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(PLATES XXXVIII.—XLIII. and Text-figures 85-87.)

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V. *On a Collection of Fishes from the Lake Ngami Basin, Bechuanaland.*By G. A. BOULENGER, *F.R.S., V.P.Z.S.*

[Received December 17, 1910; Read February 21, 1911.]

[PLATES XXXVIII.—XLIII. and Text-figures 85–87.]

IN his little book 'Mémoire sur les Poissons de l'Afrique Australe' (Paris, 1861), Count Francis de Castelnau gave the descriptions of a number of new fishes from Lake Ngami, then a lake of some importance discovered by Livingstone and Oswell. He had sent there one of his "préparateurs," Frédéric Daviaud, who brought back to Cape Town, where Castelnau was Consul, a number of dried specimens, probably accompanied by notes on the coloration, from which the descriptions were drawn up. The types of these are all lost, and as the definitions are inadequate, it has been impossible hitherto to allocate a position in the system to most of the species described by Castelnau.

Over forty years have elapsed since the publication of the 'Mémoire' quoted, and in the meanwhile no one seems to have collected fishes in the lake, which is rapidly drying up. I was therefore happy to hear, two years ago, through my colleague Mr. Ogilvie-Grant, that Mr. R. B. Woosnam was preparing an expedition to Bechuanaland, and that it might be possible to get at the lake for the purpose of obtaining a series of its fishes. An application having been made by Dr. P. L. Sclater to the Royal Society's Government Grant Committee, Mr. Woosnam was provided with the necessary means to extend his collecting-trip in that direction. Although unforeseen circumstances have prevented his reaching the lake itself, he has nevertheless been able to form a considerable collection of fishes from the Okovango river that flows into it, a collection by means of which I have been able to identify, with some approach to certainty, most of the species described by Castelnau, and thus remove a stumbling-block in African systematic ichthyology.

As Castelnau's little book is not easily procurable, I have reproduced most of the original descriptions, in order to enable others to judge of the degree of probability of my identifications, which, needless to say, in view of the unsatisfactory nature of Castelnau's work, are in some cases little more than guesses. On the other hand, a few of the species in Mr. Woosnam's collection could not be referred to any previously named, and are here described as new.

The Ngami Fish-fauna shows no feature differentiating it from that of the Zambesi, and not a few species are common to both. Although no striking discoveries have

resulted from the Expedition, Mr. Woosnam is to be congratulated on having supplied a desideratum of long standing in African Ichthyology, which has made such rapid progress during the last few years. I beg to express to him my grateful thanks for all he has done.

The specimens in the collection number 87, referable to 25 species\*. They are now preserved in the British Museum.

Mr. Woosnam's report is here appended, and I may add that the notes and coloured sketches he has made on the fishes in the fresh condition have been useful in drawing up descriptions of the new or imperfectly known species.

“With regard to the present small collection from Ngamiland, although the fish are labelled ‘Lake Ngami’ for the convenience of reference to maps, they come in reality from the Okovango river and vast extent of marshes (of which Lake Ngami is a part) into which the river opens out before it continues its way as a single great river known as the Botletle or Zouga.

“The physical geography of Ngamiland and the Kalahari Desert may shortly be said to consist of a great shallow basin or valley surrounded by higher land. There is only one outlet to the sea towards the Orange river. The lowest part of the whole central and North Kalahari basin is the Great Makarikari Salt Pan, and I am inclined to think that there is a low, broad ridge running across the Kalahari somewhere about 23° South, and forming a low watershed between the Okovango and Nolopo Nosop river-systems; it was part of this ridge which we noticed north of Lehutitu.

“Travelling from Lehutitu to Okwa one passes for three or four days by ox-wagon over a strip of country which rises some 400 feet above that south of Lehutitu, and a thousand feet above Lake Ngami; this elevation would not be detected unless altitudes were taken daily, as the rise is very gradual and undulating, but the condition of the grass on this higher country was most noticeable. Here there had evidently been more rain, and that more recently than below, for there were quantities of young green grass twelve inches high in June, while the surrounding country was scorched and yellow, showing that more moisture and local rains had been attracted by this rising ground. Also, as soon as the descent from this elevation to the Lake was begun there was a marked change in the vegetation, and many semi-tropical trees, plentiful in the lake district, began to appear, marking, I believe, the Ngamiland side of this low watershed. Again, on the east side of the desert there is a similar phenomenon, but more sharply accentuated, the fall from Palapye level to the nearest point of the Botletle river being rather more than 2000 feet. This was noticed by Livingstone in 1849 (see Livingstone's ‘Missionary Travels in South Africa,’ chapter 3, p. 66).

\* Three of the new species, belonging to the family Siluridæ, have been described and figured in the recently published volume of the ‘British Museum Catalogue of African Fresh-water Fishes’ (1911), and the figures are reproduced here by permission of the Trustees

“Now, as I have said, the lowest point of the whole Kalahari basin north of the Orange river is the Great Makarikari Salt Pan, and unless there was some rising ground between it and the Molopo and Nosop rivers, those rivers would probably have drained into it instead of into the Orange river as they do\*.

“At the present day the importance and capacity of Lake Ngami is infinitesimal when compared with the huge extent of the Okovango marshes and periodically flooded area to the north and north-east, and it is important to realize that the origin and only source of all the streams and marshes in Ngamiland is the great Okovango river (the rainfall in Ngamiland being of comparatively little importance in this respect), which rises in the Mosamba Mountains in Portuguese West Africa, and drains an enormous area with a very heavy rainfall from September to February. The result of this is a huge periodical flood which flows down the Okovango into the marshes of Ngamiland, of which Lake Ngami is really a part. These gradually rise and overspread hundreds of square miles of the surrounding country, which is extraordinarily flat, the inundation reaching its highest point not during the rainy season, but towards the end of the dry season, about August or September. None of this water finds its way out to the sea, but after filling the marshes north of the lake, and formerly the lake itself, flows on down the Botletle until lost by evaporation and percolation. No doubt on many occasions in the past some of this flood has reached the Great Makarikari Salt Pan, which is the lowest point of the whole Okovango river-system; but apparently no flood has been large enough to reach the Makarikari for many years, although an old dry river-bed can be traced a long way to the east of the present end of the Botletle.

“There is no doubt that it is only quite recently that the water-supply of Lake Ngami has failed, and the lake partially dried up, for although the processes which brought about this result must have been in progress long before Livingstone's visit in 1849, his description of the lake and his picture clearly show it to have been then an imposing sheet of water, and to a great extent open. To-day Lake Ngami is just a great reed-bed, which dries up almost entirely by the beginning of the periodical flood. Whether there are any large pools and open sheets of water in the interior of this reed-bed which do not dry up I cannot, unfortunately, say, as no white man has ever been far into the lake †, and native evidence is not unanimous on the subject; but I am certainly inclined to agree with those who say that by about March the Lake is absolutely dry on the surface, except for a few shallow pools at the south-east corner,

\* “The watershed between the Zambesi and the Okovango river-systems is a low and very ill-defined one, and it is a doubtful question whether during the times of highest flood the Okovango marshes are not connected with the Chobe marshes.”

† “It was very unfortunate that this point could not be cleared up, but owing to the sudden serious illness of my companion, a hasty retreat had to be made to the railway-line before the exploration of the centre of the Lake had been carried out.”

where it is connected with the Botletle. The explanation of this change in the water-supply of the lake is to be found in the fact that previously one of the many large channels of the Okovango, called the Téoughé, ran into the lake at the north-west corner, but by a natural process of reed-growth and silting-up this channel has gradually become choked, till now no water at all finds its way into the lake from the north-west, and its only source of supply is at the south-east corner, where it is connected with the Botletle by a kind of backwater or arm, and through this it receives a certain amount of water when the floods have risen sufficiently high in the Botletle\*. Into this backwater from the Botletle another channel from the Tamalakan (merely another name for the upper part of the Botletle) also runs, which brings a good deal of water towards the end of the flood season, but the lake never fills now to anything like its former level.

"As far as the value of the fish collection goes, I feel quite confident that there are not and never have been any fish in Lake Ngami which are not also in the Okovango and marshes, and although it would have been of interest geographically to penetrate to the centre of the lake, it would not have produced many new fish. But that there are fish in the upper waters of the Okovango which are not found in the marshes is highly probable."

#### MORMYRIDÆ.

##### 1. MARCUSENIUS CASTELNAUI, sp. n. (Plate XXXVIII. fig. 1.)

Depth of body 3 times in total length, length of head  $3\frac{2}{3}$  times. Head as long as deep, twice as long as broad; snout rounded,  $\frac{1}{5}$  length of head, projecting very slightly beyond mouth; mouth small, well below level of lower border of eye; teeth small, notched, 7 in upper jaw, 8 in lower; eye rather indistinctly defined, nearly as long as snout, its diameter not  $\frac{1}{2}$  interocular width; posterior nostril a little lower down than upper, close to eye. Dorsal fin 17, originating above fourth ray of anal, its length half its distance from head, upper border slightly convex in front, longest ray  $\frac{2}{5}$  length of head. Anal 23, similar to dorsal but longer, equally distant from base of ventrals and from base of caudal. Pectoral pointed, a little shorter than head, twice as long as ventral, extending to middle of latter. Caudal fin with rather short, rounded lobes. Caudal peduncle  $2\frac{1}{2}$  times as long as deep, a little shorter than head. 48-50 scales in lateral line,  $\frac{10-11}{14-15}$  in transverse series on body,  $\frac{8}{7}$  in transverse series between dorsal and anal, 12 round caudal peduncle. Pale brownish, darker on the back, spotted and marbled with dark brown; fins brown.

Total length 70 mm.

\* "Livingstone says that 'this channel has never been observed to flow either way, and is as stagnant as the lake itself.' This is certainly not so at the present day, for at the time of our visit it was running into the lake in a strong deep stream."

This small Mormyr, of which two specimens are in the collection, is most nearly related to *M. Uhuysi* Stdr., from the Senegal, which differs principally in the higher number of dorsal and anal fin-rays.

2. GNATHONEMUS MACROLEPIDOTUS Peters.

Numerous specimens, with 21 to 26 rays in the dorsal fin and 27 to 30 in the anal.

A third Mormyr, evidently of the genus *Mormyrus*, has been reported by Castelnau from Lake Ngami, and diagnosed as follows (p. 61):—

MORMYRUS LACERDA.

“Longueur totale, 0 m. 36.—Hauteur du corps, 0 m. 09.—Epaisseur, 0 m. 45.

“Forme ordinaire du genre; les yeux placés aux deux tiers de la hauteur de la tête; dents de la mâchoire supérieure au nombre de quatre, réunies en devant en un petit faisceau; elles sont assez longues, avancées et bifides à l'extrémité. Celles de la mâchoire inférieure forment une rangée autour de la bouche; elles sont fortes, carrées, en forme d'incisives et échancrées au milieu.

“D'un gris sale, avec le dessus de la tête noire, et le dessous de la gorge d'un jaune doré. L'anale est noire.

“Dorsale, 72.—Anale, 19.—Ventrals, 6.—Pectorales, 14.—Caudale manque.”

CHARACINIDÆ.

3. SARCODACES ODOË Bl.

*Hydrocyonoides cuvieri* Castelnau, op. cit. p. 66.

A single specimen.

4. ALESTES LATERALIS Blgr.

Numerous specimens.

A *Hydrocyon*, probably identical with the widely distributed *H. lineatus* Blkr., has been recorded by Castelnau under the name of *Hydrocinus vittatus* (p. 65).

CYPRINIDÆ.

5. BARBUS TRIMACULATUS Peters.

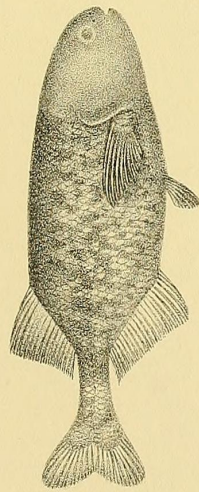
Four specimens.

6. BARBUS PALUDINOSUS Peters.

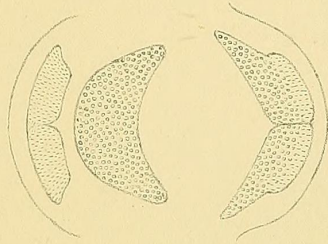
A single specimen.

## PLATE XXXVIII.

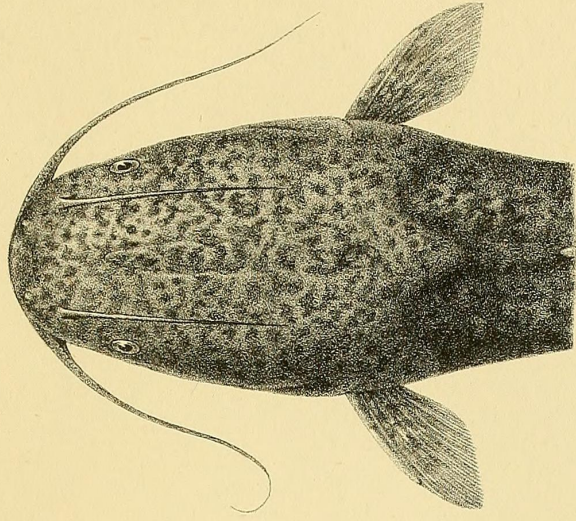
- Fig. 1. *Marcusenius castelnaui* Blgr., p. 402.  
2. *Clarias ngamensis* Casteln., p. 404, with upper view of head (*a*) and enlarged view ( $\frac{3}{2}$ ) of dentition of upper jaw and palate (*b*).



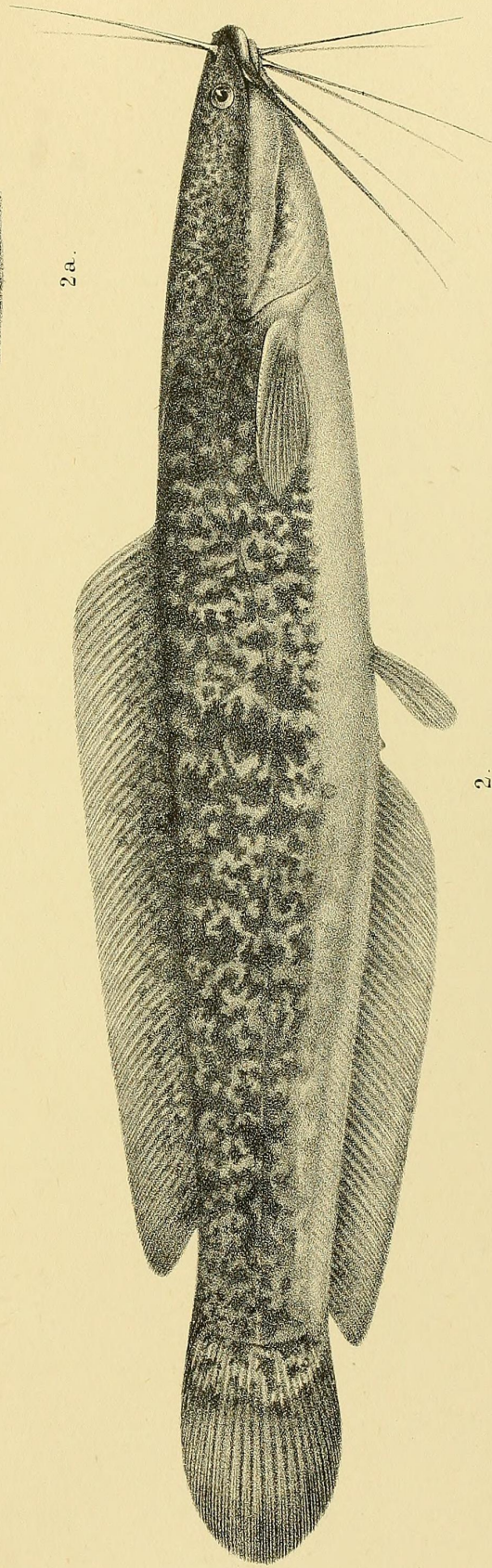
1



2b



2a.



2.

1. MARCUSENIUS CASTELNAUI.

2. CLARIAS NGAMENSIS.