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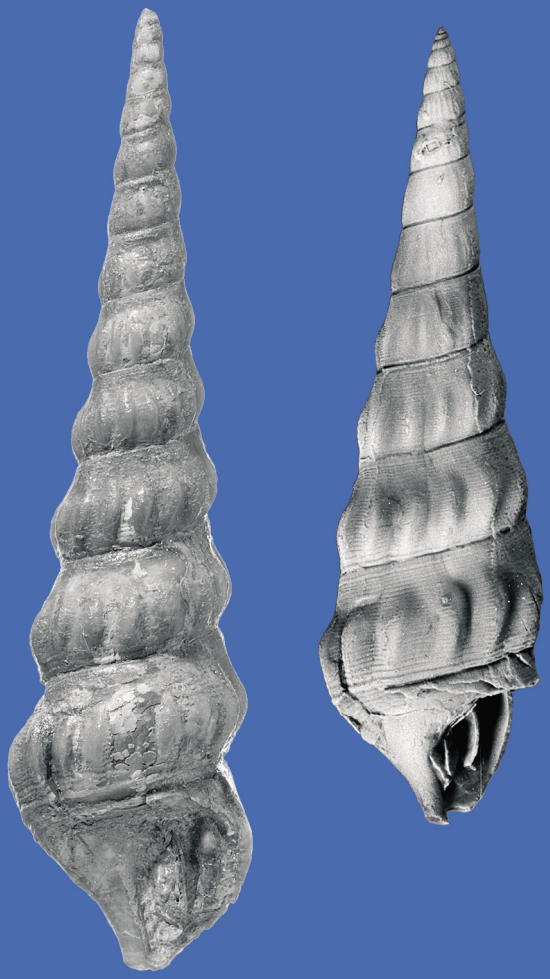

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Cover illustration: Snail *Pseudokatosira undulata* (BSPG 2007 XXII 1 and 2) from the Early Jurassic Amaltheenton of Franconia; this species is relatively rare and is the largest from the Amaltheenton (as large as 10 cm). For details see Nützel, A. & Gründel, J.: Two new gastropod genera from the Early Jurassic (Pliensbachian) of Franconia (South Germany), pp. 59 - 67 in this issue.

Umschlagbild: Schnecke *Pseudokatosira undulata* (BSPG 2007 XXII 1 und 2) aus dem unterjurassischen Amaltheenton Frankens; diese Art ist relativ selten und die größte aus dem Amaltheenton (bis zu 10 cm). Für weitere Informationen siehe Nützel, A. & Gründel, J.: Two new gastropod genera from the Early Jurassic (Pliensbachian) of Franconia (South Germany), S. 59 - 67 in diesem Heft.

Zitteliana	A47	127-132	6 Figs	München, 31.12.2007	ISSN 1612-412X

Occurrence of the genus *Tarsichthys* Troschel (Teleostean fishes, Cyprinidae) in the Upper Oligocene of Lake Kunkskopf, near Burgbrohl (E-Eifel-Mountains, Germany)

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Abstract

Fish skeletons are described that were discovered during scientific excavations in the Upper Oligocene black pelites of Lake Kunkskopf, near Burgbrohl (Germany) carried out in 1998 and 1999 by the Landesamt für Denkmalpflege Rheinland-Pfalz. All skeletons belong to a single species, *Tarsichthys* cf. *macrurus* (Agassiz), which was already known from time-equivalent sediments of the Siebengebirge, both at Stößchen and Rott near Bonn. The occurrence of this species at Burgbrohl is indicative of lacustrine conditions that, at least temporarily, existed in this region during the Upper Oligocene.

Key words: *Tarsichthys*, Fishes, Teleosts, Cyprinidae, Upper Oligocene, Germany, Palaeoecology

Kurzfassung

Fischskelette aus den oberoligozänen Schwarzpeliten des Kunkskopf-Sees bei Burgbrohl (E-Eifel, Deutschland) werden beschrieben. Sie stammen aus Grabungen des Landesamtes für Denkmalpflege Rheinland-Pfalz (Erdgeschichtliche Denkmalpflege) in den Jahren 1998–1999. Sie gehören zur einzigen Spezies, *Tarsichthys* cf. *macrurus* (Agassiz), die bereits aus zeitgleichen Sedimenten des Stößchens bei Linz bzw. von Rott bei Bonn bekannt sind. Das Auftreten dieser Spezies belegt limnische Verhältnisse, die dort, zumindestens zeitweise, während des Oberoligozäns existierten.

Schlüsselwörter: *Tarsichthys*, Fische, Teleostei, Cypriniden, Ober-Oligozän, Deutschland, Paläoökologie

Résumé

On décrit les squelettes articulés de poissons découverts pendant les fouilles réalisées en 1998 et 1999 par le Landesamt für Denkmalpflege Rheinland-Pfalz (Erdgeschichtliche Denkmalpflege) dans les pélites noires de l'Oligocène supérieur du lac Kunkskopf, près de Burgbrohl. Ils appartiennent à une espèce unique, *Tarsichthys* cf. *macrurus* (Agassiz), qui était déjà connue dans des sédiments d'âge similaire des Siebengebirge, à la fois à Stößchen et à Rott, près de Bonn. L'existence de cette espèce à Burgbrohl témoigne des conditions lacustres qui existaient en ce lieu, au moins temporairement, à la fin de l'Oligocène.

Mots-clés: *Tarsichthys*, Poissons, Téléostéens, Cyprinidae, Oligocène supérieur, Allemagne, Paléoécologie

1. Introduction

The occurrence of "antepliocene" black pelitic sediments ("Braunkohle") in the vicinity of Burgbrohl was first reported by Ahrens (1929) who described the section exposed in a pit open on the western side of the Kunkskopf Hill. The locality of Kunkskopf Hill lies south of the village of Burgbrohl (sheet 5509 Burgbrohl, R: 2590600, H: 5591200), approximately 3,5 km north of Lake Laach, E-Eifel Mountains (Fig. 1). Ahrens noted that, near the bottom of the section, a brown dysodil occurs that preserves tree leaves, seeds, frogs, fishes, bird feathers, insects, etc. The frogs were studied by Wolterstorff (1929) who identified them as *Palaeobatrachus* cf. *diluvianus* (Goldfuss). According to Gothan (in Ahrens 1929, 1936), the flora, which is similar to that of Rott, is indicative of a Lower Miocene age (presently considered as uppermost Oligocene). The similarity between the Kunkskopf and Rott floras was more recently confirmed by a palynological analysis (Thiergart 1958). As the original fish material collected by Ahrens was destroyed during World War II in Berlin, the present study was made possible by new excavations made in 1998 and 1999 near the former pit open on the western side of Kunkskopf. During these excavations, all the fishes were collected in a single, about one decimetre thick, bed (Poschmann et al., 2000a, 2000b).

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2. Anatomical description

One complete skeleton (with partial counterpart; Fig. 2) and approximately ten incomplete specimens, which have been prepared by the transfer method, had been collected at Burgbrohl. They belong to a Cyprinid species exhibiting a sexual dimorphism concerning the pelvic fins.

Although these fishes had a standard length that could reach at least 140 mm, the most complete specimen (2000 PW 5001a+b) is a small fish with a standard length of 66 mm. The body is elongated, the maximum depth, which equals the length of the head, being included 3.5 times in the standard length.

Head: The anatomy of the head is not well enough preserved to permit a detailed anatomical description. However, another specimen (2000PW 5018b) shows the skull roof in which the length of the frontal is about three times that of the parietal.

The best preserved operculum is that of specimen 2000 PW 5002b (Fig. 3). It is subtrapezoidal in shape, and exhibits a prominent antero-dorsal process. The dorsal edge, which is approximately horizontal, is prolonged by a more or less regularly rounded postero-ventral outline, whereas the lower edge of the bone, which is rather oblique, makes a 70° angle with the anterior border. The counterpart of the same specimen demonstrates that the preoperculum is falciform (Fig. 4). The anterior edge of its two arms measured along the preopercular canal exhibits an angle of 125°. The postero-ventral border of the bone is regularly rounded. Pharyngeal teeth have not been collected during the excavations.

Body: The vertebral column is comprised of 37–39 vertebrae, 15–17 of which are postabdominal (Figs 2B, 5). There are 22 abdominal vertebrae, including those included in the Weberian apparatus. Behind it, the first eight or nine vertebrae bear long neurapophyses, the distal end of which almost reaches the dorsal border. The forked caudal fin is never well preserved, and it is impossible to determine the number of its rays.

There are about 15 pairs of long and robust pleural ribs. Their distal end reaches the lower border of the abdominal cavity. Epineurals and epipleurals can be observed in the postabdominal region.

The dorsal fin begins just behind the middle of the body: the antedorsal length equals 53% of standard length. Two or

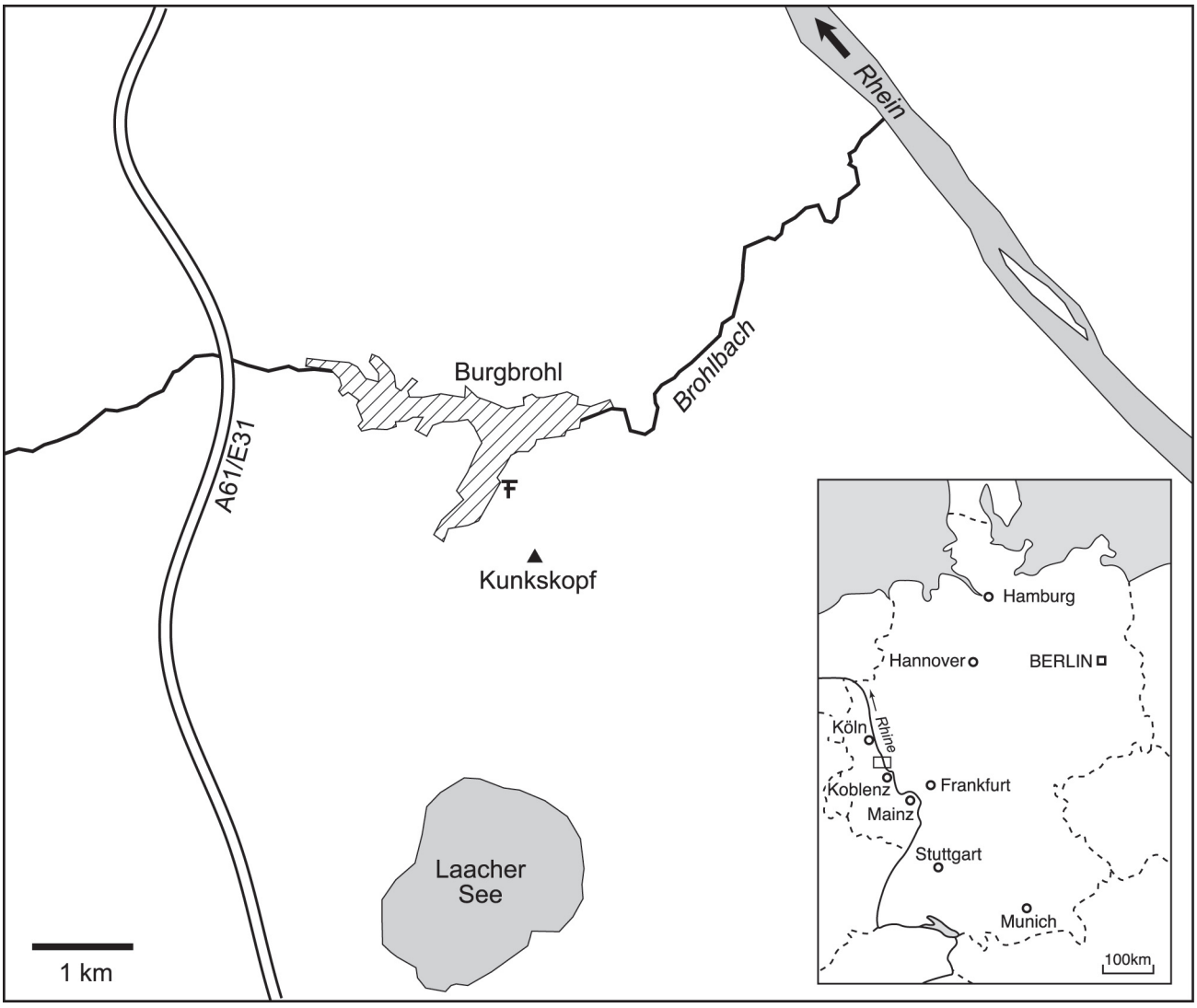

Figure 1: Map showing the location of the fossil site at the locality Lake-Kunkskopf, near Burgbrohl (Germany).

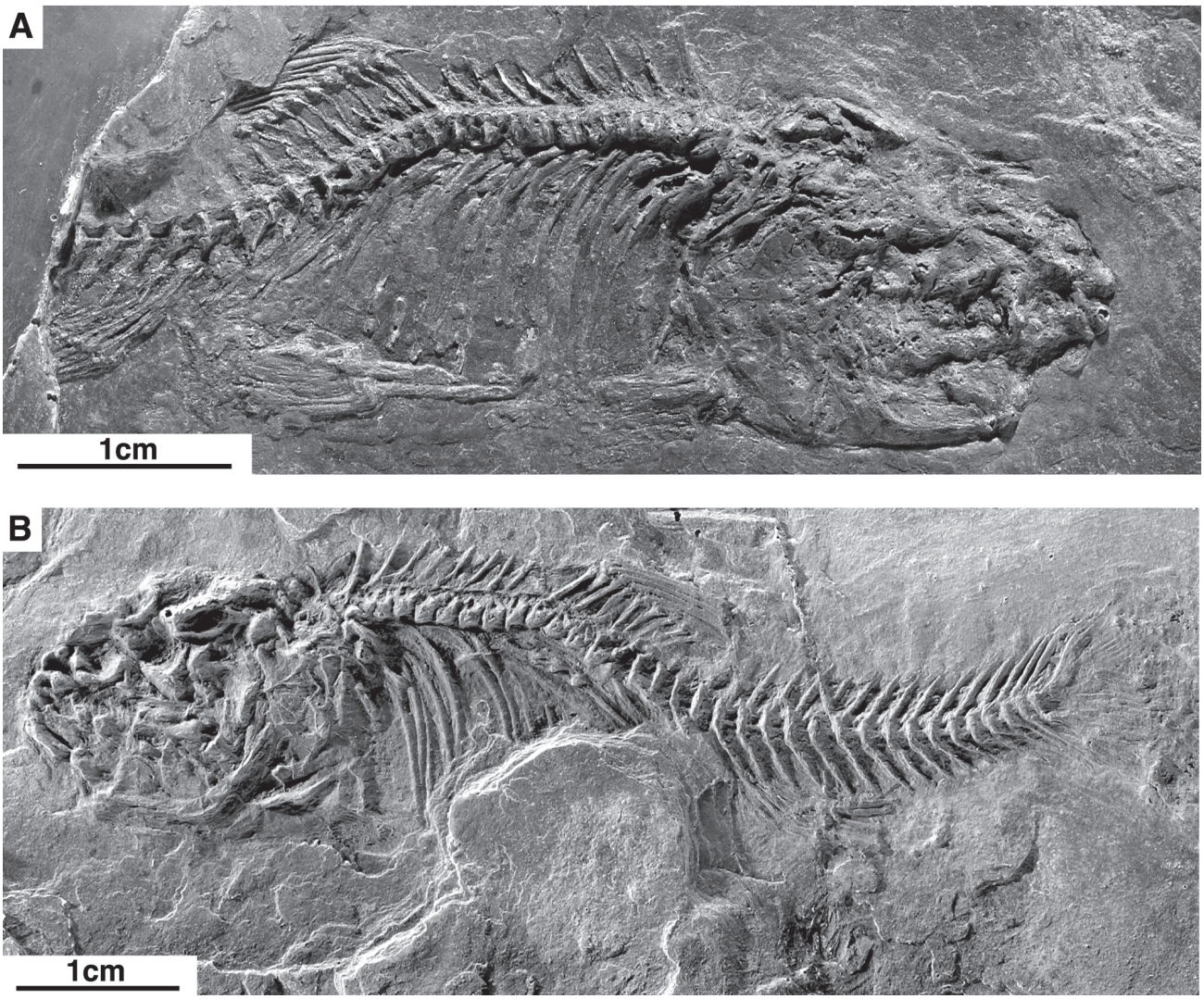

Figure 2: *Tarsichthys* cf. *macrurus* (Agassiz). General view of the most complete specimen (a female) found at Burgbrohl-Kunkskopf. Specimen 2000 PW 5001a+b, kept in Mainz, in the Landesamt für Denkmalpflege Rheinland-Pfalz, Ref. Erdgeschichtliche Denkmalpflege.
A: incomplete left side; B: complete counterpart.

three short rays are present in front of the long articulated ray, which is the longest ray of the fin. Posteriorly, there are 8 rays, both articulated and furcated, the length of which decreases backwards. The endoskeleton of the dorsal fin includes 8 or sometimes 9 pterygiophores.

The anal fin is inserted posteriorly: the anteanal distance equals 74% of standard length. It has about 9–10 rays that are supported by 7? or 8 pterygiophores.

The pectoral fins are situated relatively low on the flank. There are about 14 pectoral rays of moderate size.

The pelvic fins are located in the middle between the pectorals and the anal fins. They are either opposed to the origin of the dorsal fin or inserted slightly behind it. They are made up of one short sharp spiny ray, one long articulated ray, and eight rays that are both articulated and furcated. A sexual dimorphism characterizes the pelvic fins: in some specimens (e.g., 2000PW 5014 and 5034) there is a strongly thickened pelvic ray, whereas the pelvic bones are enlarged (Fig. 6). Like in the recent genus *Tinca* Cuvier, this feature characterizes the males, while the females exhibit normal pelvic fins and bones (Fig. 2A). The scales have only left indistinct remains.

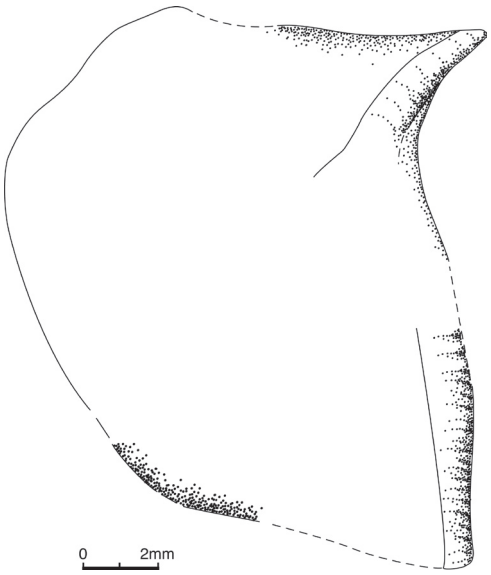

Figure 3: *Tarsichthys* cf. *macrurus* (Agassiz). Operculum of specimen 2000 PW 5002b, kept in Mainz, in the Landesamt für Denkmalpflege Rheinland-Pfalz, Ref. Erdgeschichtliche Denkmalpflege

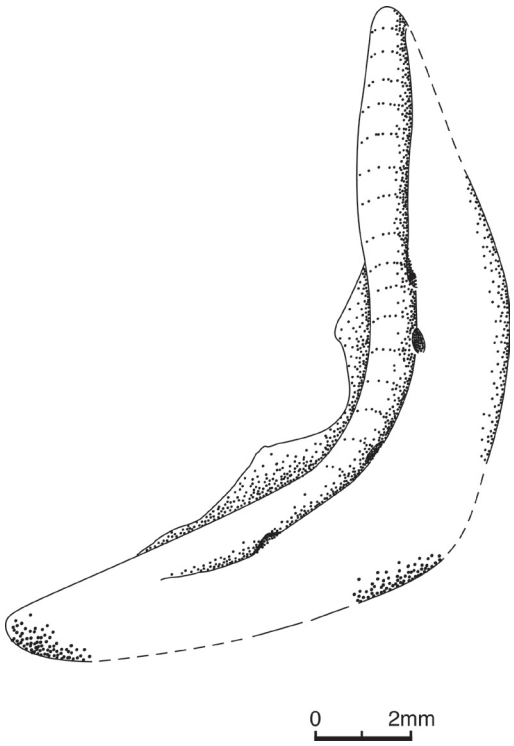

Figure 4: *Tarsichthys* cf. *macrurus* (Agassiz). Preoperculum of specimen 2000 PW 5002a, kept in Mainz, in the Landesamt für Denkmalpflege Rheinland-Pfalz, Ref. Erdgeschichtliche Denkmalpflege.

3. Taxonomical assessment

Although the fish fossils collected from Burgbrohl are generally comprised of incomplete skeletons, it is possible to define the main characters of a single Cyprinid species. This species is characterized by:

- falciform preoperculum having vertical and horizontal arms of subequal length making together a 115° angle;
- subtrapezoidal operculum having a prominent antero-dorsal process;
- vertebral column including 37–39 vertebrae, 15–17 of which are postabdominal;
- forked caudal fin;
- dorsal fin with 11–12 rays (eight rays being both articulated and furcated), supported by 8–9 pterygiophores;
- remote anal fin with about 9–10 rays, supported by 7?–8 pterygiophores ;
- pectoral fins of moderate size including 14 rays;
- pelvic fins made of ten long rays (eight both furcated and furcated), either opposed to the origin of the dorsal fin or located slightly behind, exhibiting a sexual dimorphism (males having larger pelvic bones and a strongly thickened fin ray).

All these characters fit quite well with those of *Tarsichthys macrurus* (Agassiz), a species that is rather abundant in the uppermost Oligocene of Rott and is also present at Stößchen

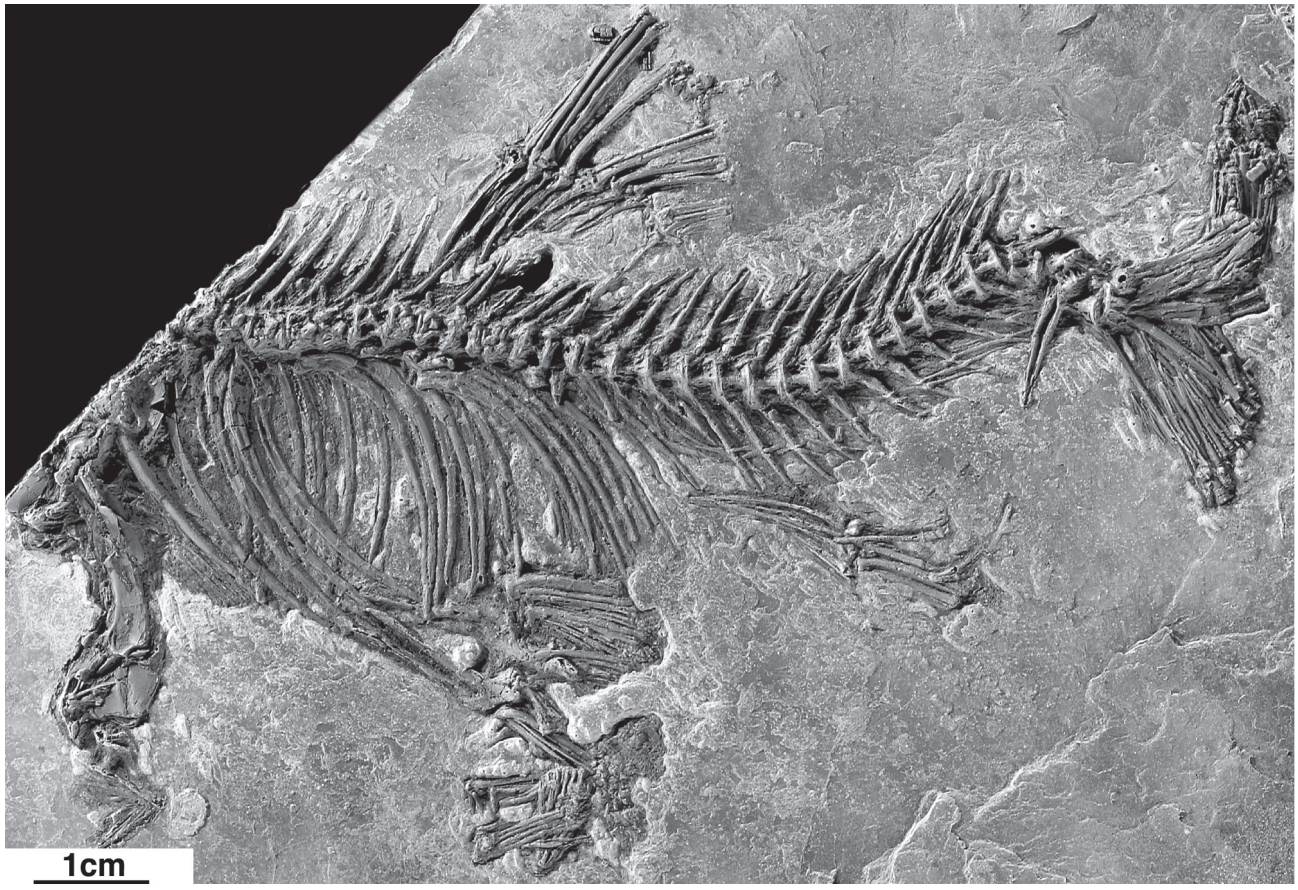

Figure 5: *Tarsichthys* cf. *macrurus* (Agassiz). General view of an incomplete specimen found at Burgbrohl-Kunkskopf. Specimen 2000 PW 5013, kept in Mainz, in the Landesamt für Denkmalpflege Rheinland-Pfalz, Ref. Erdgeschichtliche Denkmalpflege.

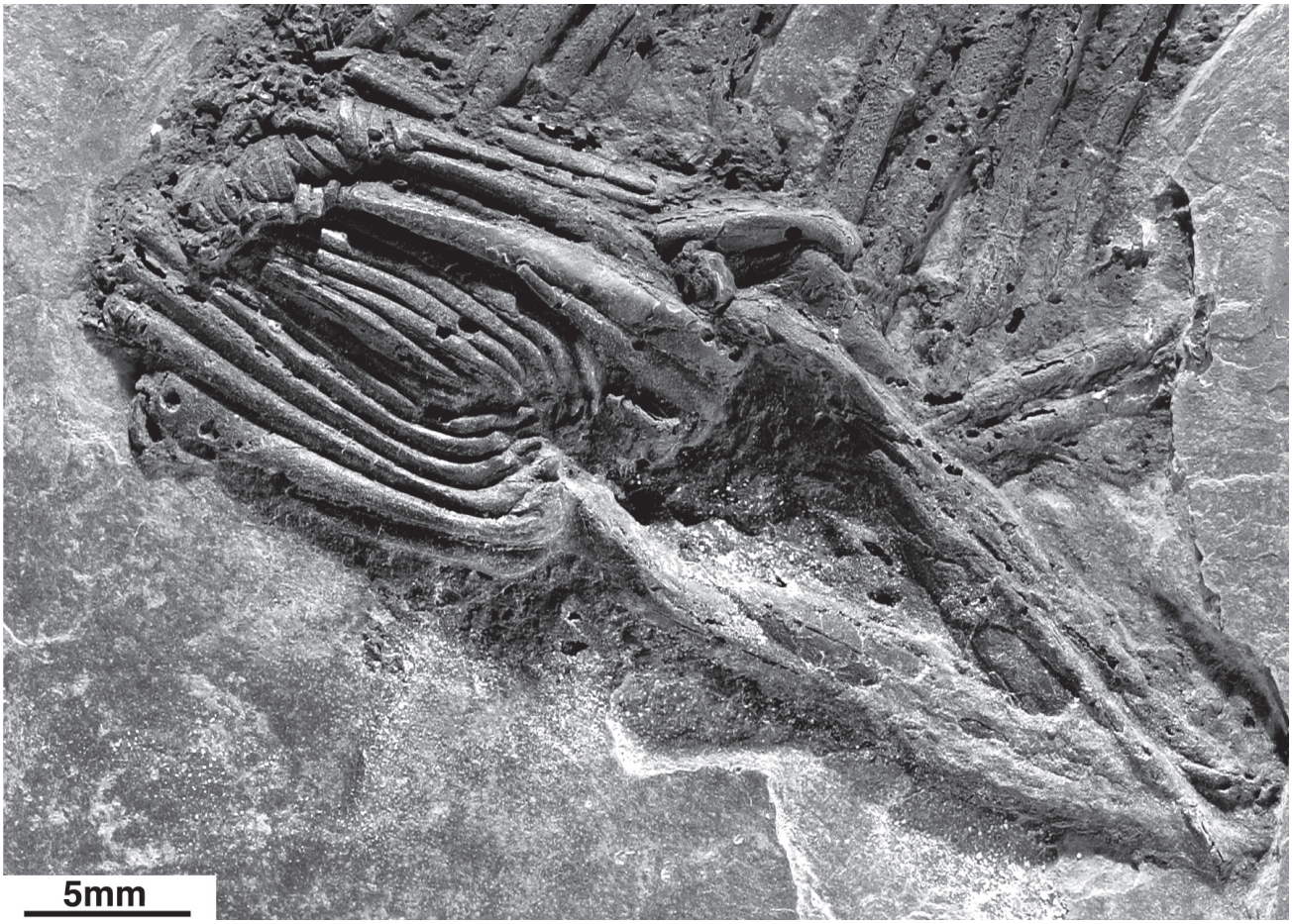

Figure 6: *Tarsichthys* cf. *macrurus* (Agassiz). Pelvic fin of an incomplete male specimen showing the characteristic thickened pelvic fin ray. Specimen 2000 PW 5014, kept in Mainz, in the Landesamt für Denkmalpflege Rheinland-Pfalz, Ref. Erdgeschichtliche Denkmalpflege

in the Siebengebirge (Gaudant 2002). For this reason, the material from Burgbrohl described in the present paper does not significantly differ from this species. However, as the operculum exhibits a less developed postero-dorsal angle and a more regularly rounded postero-ventral outline than the opercula of *Tarsichthys macrurus* (Agassiz) from Rott (Gaudant 2002: fig. 27), it seems to be more appropriate to name the material from Burgbrohl *Tarsichthys* cf. *macrurus* (Agassiz).

4. Palaeoecological significance

The occurrence of representatives of the genus *Tarsichthys* Troschel in the Upper Oligocene of Burgbrohl is indicative of lacustrine conditions, which were probably rather similar to those which existed during the deposition of the time-equivalent lignitic black pelites at Rott near Bonn, and also of the calcareous limnic sediments rich in organic matter at Stößchen (Felder et al. 2004) where *Tarsichthys macrurus* (Agassiz) was initially described as "*Leuciscus bubalus* Troschel" (Gaudant 2002). This interpretation is supported by the occurrence of fossil vertebrates, which were already known from Rott (von Koenigswald 1996), such as frogs: *Palaeobatrachus* cf. *diluvianus* (Goldfuss) and Pelobatids, urodeles and small crocodilians: *Diplocynodon* sp. (Poschmann et al. 2000b). However, in contrast to Rott, which has yielded four different species belonging to four genera of Teleostean fishes, two of which are exceptionally rare (Gaudant 2002), apparently only a single fish species was present at Burgbrohl. It is in fact remarkable that no representative of the Cyprinid genus *Palaeorutilus* Gaudant was found at Burgbrohl, whereas the species *P. papyraceus* (Bronn) is by far the most abundant taxon, both at Rott and at Stößchen, another species of the same genus being present in the Upper Oligocene of Enspel (Böhme 2000). The significance of the monospecificity observed in the Burgbrohl fish community is rather difficult to understand, although it certainly bears witness to the relative isolation and also, probably, to the relatively small size of this lake.

Acknowledgements

The author wishes to acknowledge Dr. Michael Wuttke who proposed him to study the material found at Burgbrohl-Kunkskopf and provided recent literature and finally critically revised a first draft of the manuscript, the stylistic revision of which was kindly made by Dr. Martin Pickford, Paris.

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