

DR. KARL JORDAN'S EXPEDITION TO SOUTH-WEST AFRICA AND ANGOLA :

THE FRESH-WATER FISHES.

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(With Plates I and II.)

THE fishes collected by Dr. Karl Jordan on his expedition to Angola and South-west Africa are in the collection of the British Museum (Natural History), and have been entrusted to me for description, after preliminary determinations had been made by Mr. Norman. Seventeen species and subspecies are represented, eight of which are here described for the first time. A list of species grouped under localities will be found at the end of this paper.

Our knowledge of the fishes of Angola is due chiefly to the work of Steindachner¹ and Boulenger. Boulenger's descriptions up to 1916 are gathered together in his *Catalogue of African Fresh-water Fishes*,² and are based mainly on the collections of Welwitsch, Ansorge and Wellman. More recently Nichols and Boulton³ have described a collection made on an expedition sent to Angola by the American Museum of Natural History, and led by Mr. A. S. Vernay. Angolan species have also been described by Pellegrin,⁴ Fowler,⁵ and Norman.⁶

Nichols and Boulton obtained their Angolan fishes from two localities, one in the Cuanza system, the other in the Cunene system. As none of their species was common to the two localities, they advanced tentatively the suggestion that Angola could be divided into two faunal areas, the northern centring round the Cuanza, related zoogeographically to the Congo region, the southern related to South and East Africa. Dr. Jordan's collection has so few species in common with the American one, and includes such a high percentage of hitherto undescribed species, that it emphasizes our ignorance of the ichthyology of this region at the same time that it diminishes it. The watershed from which the Cuanza, Cuvo, Luculla, and Catumbela flow northwards and westwards may have a minor importance as a zoogeographical barrier. There is no precise record of *Barbus kessleri* to the south of it, but *Haplochromis philander* is recorded from an affluent of the Cuanza as well as from South-West Africa and other south-tropical localities, *Tilapia sparrmani* is recorded from the Que River, as well as from farther south and east, and *Barbus paludinosus* is represented in Dr. Jordan's collection by a single specimen from the Cuvo system, as well as by numerous specimens from South-West Africa. Worthington⁷ and Poll⁸ have recently demonstrated the close relationship between the fish-faunas of the upper reaches

¹ Steindachner, *Verh. Zool.-Bot. Ges. Wien*, xvi, 1866, pp. 761-771, pls. xiii-xvii.

² Boulenger, *Cat. Fresh-W. Fish. Africa*, vols. i-iv, 1910-1916.

³ Nichols and Boulton, *Am. Mus. Novit.*, no. 264, 1927.

⁴ Pellegrin, *Bull. Soc. Zool. France*, xlvi, 1922, p. 118.

⁵ Fowler, *Proc. Ac. Nat. Sci. Philad.*, lxxxiii, 1930, pp. 27-83.

⁶ Norman, *Ann. Mag. Nat. Hist.* (9), xii, 1923, p. 695.

⁷ Worthington, *Ann. Mag. Nat. Hist.* (10), xii, 1933, p. 34.

⁸ Max Poll, *Ann. Mus. Congo Belge* (1), iii, fasc. 3, p. 101.

of the Zambezi and of the southern affluents of the Congo, in Northern Rhodesia and Katanga; Angola, in its fauna, has much in common with this region, and this applies to the Cunene as well as to more northern rivers. More definite conclusions must await a far more complete exploration of the streams, rivers, and marshes of tropical Africa.

In the report which follows I have endeavoured to show the true relationships of new species, and to summarize the distribution of those already known, in such a way as to make them available for zoogeographical study.

Special interest attaches to certain fishes in the collection. Males and females of a new species (or subspecies) of *Xenopomatischthys* provide additional confirmation of Max Poll's discovery that this name was given to males of the genus *Kneria*, and should now be placed in the synonymy of that genus. In seeking the affinities of the new *Micralestes* it has been found that several species are wrongly placed in the genus *Petersius*, and the necessity for a revision of this group of Characins becomes apparent. An unpigmented, cave-dwelling *Clarias*, which, however, has not lost its eyes, is described. Before naming the *Cichlidae* I made a revision, soon to be published, of the species of *Haplochromis* found in the rivers and smaller lakes of Africa.

1. ***Kneria polli*** sp. n. (Pl. I, figs. 1, 2).

Depth of body $5\frac{1}{2}$ to 6 in the length, length of head $4\frac{3}{4}$ to $5\frac{1}{4}$. Width of head a little less than depth at occipital region, $1\frac{3}{4}$ to 2 in length of head. Snout 3 to $3\frac{1}{3}$ in length of head, diameter of eye $3\frac{1}{2}$ to $4\frac{1}{6}$, interorbital width $2\frac{3}{4}$ to 3. Eyes lateral. Mature males with a cupped outgrowth on the operculum and a series of oblique laminae behind the gill-opening; no spines on the head. Dorsal 2 or 3 + 7 + 0 or 1; origin equidistant from end of snout and base of caudal, above or immediately behind base of pelvic. Anal 3 + 7-8 + 0 or 1; base equidistant from origin of pelvic and root of caudal, or a little nearer caudal. Pectoral 1 + 11-13; $\frac{5}{8}$ or nearly as long as head. Pelvic 1 + 7 + 0 or 1; as long as or a little shorter than pectoral. 84 to 98 scales in a longitudinal series, 10 to 13 from origin of dorsal to lateral line, 8 to 10 from lateral line to pelvic. Caudal forked. Caudal peduncle twice as long as deep. Yellowish; a series of dark spots, united by a narrower band, along lateral line or its posterior $\frac{2}{3}$; a series of 3 to 5 round dark spots on either side of mid-dorsal line in front of dorsal fin; sometimes a spot at origin of dorsal; fainter dark markings along back and sides; upper part of head dark, lower parts of head and trunk pale; caudal spotted or clear, other fins clear.

Five males and nine females, 41 to 50 mm. to base of caudal; also two immature females and one immature male (without the opercular accessory organ); all from a brook at Mt. Moco, Angola (Cuvo River system).

I have pleasure in naming this species after Dr. Max Poll,¹ who first recognized the opercular apparatus of *Xenopomatischthys* to be a character of the mature male, and not generic. Dr. Poll, however, did not venture to abolish the name *Xenopomatischthys* without first knowing the sex of the described specimens of both *Kneria* and *Xenopomatischthys*. After examining the British Museum material, I have no hesitation in uniting the two genera. The types of *Xenopomatischthys ansorgei* are males. The type of *Kneria marmorata* and the three types of *K. spekei* are females. Two other specimens of *K. spekei*, 40 and 41 mm.

¹ Ann. Mus. Congo Belge, iii, 1933, p. 116.

to base of caudal, have immature gonads. Six specimens of *K. cameronensis* are spent fish, in four of which the gonads are empty, membranous sacs; in the remaining two a few ova are retained. A specimen of *K. stappersi* and two of *K. angolensis* are small fish with immature gonads.

The possibility arises that *X. ansorgei* may be a synonym of *K. angolensis*, but on the material available it is difficult to decide this with certainty. They agree in scale-counts and in the position of the dorsal fin. Both species may have short spines on the head. Steindachner states of the types of *K. angolensis* that "der vordere Theil der Schnauze ist ringsum mit kleinen, dohrnähnlichen Auswüchsen besetzt," perhaps only in the male. The types of *X. ansorgei* have such spines, but situated below the eye, extending on to the lower jaw, and a few immediately in front of the eye. If Steindachner had a mature male he could hardly have overlooked the opercular apparatus, which is far more conspicuous than the spines. The spines may perhaps be common to both sexes. Poll evidently considers the two species to be distinct, for he refers a number of specimens of both sexes to *X. ansorgei* and also one to *K. angolensis*. The British Museum material of *K. angolensis*, being immature, is useless for comparison.

Max Poll (*l.c.*) refers all his Katangan specimens with the dorsal originating above the base of the pelvic to *Xenopomatiichthys auricularis* Pellegrin, originally described from Mozambique. Of these, one large sample, from Lake Mweru, agrees with the types in scale-counts (60 to 70 in the lateral line), but a second, from Kansenia, has 75 to 80, and a third, from Elizabethville, has 85 to 90. These should probably be regarded at least as three subspecies, of which the first may be identical with the types and the last identical with or very near *K. polli*. In the absence of details of proportions and coloration, decision on this point must be postponed.

2. *Micralestes argyrotaenia* sp. n. (Pl. I, fig. 3).

Depth of body $3\frac{4}{5}$ to 4 in the length, length of head $3\frac{4}{5}$ to 4. Depth of head $1\frac{1}{3}$ to $1\frac{2}{5}$ in its length, width 2 to $2\frac{1}{4}$. Snout $\frac{3}{4}$ to $\frac{4}{5}$ as long as diameter of eye, which is $2\frac{4}{5}$ to nearly 3 in length of head, a little greater than interorbital width. Maxillary not quite reaching vertical from anterior edge of eye. 6 outer and 8 inner teeth in upper jaw, 8 outer and 2 inner in lower. 13 or 14 gill-rakers on lower part of anterior arch. Dorsal $2 + 8$, originating above base of pelvic and slightly nearer to end of snout than to base of caudal, or at equal distance from both. Anal $3 + 16-18$. Pectoral about $\frac{5}{8}$ head, not reaching pelvic. Caudal peduncle (measured from base of anal) $1\frac{1}{2}$ to $1\frac{3}{4}$ as long as deep. 30 to 32 scales in the lateral line, $4\frac{1}{2}$ from origin of dorsal to lateral line, 2 between lateral line and pelvic. A silvery lateral band with dark upper edge; a narrow, dark, mid-dorsal streak.

Described from six specimens, the types, 48 to 72 mm. to base of caudal, from an upper reach of the Cunene River, Angola. Fourteen other specimens, 37 to 50 mm. long, from the same locality, also belong to this species.

As in some other species of *Micralestes* Boulenger 1899, and *Petersius* Hilgendorf 1894, the anterior and middle rays of the anal fin are longer, stouter and more curved in the male than in the female; there is no filamentous extension.

M. argyrotaenia is closely related to the two Congo species *M. woosnami*¹ (Boulenger 1907) and *M. humilis* Boulenger 1899, in both of which, however, the scales do not exceed 30 in number in the lateral line, and the caudal peduncle is shorter. *M. humilis* is recorded by Poll (*t.c.*, p. 120) also from Lake Mweru, L. Upemba and the rivers that flow into them. *M. luluae* Fowler 1930, of the Lulua River, has fewer anal rays (3 + 13-15) and fewer gill-rakers as well as fewer scales (26 to 29 in the lateral line). All these belong to a group of closely related species, which includes also the widespread *M. acutidens* (Peters 1852).

3. *Barbus paludinosus* Peters 1852.

Barbus paludinosus Boulenger, *Cat. Fresh-W. Fish. Afr.*, ii, p. 115, fig. 92 (1911), and iv, p. 251 (1916).

Sixty-four specimens, 38 to 75 mm. in length to base of caudal, from Satansplatz, S.W. Africa.

Eighteen specimens, 31 to 55 mm. in length to base of caudal, from Voigtsgrund, S.W. Africa.

One specimen, 50 mm. in length to base of caudal, from a brook at Mt. Moco, Angola (Cuvo River system).

This species, with a wide distribution in East and South Africa and known also from the Luapula and Lualaba river systems, has been recorded from the interior of Benguela (Boulenger) and from the Cunene river system (Nichols and Boulton).

4. *Barbus evansi* Fowler 1930.

Barbus evansi Fowler, *Proc. Ac. Nat. Sci. Philad.*, lxxxii, 1930, p. 34, fig. 5.

Dr. Jordan's collection contains two specimens, 31 and 33 mm. in length to base of caudal, from an affluent of the Catumbela River, Angola. In them the body is deeper than in the type (depth $3\frac{1}{4}$ times in the standard length), the eye, as may be expected in young fish, is relatively larger ($3\frac{2}{5}$ in length of head), and the anal fin is sheathed at the base by few large scales instead of by many small ones as in the type. The lateral line pierces only a few anterior scales of the longitudinal series. They agree with the type and differ from *B. kessleri*, which appears to be their nearest ally, in having only 22 or 23 scales in a longitudinal series, in the broad suborbital bones, and in the position of the dorsal fin, which is equidistant from the caudal and the posterior edge of the eye.

The species was formerly known only from the type, from the Cuanza River, Angola.

5. *Barbus kessleri* (Steindachner 1866).

Puntius kessleri Steindachner, *Verh. Zool.-bot. Ges. Wien*, xvi, 1866, p. 768, p. xiv, fig. 3.

Barbus kessleri, Boulenger, *Cat. Fresh-W. Fish. Afr.*, ii, p. 138, fig. 115 (1911), and iv, p. 258.

Nineteen specimens, 34 to 50 mm. to base of caudal, from a brook at Mount Moco, Luimbale district, agree very closely with Steindachner's description and figure, and with specimens in the British Museum (Natural History).

¹ I have examined the types of *Petersius woosnami*, *P. ansorgei*, *P. major* and *P. ubalo*, all of Boulenger, and a paratype of *P. nummifer* Boulenger, and find that they all possess a pair of inner mandibular teeth, and should therefore be transferred to the genus *Micralestes*. The remaining species represented in the British Museum (Natural History) are without these teeth, and are true *Petersius*, namely *P. conserialis* Hilgendorf, *P. tangensis* Lönnberg, *P. caudalis* Boulenger, *P. pulcher* Boulenger, *P. occidentalis* Günther, *P. septentrionalis* Boulenger, *P. xenurus* Boulenger and *P. spilopterus* Boulenger. It seems probable that *Petersius* is, even so, a polyphyletic genus. Myers has already made the peculiar *P. spilopterus* the type of a new genus, *Arnoldichthys* (*Rev. Zool. Afr.*, xiii, 1926, p. 174). Pellegrin's genera *Hemigrammalestes* (*Rev. Zool. Afr.*, xiii, 1926, p. 158) and *Hemigrammopetersius* (*t.c.*, p. 157) perhaps form together a more natural group.

The locality of the type is not given more precisely than "Angola." The specimens listed by Boulenger (1911 and 1916) are all from Angola (Cuanza system and "Benguella") and Nichols and Boulton (1927) also record specimens from the Cuanza system. The Angolan specimens in the British Museum agree very well with Steindachner's description, but there are also two from Katanga (see Boulenger, 1920, p. 17) which are not so close. They differ in coloration, the dark lateral band being very well-marked and extending forwards on to the snout, and in having a larger head ($3\frac{1}{3}$ to $3\frac{1}{2}$ in the standard length as against $3\frac{3}{4}$ to 4 in typical specimens);¹ also, in them the posterior barbel does not exceed in length the diameter of the eye. They agree with the Angolan specimens, however, in scale and fin-ray counts, and in having two rather conspicuous dark scales on each side of the base of the dorsal fin. These dark scales are well-marked in the figure of the type and in all the Angolan specimens, except the types of *B. caudimacula* Günther 1868, one of which is figured in Boulenger's *Catalogue*. Poll (*t.c.*, p. 128) also records this species from Katanga.

The scales of the lateral line (not counting one or two on the caudal fin) number 25 to 27 in the specimens from the Luculla River, 25 or 26 in the other Angolan specimens except three of Dr. Jordan's collection, which have only 24. The two Katanga specimens have 26 and 27.

6. *Barbus dorsolineatus* sp. n. (Pl. I, fig. 4).

Depth of body $3\frac{2}{5}$ to $3\frac{3}{5}$ in the length, length of head $3\frac{1}{3}$ to $3\frac{3}{5}$. Snout shorter than diameter of eye, which is 3 to $3\frac{3}{5}$ in length of head. Interorbital width 3 to $3\frac{1}{3}$ in length of head, length of lower jaw $2\frac{1}{5}$ to $2\frac{1}{2}$. Lower jaw included; maxillary extending to below anterior edge or anterior $\frac{1}{4}$ of eye; two barbels at each side, the anterior $\frac{3}{4}$ to as long as diameter of eye, the posterior from as long to $1\frac{1}{2}$ as long. 25 to 28 scales in a longitudinal series, $4\frac{1}{2}$ from origin of dorsal to lateral line, $2\frac{1}{2}$ or 3 between lateral line and origin of pelvic, 11 or 12 round caudal peduncle. Scales radially striate. Dorsal $3 + 7$; third simple ray bony, serrate, its rigid part $\frac{3}{5}$ to $\frac{2}{3}$ length of head; dorsal midway between base of caudal and some part of pupil (rarely anterior part of eye). Scales at base of dorsal not conspicuously enlarged or pigmented. Anal $3 + 5$. Pelvics originating below origin of dorsal. Caudal crescentically forked. Caudal peduncle $1\frac{1}{2}$ to $1\frac{2}{3}$ as long as deep. Colour darker above; a dark stripe before dorsal fin; parietal region dark; a spot at base of caudal; a grey streak extending forwards from this towards head, sometimes bearing one or two dark spots; a larger spot below origin of dorsal; a spot at anterior end of lateral line and often another a little behind this.

Described from twenty-five specimens, 25 to 52 mm. in length to base of caudal, fourteen of which, the types, are from an affluent of the Catumbela River, the others from a locality 20 km. E. of Bocoio. Eight young fish, $13\frac{1}{2}$ to $20\frac{1}{2}$ mm. to base of caudal, also belong to this species. They are without dark spots except that at base of caudal.

This species is evidently related to *B. kessleri*, with which it agrees in the scale-counts, but from which it differs in having a larger head, and a slightly larger mouth, and in the coloration. In one or two of the smaller specimens the lateral line is incomplete.

¹ Boulenger gives $3\frac{1}{3}$ to 4, but among his specimens I find none in which the head is contained less than $3\frac{1}{4}$ times in the standard length.

7. *Barbus wellmani* Boulenger 1911.

Barbus wellmani Boulenger, *Cat. Fresh-W. Fish. Afr. ii*, p. 137, fig. 114 (1911).

Six specimens, 52 to 68 mm. to base of caudal, from a clear brook at Mt. Moco (Cuvo River system), agree very well with the types. In the types and the new specimens I measure the bony interorbital region as from a little more than 3 to $3\frac{1}{2}$ in length of head, thus differing from Boulenger, who probably included the flap of skin over the eye.

The species was hitherto known only from the types, from the interior of Benguela at an altitude of 4,000–5,000 ft.

8. *Barbus breviceps* sp. nov. (Pl. I, fig. 5).

Depth of body $3\frac{1}{8}$ in the length, length of head $4\frac{1}{5}$. Snout as long as diameter of eye, which is $\frac{1}{4}$ length of head. Interorbital width nearly 3 in length of head, lower jaw 3. Mouth subterminal; two barbels on each side, anterior $\frac{1}{2}$, posterior $1\frac{1}{4}$ diameter of eye. Dorsal $3 + 7$, equidistant from caudal and nostril; third ray not enlarged, not serrate, a little shorter than head. Anal $3 + 5$. Pectoral $\frac{3}{4}$ length of head, not reaching pelvic, the base of which is below anterior half of dorsal. Caudal peduncle $1\frac{3}{8}$ as long as deep. Scales with numerous, radiating striae, $33\frac{5\frac{1}{2}}{5\frac{1}{2}}$, $3\frac{1}{2}$ between lateral line and pelvic, 13 round caudal peduncle. Brown above, silvery beneath; a small dark spot at base of caudal and a grey streak from this nearly to head, parallel with line of vertebral centra. Lateral line almost straight, not pigmented.

Described from a single specimen, 50 mm. to base of caudal, from a brook, 100 km. S.E. of Quibala, Angola, Longa River system.

Five young fish from the same locality also belong to this species, which differs from *B. unitaeniatus* Günther 1866 in the smaller head and smaller eye, and in the fewer branched rays in the dorsal fin, and from *B. inermis* Peters 1852 in the deeper body and fewer dorsal rays. Of the species with 7 branched rays in the dorsal it is perhaps nearest to *B. motebensis* Steind. 1894 (from the Transvaal), which, however, has more scales below the lateral line and a larger head.

9. *Barbus mocoensis* n. sp. (Pl. II, fig. 6).

Depth of body 4 to $4\frac{1}{3}$ in the length, length of head $3\frac{3}{4}$ to 4. Snout as long as or a little longer than diameter of eye, which is $3\frac{2}{3}$ to $4\frac{1}{3}$ in length of head; interorbital width 3 to $3\frac{1}{2}$ in length of head. Mouth terminal, its width about $3\frac{1}{2}$ to 4 times in length of head. Two barbels on each side, anterior about $\frac{1}{2}$, posterior $\frac{3}{4}$ to as long as diameter of eye. Dorsal $3 + 7$, equidistant from root of caudal and from anterior part of eye or nostril; last simple ray not enlarged, $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Anal $3 + 5$. Pectoral shorter than head, not reaching pelvic, the base of which is below anterior half of dorsal. Caudal peduncle $1\frac{3}{4}$ to twice as long as deep. Scales with radial striae, 32 or $33\frac{5-5\frac{1}{2}}{4\frac{1}{2}-5\frac{1}{2}}$, 3 or $3\frac{1}{2}$ between lateral line and pelvic fin, 12 or 13 round caudal peduncle. Brown above, silvery beneath; a dark spot at base of caudal, from which a dark streak extends forwards nearly to head, following the line of the vertebral centra; four or five fainter pigment streaks along the longitudinal series of scales.

Thirty-six specimens, 35 to 52 mm. in length to base of caudal ; from a clear brook belonging to the Cuvo River system, at Mt. Moco, Angola.

This species is quite distinct from *B. unitaeniatus*, which has a larger eye, 8 branched rays in the dorsal fin, and the longest dorsal ray from a little shorter than the head to a little longer. The barbels are also shorter than in most specimens of *B. unitaeniatus*. In coloration and in the shortness of the barbels it resembles *B. burgi* Boulenger 1911 of Cape Colony, but in *B. burgi* the mouth is inferior and the scales above the lateral line are larger (4 or $4\frac{1}{2}$ from origin of dorsal to lateral line).

10. *Barbus lineomaculatus* Boulenger 1911.

Barbus lineomaculatus Boulenger, *Cat. Fresh-W. Fish. Afr.* ii, p. 159, fig. 136 (1911), and iv, p. 266 (1916).

The types are from the neighbourhood of Kilimanjaro, and further specimens are recorded from Tanganyika territory, Katanga and Northern Rhodesia (Solwezi River).

Dr. Jordan's collection contains six specimens, 26 to 40 mm. in length to base of caudal, from an upper reach¹ of the Cunene River, Angola. They agree very well with the Katanga specimens of *B. lineomaculatus*, and are placed with this species on the length of the barbel and the rather slender form (depth $3\frac{1}{2}$ to 4 in the length). The scales number 27 to 29 in the lateral line, $4\frac{1}{2}$ or $5\frac{1}{2}$ from origin of dorsal to lateral line, $2\frac{1}{2}$ or 3 between lateral line and pelvic. The anterior barbel is about as long as the diameter of the eye, the posterior $1\frac{1}{3}$ to $1\frac{1}{2}$ times as long. The diameter of the eye is contained $2\frac{2}{3}$ to 3 times in the head. The caudal peduncle is twice or nearly twice as long as deep. There are four to six, usually four, dark spots along the middle of the side, a fainter one at the anterior end of the lateral line, a dark spot at the origin of the dorsal fin and a larger one at the base of the anal. The upper scales and sometimes also those of the lateral line are pigmented basally. The dorsal fin formula is 3+8, the anal 3+5.

The relationship between the specimens assigned to *B. unitaeniatus* and *B. lineomaculatus* is probably not correctly expressed by dividing them between the two specific names. The species were distinguished in Boulenger's *Catalogue* (1911) by the coloration and by the length of the barbel, which was stated to be 1 to $1\frac{1}{4}$ times the diameter of the eye in *B. unitaeniatus*, $1\frac{1}{2}$ to twice in *B. lineomaculatus*. The scales of the lateral line were given as 30 to 33 in *B. unitaeniatus*, 30 to 32 in *B. lineomaculatus*.

Subsequently Worthington (1933, p. 44) recorded thirty-two specimens of *B. unitaeniatus* from the Luapula River system having 29 or 30 scales in the lateral line, and I find that, of the specimens recorded by Boulenger in vol. iv of his *Catalogue* (1916), two from the Luculla River, and four from Banga Ngola, Angola, as well as two from Zululand, have 27 to 29. Also the specimens of *B. lineomaculatus* from Katanga and Rhodesia have 27 to 30 scales. The range of variation in scale-counts for both species is thus 27 to 32 or 33. The length of the barbels does not seem to be correlated with scale-counts ; in the Angolan specimens of *B. unitaeniatus*, from the Bengo and Luculla Rivers, with 30 to 32 scales, the posterior barbel is not longer than the diameter of the eye, in a Zululand specimen with 34 scales it is a little longer ; in the Angolan specimens with 27 to 30 scales it is about $1\frac{1}{4}$ the diameter of the eye, in the Zululand specimens

¹ Probably the Cuando R.; cf. p. 51.

with 27 to 29 scales it is as long as the diameter of the eye or a little longer; in the Luapula River-system specimens it is once to $1\frac{1}{2}$ as long. The Luapula River specimens, however, differ from those of Dr. Jordan's collection here assigned to *B. lineomaculatus* in having a smaller eye (3 to $3\frac{3}{4}$ in length of head), and in this they differ also from most small specimens of *B. unitaeniatus*, but agree with them in having a rather deep, compressed body.

In considering the geographical distribution of these little fishes, their likenesses are perhaps more important than their differences, and they should be thought of as a single systematic unit liable to develop local peculiarities. Such close resemblances as are apparent between the Angolan and Zululand specimens of *B. unitaeniatus* and between the East African, Central African, and Angolan specimens of *B. lineomaculatus* make it impossible, in the present state of our knowledge, to define subspecies.

Farther afield, the relationships of this *B. unitaeniatus*-*lineomaculatus* group are with *B. trispilos* (Bleeker 1863) (Gold Coast and Niger Delta), *B. tetrastigma* Boulenger 1913 (Upper Congo), in which the caudal peduncle is both shorter and deeper, and *B. quadripunctatus* Pfeff. 1896 (East Africa), in which the barbels are much shorter.

B. inermoides Nichols and Boulton 1927, from the Cunene system, is evidently related to *B. unitaeniatus* and *B. lineomaculatus*, and may be identical with the latter. *B. tristigmaturus* Fowler 1934 from Natal is also very near *B. lineomaculatus*.

11. *Clarias dumerilii* Steindachner 1866.

C. dumerilii, Boulenger, *Cat. Fresh-W. Fish. Afr.* ii, p. 257, fig. 213 (1911), and iv, p. 286 (1916).

Four specimens in Dr. Jordan's collection, 137 to 250 mm. in length to base of caudal, from Mt. Moco (Cuvo River system), Angola.¹

One of these is larger than the specimens recorded by Boulenger, and differs from them in certain proportions, as follows: Length of head $4\frac{7}{8}$ in the standard length, diameter of eye 8 times in interorbital width.

The type (in Vienna) is from Angola, and Boulenger's specimens are from Old Calabar, Lower Congo, and Angola.

12. *Clarias cavernicola* sp. n. (Pl. II, figs. 7, 8, 9).

Depth of body $6\frac{1}{2}$ to $8\frac{1}{2}$ in the length, length of head $4\frac{1}{5}$ to $4\frac{3}{8}$. Head $1\frac{1}{2}$ to $1\frac{2}{5}$ times as long as broad, smooth. Occipital process acutely pointed, but a little broader than long. Frontal fontanelle of variable size and shape, more or less sole-shaped, its length $3\frac{1}{2}$ to $4\frac{1}{2}$ in length of head; occipital fontanelle sometimes extending on occipital process. Eyes variously developed, their diameter 6 to 10 times in interorbital width; often sunk in the socket, with the surface skin more or less opaque; upper rim of orbit usually distinct but lower often vague. Interorbital width $2\frac{1}{3}$ to $2\frac{2}{5}$ in length of head, width of mouth from a little more than 2 to $2\frac{2}{5}$. Nasal barbel $\frac{3}{4}$ to nearly as long as head, maxillary $1\frac{1}{4}$ to $1\frac{1}{2}$ as long, outer mandibular about $1\frac{1}{6}$, inner $\frac{5}{8}$ to nearly as long. Praemaxillary band of teeth about $4\frac{1}{2}$ times as long as broad. Vomerine teeth forming a curved band with a median posterior process, or (young) in two groups. 12 to 15 gill-rakers on anterior arch. Clavicles concealed. Dorsal 72-76, its distance from occipital process $\frac{1}{4}$ to $\frac{2}{7}$ length of head, ending at root of caudal. Anal

¹ Common in the neighbourhood of Mt. Moco; the natives brought specimens for us to eat; quite good fried. The specimens sent to the B.M. were caught by myself in a trap.—K. J.

60 to 73, in contact with caudal. Pectoral $\frac{1}{3}$ to nearly $\frac{1}{2}$ length of head, the spine feebly serrated on the outer side, strongly on the inner, $\frac{3}{4}$ to $\frac{5}{6}$ length of fin. Distance of pelvic from caudal $1\frac{1}{2}$ to $1\frac{2}{3}$ that from tip of snout. No pigment, except in the eyes.

Described from six specimens, 106 to 130 mm. to base of caudal. There are twelve other specimens from the same locality, Aigamas Cave, north of Otavi.

The abdomens of all these are swollen and the dark contents of stomach and intestine show through the colourless skin. In three specimens examined the stomach was full of fragments of fairly uniform size, most of which are parts of the dark-brown exoskeletons of insects. These are contained in the excrements of the baboons frequenting the cave. None of the fragments suggested that the prey had been taken whole and alive except a complete insect in a pupal case, a curved white grub, and a flatworm. The debris included several white egg-shells measuring about 2×1 mm.

In numerical characters and in the positions of the fins *C. cavernicola* agrees with *C. alluaudi* Boulenger 1906 of Lake Victoria, but this has longer barbels, a more acute occipital process and a more strongly serrated pectoral spine. In *C. submarginatus* Peters 1882 (Cameroon) the interorbital region is wider, and the dorsal fin is more distant from both head and caudal. *C. dumerilii* Steindachner (Angola) differs in the same ways and also has fewer fin-rays. From all these species, *C. cavernicola* is further distinguished by having no pigment and by the degeneration of the eyes. The blind Clariid fish *Uegitglanis zammарanoi* Gianferrari (1923), of Italian Somaliland, appears to be related to *Gymnallabes* Günther 1867.

13. *Amphilius lentiginosus* sp. n. (Pl. II, figs. 10, 11).

Depth of body $6\frac{1}{5}$ to $6\frac{1}{2}$ in the length, length of head $3\frac{2}{3}$ to 4. Head very slightly longer than broad. Snout broadly rounded, $\frac{1}{2}$ length of head. Diameter of eye $8\frac{2}{5}$ to $9\frac{1}{2}$ in length of head, $2\frac{1}{3}$ to $2\frac{1}{2}$ in interocular width, which is $3\frac{3}{4}$ to $3\frac{4}{5}$ in length of head; posterior nostril nearer to eye than to end of snout. Maxillary barbel a little more than $\frac{1}{2}$ length of head, outer mandibular $\frac{1}{2}$, inner $\frac{1}{3}$. Dorsal $1 + 7$, its distance from root of caudal $1\frac{2}{5}$ to $1\frac{1}{2}$ that from tip of snout. Adipose dorsal $1\frac{1}{3}$ length of rayed dorsal, twice or $2\frac{2}{5}$ its own length distant from latter. Anal $3 + 6$. Pectoral $\frac{3}{4}$ length of head, longer than pelvic, which begins at a distance behind dorsal equal to $\frac{1}{3}$ length of latter. Caudal emarginate, with rounded lobes. Caudal peduncle, measured from end of base of anal, twice as long as deep. A row of papilla-like folds of skin at base of caudal. Throat, belly and undersides of pectoral and pelvic fins pale; rest of body, head and fins covered with small dark spots, over a fainter piebald pattern (which is the same in both specimens).

Two specimens, 115 and 118 mm. in length to base of caudal, from a brook at Mt. Moco (Cuvo River system).¹

Perhaps nearest to *A. natalensis* Boulenger, but differing from this especially in the more slender caudal peduncle and the shorter adipose fin. The papillae at the base of the caudal fin are absent in *A. natalensis*, *A. platychir* Günther 1864 and *A. grandis* Boulenger 1905, but are present, and more elongate, in *A. grammatophorus* Pellegrin 1913 and *A. longirostris* Boulenger 1901, and are weakly developed in *A. opisthophthalmus* Boulenger 1919.

¹ Obtained together with *Clarias dumerilii* in a trap placed in the clear brook, the bottom of which is covered with pebbles and stones.—K. J.

14. *Tilapia guinasana* sp. n.

Depth of body $2\frac{1}{3}$ to $2\frac{3}{5}$ in the length, length of head from a little less than 3 to $3\frac{1}{6}$. Snout from a little longer than diameter of eye to $1\frac{3}{4}$ as long. Diameter of eye 4 to 5 in length of head, depth of preorbital $4\frac{1}{4}$ to $4\frac{1}{5}$, interorbital width $2\frac{3}{4}$ to $3\frac{1}{3}$, length of lower jaw $2\frac{2}{3}$ to nearly 3. Jaws equal anteriorly; maxillary not extending to below eye. Teeth in 4 to 7 series, outer bicuspid, inner tricuspid, 52 to 58 in outer series of upper jaw. 1 or 2 series of scales on cheek. 8 to 11 very short gill-rakers on lower part of anterior arch. Lower pharyngeal teeth small, close-set. 27 or 28 scales in a longitudinal series, 3 from origin of dorsal to lateral line. Dorsal XII–XIV 10–11; last spine less than $\frac{1}{2}$ length of head. Anal III 8–10; third spine less than $\frac{2}{5}$ length of head. Pectoral not reaching anal. Caudal truncate or rounded-subtruncate. Caudal peduncle $\frac{4}{5}$ to as long as deep. Uniformly blackish or particoloured; or, occasionally, with faint traces of a black band from operculum to caudal and another on upper lateral line.

Thirty-two specimens, 60 to 137 mm. in total length, from Lake Guinas, South-West Africa (W. of L. Otjikoto and Tsumeb, altitude 1,270 m.).

Fishes of less than 85 mm. are included for numerical characters only. They have a relatively larger eye (diameter $3\frac{1}{2}$ in length of head in a 60-mm. fish), and fewer teeth (in the same fish, 32 in the outermost of 3 series in the upper jaw). Otherwise they agree with older fishes.

The low numbers of gill-rakers, of dorsal spines and of scales on the cheek show the relationship of *T. guinasana* to *T. sparrmani* A. Smith 1840, the type of which came from Namaqualand. In *T. sparrmani* of the same size¹ the head is smaller ($3\frac{1}{5}$ to $3\frac{1}{2}$ in the length), the snout shorter (from less than diameter of eye to $1\frac{1}{4}$ as long), the eye larger ($3\frac{3}{5}$ to $4\frac{1}{3}$ in length of head), the preorbital narrower ($4\frac{2}{3}$ to 6 in length of head), and the teeth in 3 or 4, rarely 5, series. On the cheek there are always 2, occasionally 3, series of scales. There is also a notable difference in numbers of dorsal fin-rays, as the following table shows.

Dorsal fin-rays.		<i>Tilapia guinasana</i> (32 specimens).	<i>T. sparrmani</i> (40 specimens).	<i>T. sparrmani</i> (57 specimens), recorded by Poll. ²
Total	22	4	0	—
	23	5	1	—
	24	23	6	—
	25	0	25	—
	26	0	8	—
Spines	XII	9	0	0
	XIII	21	1	1
	XIV	2	29	47
	XV	0	10	9

The number of dorsal rays in the type of *T. sparrmani* was given as XIII 9.

The intestine in *T. guinasana* is long, coiled and thin-walled, and is found

¹ These measurements were made on 16 specimens of *T. sparrmani*, 96 to 140 mm. long, from L. Bangweulu, Upper Zambezi, Katanga, Angola, Namaqualand, Rhodesia and Transvaal. *Tilapia deschauensei* Fowler 1930, from Bechuanaland, is very near, and probably identical with *T. sparrmani*.

² Poll, *l.c.*, p. 141.

to contain the fine remains of vegetable matter, including numerous diatoms. In a specimen of 107 mm. the intestine is over 5 times the total length of the fish.

15. *Haplochromis philander dispersus* subsp. n.

Paratilapia moffati (not Castelnau)¹ Boulenger, *Proc. Zool. Soc. Lond.* 1898, p. 140; Pellegrin, *Mém. Soc. Zool. France*, xvi, 1904, p. 259.

Tilapia philander (part.) Boulenger, *Proc. Zool. Soc. Lond.* 1899, p. 136; Pellegrin, *t.c.*, p. 340.

Tilapia ovalis (not Steindachner)² Boulenger, *Poiss. Bass. Congo*, p. 461 (1901); *Cat. Fresh-W. Fish. Afr.* iii, p. 208, fig. 133 (1915); Pellegrin, *t.c.*, p. 319; Gilchrist and Thompson, *Ann. S. Afr. Mus.*, xi, 1917, p. 505, fig. 131.

Haplochromis moffati (part.) Boulenger, *Tr. Zool. Soc. Lond.*, xviii, 1911, p. 415; *Cat. Fresh-W. Fish. Afr.* iii, p. 300 (1915); Gilchrist and Thompson, *t.c.*, p. 514; Regan, *Ann. Mag. Nat. Hist.* (9), x, 1922, p. 257.

Haplochromis moffati Schreitmüller, *Bl. Aqu. Terr. K.*, xxiii, 1912, p. 724, fig.

Dr. Jordan's collection contains five specimens, two full-grown (89 and 91 mm.) and three young (24 to 40 mm.), from Lake Otjikoto, South-West Africa.³

This subspecies is known from the rivers and lakes of Transvaal, Bechuanaland, Rhodesia, Katanga and Angola. It differs from *H. philander philander* (Weber 1897), from Natal and Mozambique, but slightly, in having a smaller mouth, with shorter premaxillary pedicels (nearly $3\frac{1}{2}$ to 4 in length of head as against 3 to nearly $3\frac{1}{2}$ in *H. philander philander*).

16. *Haplochromis philander luebberti* (Hilgendorf 1902).

Paratilapia luebberti Hilgendorf, *Sitz. Ber. Ges. naturf. Fr. Berlin*, 1902, p. 141; Boulenger, *Cat. Fresh-W. Fish. Afr.* iii, p. 350 (1915).

Haplochromis moffati (part.), Regan, *Ann. Mag. Nat. Hist.* (9), x, 1922, p. 257.

Dr. Jordan's collection contains about forty specimens, 33 to 80 mm. in total length, from Otavifontein, South-West Africa.⁴

This subspecies, hitherto unrepresented in the British Museum (Nat. Hist.), is known only from the neighbourhood of Otavi. From *H. philander dispersus* it differs mainly in the higher numbers of dorsal spines (XV or XVI as against XIII to XV in *H. p. dispersus*).

LIST OF THE FISHES COLLECTED

SOUTH-WEST AFRICA

Barbus paludinosus Peters 1852, Voigtsgrund and Satansplatz, Fish R. system, affluent of Orange River.

Clarias cavernicola sp. nov., Aigamas Cave, north of Otavi.

Tilapia guinasana sp. nov., Lake Guinas, west of Tsumeb.

Haplochromis philander dispersus subsp. nov., Lake Otjikoto.

Haplochromis philander luebberti (Hilgendorf 1902), Otavifontein.

¹ *Chromys moffati* Castelnau (*Poiss. Afr. Austr.*, p. 16, 1861) was insufficiently described, but it is improbable that it is this small species of *Haplochromis*, for Castelnau's specimen was 140 mm. long, and he states that the Cape Museum has one of twice that length. No specimen of *H. philander* is known to exceed 112 mm. total length. *C. moffati* is probably a *Tilapia*.

² *Chromis ovalis* Steindachner 1866 is a synonym of *Tilapia sparrmani* A. Smith 1840.

³ Reported to be plentiful in L. Otjikoto, but we saw very few. The pumping station installed at the Lake may have destroyed the fish, or the water may have been poisoned by the cannon, etc., thrown into the lake by the German contingent before surrendering.—K. J.

⁴ In numbers in the little pool near the police station, none in the swift-running brook from this pool to the farm, but again in numbers in the bathing pool at the farm; evidently prefers quiet water. Many with young in the mouth.—K. J.

ANGOLA.

A brook at Cuito, Mt. Moco, Luimbale, Cuvo River system.

Kneria polli sp. nov.

Barbus paludinosus Peters 1852.

Barbus kessleri (Steindachner 1866).

Barbus wellmani Boulenger 1910.

Barbus mocoensis, sp. nov.

Clarias dumerilii Steindachner 1866.

Amphilius lentiginosus, sp. nov.

A brook south-east of Quibala, Longa River system, probably Nhia River, affluent of Longa River.

Barbus breviceps, sp. nov.

A brook between Lepi and Ganda, Catumbela River system.

Barbus dorsolineatus, sp. nov.

Barbus evansi Fowler 1930.

A brook 20 km. east of Bocoio, probably Balombo River system.

Barbus dorsolineatus sp. nov.

A small river west of Nova Lisboa, affluent of Cunene River.

Micralestes argyrotaenia sp. nov.

Barbus lineomaculatus Boulenger 1903.

EXPLANATION OF PLATES I AND II

Pl. I. Fig. 1. *Kneria polli* sp. nov., female, 54 mm.

2. *Kneria polli* sp. nov., male, 58 mm.

3. *Micralestes argyrotaenia* sp. nov., female, 91 mm.

4. *Barbus dorsolineatus* sp. nov., 64 mm.

5. *Barbus breviceps* sp. nov., 60 mm.

Pl. II. Fig. 6. *Barbus mocoensis* sp. nov., 65 mm.

7. *Clarias cavernicola* sp. nov., 147 mm.

8. *Clarias cavernicola*, dorsal view of head of another specimen.

9. *Clarias cavernicola*, premaxillary (a) and vomerine (b) teeth of a specimen 122 + 15 mm.

10. *Amphilius lentiginosus* sp. nov., 142 mm.

11. *Amphilius lentiginosus*, dorsal view of head.



1936. "Dr. Karl Jordan's expedition to South-West Africa and Angola: The fresh-water fishes." *Novitates zoologicae : a journal of zoology in connection with the Tring Museum* 40, 63–74.

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