During a year's stay in Anglo-Egyptian Sudan in 1920 Dr. Harald Engelsen collected various zoological material for the Bergen Museum; the expenses were covered by a generous grant from Mr. O. Grolle Olsen, Bergen. Fishes were collected in the following localities: — The White Nile, principally at Khartum, a few specimens also at Bahr-el-Zeraf. On the river Yei, at Yei, at Ramadalla (to the north of Yei) and at Aluma (to the south of Yei).

The fishes from the Yei are of special interest because, as far as I know, nothing has been published of the fish fauna of this district. The following nine species were found here: —

Alestes macrolepidotus, *Micralestes acutidens*, *Barbus werneri*, *Barbus yeiensis* n. sp., *Barilius niloticus*, *Barilius loati*, *Allabenchelys engelseni* n. sp., *Tilapia zillii* and *Anabas nanus*.

This list, though of course far from complete, is all the same suggestive as to the character of the fish fauna of this district. Besides species of a wider range and forms from the Nile system (as *Barbus werneri*, hitherto only known from the lower Nile), we have here forms showing connections with the faunas of Congo and South Cameroon. *Barbus yeiensis* n. sp. comes nearest to *B. nigeriensis* Blgr. from the lower Niger and Cameroon, *Anabas nanus* Ghtr. was hitherto recorded from South Cameroon to Congo, but most noteworthy is the presence of an *Allabenchelys;* of the five species hitherto described of this genus two are from South Cameroon, two from Congo and one from near the west coast of Tanganyika.

For the determination I have principally used the excellent work of G. A. Boulenger: "Catalogue of the Fresh-water Fishes of Africa". During a visit in 1924 to the British Museum (Natural History) I took the opportunity of comparing some of my specimens with the rich material of this institution. My best thanks are due to Mr. J. R. Norman, who in every way facilitated my work. I am also indebted to him for giving me his opinion on the two species described here as new, as well as for various information which he afterwards has sent me on fishes in his charge.

Mormyridae.

Mormyrops anguilloides (Lin.).

Khartum, 3 specimens, total length 215, 325 and 510 mm. Boulenger (I p. 35) gives the total length of his largest specimen as 310 mm.[1]) The species attains a much larger size. My specimen of 510 mm. is, however, also far from the maximum size of the species as Pekkola (1919 p. 113)[2]) has measured a specimen which was "1 m. 15 cmt. long".

M. anguilloides has previously only been reported from the White Nile by Pekkola, the lower Nile (to the north of the first cataract) being stated by Boulenger as the general distribution of the species.

Petrocephalus bane (Lacép.).

White Nile, Khartum, June 10th, 3 specimens, 113, 122 and 145 mm.

Gnathonemus cyprinoides (Lin.).

Bahr el Zeraf, April 28th, one specimen, 160 mm.

Mormyrus kannume Forsk.

Khartum, one specimen, 480 mm.

Characinidae.

Hydrocyon forskalii Cuv.

Khartum, 5 specimens, 63, 110, 145, 230 and 460 mm.

Hydrocyon brevis Gthr.

Khartum, one specimen, 400 mm.

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[1]) The total length as measured by Boulenger (I p. VI) is from the end of snout to the extremity of the middle rays of the caudal fin. In this paper the total length of the fish is measured from the end of the snout to the tip of the caudal rays. When not expressly stated as total length, the size of the specimens is, however, generally given as the length exclusive of the caudal fin.

[2]) W. Pekkola. Notes on the habits, breeding and food of some White Nile fish. Sudan Notes and Records. Vol. II, no. 2. Cairo 1919.

Alestes dentex (Lin.).

Khartum, 3 specimens, 133, 145 and 265 mm.

Alestes baremose (Joann.).

Khartum, 6 specimens, 120, 132, 137, 145, 145 and 163 mm. White Nile, Khartum, June 6th, 3 specimens, 113, 120 and 143 mm.

Alestes nurse (Rüpp.).

Khartum, one specimen 112 mm. White Nile, Khartum, June 10th, 3 specimens, 95, 120 and 130 mm.

Alestes macrolepidotus (Cuv. & Val.).

Ramadalla, Yei, April 14th, many young specimens, 26—44 mm.

Micralestes acutidens (Peters).

Ramadalla, Yei, April 10th, 2 specimens 48 and 65 mm.

Distichodus engycephalus Gthr.

Khartum, 2 specimens, 115 and 120 mm.

Distichodus niloticus (Lin.).

Khartum; a dried head, length 130 mm., I have referred to this species. Boulenger (Cat. I, p. 274) states that the length of head goes from $3^1/_4$ (young) to $5^1/_8$ times in total length. My specimen would then have measured abt. 660 mm., and when the caudal is included (= length of head) abt. 790 mm. in total length. Boulenger gives the maximum size as 700 mm., but then is measured to the tip of the middle caudal rays.

Citharinus citharus (Geoffr.).

Khartum, 2 specimens, 160 and 440 mm.

Citharinus latus Müll. & Trosch.

White Nile, Khartum, June 10th, one specimen 125 mm. This species does not seem to be common at Khartum as neither Boulenger nor Pekkola mention it.

Cyprinidae.

Labeo horie Heck.

White Nile, Khartum, June 10th, 2 specimens, 125 and 155 mm. Khartum, 2 specimens 160 and 485 mm. I have further referred a dried head, length 170 mm., to this species. According to Boulenger (I p. 306) the proportion between head and total length (excl. caudal) is 5 to $5^2/_3$ in adult; this would give a total length of my specimen of abt. 1 metre (1020 mm.—1138 mm.) when the caudal fin (= length of head) is included. The largest specimen measured by Boulenger had a total length of 570 mm., and for the closely related species *L. niloticus,* which is also found at Khartum, he records 470 mm. as maximum.

Barbus bynni (Forsk.).

White Nile, Khartum, June 10th, 3 specimens, 88, 100 and 103 mm.

Barbus werneri Blgr.

Yei, April, 7 specimens, 38—44 mm.

The specimens are not in good condition, thus the number of scales can not be exactly stated. From comparison with specimens in the British Museum (from Lake No) I am inclined to refer my material to *B. werneri* and not to *B. perince*, small specimens of which have a considerable likeness with the first-named form. The size of the scales in my specimens points to *B. werneri*, also the number of spots along the body, generally 3 distinct ones and a fourth (the third in the row) more or less conspicuous. D. 9 in one, D. 8 in six specimens.

Barbus yeiensis n. sp. (Fig. 1).

Depth of body equal length of head, 4 times in length (exclusive caudal); snout a little shorter than eye which is 3 times in length of head; interorbital width 2 times in length of head. Mouth small, subinferior; two barbels on each side, anterior one half the length of posterior which is a little longer than diameter of eye. Dorsal III + 8, equally distant from tip of snout and from root of caudal; last simple ray not enlarged, a little shorter

than head; border straight. Anal III + 5, border slightly rounded. Pectoral a little shorter than head, not reaching ventral; base of latter below first rays of dorsal. Caudal-peduncle $1^2/_3$ as long as deep. Scales large, radiately striated, striæ few and distinct; 23—24 $\frac{3^1/_2}{3^1/_2}$, 2—$2^1/_2$ between lateral line and ventral, 10 round caudal peduncle. Colour (in spirits): Back brownish, a large blotch on the nape, scales of back braoadly edged with brown, sides of head and body silvery, a distinct dark brownish black lateral streak from gill-opening to base of caudal (along lateral line), consisting

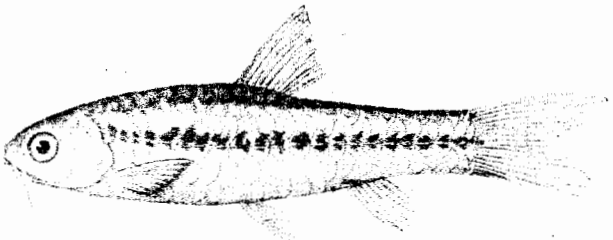


Fig. 1. *Barbus yeinsis* n. sp. Total length 40 mm. × 2.

of large spots. Fins whitish, rays minutely dotted with brownish, especially in the dorsal, pectoral and caudal fin; a few distinct brown spots at upper and lower base of caudal fin and also but more concealed, at the anterior base of anal.

This species seems to come near to *B. nigeriensis* Blgr. from the lower Niger and Cameroon, young of which I have seen in the British Museum. These have a similar lateral black streak (not depicted in the figure given by Boulenger (II fig. 130), but differing in the larger eye, the length of the barbels and the more numerous scales. In the last respect my specimens agree better with *B. humeralis* Blgr. but this form has an entirely different coloration.[1])

[1]) The fig. 131 in vol. II of Boulenger's work does not represent *B. humeralis* but an entirely different species with serrated dorsal ray, viz. *B. miolepis* Blgr. Through an oversight the figures representing these two species (figs. 117 and 131) have changed place in the Catalogue, as will be seen from comparison with the original figures which both appeared in "Annales du Musée du Congo" 1902. Tome II, fasc. 2, Pl. IX, figs. 3 & 1.

Ramadalla (Yei River), April 14th 1920; 3 specimens, total length 40, 38, 37 mm. (Bergen Museum No. 3625; type specimens). From the same locality 2 specimens, labelled April 1920, total length 36 mm.

Barilius niloticus (Joann.).

Ramadalla, Yei, April 10th, 4 specimens, 62, 66, 68 and 70 mm.; from the same locality 5 more specimens dated April.

Barilius loati Blgr.

Ramadalla, Yei, April 10th, 3 specimens total length, 52, 68 and 88 mm. 6 specimens from the same locality labelled April, not in good condition, total length 40—48 mm.

Siluridae.

Clarias anguillaris (Lin.).

Khartum, one specimen 620 mm. Further a dried head, length to occ. process 225 mm., to gill-opening 220 mm. According to Boulenger (Cat. II, p. 226) length of head goes 3 to $3^{3}/_{4}$ times in total length (excl. caudal). This would give a total length of my specimen of abt. 825 mm., and when the caudal is included (= abt. $^{1}/_{2}$ length of head) of abt. 935 mm. Boulenger records 750 mm. as maximum size. The fish grows, however, according to Peccola (*l. c.* p. 17) to a total length of 1.5 metres.

Allabenchelys, Blgr.

As I shall show in the following (pp. 16—22, fig. 9) the diagnosis of this genus must be altered and I propose the following definition: — Characters of *Clarias*, but casque less developed, the sides of head partly unprotected by bone, caused by the postorbital not meeting the supratemporal, letting the postfrontal with free outer border. Dorsal and anal reaching caudal.

Allabenchelys engelseni n. sp. (Figs. 2, 3 & 9).

Depth of body (at anus) $8^{2}/_{5}$ to $9^{3}/_{5}$ in total length (excl. caudal), length of head (to occipital process) 5 times or a little less. Head $1^{1}/_{5}$ to $1^{1}/_{3}$ as long as broad, the bony casque, in

the middle of the head, 1/2 width of head; postorbital bone rather broad (see fig. 9). Head smooth above, frontal and occipital fontanelle very indistinct, the latter just reaching occipital process, which is triangular with acute point. Eye very small, 6 2/3 to 7 times in interorbital width, which is 1/2 length of head. Band of præmaxillary teeth villiform, 4 1/2 to 5 times as long as broad; vomerine teeth conical or subgranular, forming a crescentic band nearly as long and broad as the præmaxillary band. Nasal barbel 3/5 to 2/3 length of head; maxillary barbel as long as head (or

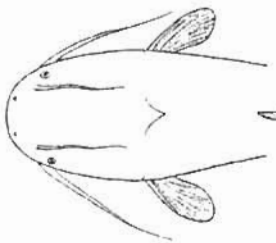
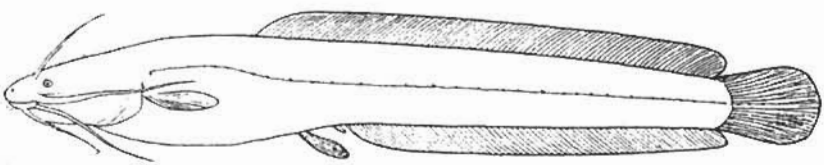


Fig. 2

Fig. 3.



Figs. 2, 1 & 3. *Allabenchelys engelseni* n. sp. Total length 197 mm. × abt. 1/2.

nearly so); outer mandibular barbel 3/4 to 5/6 length of head, inner 1/2 length of head. Gill-rakers on anterior arch abt. 10 in number, short, abt. as long as diameter of eye. Clavicles hidden under the skin. Dorsal 77—80, its distance from occipital process 3/5 to 5/8 length of head. Anal 64—68. Both dorsal and anal narrowly but distinctly separated from caudal. Pectoral about 1/2 length of head, its spine 1/2 length of fin, serrated on outer side. Ventrals 1 2/5 to 1 1/2 as distant from root of caudal as from end of snout. Caudal 1/2 to 3/5 length of head.

Coloration (as far as now can be ascertained): — Dark brown, or in some specimens bluish black above, which seems to be the original colour; underside of head and belly whitish; dorsal, anal and caudal fin brown without any lighter edge.

Measurements, in mm.

Total length	235	227	215	197	127
Total length excl. caudal fin	211	203	194	176	114
Length of head to gill-opening	40	36	34	34	22
„ „ „ to occ. process	44	41	40	38.5	25
Breadth of head	37	30	32	31	20
„ „ bony casque	18	15	15	15	10
Height of body at anus	22	21	23	21	13
Maximal height of body	(23)	—	25	27	15
Diameter of eye	3	3	3	2.6	1.5
Interorbital width	21.5	20	20	19	12.5
Length of snout	13	12	10	11	7
Nasal barbel	26	23	25	24	18
Maxillary barbel	42	35	41	41	27
Outer mandibular barbel	32	34	30	34	19
Inner „ „	22	20	21	20	14
Length of pectoral	23	20	20	19	12.5
„ „ ventral	14	14.5	14	14	8.5
„ „ caudal	24	24	21	21	13
Snout to dorsal	68	—	—	61.5	—
Snout to ventral	86	84	78	72	44
Ventral to caudal	125	119	115	104	65
Occ. process to dorsal	25	26	23	23	14

Proportions.

Height of body (at anus) in total length (excl. caudal)	9.59	9.67	8.43	8.52	8.77
Length of head in total length	4.80	4.95	4.95	4.59	4.56
Breadth of head in length of head	1.19	1.37	1.25	1.26	1.25
Breadth of bony casque in breadth of head	2.05	2.00	2.13	2.06	2.00
Diameter of eye in snout	4.33	4.00	3.33	4.20	4.70
Diameter of eye in interorb. width	7.17	6.67	6.67	7.30	8.30
Interorb. width in length of head	2.05	2.05	2.00	2.06	2.00
Nasal barbel in length of head	1.69	1.78	1.60	1.60	1.40
Max. barbel in length of head	1.05	1.17	0.98	0.93	0.93
Outer mand. barbel in length of head	1.42	1.21	1.33	1.15	1.30
Inner mand. barbel in length of head	2.00	2.05	1.90	1.82	1.78
Snout to ventral in ventral to caudal	1.45	1.42	1.47	1.44	1.48
Snout to dorsal in total length	3.10	—	—	2.86	—
Occ. process to dorsal in length of head	1.76	1.58	1.74	1.67	1.78
Length of caudal in length of head	1.83	1.71	1.94	1.86	1.92

15 specimens from Aluma, Ramadalla und Yei, April 1920; total length (incl. caudal) from 127 to 235 mm. The description is based upon the following specimens (see tables below): — Aluma, 2 specimens, total length 197 mm. (figs. 2, 3) and 127 mm.[1]) (Bergen Museum No. 4131, a, b). Ramadalla and Aluma, 3 specimens 235, 227, and 215 mm., 2 skeletons. (Bg. M. No. 4132, a, b, c, d, e).

Of *Allabenchelys* the following species have been described: —

A. brevior Blgr. from South Cameroon.

A. longicauda Blgr. from South Cameroon.

A. laticeps Steind. from Ituri River, Upper Congo.

A. manyangae Blgr. from Congo.

A. dhonti Blgr. from Kabeke, near west coast of Tanganyika. *A. engelseni* seems to come nearest to *A. brevior*, but differs from this species *inter alia* in the greater number of dorsal and anal rays, this species having D. 65—75, A. 60—65. Mr. J. R. Norman has kindly compared one of my specimens with Boulenger's material and writes to me that in his opinion my specimen represents a species quite distinct from *A. brevior* (and also other species represented in the British Museum), pointing out various characters in which they differ, viz. position of dorsal origin, rather larger head, distinctly broader interorbital width and wider bands of teeth in the jaws in *A. engelseni.*

A. laticeps, which comes nearest in distribution, has about the same number of rays in the vertical fins (D. 74—81, A. 61), but is distinguished by much longer nasal barbels ($1^1/_3$ to $1^3/_5$ times as long as head), and caudal longer than head.

A. longicauda is more elongated, and is further distinguished by its narrow bony casque, position of ventral fins, longer caudal fin; D. 80—90, A. 60—75.

A. manyangae and *A. dhonti* have fewer rays in dorsal and anal (D. 60—67, A. 50—55; D. 55—60, A. 50—53).

Eutropius niloticus (Rüpp.).

White Nile, Khartum, June 10th, one specimen, 110 mm. Khartum, one specimen, 165 mm.

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[1]) The specimen 127 mm. is not included in the description.

Schilbe mystus (Lin.). (Fig. 4).

Bahr el Zeraf, April 28th, one specimen, 150 mm.

Schilbe uranoscopus Rüpp. (Fig. 5).

White Nile, Khartum, June 10th, 2 specimens, 88 and 104 mm. Kharthum, one specimen, 215 mm. Bahr el Zeraf, April 28th, one specimen, 150 mm.

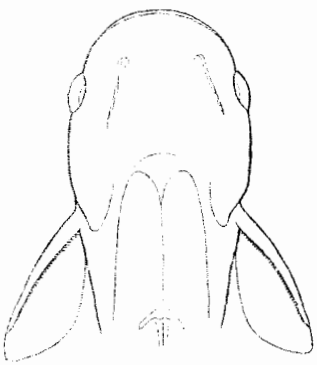

Fig. 4. *Schilbe mystus* (Lin); dorsal view of head × 1.

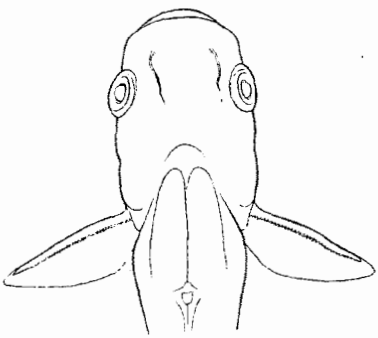

Fig. 5. *Schilbe uranoscopus* Rüpp.; dorsal view of head × 1.

This species agrees in many respects with *S. mystus*. As one of the more striking distinguishing characters between these two species is generally given the difference in the upper profil of the head, being nearly horizontal with the nape ascending very abruptly from the occiput in *S. uranoscopus*, while nearly straight in *S. mystus*. This does not seem to hold good in all cases; the difference in this respect is slightly marked in my two specimens of 150 mm. of these species. More strikingly is the difference in the configuration of the head when this is seen from above (Figs. 4 and 5). Nichols and Griscom[1]) remark of their Congo specimens of *S. mystus* that they have the profil in most cases as described for *S. uranoscopus*.

[1]) Freshwater Fishes of the Congo, p. 709. Bull. Am. Mus. Nat. Hist. Vol. 37 1917.

Physailia pellucida Blgr.

White Nile, Khartum, June 10th, 2 specimens, 62 mm.

Colourless with minute black dots above the brain, on 3—4 of the upper central caudal rays, on the basal half of the maxillary barbel and more diffusely distributed along the basis of anal fin and on the anal rays. Irides silvery. The lateral line is whitish and runs along the middle of the body. My two specimens have a distinct conical anal papilla, 3 mm. long, longer than the nearest anal rays. Anal 66 and 68. The body is not quite smooth but finely rough from minute prickles placed at some distance. Of this species previously only the type specimens were known from the White Nile, caught at Obdurman; it has, however, also been recorded from Lagos and Old Calabar (Boulenger IV p. 296).

Bagrus docmac (Forsk.)

White Nile, Khartum, June 6th, 2 specimens, 95 and 100 mm. Khartum, 2 specimens, 105 and 150 mm. Further a dried head, length to occipital process 213 mm. Length of head goes acc. to Boulenger (Cat. II, p. 310) $3^1/_4$ to 4 times in total length. Accordingly my specimen would have measured abt. 800 mm., and when the caudal fin (= abt. length of head) is included abt. 1 metre in total length. Boulenger records 650 mm. as maximum.

Chrysichthys auratus (Geoffr.).

White Nile, Khartum, June 10th, 2 specimens, 88 and 95 mm.

Clarotes laticeps (Rupp.).

Khartum. To this species I have referred a specimen of which Dr. Engelsen brought home in dried state the head and the body as far as the dorsal spine; length of head 230 mm., tip of snout to dorsal spine 320 mm. This specimen must have been considerably larger than any one hitherto recorded. According to Boulenger the length of head goes $2^4/_5$ to $3^1/_4$ in total length. This would give a total length (incl. caudal) of my specimen of abt. 900 mm.[1])

[1]) In the figure given by Boulenger (Cat. II, fig. 267) tip of snout to dorsal spine goes nearly 3 times in total length inclusive caudal; my specimen would accordingly have measured abt. 960 mm.

Boulenger mentions that the species grows to a total length of 300 mm., having himself seen specimens up to 570 mm.

Auchenoglanis occidentalis (Cuv. & Val.).

Khartum, 4 specimens, total length 137, 253, 260 and 520 mm.; the lastnamed specimen seems to be the largest one on record.

Synodontis schali (Bloch. Schn.).

White Nile, Khartum, June 10th, one specimen, 67 mm.

Synodontis frontosus Vaill.

Khartum, one specimen, total length 280 mm.

Synodontis filamentosus Blgr.

Khartum, one specimen, total length 215 mm. This species was hitherto only known from the type specimen, which was taken at Jebelain, White Nile; it measured 180 mm. in total length. I have nothing to add to Boulenger's description.

Mochochus niloticus Joann.

White Nile, Khartum, Jan. 20th, one specimen, total length 27 mm.

Malopterurus electricus (Gmel.).

White Nile, Khartum, June 10th, one specimen, total length 115; further 3 adult specimens from Khartum, total length 350, 370 and 440 mm. The largest specimen is of stouter build than stated by Boulenger (II, p. 512), height of body going only $3^1/_5$ times in total length (excl. caudal), length of head $3^3/_4$ times into the same, against 4 to $5^1/_2$ times and 4 to 5 times respectively in Boulenger's description.

Serranidae.

Lates niloticus (Lin.).

Khartum, 5 specimens, total length 75, 88, 105, 198 and 250 mm.

Cichlidae.

Tilapia nilotica (Lin.).

Khartum, 6 specimens, 70, 78, 158, 170, 200 and 220 mm.

Tilapia zillii (Gerv.).

Yei, March—April, many specimens 32—128 mm.

I have referred my specimens from Yei to this species, not without some doubt, however, as they have the caudal fin (in adult) scaly nearly all over (abt. $^3/_4$ of length). In his key to the species of *Tilapia* Boulenger (III, p. 143) makes use of this character, placing *T. zillii* in one section with caudal fin not scaly in opposition to another group with caudal fin scaly, *T. christyi* a. o. In other respects my specimens agree well *T. zillii*, and as Mr. J. R. Norman kindly has informed me that the caudal fin frequently is more or less scaly in specimens of *T. zillii* belonging to the British Museum, this character seems to be of little value in distinguishing the species.

T. zilllii has a wide distribution and seems to be subject to considerable variation; the list of synonyms enumerated by Boulenger bears evidence hereto. The number of rays in the vertical fins as stated by Boulenger is: — D XIV—XVI + 10—13, A III + 7—10 (usually 8—9). In 25 specimens from Yei I have found the following variation: —

D XV + 11 in 3 specimens.	A III + 7 in 1 specimen.
D XV + 12 - 21 „	A III + 8 - 24 specimens.
D XVI + 11 - 1 specimen.	

The only specimen with D XVI + 11 had A III + 7. D XV + 12, A III + 8 must accordingly be considered to represent the normal number of rays of the species in this locality.

Anabantidae.

Anabas nanus Günr

Yei, April, two specimens, total length 53 and 65 mm. Baraba, Yei district, April, one specimen, total length 46 mm.

Tetrodontidae.

Tetrodon fahaka Lin.

White Nile, Khartum, Jan. 20th, one specimen, 52 mm.

Notes on the skull of *Allabenchelys* and *Clarias*.

The genus *Allabenchelys* was established by Boulenger[1]) to receive a new species *A. longicauda*, The genus was described as intermediate between *Clarias* and *Clariallabes*, agreeing with the former in the free border of the eye, with the latter in the sides of the head being unprotected by bone. The last-named character Boulenger[2]) later worded: — "Sides of head naked, only the postorbital shield being present". The same diagnosis is repeated in "Cat. Fresh-Water Fishes Africa", vol. III, p. 206. For this work Boulenger had two skeletons of *A. brevior* and *A. longicauda*. I was therefore somewhat surprised, when in some specimens from Yei, which from having the sides of the head partly unprotected and eyes with free border, apparently had to be referred to *Allabenchelys*, I found that the casque consisted of the same bones as in *Clarias*, though in somewhat altered mutual position, thus letting the sides of the head partly unprotected (Fig. 9). Mr. J. R. Norman of the British Museum (Natural History) has on my request examined the two above

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[1]) G. A. Boulenger. Contributions to the Ichthyology of the Congo. I. On some new Fishes from the French Congo. Proc. Zool. Soc. London, 1902 I, p. 234.

[2]) G. A. Boulenger. A Revision of the African Fishes of the Subfamily *Clariinæ*. Proc. Zool. Soc. London, 1907, p. 1063.

mentioned skeletons of *Allabenchelys brevior* and *A. longicauda* and has kindly informed me, that the arrangement of the bones in the skull of *Allabenchelys* as shown in the figure here given (of which I sent him a copy) is the normal condition in the genus.

A thorough description of the skull of *Clarias sp.* has been given by Schelaputin.[1]) Goodrich[2]) has a figure of the skull of *Clarias magur* H. B. As to the interpretation of the elements of the skull of *Clarias* these two authors differ in some respects. According to Goodrich it must remain doubtful where the parietals are to be found; in the text *(l. c.* pag. 377) he says about the *Siluroidei* in general: — ". . . no distinct parietals, these bones being probably fused with the supraoccipital, formed by the combination of a large dermal plate with an endochondral element (unless the parietals are represented by two small supratemporal bones pushed outwards and backwards)". In the explanation to his fig. 367 of *Cl. magur* Goodrich states "supraoccipital, possibly including parietals", but also "frontal, possibly including parietals". On the suborder *Siluroidei* Weber[3]) makes the following statement: — "Parietals generally united with supraoccipital". In his definition of the fam. *Siluridae* Boulenger (Cat. II, p. 218) states: — "Parietal bones usually confluent with the supraoccipital". Schelaputin *(l. c.* pag. 96) decidedly takes the view that the parietals are included in the frontals, naming this element *oo. fronto-parietalia;* in his two specimens of *Clarias sp.* he found a distinct median suture, whilst Huxley (acc. to Schelaputin) in *Clarias capense* (from Congo) describes this element, which he called *frontalia principalia*, as a single bone exhibiting no median suture. This is also the case in Goodrich's figure of *Clarias magur.* This feature is, however, evidently dependant on the age of the specimens, the suture obliterating in old specimens. Thus as regards *Clarias batrachus* Lin. =

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[1]) Gr. Schelaputin. Beiträge zur Kenntnis des Skelets der Welse (Das Cranium von *Clarias*). Bull. Soc. Imp. Nat. Moscou. Nouv. Ser. T. XIX. 1905 (1907), pp. 85—126, 16 Figs.

[2]) E. S. Goodrich. Vertebrata Craniata (1. Fasc. Cyclostomes and Fishes), fig. 367. In: Treatise on Zoology. Pt. IX. Ed. by Sir Ray Lancaster.

[3]) Max Weber. Fishes of the Indo-Australian Archipelago. Vol. II p. 185. Leiden 1913.

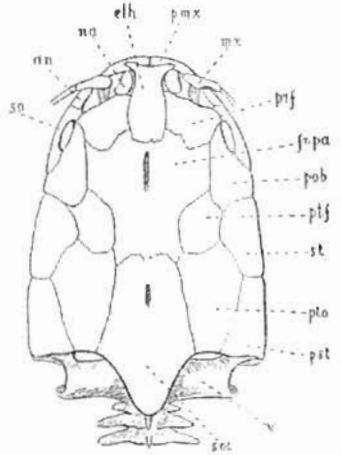

Fig. 6.

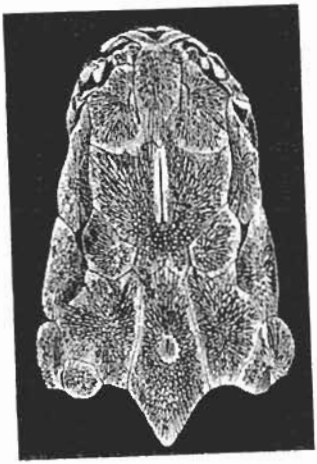

Fig. 7.

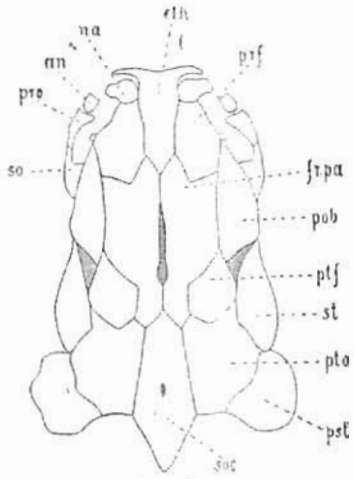

Fig. 8.

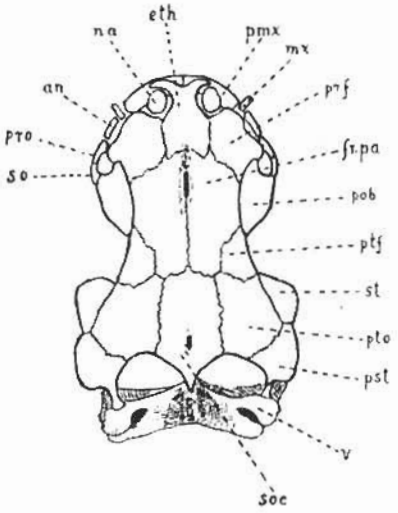

Fig. 9.

Fig. 6. Skull and anterior vertebrae of *Clarias batrachus* Lin. (= *Cl. magur* H. B.). (After Goodrich).
Fig. 7. Skull of *Clarias sp.* (After Schelaputin).
Fig. 8. Skull of *Clarias sp.* (After Schelaputin).
Fig. 9. Skull and anterior vertebrae of *Allabenchelys engelseni* n. sp. × 1.

an. adnasal; *eth.* ethmoid; *fr.pa.* frontal + parietal; *mx.* maxilla; *na.* nasal; *pmx.* premaxilla; *pob.* postorbital; *prf.* prefrontal; *pro.* preorbital; *pst.* post-temporal; *ptf.* postfrontal; *pto.* pterotic; *so.* suborbital; *soc.* supraoccipital; *st.* supratemporal; *v.* expanded processes of anterior vertebrae.

Clarias magur Ham. Buch. (*fide* Weber *l. c.* pag. 190) I have found a very distinct median suture in a specimen total length 120 mm., length of skull 31 mm.; this species grows to a total length of more than 400 mm. (acc. to Weber).

Koscharoff[1]) in his work on the skeleton of the *Siluroidei* strongly supports the views of Schelaputin. In addition to Schelaputin's material of *Clarias* Koscharoff has studied seven other types of this sub-order. In all except *Malopterurus* he has found the fronto-parietalia divided by a median suture, and in one case viz. in very young specimens of *Synodontis macrodon*, this bone by boiling could be divided in two elements which he interprets as the frontal and the parietal bones. (*l. c.* p. 226, fig. 11).[2]) When summing up his results as to the diagnosis of the *Siluroidei* Koscharoff states (*l. c.* pag. 296): — "Die Parietalia verschmelzen bereits früh mit den Frontalia zu Fronto-parietalia (bei *Clarias* ist das Parietale der linken Seite selbständig)." Evidently *Clarias* must here be a slip of the pen for *Synodontis* as no such statement is given under *Clarias*. I have had two small specimens of *Clarias sp.* from Yei, total length abt. 65 and 50 mm., length of skull 15 and 11 mm, but I have not succeeded in getting the fronto-parietal bones divided into a frontal and a parietal element by boiling.

On the other hand, the supraoccipital seems to be always represented by a single undivided bone. True, Parker[3]) remarks of *Callichthys littoralis*, halfgrown, length 5 inches, that this species has two dermo-supra-occipitals (*l. c.* pag. 24, pl. I, fig. 9); but Parker treats this question only *en passant*, without, as it seems, any comparison with other Silurids whose skulls are less complicated than that of *Callichthys* with its many dermal plates. Koscharoff (*l. c.* pag. 253) indicates that the two bones identified by Parker as supraoccipitals are the first dermal dorsal

[1]) D. N. Koscharoff. Beiträge zur Morphologie des Skelets der Teleostier. Das Skelet der *Siluroidei*. Bull. Soc. Imp. Nat. Moscou. 1905 (1907), pp. 209–307, 1 Taf., 72 text-figs.

[2]) In the figure these two elements must have been misplaced, reproduced upside down?

[3]) W. Kitchen Parker. A Monograph on the Structure and Development of the Shoulder-girdle and Sternum in the Vertebrata. London 1868.

plates, while his single parietal really is the supra-occipital. In my young specimens of *Clarias*, length of skull 15 and 11 mm., no median suture is discernible in the supraoccipital; the occipital fontanelle is rather large in the smaller specimen, and a groove is running backwards from it on the small occipital process, giving the impression that on a still younger stage the foramen would have been open in this direction. The occipital process in *Clarias* is developed gradually with age, reaching its final shape later than the other elements of the casque; this might indicate that the supraoccipital is of double origin.

The lateral shield *(st* in fig. 6*)* in the skull of *Clarias* is by Goodrich named lateral cheek-bone, possibly representing the preopercular? By Schelaputin it is called supratemporal.

In the nomenclature of the elements of the skull I have followed Schelaputin and Koscharoff as their views at present seem to be best founded, though these questions can only be finally solved by an investigation of the development of the skull.

A comparison between the skull of *Clarias* (figs. 6—8) and of *Allabenchelys* (fig. 9) shows clearly the near relationship between these two genera. The main difference in the configuration of the skull is caused by a different mutual position of the postorbital, the postfrontal and the supratemporal. In *Clarias* the postfrontal is shut in by the postorbital and the supratemporal, which two bones are in contact with another, forming the side of the casque. In *Allabenchelys* the postorbital and the supratemporal are wide apart, with an unprotected space between, thus letting the postfrontal with a free outer border. This is partly because the supratemporal and especially the postfrontal are somewhat reduced in size as compared with *Clarias*, partly because of an altered position and shape of the supratemporal, which is nearly as broad as long and swung more outwards and downwards, while this element is longer than broad in *Clarias*.

The interesting question then arises whether *Allabenchelys* is to be considered as a more primitive form than *Clarias* or a specialized form. Boulenger has decidedly taken the latter view, "the series *Clarias—Allabenchelys—Clariallabes—Gymnallabes—Channallabes* forming what may be termed an orthogenetic series leading from more typical Cat-fish to one that is truly Eel-like".

(Boulenger 1907, *l. c.* pag. 1062, figs. 248—249). Besides in an elongation of the body, fusion of dorsal and anal fin with the caudal, a reduction and finally in *Channallabes* a suppression of the ventrals and the pectorals takes place. At the same time the bony casque of the head has been gradually reduced. In *Clarias* the lateral parts of the head are protected by the postorbital and supratemporal shields. In *Allabenchelys* and *Clariallabes* — according to Boulenger — the lastnamed element is gone, and in *Gymnallabes* and *Channallabes* even the postorbital shield is absent. As we have seen this does not hold good for *Allabenchelys*, and judging from the figures of the head of *Clariallabes* given by Boulenger (1902, *l. c.* pl. XXII fig. 2; Cat. vol. II, fig. 223) I think it safely to conclude that the elements of the casque are the same as in *Allabenchelys;* and even in *Channallabes* (outline drawing of head in Boulenger 1907, *l. c.* fig. 349; Cat. vol. II, fig. 225) one may suspect that the postorbital and the supratemporal shields are present, though highly reduced, as is the case with the true cranial bones.

These remarks do not refute the theory of Boulenger; on the contrary, the transition from typical *Clarias* to the next stage in the series becomes more gradual when as shown for *Allabenchelys* (and probably also for *Clariallabes)* that the elements of the casque are the same, with some alterations in size and shape. I may add that in some species of *Clarias* the casque will probably show some transition to *Allabenchelys.* Thus f. i. in *Clarias batrachus* (= *Cl. magur)* the casque efficiently protects the sides of the head; the postorbital broadly adjoins the supratemporal (fig. 6); this is even the case in half-grown specimens, length of skull 31 mm.; the only suture, a short one, is between the supratemporal and the posttemporal, but all the same the connection between the lateral shields and the cranial bones is very close without any week places. A somewhat different aspect is represented by the figures of *Clarias sp.* given by Schelaputin *(l. c.* figs. 1 & 2; here reproduced as figs. 8 & 7). Schelaputin does not state the size of his two specimens, only that the one was younger than the other. The younger specimen is probably represented by his fig. 1, a somewhat diagramatic drawing of the head. The postorbital scarcely meets the supratemporal, and the last-

named shield is only on a short distance in connection with the postfrontal, thus letting a triangular space unprotected between them. Schelaputin's fig. 2, which from the pronounced sculpture of the bones must represent an old specimen, still shows an open space between the postorbital, the postfrontal and the supratemporal. This type of skull may well be considered a more primitive one than the skull of the typical *Clarias* as f. i. *Cl. batrachus;* but, on the other hand, it may also be taken as a transitional form from typical *Clarias* to *Allabenchelys*.[1])

The theory of Boulenger is engaging by its simpleness, but it must be admitted that it is mainly based on the outward appearance of the genera in question (elongation of the body, fusion of the vertical fins, reduction of the paired fins) and that a closer analysis of the skeleton etc. is required in order to show (1) that all the said genera can be placed in a series and (2) whether they are to be regarded as primitive or as specialized forms; *Gymnallabes* and still more *Channallabes* may in some respects safely be considered degraded forms.

[1]) Schelaputin does not state the locality of his specimens; Boulenger's series consists of African forms.