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New data on the osteoglossid fishes (Teleostei, Osteoglossiformes) from the marine Danian (Paleocene) of Landana (Cabinda Enclave, Angola)

Nouvelles données concernant les poissons ostéoglossidés (Teleostei, Osteoglossiformes) du Danien marin (Paléocène) de Landana (Enclave de Cabinda, Angola)

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Résumé: Un squelette caudal provenant de la couche 3 du Danien marin de Landana (Enclave de Cabinda, Angola, Afrique centrale) est étudié en détails. Ses caractères généraux et ses hypuraux autogènes montrent qu'il est un membre primitif de la famille des Osteoglossidae. La forme et la taille de ses deux hypuraux ventraux diffèrent considérablement de ce qui est connu chez les autres Osteoglossidae et même chez les autres Osteoglossomorpha. Cela justifie d'attribuer un statut générique particulier à ce poisson. Des critères chronologiques, stratigraphiques et faunistiques amènent à penser qu'il se rapporte à l'espèce *Ridewoodichthys caheni* dont le matériel type provient des couches 4 et 5. Le squelette caudal de type ostéoglosside trouvé dans la couche 10 du Danien de Landana et rapporté précédemment à *R. caheni* appartient à un ostéoglossidé plus jeune et plus évolué qui n'a pas encore reçu de nom scientifique.

Mots-clés: Teleostei, Osteoglossidae, *Ridewoodichthys caheni*, squelette caudal, relations, Danien marin, Landana, Enclave de Cabinda, Angola, Afrique centrale.

Abstract: A caudal skeleton from the layer 3 of the marine Danian of the Landana (Cabinda Enclave, Angola, middle Africa) is studied in details. Its general characters and its autogenous hypurals show that it is a primitive member of the family Osteoglossidae. The shape and the size of its two ventral hypurals strongly differ from what is known in other Osteoglossidae and even in other Osteoglossomorpha. That justifies the attribution of a peculiar generic status for this fish. Some chronological, stratigraphical and faunal criterions lead to think that it must be reported to the species *Ridewoodichthys caheni* of which the type material comes from the layers 4 and 5. The caudal skeleton of osteoglossid pattern from the layer 10 of the Danian of Landana previously ranged in *R. caheni* belongs to a younger and more evolved osteoglossid fish that has not yet received a scientific name.

Key words: Teleostei, Osteoglossidae, *Ridewoodichthys caheni*, caudal skeleton, relationships, marine Danian, Landana, Cabinda Enclave, Angola, middle Africa.

INTRODUCTION

The marine Paleogene fossil fish fauna of the Lower-Congo (Democratic Republic of Congo) and bordering countries was principally studied by DARTEVELLE & CASIER (1943, 1949, 1959) in a big monograph published in three parts and by CASIER (1960) in a shorter memoir. The concerned material is preserved in the paleontological collection of the Royal Museum for Middle Africa (MRAC), Tervuren, Belgium.

In the third part of their monograph (ibid., 1959: 351-352), the two authors described a few bony fragments of an osteoglossid teleost from the Danian of Landana (Cabinda Enclave, Angola).

The material was constituted by a partial left dentary, an incomplete left premaxilla (MRAC RG 9169, 9170), both from the layer 5, and of an isolated teeth (MRAC RG 9171), from the layer 4 (ibid., 1959: pl. 37, figs 8, 9, pl. 39, fig. 3; TAVERNE, 2009a: figs 1, 2, 3).

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DARTEVELLE & CASIER (1959) reported these fossil fragments to *Brychaetus* cf. *muelleri* WOODWARD, 1901, a species known from the marine Ypresian (London Clay) of England. Ten years later, a new species, *Brychaetus caheni* TAVERNE, 1969, was erected for this material because of important differences in tooth shape with the true *B. muelleri* (TAVERNE, 1969: fig. 2, 2009a: fig. 3). A typical osteoglossid caudal skeleton (MRAC RG 9183) from the layer 10 of the Landana strata, figured by DARTEVELLE & CASIER (1959: 371, pl. 38, fig. 4) but not identified, was also referred to *B. caheni* by TAVERNE (1969: fig. 1).

The choice of DARTEVELLE & CASIER (1959) and of TAVERNE (1969) to assign these marine African Paleocene osteoglossid remains to *Brychaetus* WOODWARD, 1901 was exclusively based on the fact that this genus was the only marine osteoglossid fish known at that time. However, numerous other marine fossil osteoglossid genera were described later in some Paleogene deposits of Europe and other countries (TAVERNE, 1998; BONDE, 2008; among others). Meanwhile, a more complete technical preparation of the caudal skeleton from layer 10 attributed to *B. caheni* was completed. New osteological features not present in any other known fossil and Recent osteoglossid fish were revealed (TAVERNE, 2009a: 149, fig. 4), justifying the assignment of *B. caheni* to a new genus, *Ridewoodichthys* TAVERNE, 2009.

I have found recently another osteoglossid caudal skeleton in the paleontological collection of the MRAC. It come from the layer 3 of the Landana deposits and was collected by J. BEQUAERT in 1913, during his mission in Central Africa. The sample was left "Teleostei indéterminé" by CASIER (1960: 27). This caudal skeleton completely differs from that of the layer 10.

The aim of the present paper is to describe this new osteoglossid caudal skeleton and to discuss its relationships and the consequences of its discovery.

MATERIAL AND METHOD

The specimen hereafter described belongs to the paleontological collection of the Department of Geology of the MRAC. This sample was studied with a Leica MZ8 stereomicroscope. The drawings of the figures were made by the author with a camera lucida and the photos by Mr. Stéphane HANOT, from the MRAC.

List of abbreviations used in the text-figures

AF = ray fragments of the anal fin
DF = ray fragments of the dorsal fin
HEMEP = haemal spine
HY 1-6 = hypurals 1 to 6
LEP = caudal lepidotrichia (= caudal fin rays)
NAR U1, 2 = neural arch of ural centra 1 and 2
NEUREP = neural spine
NS U1 = neural spine of ural centrum 1
PHY = parhypural
PU1-4 = preural centra 1 to 4
SC fr. = fragment of scale
U1, 2 = ural centra 1 and 2
UR = uroneural

Systematic paleontology

Division Teleostei MÜLLER, 1846
Superorder Osteoglossomorpha GREENWOOD *et al.*, 1966
Order Osteoglossiformes BERG, 1940
Suborder Osteoglossoidei REGAN, 1909
Family Osteoglossidae BONAPARTE, 1832

Genus ***Ridewoodichthys*** TAVERNE, 2009 (?)
Species ***Ridewoodichthys caheni*** **(**TAVERNE, 1969) (?)

Material

MRAC RG 1275: a specimen reduced to the caudal skeleton, from the Danian of Landana, layer 3, and discovered by J. BEQUAERT in 1913 (Figs 1, 2). Total length: 275 mm. Length of the vertebral part: 157 mm.

Figure 1: *Ridewoodichthys caheni* TAVERNE, 1969 (?). The complete specimen MRAC RG 1275 (caudal skeleton and ventral lobe of the caudal fin), from the marine Danian (layer 3) of Landana, Cabinda Enclave, Angola.

Figure 2 : *Ridewoodichthys caheni* TAVERNE, 1969 (?). Caudal region of specimen MRAC RG 1275.

Synonymy

Brychaetus cf. Muelleri (L. AGASSIZ) A. S. WOODWARD, 1902 – *in*: DARTEVELLE & CASIER, 1959: 351.
Brychaetus caheni sp. nov. – *in*: TAVERNE, 1969: 128.
Ridewoodichthys caheni (TAVERNE, 1969) – *in*: TAVERNE, 2009: 148.

Osteology (Figs 3, 4)

Specimen MRAC RG 1275 contains the 17 last vertebrae with the caudal endoskeleton, the ventral lobe of the caudal fin and ray fragments of the dorsal and anal fins. These two last fins are located near the tail, as usual in an osteoglossiform fish. The neural arches and spines are fossilized in a perpendicular plan in regard to the vertebrae. That is due to a taphonomic artefact. The shortness of the neural spines and the very oblique orientation of the haemal spines indicate that the concerned fish was low-bodied. A few long epineurals are associated to some vertebrae.

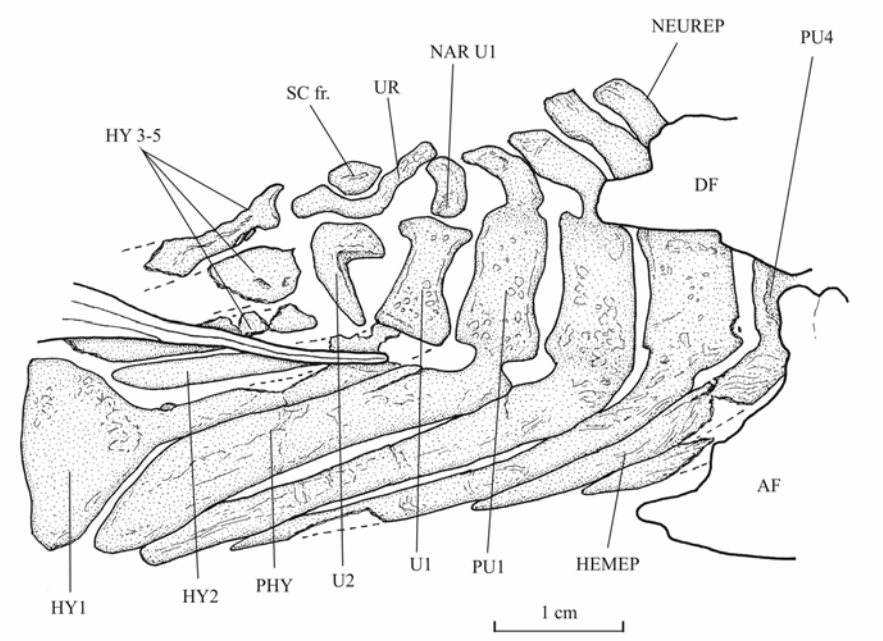

Figure 3: *Ridewoodichthys caheni* TAVERNE, 1969 (?). Caudal skeleton of specimen MRAC RG 1275. The neural pieces are perpendicularly oriented in regard to the vertebral axis because of an artefact of fossilization. These elements are straightened in the same plan as the vertebrae on the present drawing.

All these caudal vertebrae, including the two ural centra (U1, U2), are well individualized. U1 and U2 are autogenous. These last vertebrae decrease in size from stem to stern and U2 is strongly reduced. At the level of the preural vertebrae (PU1-15), the neural and haemal arches are fused to the corresponding centra, but the ural neural arch 1 and the hypurals are articulated on U1 and U2 and not fused. The neural spines of the caudal region are very short. The last neural spine, associated to U1, is extremely reduced. There is no trace of epurals. The last haemal spines are elongate and rather thick. The parhypural is long and broad but its proximal extremity, fused to PU1, is narrow. The two ventral hypurals (HY1, 2) are fused together by their proximal regions that articulate on the ventral face of U1. HY1 is long and especially thin but its distal part is abruptly enlarged, forming a broad posterior triangular plate. HY2 is narrow and much shorter than HY1. Some fragments of three dorsal hypurals (HY3-5) are preserved. HY3 and HY4 are articulated on the rear of U2. There is only one short uroneural that is slightly distorted due to the fossilization.

The ventral lobe of the caudal fin is extremely elongate and contains 5 segmented and branched rays and 1 shorter segmented and pointed ray. The segments are very short and their articulation is sigmoid.

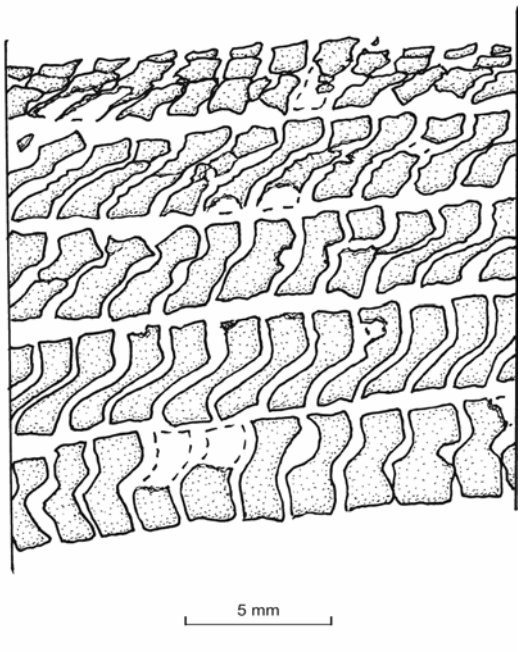

Figure 4: *Ridewoodichthys caheni* TAVERNE, 1969 (?). Specimen MRAC RG 1275. Parts of a few principal caudal rays (ventral lobe) showing the sigmoid articulation between the very short segments.

DISCUSSION

The caudal endoskeleton of sample MRAC RG 1275 contains separated PU1, U1 and U2, a neural spine associated to U1, a shortened U2, no free epural, autogenous hypurals, only one uroneural and HY3 and HY4 articulated on the rear of U2 and not on its ventral face. Within Teleostei, such a peculiar caudal complex is characteristic of some fossil osteoglossid fishes, such as for instance *Phareodus* LEIDY, 1873, *Musperia* SANDERS, 1934 or *Joffrichthys* LI & WILSON, 1996 (GREENWOOD, 1966: fig. 12; LI & WILSON, 1996: fig. 5; LI *et al.*, 1997: fig. 5; TAVERNE, 2009b: fig. 13, 2016a: fig. 16; among others). These characters justify that specimen MRAC RG 1275 be included in the Osteoglossidae.

However, the extremely unusual size and shape of HY1 and HY2 in specimen MRAC RG 1275 are unknown not only in the other members of the family but also in the other osteoglossomorph fishes. This highly specialized character clearly indicates that this specimen deserves a peculiar generic status within Osteoglossidae.

Within this family, the caudal skeleton of specimen MRAC RG 1275 places this fish in an apomorphic position in regard to the primitive African osteoglossid *Chanopsis lombardi* CASIER, 1961, that retains three uroneurals and a long U2 (TAVERNE, 2016b: fig. 11), but in a plesiomorphic position regarding many fossil and Recent osteoglossid genera that have HY3 to HY5 partially or totally fused together and with U2 (TAVERNE, 1977: figs 66, 90, 120, 143, 144, 1978: fig. 54, 1998: figs 10, 14, 18; among others).

On the other hand, the caudal skeleton of sample MRAC RG 1275 completely differs from that of specimen MRAC RG 9183 from layer 10 which is much more evolved. Indeed, in sample MRAC RG 9183, HY1 and HY2 are fused in a ventral hypural plate articulated to U1 and U2 is fused with a dorsal hypural plate formed by HY3, HY4 and HY5 (Fig. 5). These two specimens represent two quite different patterns of osteoglossid caudal skeleton and clearly belong to two different osteoglossid genera.

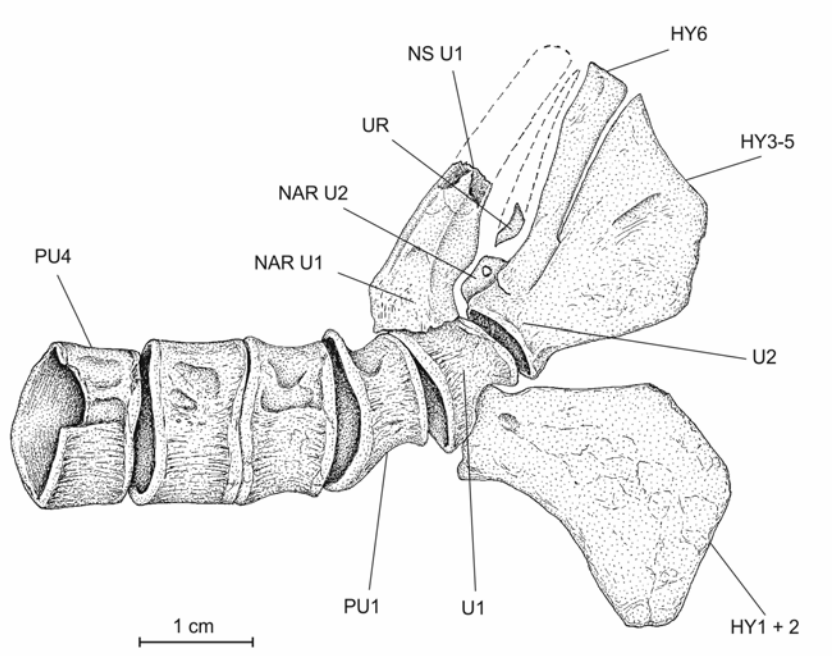

Figure 5: Caudal skeleton of specimen MRAC RG 9183, from the marine Danian of Landana (layer 10), previously reported to *Ridewoodichthys caheni* TAVERNE, 1969 but belonging to a still unnamed osteoglossid genus.

When the osteoglossid relationship of sample MRAC RG 9183 was established by TAVERNE (1969), he linked this caudal skeleton from the layer 10 with the osteoglossid jaw remains fund in layers 4 and 5 (DARTEVELLE & CASIER, 1959) and he ranged all that material in *Brychaetus caheni*, a species that later became *Ridewoodichthys caheni* (TAVERNE, 2009). That seemed a reasonable conclusion at that time, when only one osteoglossid caudal skeleton was reported from the Landana deposits. However, the problem is no more the same now. The presence clearly identified of two very different osteoglossid caudal skeletons in the marine Danian of Landana leads to the question of knowing which one of these two caudal complexes really belongs to *R. caheni* and which one is referable to another genus.

We know that the type material of *R. caheni* comes from the layers 4 and 5 of the Landana geological strata. On a chronological and stratigraphical point of view, the layer 3, with the specimen MRAC RG 1275, obviously is much closer to the layers 4 and 5 than is the layer 10, with the specimen MRAC RG 9183. Moreover, an important modification in the composition of the marine Danian fauna of Landana, bearing on bivalves, cephalopods, marine turtles and fishes, occurs between the layers 5 and 6 (DARTEVELLE & CASIER, 1959; SOLÉ *et al.*, in prep.). In these conditions, it is highly probable that the newly described caudal skeleton of sample MRAC RG 9183 is the one of *R. caheni* while that of specimen MRAC RG 9193, previously reported to *R. caheni* by TAVERNE (1969, 2009), must be regarded as belonging to a new, younger and more specialized marine osteoglossid genus that has not yet received a scientific name.

It is also to be noted that the osteoglossiform fossil record is rich in the Democratic Republic of Congo (DRC) and in the Cabinda Enclave (CE). We have not only the two osteoglossid fishes from the marine Danian of Landana (CE) (TAVERNE, 1969, 2009a, and the present paper) but also four other osteoglossoid species that are known in the DRC, the large *Chanopsis lombardi* CASIER, 1961 and a smaller unnamed species, both from the continental Aptian-Albian of the "Congolese Cuvette" (TAVERNE, 1984, 2016a, b), on the one hand, and *Paradercetis kipalaensis* CASIER, 1965 and *Kipalaichthys sekirskyi* CASIER, 1965, from the marine Cenomanian-Turonian of the Kwango region (TAVERNE, 1976), on the other hand.

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