

October, when sexually mature individuals swarmed, though none showed any tendency to form buds\*), Dr. Cunningham's carefully collected material, on the other hand, showed that reproduction by budding was continued in August, September, December, and February, and that it might therefore reasonably be supposed that it went on during the greater part of the year—if, indeed, it ever ceased.

The discovery of *Limnocnida* in other river-basins in Africa had materially weakened the case of those who considered that Lake Tanganyika was the last surviving remnant of a Jurassic Sea. The fact that this Medusa had been found in the Victoria Nyanza by M. Ch. Alluaud and Sir Charles Elliot, and also in the Niger by the late Mr. Budgett, proved that it was another instance of a member of the freshwater fauna characteristic of the Central-African Region, and that it was not peculiar to this one deep-water lake as had been originally supposed.

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Mr. G. A. Boulenger, F.R.S., V.P.Z.S., read a paper entitled "Fourth Contribution to the Ichthyology of Lake Tanganyika. Report on the Collection of Fishes made by Dr. W. A. Cunningham during the Third Tanganyika Expedition, 1904-05."

This paper will be published entire in the 'Transactions.'

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The following papers were also read:—

1. Zoological Results of the Third Tanganyika Expedition, conducted by Dr. W. A. Cunningham, 1904-1905. Report on the Mollusca. By EDGAR A. SMITH.

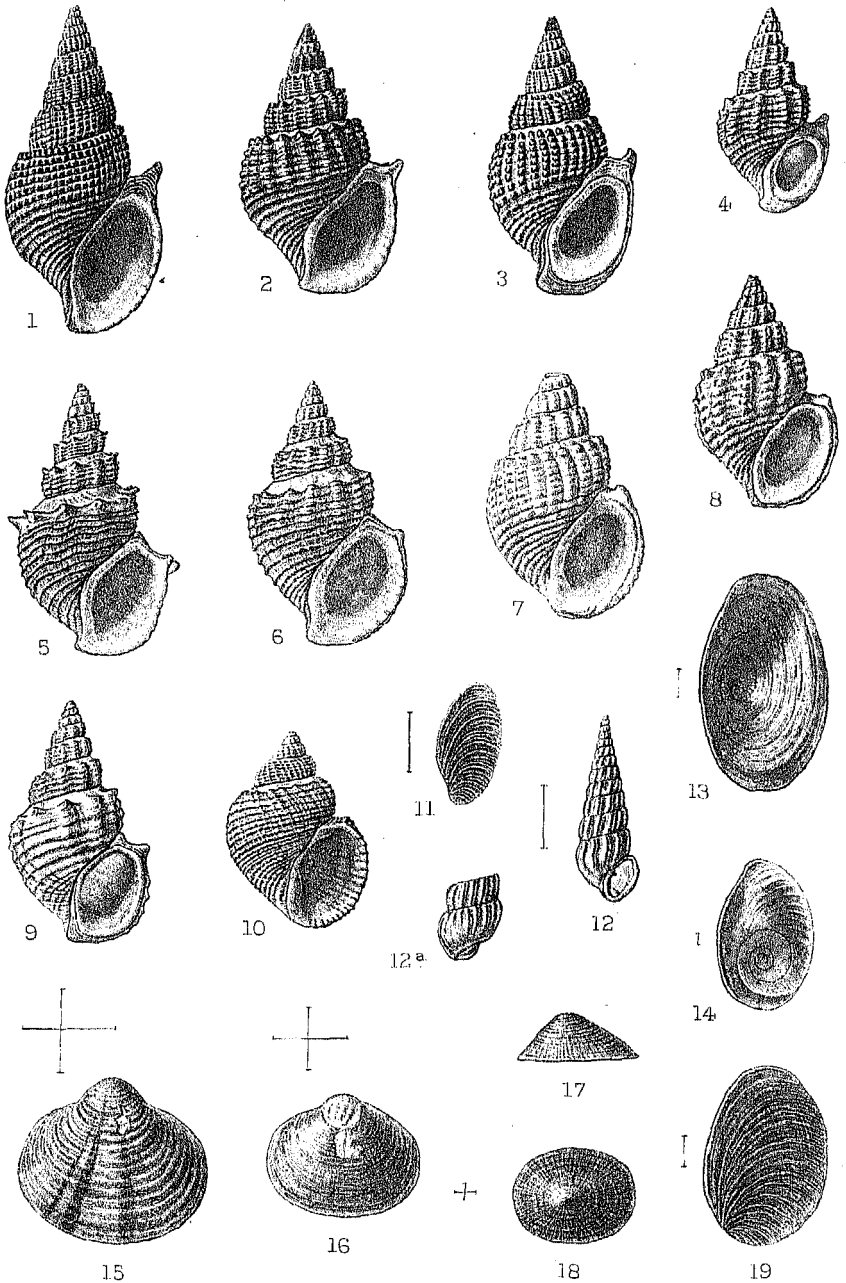
[Received February 6, 1906.]

(Plate X.†)

The small collection of Mollusca obtained by Dr. W. A. Cunningham in Lake Tanganyika does not contain any important addition to the thalassoid series. There are some interesting specimens of *Bythoceras iridescens*, tending to show that, like most freshwater species, it is subject to considerable variation. In two cases, *Edgaria* and *Giraudia*, I have been enabled to describe the opercula, which hitherto were unknown, and the collection also affords one new species of the genus *Anceya*. The various localities furnished by Dr. Cunningham also add to our knowledge of the distribution of some of the forms. Another matter which may be referred to in these introductory remarks is the occurrence together, at the south end of the lake, of both the keeled and unkeeled varieties of *Neothauma tanganyicense*, which, according

\* J. E. S. Moore, 'Tanganyika Problem,' 1903, pp. 298-308.

† For explanation of the Plate, see p. 186.



A. H. Searle, del. et lith.

Bale & Danielsson, L<sup>id</sup> imp.

MOLLUSCA FROM LAKES TANGANYIKA & VICTORIA.

to Mr. J. E. S. Moore \*, were found by him, respectively, only at the south end and more northern localities.

Living examples were obtained of *Limnotrochus*, *Tiphobia*, *Bythoecus*, *Paramelania*, *Lavigeria*, *Edgaria*, *Giraudia*, and *Anceya*; and these it is proposed to place in the hands of an experienced anatomist for investigation. The last three of these thalassoid genera have not been anatomically examined, and therefore it will be of interest to know their relationship and systematic position, and it will also be interesting to see if the conclusions arrived at, in respect of the rest, coincide with the results of Mr. Moore's investigations of them. In concluding these prefatory observations on the marine-like forms, I would again † call attention to the fact that M. Bourguignat had employed the term "thalassoid" in connection with them long before the invention of the compound "halolimnic" by Mr. Moore.

Among the ordinary freshwater forms, the discovery of a species of *Ancylus*, the first from the lake, is of interest. This genus has been recorded from the Victoria Nyanza, but not from the other large lakes of Central Africa. Being, however, such small objects, and difficult of observation, they may have easily been overlooked ‡.

Of the few species obtained by Dr. Cunningham in the Victoria Nyanza, two appear to be new, namely, a *Corbicula* and a *Sphaerium*, both closely allied to one or other of the few forms already known from this lake.

## I. Species from Lake Tanganyika.

### a. THALASSOID SPECIES.

#### 1. CHYTRA KIRKII (Smith).

*Hab.* Tembwi, a little below middle of west coast, 20 fath.

#### 2. BATHANALIA HOWESI Moore.

*Hab.* Niamkolo, south end of lake.

The dimensions of this species, which have never been stated, are:—Length 30 millim., diam. 22; aperture  $11\frac{1}{2}$  long, 10 broad.

#### 3. LIMNOTROCHUS THOMSONI Smith.

*Hab.* Ndanvie, east coast towards the north end of the lake, 10 fathoms, also at south end.

#### 4. TIPHOBLA HOREI Smith.

*Hab.* Kala, at south end of lake.

\* 'The Tanganyika Problem,' p. 149.

† See Proc. Malac. Soc. vol. vi. p. 78.

‡ M. Louis Germain has recently briefly described from Tanganyika new species of *Planorbis*, *Vivipara*, and *Cleopatra*. Bull. Mus. Hist. Nat. Paris, 1905, no. 4, pp. 254-261.

## 5. BYTHOCERAS IRIDESCENS Moore. (Plate X. figs. 1-3.)

*Hab.* Niamboko, south end of lake.

The series of specimens now available for examination shows that this species, like most freshwater forms, exhibits considerable variation in size, form, and sculpture. The much enlarged figure in the Proc. Royal Soc. 1898, vol. lxii. p. 452, fig. 1, reproduced in the Proc. Malac. Soc. vol. iii. p. 93, fig. 1, exhibits an extreme development of the anterior or basal spine, such as I have not seen in any specimen. The largest example in the present collection is 44 millim. in length, and the spire is much longer in proportion to the length of the body-whorl than in the shell depicted by Mr. Moore, and the sculpture is altogether finer. A smaller variety, but equally adult, is more strongly sculptured than the large form and only 30 millim. in length.

## 6. BYTHOCERAS MINOR Moore. (Plate X. fig. 4.)

*Hab.* Tembwi, west coast, a little below middle, in 20 fath.

A single specimen only. I am inclined to think that this species will eventually prove to be a variety of *Paramelania crassigranulata*. In the character of the shells, opercula, and radula there seems to be very little to separate the genera *Bythoceras* and *Paramelania*.

## 7. PARAMELANIA CRASSIGRANULATA Smith. (Plate X. figs. 7, 8.)

*Hab.* South end of the lake.

One very large specimen, 37 millim. in length.

## 8. PARAMELANIA DAMONI Smith. (Plate X. figs. 5, 6, 9.)

*Hab.* Tembwi, near middle of west coast of the lake, 30 fath.; Mrumbi, south of Tembwi, 40 fath.; Mshale, east coast towards the north end of the lake, 25 fath.; also south end.

The single specimen from the last locality resembles the variety *imperialis* rather than the typical form.

## 9. LAVIGERIA GRANDIS Bourguignat. (Plate X. figs. 10, 11.)

*Hab.* Mbete, south end of lake, on rocks in shallow water.

A few specimens rather smaller than the type (P.Z.S. 1881, pl. xxxiv. fig. 26 a), with the oblique plications less strongly developed.

## 10. EDGARIA NASSA (Woodward). (Plate X. fig. 19.)

*Hab.* Kirando, east coast of lake towards the south end.

A few specimens of a small variety. Operculum similar in character to that of *Lavigeria grandis*, horny, dark brown, broadly ovate, nucleus marginal, near the lower end, sculptured with fine lines of growth.

## 11. EDGARIA PAUCICOSTATA Bourguignat.

*Hab.* South end of the lake.

Two rather large specimens, 21 millim. in length.

12. *TANGANYICIA RUFOFILOSA* (Smith), var.

*Hab.* South end of lake.

One very black specimen, having evidently been stained in black mud. It is very different in shape from the type, being more ovate, with a longer spire, and the umbilicus nearly closed.

13. *SPEKIA ZONATA* (Woodward).

*Hab.* Niamkolo, south end of lake, on stones in shallow water.

14. *GIRAUDIA HOREI* Smith. (Plate X. fig. 13.)

*Hab.* Mrondwe Bay, south end of lake, 10 fath.

A few examples, rather smaller than the type. Operculum ovate, horny, brown, paucispiral in the middle, with concentric lines of growth at the outer margin.

15. *GIRAUDIA PRÆCLARA* Bourguignat. (Plate X. fig. 14.)

*Hab.* Moliro, west coast of south end of the lake, on rocks in shallow water.

A few specimens, rather smaller than the type. The minute horny operculum, 1 millim. in length, consists of a single whorl, the nucleus being subcentral, but nearer the lower end. It is subovate, being rather narrower below than above.

16. *ANCEYA RUFOCINCTA*, sp. n. (Plate X. fig. 12.)

Shell small, elongate, subulate, imperforate, yellowish horn-colour, with a dark red band at the upper part of the whorls. Whorls 13, slowly increasing, slightly convex; apical whorls probably smooth and convex, the two topmost remaining with two spiral threads round the middle crossing the costæ, which are much finer and more numerous than those upon the lower volutions. Costæ strong, oblique, about twelve or thirteen upon the penultimate whorl, those upon the body-whorl terminating abruptly at a strong spiral ridge which encircles the base. In a young specimen this ridge is absent, so that probably it only occurs in adult shells. Aperture oblique, broadly sinuated above and below; peristome continuous, brownish, outer margin thickened, a little expanded, columellar side also thickened and reflexed, with a distinct tooth or fold at the upper part, joined to the outer lip by a distinct callus. Operculum none? Length  $8\frac{1}{2}$  millim., diam.  $2\frac{1}{2}$ ; aperture 2 long,  $1\frac{1}{4}$  broad.

*Hab.* Kirando, towards south end of the east coast, 10 fath.

Apparently differing from the two known species of the genus *Anceya* in colour, form of the aperture, and the character of the costæ. *A. giraudi* Bourguignat has a palatal liration which is absent in the present species. In his figures the outer lips have the appearance of being drawn from broken specimens. If, however, they are normal, they are very different from the labrum of the present species. In a young specimen both the basal keel and the columellar tooth are absent, so that these are probably

features which are only developed in adult shells. Having broken up one specimen, I failed to find an operculum.

b. NON-THALASSOID SPECIES.

1. *LIMNÆA NATALENSIS* Krauss.

*Hab.* Swamp at Mbete, south end of lake.

2. *ANCYLUS TANGANYICENSIS*, sp. n. (Plate X. figs. 17, 18.)

Shell very small, roundly ovate, moderately elevated, thin, brown, finely radiately striated across the concentric lines of growth; apex obtuse, boss-like, circumscribed, radiately striated, subcentral or a trifle towards the right; interior glossy, exhibiting through the semitransparency of the shell the external sculpture. Length  $2\frac{3}{4}$  millim., diam. 2, height 1.

*Hab.* On a stone dredged in a few fathoms in Niamkolo Harbour, south end of lake.

This is the first and only species of *Anchylus* known from the lake. The genus, however, occurs both in the north and south of the African continent, but with the exception of *A. stuhlmanni* Martens, from the Victoria Nyanza, no species have been recorded from the great lakes. Being so small it is possible they may have been overlooked.

Prof. Gwatkin, who has very kindly examined the radula, observes:—"As I expected, it belongs to the *A. parallelus* type, which I have from S. Africa, Australia, and North and South America. To it belong my 'Gundlachias' from Tasmania and New Zealand."

3. *PLANORBIS SUDANICUS* Martens.

*Hab.* Swamp at Mbete, south end of lake.

4. *NEOTHAUMA TANGANYICENSE* Smith.

*Hab.* Kituta, Kala, Moliro, Sumbu, Kalambo.

Keeled and non-carinate specimens were found together at the south end of the lake by Dr. Cunningham, so that Mr. Moore's idea of the local distribution of this species appears to be, in a measure, incorrect.

5. *AMPULLARIA OVATA* Olivier.

*Hab.* South end of lake.

6. *UNIO BURTONI* Woodward.

*Hab.* South end of lake, and Kala at south end of east coast.

7. *BURFONIA TANGANYICENSIS* (Smith).

*Hab.* Kombe, east coast below the middle, and south end of the lake.

8. *PLEIODON SPEKEI* Woodward.

*Hab.* Sumbua, east coast.

9. *BRAZZEA ANCEYI* Bourguignat.

*Hab.* Kibanga.

One valve only, with five or six radiating ridges down the anterior end.

## c. POST-PLIOCENE SPECIES.

Some shells of species still living in Tanganyika were found embedded in a coarse sandy matrix upon the shore at Sumbua, about halfway up the east coast of the lake. One reef was so weathered that the shells (*Neothauma*) stood out very conspicuously, just in the breakers. Three similar reefs occur at intervals inland, on the summits of the former sandy beaches. These shells may be referred to a late Post-Pliocene age. Other specimens occurred in a cliff or ridge, about six feet high, in the north-west part of the Rukwa Valley, where the lake formerly was, but is now dried up.

So far as one can judge, none of the shells which are more or less perfect, or of those of which there are only fragments, belong to other than recent species, showing that these ridges are of quite modern origin.

Among those from Sumbua, besides the *Neothauma*, are remains of *Ramella*, a thalassoid genus, and of *Unio*; and from the Rukwa Valley are fragments of *Lanistes*, *Vivipara*, *Melania*, *Corbicula*, and *Unio*, all ordinary freshwater types. The amount of material at hand, however, is so small, that one cannot say to what extent the thalassoid shells may be represented in the same locality.

II. *Species from the Victoria Nyanza.*

The following species were obtained by Dr. Cunningham at Bukoba on the west shore of the Lake.

1. *PLANORBIS SUPANICUS* Martens, var. *MINOR* Martens.

*Hab.* On water-weed in shallow-water inlet north of the town.

2. *PLANORBIS CRAWFORDI* Melville & Ponsonby.

*Hab.* Same as that of preceding species.

Two specimens were obtained, which appear to be inseparable from this species described from Cape Colony.

3. *MELANIA TUBERCULATA* (Müller).

*Hab.* Taken in shrimp-net in a few feet of water in the harbour.

4. *VIVIPARA CONSTRICTA* Martens.

*Hab.* Dredged in about a fathom in the harbour.

The specimens of this very variable species from this locality are rather like Martens's figure ('Beschalte Weichthiere Deutsch-Ost-Afrika,' vol. iv. pl. vi. fig. 20), but they exhibit a third keel between the two represented in the illustration. They are more

strongly spirally striated than other examples which have been examined.

5. UNIO LOURDELI Bourguignat.

*Hab.* Dredged in about a fathom in the harbour.

6. CORBICULA CUNNINGTONI, sp. n. (Plate X. fig. 15.)

Shell small, irregularly ovate, almost equilateral, moderately convex, sculptured with rather distinct and distant concentric ridges, which become almost obsolete on both dorsal slopes; valves yellow olivaceous, with or without a few brownish rays, more or less deep purplish within; umbones prominent. Length  $12\frac{1}{2}$  millim., diam. 8, height 11.

*Hab.* Dredged in about a fathom in the harbour.

This species may be separated from *C. radiata* Parreyss, the only species recorded from the Lake, on account of its somewhat different form, the umbones being more prominent, the more distant concentric ridges, and a difference in colour. None of the specimens exhibit the characteristic dark purple ray proceeding from the umbo down the middle of the valves as in *C. radiata*. Two out of three examples have little or no trace of markings, but the third is distinctly rayed with brown, the rays being different in the two valves.

7. SPHÆRIUM VICTORIÆ, sp. n. (Plate X. fig. 16.)

Shell roundly subovate, nearly equilateral, greyish yellow, with numerous radiating dark hair-like lines; valves thin; finely concentrically striated with the lines of growth, which are crossed by minute microscopic radiating striæ which are quite invisible to the naked eye; interior dirty bluish; lateral teeth delicate.

Length  $9\frac{3}{4}$  millim., diam.  $5\frac{1}{2}$ , alt.  $8\frac{1}{4}$ .

*Hab.* Dredged in about a fathom in the harbour.

Larger than *S. nyanza* Smith, not quite the same shape, different in colour, rayed, and with more delicate hinge-teeth.

8. ÆTHERIA ELLIPTICA Lamarck.

*Hab.* Entebbe, north-west end of the lake.

EXPLANATION OF PLATE X.

- Figs. 1, 2, 3. *Bythoceras iridescens* : p. 182.  
 4. " *minor* : p. 182.  
 5, 6, 9. *Paramelania damoni* : p. 182.  
 7, 8. " *crassigranulata* : p. 182.  
 10. *Lavigeria grandis* : p. 182.  
 11. " operculum.  
 12. *Anceya rufocincta* : p. 183.  
 13. *Giraudia horei*, operculum : p. 183.  
 14. " *praclara*, operculum : p. 183.  
 15. *Corbicula cunningtoni* : p. 186.  
 16. *Sphærium victoriæ* : p. 186.  
 17, 18. *Ancylus tanganyicensis* : p. 184.  
 19. *Edgaria nassa*, operculum : p. 182.