Channallabes sanghaensis sp. n., a new anguilliform catfish from the Congo River basin, with some comments on other anguilliform clariids (Teleostei, Siluriformes)

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ABSTRACT. *Channallabes sanghaensis* sp. n., an anguilliform clariid from the vicinity of Ntchouo (Congo River drainage) is distinguished from other Congolese anguilliform clariids by the following combination of characters : a large foramen on the fourth post-Weberian vertebra; two large lateral processes on the second dorsal fin ray pterygiophore; a small supraorbital process on infraorbital IV, not reaching the rostral border of the eye; a fenestra between the scapulo-coracoid and the cleithrum; an interdigitation zone between the quadrate and the entopterygoid; serrations on both sides of the pectoral spine; 86–89 vertebrae; 121-125 dorsal fin rays and 104-124 anal fin rays. An updated identification key is given for the six species of *Channallabes*.

KEY WORDS : *Channallabes,* new species, biometry, osteology

INTRODUCTION

The freshwater clariids are one of the 37 catfish families within the Siluriformes (Sabaj et al., 2004). Although they occur in Syria, southern Turkey and large parts of Southeast Asia, they are most diverse and specious in Africa (Teugels, 1996; Teugels & Adriaens, 2003). This richness is demonstrated by the presence of 12 genera with up to 74 species (Teugels, 1996, Teugels & Adriaens, 2003). Some of the generalised, fusiform species show a large geographic distribution, whereas all anguilliform species, belonging to the genera *Channallabes, Gymnallabes, Dolichallabes, Platyclarias* and *Platyallabes*, occur in a small area, occupying a more specialized, burrowing niche. They can only be found in swampy areas in the Nilo-Sudan (Niger delta), Lower Guinea (Woleu, Ogowe, Ivindo River basin) and the Zaire (Congo River basin) ichthyological provinces (Poll, 1957; Roberts, 1975; Teugels, 1986; Teugels et al., 1990). Obviously, anguilliform clariids are morphologically specialized. Besides the body elongation, a whole set of morphological changes are observed, such as loss of the adipose fin, continuity of unpaired fins, reduction of paired fins, reduction of several skull bones, reduction of the eyes and hypertrophy of the jaw muscle complex (Cabuy et al., 1999; Devaere et al., 2001; 2004).

During an ongoing revision of the alpha–level taxonomy of catfishes from the Congo drainage, a new species of *Channallabes* was discovered and it is the aim of this study to describe the new species and to give an overview on the Congolese anguilliform clariids.

MATERIALS AND METHODS

Material examined is listed below in the species accounts. For this study, we used available museum material from the Royal Museum of Central Africa, Tervuren; British Museum of Natural History, London; Museum of comparative Zoology, Harvard; Musée National d'Histoire Naturelle, Paris; Musée d'Histoire Naturelle de Genève and the Naturhistorisches Museum, Vienna. Institutional abbreviations are listed in Leviton et al. (1985).

For all specimens, 36 measurements were taken point to point using a digital callipers with an accuracy of +/- 0.1mm following Devaere et al. (2004). Measurements of bilaterally paired structures were taken on the left side. Not all specimens were preserved well enough to make all meristic counts. Six specimens were cleared and stained following Taylor & Van Dyke (1985).

The data obtained was submitted to a Principal Components Analysis, using Statistica 6.0 (StatSoft Inc.). Morphometric and meristic data were independently submitted to a PCA, using the covariance matrix for 28 log transformed measurements and the correlation matrix of five meristics. The obtained PC- scores for the meristic data were combined with the PC-scores of the metric data in one plot (Boden et al., 1997). The first principle component was not used as it showed to be a size factor (Bookstein et al., 1985; Teugels et al., 1999). Qualitative and absence/presence characteristics were not included in the analyses but help to further identify and differentiate the species. Between groups variance was tested by Two-way analysis of variance (Statistica 6.0, Statsoft). Basic statistics included the Kolmogorov-Smirnov test and the non-parametric Mann-Whitney U-test.

RESULTS

In the intitial analysis all anguilliform clariids from the Congo River basin are included, inclusive type material of *Platyclarias machadoi* Poll, 1977*, Platyallabes tihoni* (Poll, 1944)*, Gymnallabes nops* Roberts & Stewart, 1976*, Dolichallabes miscrophthalmus* Poll, 1942 and *Channallabes apus* (Günther, 1873).

The PCA's were performed, using the covariance matrix for 28 log transformed measurements and correlation matrix of 5 meristics. Fig. 1 combines the second factor scores for the measurements PCA with the first factor scores for the meristic PCA. We obtain three clear groups. One group, located in the upper left quadrant, contains the type material of *Platyallabes tihoni*. Closely located to that group is the holotype of *Gymnallabes nops*, indicating the questionable systematic status of this species (see discussion). Type material of both species and additional specimens all come from the Lower Congo Rapids, the Lower Congo and the Pool Malebo freshwater ecoregions. A second group located in the upper right corner, contains all type material from *Platyclarias machadoi*. All specimens come from the Kasai freshwater ecoregion. The group, in the lower right quadrant, contains the type material of *Dolichallabes microphthalmus* and *Channallabes apus*. The factor loadings are shown in Table 1. The second principal component for the metric characters mainly reflects the distance between the origin of the dorsal fin and the occipital process and the caudal peduncle depth; while the first principal component of the meristic counts corresponds mainly to the total number of vertebrae and the number of precaudal vertebrae.

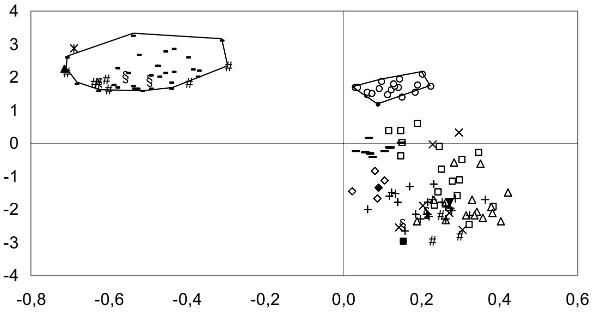

Fig. 1. – Combined plot of all specimens, including type material of *Channallabes apus, Platyallabes tihoni, Platyclarias machadoi, Dolichallabes microphthalmus* and *Gymnallabes nops,* of the scores of the second component (factor 2) taken from a principle components analysis of log-transformed metric variables versus the first principal component (factor 1) taken from a principle components analysis of meristics. × Upper Congo Rapids; □ Central Congo; △ Sudanic Congo; — Sangha; + Kasai; ▾ Tumba; § Pool Malebo; – Lower Congo Rapids; # Lower Congo; ■ holotype of *Channallabes apus*; ◆ holotype of *Dolichallabes microphthalmus*; ◇ paratypes of *Dolichallabes microphthalmus*; ● holotype of *Platyclarias machadoi*; o paratypes of *Platyclarias machadoi*; ▲ holotype of *Platyallabes tihoni*; * holotype of *Gymnallabes nops*.

TABLE 1

Factor loadings for the combined PCA; PCII of a PCA carried out on 28 log-transformed morphometric variables and PCI of a PCA carried but on five meristic variables.

	Factor 2		Factor 1
preanal length	0,170124	number of ribs	-0,478006
prepectoral length	0,209874	precaudal vertebrae	-0,508840
distance between the occipital process and the dorsal fin	0,663950	number of non-rib bearing precaudal vertebrae	0,013902
caudal peduncle depth	0,238794	caudal vertebrae	-0,492487
abdominal body depth	0,197651	total number of vertebrae	-0,519476
maxillary barbel	-0,200894		
external mandibular barbel	-0,224091		
internal mandibular barbel	-0,155758		
nasal barbel	-0,191597		
skull length	-0,005581		
preorbital length	-0,037684		
supraoccipital spine length	0,065308		
skull width	-0,147273		
supraoccipital spine width	0,127108		
inter orbital distance	-0,127932		
anterior nostril interdistance	-0,067250		
posterior nostril interdistance	-0,152486		
rostral skull width	-0,144574		
orbital skull width	-0,160837		
skull height	0,085116		
eye diameter	0,049640		
snouth height	-0,027317		
orbital skull height	0,045248		
prehyoid length	-0,033215		
internal mandibular interdistance	-0,177385		
external mandibular interdistance	-0,160344		
mouth width	-0,168569		
skull roof width	0,069837		

The results of a separate analysis on the cluster around the type material of *Dolichallabes microphthalmus* and *Channallabes apus* (meristic and log-transformed metric data) are shown in Fig. 2. Again three groups can be recognized. The first group (lower left quadrant) includes the type material of *Dolichallabes microphthalmus,* all coming from the Sudanic Congo (Oubangui) freshwater ecoregion. The second group in the upper left corner does not contain any type material and includes all the specimens from the Sangha freshwater ecoregion included in this study. The third group includes the type material of *Channallabes apus* and contains specimens from all ecoregions, except the Sangha (see above). The factor loadings are shown in Table 2. The dominant characters for the second principal component for the metric characters are the length and width of the occipital spine, width of the skull roof, mouth width and the snout height; while for the first principal component of the meristic counts, total number of vertebrae and the number of caudal vertebrae are the most important. The Sangha specimens clearly represent a population that is metrically and meristically distinct from the rest, to which no currently known type–specimen can be assigned. This information, as well as additional, distinctive osteological data (see below), supports the hypothesis that this represents a natural group, and thus a new species.

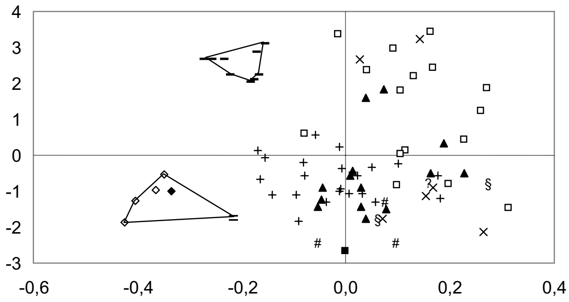

Fig. 2. – Combined plot, including type material of *Channallabes apus* and *Dolichallabes microphthalmus,* of the scores of the second component (factor 2) taken from a principle components analysis of log-transformed metric variables versus the first principal component (factor 1) taken from a principle components analysis of meristic counts. × Upper Congo Rapids; □ Central Congo; △ Sudanic Congo; — Sangha; + Kasai; ▼ Tumba; § Pool Malebo; # Lower Congo; ■ holotype of *Channallabes apus*; ◆ holotype of *Dolichallabes microphthalmus*; ◇ paratypes of *Dolichallabes microphthalmus*; = specimen of *Dolichallabes microphthalmus*.

TABLE 2

Factor loadings for the combined PCA; PCII of a PCA carried out on 28 log-transformed morphometric variables and PCI of a PCA carried out on five meristic variables.

	Factor 2		Factor 1
preanal length	-0,039298	number of ribs	-0,202709
prepectoral length	0,046373	precaudal vertebrae	-0,511543
distance between the occipital process and the dorsal fin	0,060023	number of non-rib bearing precaudal vertebrae	-0,207890
caudal peduncle depth	0,014936	caudal vertebrae	-0,557968
abdominal body depth	0,067776	total number of vertebrae	-0,585394
maxillary barbel	-0,028298		
external mandibular barbel	-0,091223		
internal mandibular barbel	-0,209065		
nasal barbel	-0,179787		
skull length	0,010614		
preorbital length	0,030991		
supraoccipital spine length	0,443546		
skull width	-0,014993		
supraoccipital spine width	0,556500		
inter orbital distance	0,026394		
anterior nostril interdistance	-0,025638		
posterior nostril interdistance	-0,064973		
rostral skull width	-0,089030		
orbital skull width	-0,076638		
skull height	0,099443		
eye diameter	0,228413		
snouth height	-0,290028		
orbital skull height	-0,123188		
prehyoid length	-0,035749		
internal mandibular interdistance	-0,077767		
external mandibular interdistance	-0,074561		
mouth width	-0,336050		
skull roof width	0,297431		

Next, we turn to the remaining large group on the right of Fig. 2, including the type material of *Channallabes apus*. Again, a combined PCA was plotted (Fig. 3). A subdivision can be observed, splitting the remaining specimens into two groups. The group in the upper part of the plot includes the type material of *Channallabes apus* (group I). The most important factor for recognizing these groups are the total number of vertebrae and the number of caudal vertebrae. In Fig. 4, the total number of vertebrae of these specimens is than plotted against the SL. Since the total number of vertebrae could be counted on a larger dataset, more specimens (n = 123) could be included. The two same groups can again be separated, with the cluster including *C. apus* having a higher number of vertebrae. The non-parametric Mann-Whitney U-test showed a p-level of $1.5e^{-15}$ ($p<0.05$), thus rejecting the null-hypothesis of equal means. This shows that the two group are significant different. No other differences (morphometric, meristic, …), however, could be found (see discussion).

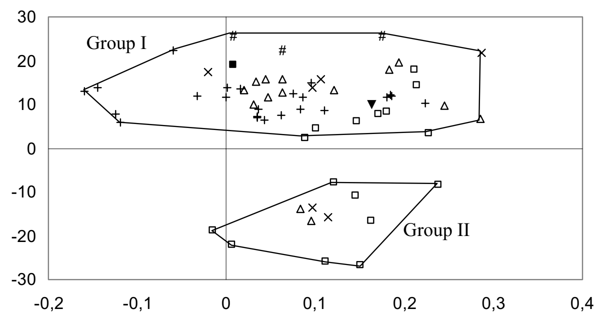

Fig. 3. – Combined plot, including type material of *Channallabes apus*, of the scores of the second component (factor 2) taken from a principle components analysis of log-transformed metric variables versus the first principal component (factor 1) taken from a principle components analysis of meristic counts. × Upper Congo Rapids; □ Central Congo; △ Sudanic Congo; + Kasai; ▼ Tumba; # Lower Congo; ■ holotype of *Channallabes apus*.

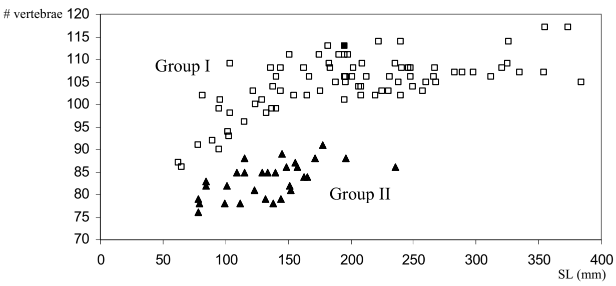

Fig. 4. – Scatterplot of the standard length against total number of vertebrae. ■ holotype of *Channallabes apus*; □ specimens with a high number of vertebrae (Group I); ▲ Specimens with a low number of vertebrae (Group II).

Key to the species of *Channallabes* (updated from Devaere et al., 2007)

1a Small supraorbital process on infraorbital IV, not reaching the rostral border of the eye (Fig. 5a); interdigitation between entopterygoid and quadrate 2

b Large, well-pronounced supraorbital process present on infraorbital IV, reaching the rostral border of the eye (Fig. 5b); no contact between entopterygoid and quadrate 3

2a Fenestra present between the cleithrum and scapulo-coracoid, large foramina at the bases of the parapophyses of the first post-Weberian vertebrae (2nd to 10th) (Fig. 6a), second dorsal fin pterygiophore with two large lateral processes (Fig. 7a). . . *C. sanghaensis*

b No fenestra present between the cleithrum and scapulo-coracoid, small foramina at the bases of the parapophyses of the first post-Weberian vertebrae (2nd to 10th) (Fig. 6b), second dorsal fin pterygiophore with two small lateral processes (Fig. 7b) . . . . *C. apus*

3a Spot present on skull roof between anterior and posterior fontanel, low number of dorsal (98-116) and anal (75-105) fin rays. 4

b No spot present on skull roof, high number of dorsal (118-160) and anal (105-155) fin rays . . . . *C. alvarezi*

4a Serrations only on the posterior edge of the pectoral spine . . . . *C. ogooensis*

b Serrations only on the anterior edge of the pectoral spine . . . . *C. teugelsi*

c Serrations on both edges of the pectoral spine . . . . *C. longicaudatus*

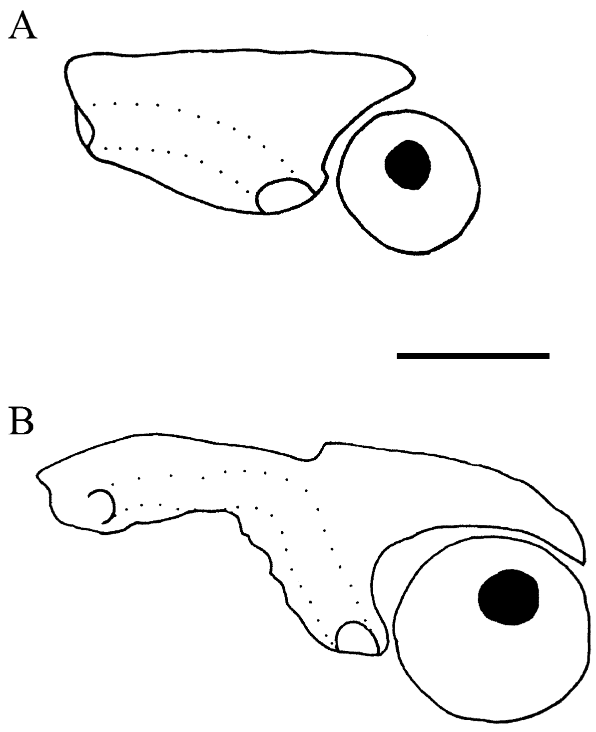

Fig. 5. – Illustration of the extent of the supraorbital process of infraorbital IV. **a** : supraorbital process not reaching the rostral border of the eye; **b** : supraorbital process reaching the rostral border of the eye (scale = 1mm).

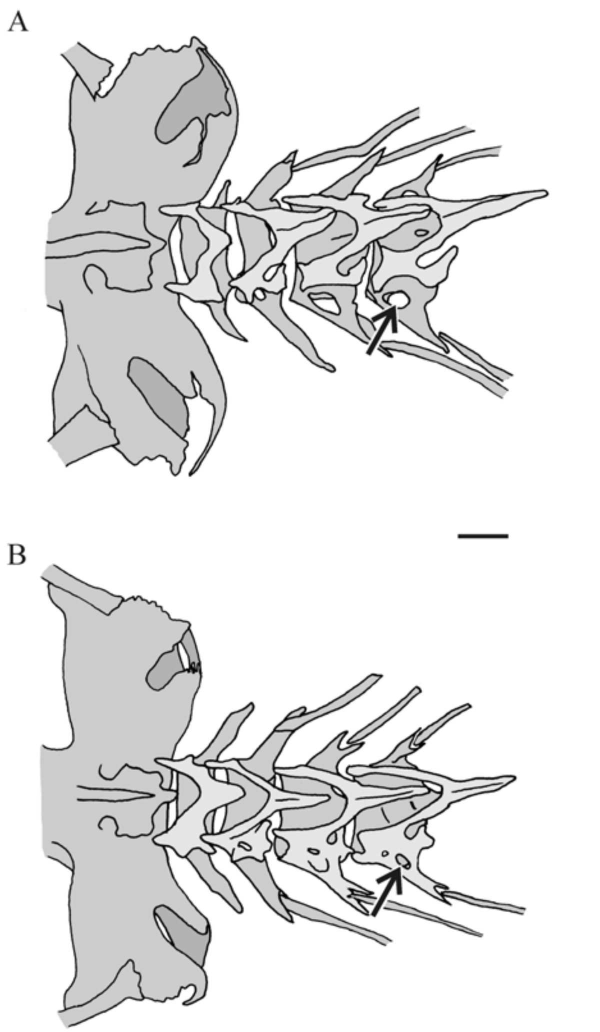

Fig. 6. – Illustration of the size of the foramen at the bases of the parapophyses of the 4th post-Weberian vertebra in **a :** *C. sanghaensis* and **b :** *C. apus* (dorsal view) (scale = 1mm).

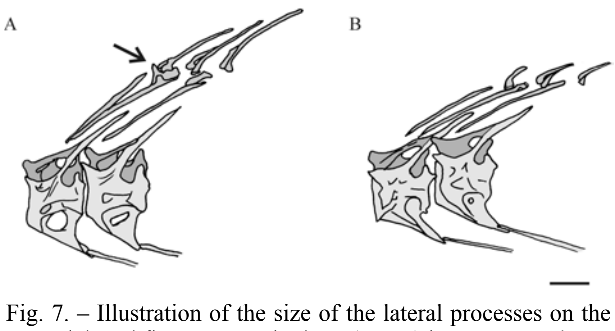

Fig. 7. – Illustration of the size of the lateral processes on the second dorsal fin ray pterygiophore (arrow) in **a :** *C. sanghaensis* and **b :** *C. apus* (dorsal oblique view) (scale = 1mm).

Channallabes sanghaensis n. sp.

(Fig. 8)

Holotype. MRAC A4-31-P-171-183, 114mm SL, Republic of the Congo; River Mbessy, close to the village of Ntchouo, (0° 46'N-14° 19'E), S. Devaere, D. Adriaens and A. Herrel, September 2000.

Paratypes. Total of 12 specimens. S. Devaere, D. Adriaens and A. Herrel, September 2000. 114-221mm SL, MRAC A4-31-P-171-183, in the vicinity of Ntchouo, River Mbessy, Republic of the Congo (0° 46'S-14° 32'E).

Differential diagnosis. *Channallabes sanghaensis* differs from *C. alvarezi, C. longicaudatus, C. teugelsi* and *C. ogooensis* in having a small supraorbital process on infraorbital IV, not reaching the rostral border of the eye and in the presence of an interdigitation zone between the quadrate and the entopterygoid. Further, *C. sanghaensis* can be distinguished from *C. apus* in the presence of a fenestra between the scapulo-coracoid and the cleithrum, the presence of large foramen at the bases of the parapophyses of the first post-Weberian vertebrae (2nd to 10th) (Fig. 6a) and the presence of two large lateral processes on the second dorsal fin ray pterygiophore (Fig. 7a).

Description. Measurements and meristics for holotype and paratypes are given in Table 3. The standard length ranges from 114 to 221mm. *C. sanghaensis* has an elongated body (Fig. 8) (ABD 4.6-6.4% of SL, mean : 5.6%), with a preanal length of 27.5% up to 33.2% of SL (mean : 30.1%). Due to the extreme elongation of the body, there is a very small skull length (10.0-12.1% SL). Skull width is 58.2-71.5% of skull length. The very narrow skull roof, width 16.5-24.4% of maximal skull width, remains clearly visible between the bulging jaw muscles. Although the eyes are small, they remain clearly visible. Tube-like anterior nostrils are present, although small.

The fleshy dorsal, anal and caudal fins form a continuous finfold. The pectorals fins are always present, length 4.0-5.3% of SL and are always preceded by a pectoral spine with a length of 2.3-3.3% of SL. The pectoral spine is serrated on both sides. Pelvic fins present in only one specimen; in the other specimens no evidence of pelvic fins. The total number of vertebrae is 86-89 (mode = 87), ribs 12-14 (mode = 13). Branchiostegal rays 8, dorsal fin rays 121-125, anal fin rays 104-124.

The skull in *C. sanghaensis* shows reduced ossifications and a narrow skull roof. This reduction is shown in the reduced lateral plate of the frontal; from a ventral view this lateral plate is only a little wider than the outlines of the orbitosphenoid (Fig. 9a). A plate-like outgrowth is present on the posttemporo-supracleithral bone. The posterior border of the mesethmoid is indented, which makes that the anterior part of the anterior fontanel lies within the mesethmoid (Fig. 9b). One suprapreopercular bone is present. On the prevomer, one long posterior process is present. The entopterygoid rostro-dorsally encloses the metapterygoid. For the interdigitation with the neurocranium, the hyomandibula has two sets of three processes. Oral teeth are present on dentary, premaxilla and prevomer.

Colour. Alcohol preserved specimens gradually fade from dark brown on the dorsal side to whitish brown on the ventral side. Both sides are separated by a white line, representing the lateral line. The skin on the jaw muscles shows a somewhat paler brownish colour than the surrounding skin of the head. The barbels and nostrils have a similar coloration.

Fig. 8. – Holotype of *Channallabes sanghaensis* (114mm SL), **a** : lateral view, **b :** dorsal view of the head, **c** : lateral view of the head and **d** : ventral view of head. (scale = 10mm); (Photographs : S. Devaere).

TABLE 3

Measurements and meristic data for *C. apus* and *C. sanghaensis*

	C. apus						*C. sanghaensis*					
	holo-type	**n**	**min**	**max**	**mean**	**SD**	**holo-type**	**n**	**min**	**max**	**mean**	**SD**
Total Length (mm)	205.0	191	42.0	416.0			123.0	12	123.0	238.0		
Standard Length (mm)	195.0	191	38.0	398.0			114.0	12	114.0	221.0		
Measurements in % standard length												
preanal length	27.3	191	21.4	35.4	27.4	3.1	28.9	12	27.5	33.2	30.1	1.7
prepectoral length		113	5.3	15.3	10.0	1.8	10.0	12	10.1	11.8	11.1	0.6
prepelvic length		4	22.2	32.9	29.6	5.0		1			29.8	
predorsal length	16.0	191	8.4	26.3	18.6	2.7	23.0	12	19.4	23.0	20.6	1.2
distance between the occipital process and the dorsal fin	7.5	191	4.6	20.0	9.2	1.9	9.5	12	7.8	11.5	8.9	1.1
pectoral fin length		113	0.2	5.3	1.9	1.3	5.3	12	4.0	5.3	4.6	0.4
pectoral spine length		113	0.2	3.6	1.1	0.6	2.9	12	2.3	3.3	2.7	0.3
pelvic fin length		4	2.2	4.4	3.2	1.2		1			3.2	
caudal peduncle depth	1.4	191	1.1	5.4	2.2	0.7	3.3	12	2.6	3.3	3.0	0.2
abdominal body depth	4.4	191	2.7	9.6	5.1	1.1	6.0	12	4.6	6.4	5.6	0.6
inter pectoral distance		113	3.8	10.1	5.9	1.2	5.9	12	6.3	7.7	6.9	0.4
inter pelvic distance		4	0.5	2.1	1.4	0.8						
skull length	9.7	191	6.9	17.8	9.8	1.9	11.4	12	10.0	12.1	11.3	0.6
Measurements in % head length												
preorbital length	75.2	191	10.5	40.5	29.2	4.0	30.3	12	26.1	33.1	31.0	1.8
supraoccipital spine length	19.0	191	6.0	24.8	16.0	3.3	13.5	12	9.7	15.1	12.3	1.6
skull width	50.9	191	41.6	71.5	58.7	5.0	70.2	12	58.2	71.5	64.2	4.1
supraoccipital spine width	17.6	191	12.1	45.0	23.3	6.0	16.5	12	13.5	18.6	16.0	1.4
inter orbital distance	28.6	191	18.6	37.0	30.6	3.0	32.3	12	28.3	37.1	32.3	2.5
anterior nostril interdistance	9.1	191	7.4	19.0	13.0	2.3	15.8	12	10.4	15.9	12.4	1.6
posterior nostril interdistance	21.2	191	14.5	35.2	24.4	3.1	27.4	12	21.9	27.4	24.4	1.4
rostral skull width	30.2	191	24.4	49.8	32.5	3.7	35.1	12	28.3	39.8	34.2	3.4
orbital skull width	38.2	191	28.5	52.9	44.4	3.8	46.6	12	42.5	50.9	46.7	2.6
skull height	14.0	191	29.0	60.3	45.6	6.1	40.6	12	33.3	48.2	39.0	4.5
eye diameter	4.0	191	4.0	11.6	7.2	1.4	5.7	12	4.6	7.7	6.0	1.0
snouth height	14.0	191	6.0	21.5	14.4	2.9	17.4	12	16.1	20.9	18.5	1.5

TABLE 3

Measurements and meristic data for *C. apus* and *C. sanghaensis*

	C. apus						*C. sanghaensis*					
	holo-type	n	min	max	mean	SD	holo-type	n	min	max	mean	SD
orbital skull height	27.4	191	12.7	41.8	27.7	4.8	29.5	12	23.8	34.4	29.9	3.1
prehyoid length	24.0	191	16.6	41.2	27.2	3.7	28.5	12	25.0	31.9	28.8	1.7
internal mandibular interdistance	20.2	191	13.6	27.8	20.3	2.9	21.0	12	19.7	25.8	22.4	2.2
external mandibular interdistance	27.8	191	20.9	41.1	32.2	4.1	34.6	12	31.1	44.2	34.7	3.3
mouth width	23.3	191	13.9	36.9	25.2	4.0	35.4	12	27.9	38.4	33.7	3.5
skull roof width	17.7	191	12.0	29.0	21.2	3.2	24.4	12	16.5	24.4	20.8	2.1
Meristic counts					**mode**						**mode**	
total number of ribs	17	79	10	17	14		13	11	12	14	13	
total number of vertebrae	113	108	76	117	106		87	11	86	89	87	
number of dorsal fin rays	140	20	86	154			123	5	121	125		
number of anal fin rays	126	20	82	130			115	5	104	124		

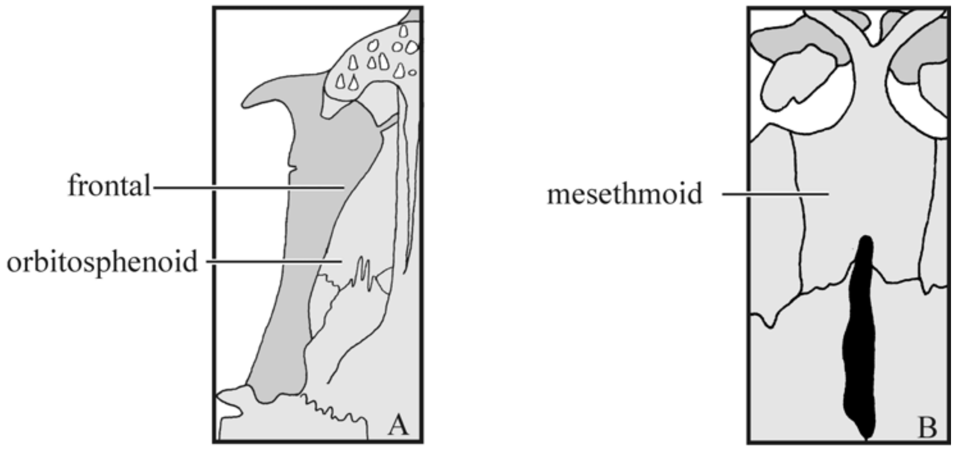

Fig. 9. – Illustration of **a** : the extent of the lateral plate of the frontal in relation to the orbitosphenoid (ventral view of neurocranium); **b** : the dorsal view of the indented, posterior margin of the mesethmoid.

Distribution. Currently known from the Congo River system, in the vicinity of Ntchouo (Fig. 10). All known sampling sites were characterised by shallow, muddy, still water.

Etymology. From the Sangha freshwater ecoregion (THIEME et al., 2004) where the species was found.

DISCUSSION

Based on several genera diagnosis (DEVAERE et al., 2001; 2004; 2005a; b; 2007) and on this species diagnosis, the new species should be included in the genus *Channallabes*. This genus is characterized by reduced infraorbital and suprapreopercular bones, with small plate-like extensions on the posterior most bone in both series; small lateral plates on the frontals and the first dorsal fin pterygiophore is situated posterior to the sixth post-Weberian vertebrae.

Besides this new species, ten other elongated clariids are known, designated to five genera. The new species can be clearly discerned from each one of the other anguilliform species. *Platyallabes tihoni* (Poll, 1944) has a very small distance between the origin of the dorsal fin and the supraoccipital process (2.2-6.6% of SL) (DEVAERE et al., 2005a). *Platyclarias machadoi* Poll, 1977 has an extremely flattened skull (SkH 22.9-37.1% of Skl) (DEVAERE et al., 2006). *Dolichallabes microphthalmus* Poll, 1942 is characterized by the presence of only one fontanel on the skull roof (DEVAERE et al., 2004). *Gymnallabes nops* Roberts & Stewart, 1976 shows a large reduction in the infraorbital series in size and number (two instead of five) (DEVAERE et al., 2005b). *Gymnallabes typus* Günther, 1867 is characterized by well developed skin folds, bordering the side wall of the mouth (CABUY et al., 1999 : Fig.1).

The remaining five anguilliform species are all in the genus *Channallabes*. The differences present between “the Congo basin” species (*C. apus, C. sanghaensis*) and the “Lower Guinea” species (*C. alvarezi, C. longicaudatus, C. teugelsi, C.ogooensis*) are reflected in both genetic (JANSEN et al., 2006) and morphological (DEVAERE et al., in press) differences. Finally, the differences between *C. sanghaensis* and *C. apus* are the presence of two clear, lateral processes on the second dorsal fin pterygiophore and the presence of a large foramen at the bases of the parapophyses of the first post-Weberian vertebrae. Although, this foramen is larger than in most other anguilliform clariids, it is not as large as in *Platyallabes tihoni*, where it is one of the diagnostic features for the genus and species (DEVAERE et al., 2005a).

Although, Figs 3 & 4 show two clear groups, which were tested significantly different, no new species is currently recognized. There is no evidence for size-related changes of the meristics in the anguilliform clariids species studied here. Moreover, in fishes in general, several authors, as for instance LANDRUM & DARK (1968), have reported on the independence of the total vertebrae number from the length of the fish within the same species. Thus, the apparent different growth series in Fig. 4 cannot be considered as such. Besides the difference in total vertebra number, no other differences (morphometric, osteological, …) were found between these groups, indicating the large similarity of these two groups.

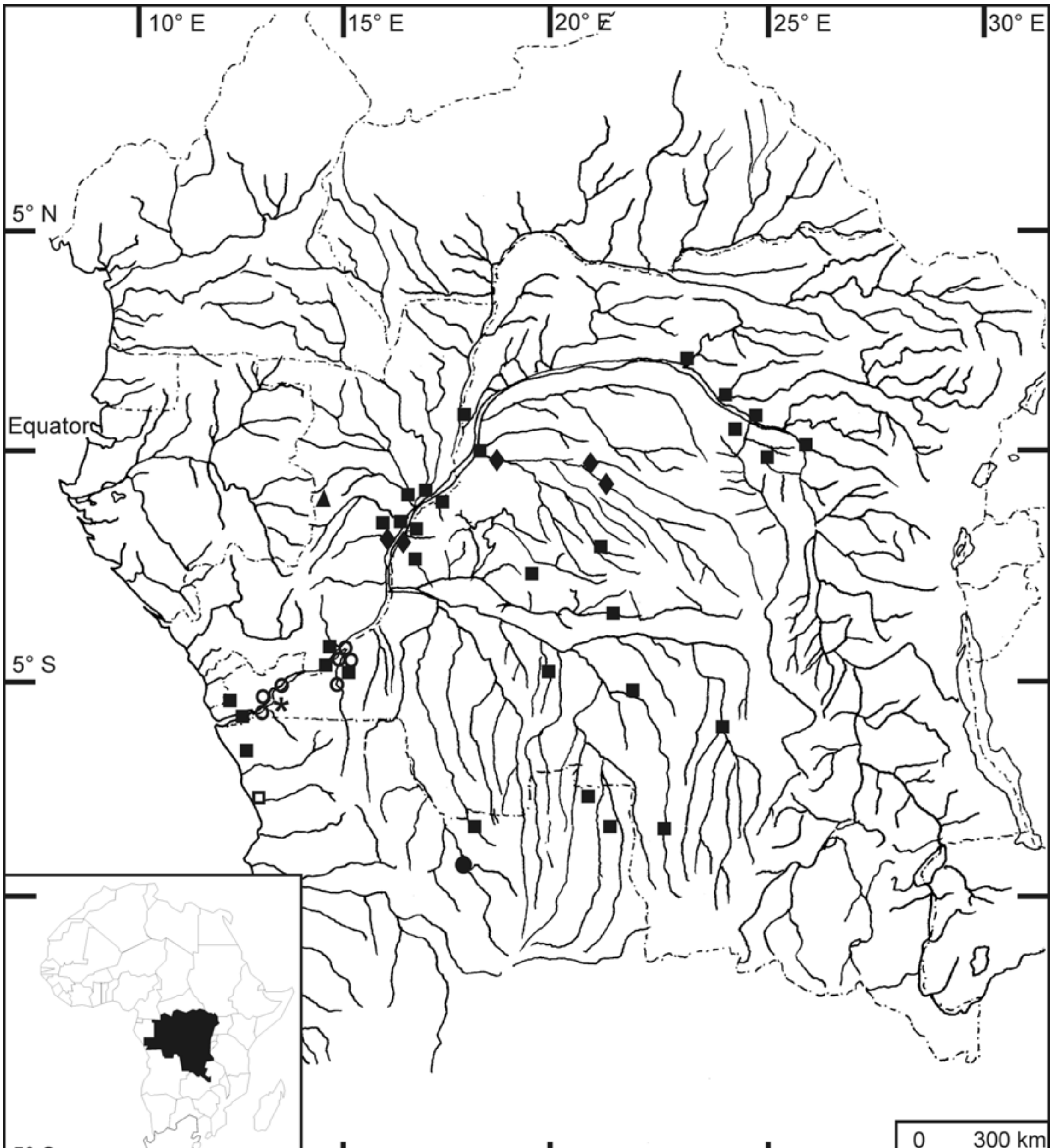

Fig. 10. – Geographic distribution of *C. apus, C. sanghaensis, P. machadoi, P. tihoni, D. microphthalmus* and *G. nops* based on the localities of the examined specimens. □ Holotype of *Channallabes apus*; ■ specimens of *Channallabes apus*, ▲ specimens of *Channallabes sanghaensis;* ◆ specimens of *Dolichallabes microphthalmus*; ● specimens of *Platyclarias machadoi*; o specimens of *Platyallabes tihoni;* * holotype of *Gymnallabes nops.*

Fig. 1 also shows the great similarity between *Platyallabes tihoni* and *Gymnallabes nops*. This large similarity, as well as morphological correspondences, was already shown by DEVAERE et al. (2005b). This similarity is based on both meristic and osteological characteristics. The additional metric data, presented in this paper, could be an extra argument for a systematic shift of *Gymnallabes nops* to the genus *Platyallabes*; however, further data is required.

The geographic distribution shows that *C. apus* and *C. sanghaensis* occur in two different parts of the Congo River system (Fig. 10). While *C. sanghaensis* only occurs in the border region with Gabon, close to the watershed of the Southern West Coastal Equatorial (Ogowe and Ivindo River), *C. apus* is found in the largest part of the Congo basin, from the mouth up to the Upper Congo Rapids. The group with the low number of vertebrae (Group II in Fig. 4) is only found in the Kasai, Upper Congo Rapids, Sudanic Congo, Central Congo and Lower Congo freshwater Ecoregions.

ADDITIONAL MATERIAL EXAMINED

Museum abbreviations are listed in LEVITON et al. (1985).

Channallabes apus. Angola. Ambriz, BMNH 1873.7.28.16 (holotype); Dem. Rep. Congo. Bokalakala, MRAC 175247-270 (n = 10); Kinshasa, MRAC 97-056-P-0001-0003 (n = 2); Bumba, MRAC 88-25-P-2192-227 (n = 36); Boma, MRAC 939; Riv. Lula, Bushimaie, MRAC 153505; Kelé, MRAC 1491; Stanleyville, MRAC 30893-30900 (n = 8), MRAC 88-01-P-1976-1992 (n = 17); Riv. Ruki, Eala, MRAC 14747-49 (n = 3); Lake Tumba swamp area, MRAC 46299; Katanga, MRAC 39480; Riv Bototа, keseki, MRAC 67763-77 (n = 15); Mwilambongo, MRAC 72886-887 (n = 2); Dekese, Riv. Lofu, Anga, MRAC 153352; Yangambi, MRAC 68700; Riv. Oubangui, Imfondo, MNHN 1922-0029; Loango, MNHN 1924-0079, MNHN 1924-0080; Sangha, MNHN 1925-0137; Mogende, MNHN 1926-0155-59 (n = 5); Riv Congo, MNHN, 1937-0124-25; Stanleypool, Bamu, MNHN 1958-0111; Boloko, Riv. Likouala, MNHN 1962-0401 (n = 7); Mossaka, Riv. Likouala, MNHN 1963-0402 (n = 2); Riv. Loadjili, Songolo, MNHN 1967-0143 (n = 6); Mangala, BMNH 1896.3.9.17; Riv. Lebuzi, Kaka Muno, BMNH 1912.4.1411-12 (n = 2); Lower Congo, BMNH 1887.1.13.8-9 (n = 2); Stanley Falls, BMNH 1889.11.20.5; New Antwerp, Upper Congo, BMNH 1899.2.20.16; Siala-Ntoto Swamps, BMNH 99.11.27.92; Bangyville, Ubangi, BMNH 1907.12.26.34; Kashi, Lulua, MHNG 1248.3; Banana, NMW 47240-42; Mollunda, NMW 47245 (n = 4), NMW 47246. Congo. Yangala Youbi, MNHN 1967-0146; Djembo, Kouilou, MNHN 1967-0147; Cayo, MNHN 1989-0527; Riv. Nanga, between Boukou-Zassi and Kouilou swamp area, MRAC 90-57-P2315; Sintou, Riv. Kibombo, Kouilou, MNHN 1967-0144; Riv. Loadjili, Songolo, Pointe Noire, MNHN 1967-0145 (n = 6); Riv. Youbi, Noumbi. Angola. Caungula, Mabete, Riv. Uamba, MRAC 162088; Riv. Camuconda, Tchimenji, MRAC 162089, MRAC 162090-094 (n = 5), MRAC 162095-100 (n = 6); Riv Ganga-Ludchimo, MRAC162083-086 (n = 4).

Platyallabes tihoni. Dem. Rep. Congo. Kingabwa, Stanley pool, MRAC 13307 (holotype); Kinsuka, MRAC 73-68-P-143, MRAC 138698-699 (n = 2), 125345-349 (n = 4), MRAC 73-22-P-3127 (n = 3); Bulu, Luozi, BMNH 1976.5.21.30-39 (n = 9), MCZ 50239 (n = 13); Inga, MCZ 88947, MCZ 50537 (n = 15); Tadi, Kibunzi, MCZ 50297 (n = 5).

Platyclarias machadoi. Angola. Cuango, Cafunfo, Borio River, MRAC 78-6-P-1345, (holotype), MRAC 78-6-P-1348-364, 78-6-P-1346, 78-6-P-1366-1367 (76-180mm SL) (21 paratypes).

Dolichallabes microphthalmus. Dem. Rep. Congo. Kunungu, MRAC 44655, adult male, (holotype), MRAC 44656-659 (n = 3) and 62407, 188mm SL (paratypes), MRAC 57662, MRAC 18850; Boende swamps, MRAC 101843, MRAC 176123-124 (n = 1), 68mm SL; Bokuma, MRAC 79093, MRAC 93774, 66mm SL; Bokuma – Tchuapa, MRAC 79258-260 (n = 3); Ndwa (Boloko), MRAC 78808-810 (n = 3); Inonge, MRAC 96672; Maylimbe, Tshela, MRAC 66721.

Gymnallabes nops. Dem. Rep. Congo. Tadi, Kibunzi, Congo River, MCZ 50298, 57mm SL (holotype).

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