

# Teleost Fishes from the Karpatian (Lower Miocene) of the Western Paratethys

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**Abstract.** An overview of the Karpatian teleost fauna (otoliths, teeth, skeletal remains) from the Western Paratethys is given. Twenty-six taxa have been recorded so far, among them 17 nominal species. The dominating faunal elements are primary freshwater fishes (13 taxa), belonging to the Cyprinidae, Channidae, Umbridae, Esocidae, Cobitidae, and Acipenseridae. Euryhaline fishes (13 taxa) belong to Cyprinodontidae, Atherinidae, Gobiidae, and Moronidae, and are less frequent. Due to the fact that more taxa became extinct than were originating or immigrating, a slight drop in diversity appears from the Ottnangian (32 taxa) to the Karpatian (26 taxa) and furthermore to the Lower Badenian (17 taxa).

As a result of environmental conditions, the Karpatian Western Paratethys fish fauna is clearly different from the mainly marine Karpatian fish fauna of the Central Paratethys. However, some freshwater taxa and the euryhaline gobiid *Gobius multipinnatus* from the Korneuburg Basin also appear in the Western Paratethys. Moreover, the first Neogene sturgeon (Acipenseridae) from Western Europe is reported and depicted.

## Introduction

Karpatian sediments from the Western Paratethys (Southern Germany, Switzerland) were deposited in lacustrine and fluviatile environments. As in the Central Paratethys, the teleost fauna is well documented by isolated teeth, bones, and otoliths, but articulated skeletons are rare. So far, studies of otoliths and osteological material have been carried out from the lower part of the Upper Freshwater Molasse from around 25 sites in Southern Germany and 11 sites in Switzerland (von Salis 1967, Reichenbacher 1988, 1993, Böhme 2002b, Gaudant *et al.* 2002, Gaudant & Reichenbacher 2002, Sach *et al.* 2003, Böhme & Ilg 2003).

Table 1 gives an overview of the 47 teleost taxa from the Ottnangian, Karpatian, and Lower Badenian of the Western Paratethys, which are known by otoliths (34 taxa), skeletons (7 taxa, among them 1 taxon with otoliths *in situ*), and disarticulated bones and teeth (15 taxa). A sturgeon (Acipenseridae; Fig. 1:1a-b) from the Karpatian of Southern Germany represents the first record of this fish group in the Neogene of Western Europe.

## Stratigraphic occurrence and biostratigraphy

The Karpatian fish fauna comprises 26 taxa. The dominating faunal elements are primarily freshwater fishes (13 taxa), belonging to the Cyprinidae, Channidae, Umbridae, Esocidae, Cobitidae, and Acipenseridae. Euryhaline fishes display same diversity (13 taxa), but are less frequent. They comprise Cyprinodontidae, Atherinidae, Gobiidae, and Moronidae. Stratigraphically significant species are the cyprinid *Palaeocarassius mydlovariensis* and the gobiid *Gobius longus*, which are both restricted to the Karpatian. Furthermore, the genera *Dapalis* (Ambassidae) and *Palaeotinca* (Cyprinidae) became extinct at the end of the Ottnangian.

The teleost fauna from the Ottnangian comprises 32 taxa. They are known from 53 sites in Southern Germany (Reichenbacher 1988, 1993, Gaudant & Reichenbacher 1998, Böhme & Ilg 2003). In contrast to the Karpatian, the Ottnangian fauna is dominated by euryhaline fishes (25 taxa). Many of them disappear in the Karpatian, but some cyprinodontids (*Prolebias*, *Aphanius*), moronids, and gobiids are still present. Among the gobiids, speciation happens (*G. helvetiae*, *G. latiformis*, *G. longus*) and thus the Karpatian teleost fauna can be distinguished from the Ottnangian by those newly evolved gobiids. Furthermore, during the Karpatian we found some immigrating taxa, like *Palaeocarassius mydlovariensis*, *Barbus* sp. B, *Palaeoleuciscus* sp. B. The extinct taxa, which were widely distributed in the Ottnangian, are *Dapalis* (4 species), *Palaeotinca*, and the marine/euryhaline Mugilidae, Sciaenidae and Soleidae. Due to the fact that more taxa became extinct

Family	Taxon	Ott.	KARPATIAN				Early Baden.	Mat.	Reference / Iconography
		Ottungian localities (MN 4)	grey Molasse (upper MN 4b)	Yellow Finesand (upper MN 4b)	MN 5 (lower part) localities in Southern Germany	MN 5 (lower part) localities in Switzerland	Early Badenian localities (MN 5, middle part)		
Acipenser.	Acipenseridae gen. indet.			X				S	Fig. 1: 1a-b
	<i>Chupeonella cornuta</i> (Reichenbacher, 1988)	X						O	R1, Pl. 2, Fig. 1-14
Clupeidae	<i>Chupeonella humilis</i> (H.v.Meyer, 1852)	X						O, S	R, Pl. 11, Fig. 174-175
	<i>Palaeocarassius mydlovariensis</i> Obrh., 1970		X	X	X M			T, S	O, Fig. 1-15, Pl. 1-5
Cyprinidae	<i>Palaeocarassius priscus</i> (H.v. Meyer, 1852)	X			aff		X	T, S	M, Pl. 15, Fig. 1-5
	<i>Palaeocarassius</i> sp.	X		X	X	X	X	T	B1, Fig. 2
	<i>Barbus</i> sp. A (large)						X	T	B, p. 19
	<i>Barbus</i> sp. B (small)			X	X		X	T	B, p. 19
	<i>Cyprinion</i> vel <i>Capoeta</i>						X	T	B, p. 19
	<i>Palaeotınca</i> sp.	X						T	G, Fig. 5
	<i>Palaeoleuciscus</i> sp. A (small)	X	X	X	X	X	X	T, S	G, Pl. 2, Fig. 5-7
	<i>Palaeoleuciscus</i> sp. B (large)				X		X	T	B, p. 18
Cobitidae	<i>Cobitis</i> sp. B				X			S	B2, Tab. 1
Esocidae	<i>Esox</i> sp.	X			X		X	T	B, p. 23
	<i>Mikroumbra maendlii</i> Reichenbacher, 1993					X		O	R, Pl. 11, Fig. 170-171
Umbridae	<i>Mikroumbra? salisae</i> Reichenbacher, 1993					X		O	R, Pl. 11, Fig. 168-169
Mugilidae	<i>Mugil</i> sp.	X						O	R, Pl. 7, Fig. 113
Atherinidae	<i>Hemitrichas brzobohatyi</i> (Martini, 1983)	X						O	R, Pl. 4, Fig. 63-64
	<i>Hemitrichas martinii</i> (Reichenbacher, 1993)	X	X					O	R, Pl. 5, Fig. 65-74, 78
	<i>Hemitrichas molassica</i> (Reichenbacher, 1993)	X						O	R, Pl. 4, Fig. 57-60, 62
	<i>Hemitrichas schwarzhansi</i> (Reichenb., 1993)	X						O	R, Pl. 4, Fig. 48-56
	<i>Hemitrichas</i> sp.	X						O	R, Pl. 5, Fig. 75-77, 79
Cyprinodontidae	<i>Prolebias weileri</i> von Salis, 1967	X	X			X		O	R, Pl. 1, Fig. 1-9
	<i>Prolebias</i> aff. <i>weileri</i> von Salis, 1967				X		X	O, S	GR, Fig. 3, Pl. 1
	<i>Prolebias nappi</i> von Salis, 1967					X		O	R, Pl. 1, Fig. 11-13
	<i>Prolebias</i> sp. A						X	O	Fig. 1: 2-3
	<i>Aphanius gubleri</i> Reichenbacher, 1993	X				X		O	R, Pl. 1, Fig. 10, 11-17
	<i>Aphanius konradi</i> Reichenbacher, 1988	X	X		X	X	aff.	O	R, Pl. 2, Fig. 18-28, Pl. 3
Ambloplitidae	<i>Dapalis crassirostris</i> (Rzehak, 1893)	X						O	R, Pl. 6, Fig. 83, 90
	<i>Dapalis curvirostris</i> (Rzehak, 1893)	X						O	R, Pl. 6, Fig. 86, 93-94
	<i>Dapalis formosus</i> (H. von Meyer, 1852)	X						O	R, Pl. 6, Fig. 84-85, 87f
	<i>Dapalis kaelini</i> Reichenbacher, 1993	X						O	R, Pl. 6, Fig. 95, 99
Moronidae	<i>Morone moravica</i> Weiler, 1966 / Moronidae	X /		/ X			/ X	O / S	R, Pl. 7, Fig. 100-104
Sparidae	? Sparidae gen. indet.	X						T	R1, Pl. 1, Fig. 22-23
Sciaenidae	<i>Sciaena kirchbergensis</i> Koken, 1891	X						O	R, Pl. 11, Fig. 172
Gobiidae	<i>Gobius brzobohatyi</i> Reichenbacher, 1993	X						O	R, Pl. 8, Fig. 114-125
	<i>Gobius doppleri</i> Reichenbacher, 1993	X	X					O	R, Pl. 9, Fig. 132-137
	<i>Gobius gregori</i> Reichenbacher, 1993	X	X					O	R, Pl. 10, Fig. 156-159
	<i>Gobius helvetiae</i> von Salis, 1967		X		X	X	X	O	R, Pl. 10, Fig. 153-155
	<i>Gobius latiformis</i> Reichenbacher, 1992				X	X	X	O	R, Pl. 10, Fig. 147-148
	<i>Gobius longus</i> von Salis, 1967					X		O	R, Pl. 10, Fig. 149-152
	<i>Gobius multipinnatus</i> (H. von Meyer, 1852)	X			X		X	O, S	R, Pl. 10, Fig. 144-166
	<i>Gobius</i> cf. <i>vicinalis</i> Koken, 1891	X						O	R, Pl. 9, Fig. 142-143
	"genus Gobiidarum" <i>bollikeri</i> Reich., 1993	X						O	R, Pl. 9, Fig. 129-131
Channidae	<i>Channa elliptica</i> (von Salis 1967)	X	X		X	X	X	O	R, Pl. 11, e.g., Fig. 164-167
	Channidae div. sp.	X	X	X	X	X	X	O, S	R, Pl. 11, Fig. 161, 163
Soleidae	<i>Solea kirchbergana</i> H. von Meyer, 1852	X						O, S	R, Pl. 11, Fig. 176

Table 1: Teleost taxa recorded from the Ottungian, Karpatian and Lower Badenian and their distribution in the Western Paratethys.

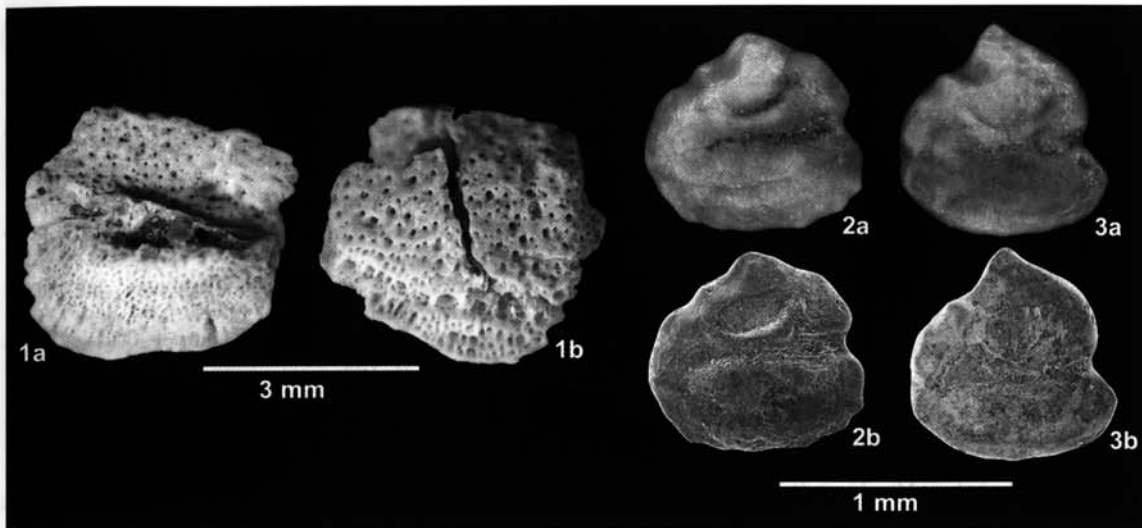


Figure 1: New freshwater fish taxa from the Karpatian and Lower Badenian of the Western Paratethys. 1 = *Acipenseridae* indet., Osteoderm, a – dorsal view, b – ventral view; Günzburg 2/1, Karpatian, MN4b, sedimentary cycle OSM 0; Bavarian State Collection (1995 XII 1). 2, 3 = *Prolebias* sp. A, left sagittae (a: digital photograph, b: SEM photograph); Walda 1, Lower Badenian, MN5 (middle part), sedimentary cycle OSM 3; Bavarian State Collection (1987 V 701–702).

than were originating or immigrating, a slight drop in diversity appears from the Ottnangian (32 taxa) to the Karpatian (26 taxa) and furthermore to the Lower Badenian (17 taxa). This may be caused by a decrease in environmental diversity, e.g., the progressive disappearance of euryhaline habitats, probably as a result of increasing humidity and changing hydrology around the Lower-Middle Miocene transition in the Western Paratethys. However, the drop in diversity in the Lower Badenian is particularly significant, and only two new species appear (*Barbus* sp. A, *Prolebias* sp. A, see Fig. 1:2–3).

## Comparison with the Karpatian teleost fauna of the Central Paratethys

Due to environmental conditions, the Karpatian Western Paratethys fish fauna is clearly different from the mainly marine Karpatian fish fauna of the Central Paratethys. However, the freshwater taxa from the Korneuburg Basin (*Barbus* sp. B, *Esox* sp., *Aphanius konradi*; Böhme 2002c, Reichenbacher 1998) also appear in the Western Paratethys. Furthermore, some euryhaline taxa, which are frequent in the Central Paratethys also occur in the Western Paratethys. These are the cosmopolitan Moronidae, known from the Fohnsdorf Basin (Hiden 2002) and the Styrian Basin (Gaudant 2000), and *Gobius multipinnatus*, a frequent species in the Korneuburg Basin (Reichenbacher 1998).

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