblong plate. Columella smooth, but there is a prominent oblique lamella in front of the columella which reaches the peristome. A smallish denticle may be discernable between the columellar and basal plates. Both shells have two small nodules in the parietal-columellar corner.

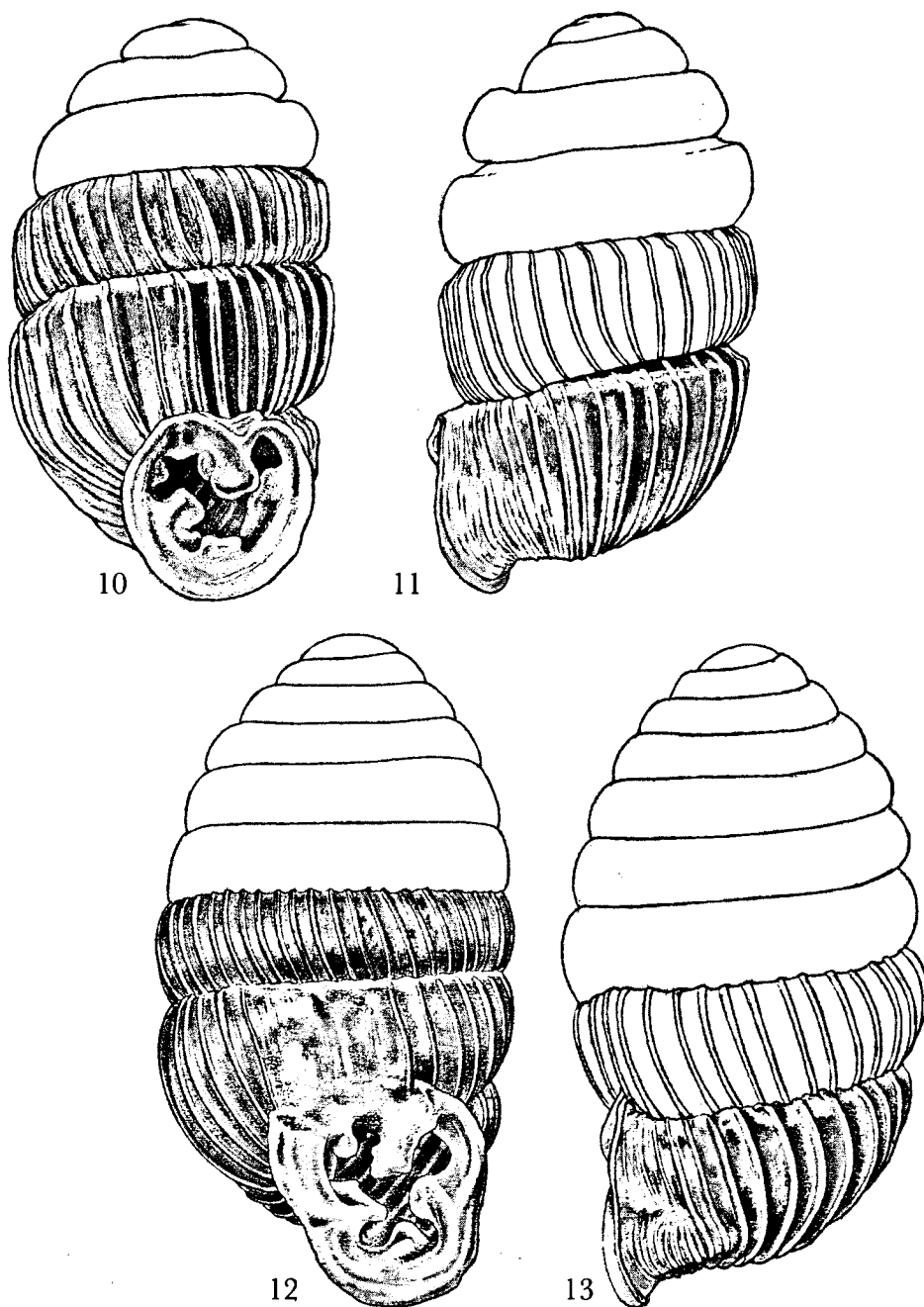
Remarks.— With respect to size and shape, and to a lesser extent, apertural dentition, *G. atewana* superficially resembles *G. lambda* Degner, 1934, sensu Binder, 1963, and *G. kemblei pretiosa* Binder, 1963. However, apart from details in apertural dentition, these two taxa differ by their much denser costulation. The same holds for *G. cyclochilus* Degner, 1934, which is also larger.

***Gulella jongkindi* nov. spec. (figs. 12-13)**

Material.— Holotype (RMNH 57242) and paratypes (RMNH 57243/3 ad., 10 juv.), Ghana, Eastern Region, near Akosombo, $6^{\circ}19'N$ $0^{\circ}03'W$, closed dry forest with many *Talbotiella gentii* Hutch. & Greenway trees (Leguminosae, Caesalpinioidea) on slope with numerous rock outcrops, December 1995, C. Jongkind leg. Additional material, Eastern Region, Krobo Hill, $6^{\circ}05'N$ $0^{\circ}04'E$, dry forest dominated by *Talbotiella gentii* of only a few ha on hill surrounded by savanna vegetation, 8.XII.1994, C. Jongkind leg. (RMNH/1 ad., 7 juv.); Eastern Region, forest near Boti Water Falls, c. 12 km NE of Koforidua, December 1991, R.J. & C. Post leg. (RMNH/1 juv.). Only specimens from the type locality are considered paratypes.

Description.— Shell comparatively small (H 4.7-5.2, D 2.6-2.8 mm, H/D 1.7-1.9), narrowly perforate, semi-transparent when fresh, oval to subcylindrical, greatest width at the last or penultimate whorl, spire tapering towards apex. Whorls $7 \frac{1}{2}$ - $8 \frac{1}{2}$, gradually increasing, moderately convex; apex rounded. About the first two whorls with very delicate spiral sculpture and extremely fine crenulations in the suture (often worn in adult specimens). Postembryonic whorls with regular, sharp, slightly oblique ribs extending over the entire height of the whorls. Suture of postembryonic whorls impressed, simple. Peristome somewhat quadrate, reflexed and incrassate. Dentition six-fold; on the parietal side a conspicuously sinuous and high angular lamella with a weakly bilobed left side, as well as a distinct (infra)parietal tooth; the palatal side with a large, obliquely positioned, more or less oblong plate, corresponding to a distinct depression behind the labrum, as well as an inconspicuous suprapalatal tooth in the sinulus, which is usually obscured by the right edge of the angular lamella in front view; in the centre of the basal wall a prominent slab, corresponding to a depression behind the peristome on the base of the shell; and a long and bifid columellar tooth which reaches the outer lip. In the specimens studied the dentition is subject to little variable. Juvenile shells have a circular, open umbilicus. All juveniles studied (shells between two and five whorls) exhibit a deeply entering lamella on the centre of the parietal wall.

Remarks.— In only few species of the heterogeneous genus *Gulella* (and *Ptychotrema* s.l.) the apertural dentition of the juvenile shells has been studied. However, the general picture seems to be that juvenile shells of most *Gulella* species are edentate, and in those species of which the apertures of the juveniles are obstructed there are usually several



Figs. 10-13. New species of *Gulella* from Ghana. 10-11. *Gulella atewana* n. sp., holotype shell, Ghana, Eastern Region, Atewa Range Forest Reserve (RMNH); actual height 2.9 mm. E.J. Bosch del. 12-13. *Gulella jongkindi* n. sp., holotype shell, Ghana, Eastern Region, near Akosombo (RMNH); actual height 5.2 mm. S.B. Blankevoort del.

teeth and lamellae. Juvenile shells of *G. jongkindi*, even the ones with barely more than the embryonic whorls, are peculiar in that they possess only a parietal lamella, but no columellar, basal or other teeth. In this character it resembles the unfigured *Gulella titania adansiensis* Connolly, 1942. According to the description and reference to the figure of *G. t. titania* Connolly, 1928 (p. 534, pl. 18 fig. 4), the apertural dentition of the adult shell of *G. t. adansiensis* species is also similar (Connolly, 1942: 330). This species may be related, but appears to differ by its smaller size, mammillate apex, smooth embryonic whorls, and more distant and blunt ribs on the later whorls.

The species is named after the botanist Dr. Carel Jongkind, as a token of appreciation for his sustained malacological collecting efforts in Africa and elsewhere.

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