

DAWID SURMIK¹, TOMASZ BRACHANIEC²

¹Faculty of Earth Science, University of Silesia,
Department of Paleontology and Stratigraphy,
Bedzinska Str. 60, 41-200 Sosnowiec.

Email: dawid@surmik.pl

² Faculty of Earth Science, University of Silesia,
Department of Geochemistry, Mineralogy and
Petrography, Bedzinska Str. 60, 41-200 Sosnowiec.

Email: tribal216@gmail.com

The large superpredators' teeth from Middle Triassic of Poland

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ABSTRACT

An unusual large teeth, finding from time to time in marine sediments of Muschelkalk, Silesia, Poland indicate the superpredators occurrence. According to size and morphological features the teeth are similar to archosaurs or giant marine reptiles.

Introduction

We report findings of two teeth of large predators from outcrops in Żyglin and Gogolin, Silesia, Poland. We discuss the taxonomical

affiliation of mentioned remains to terrestrial or aquatic archosaurs or giant marine reptiles, like piscivorous ichthyosaurs.

Geological settings

Żyglin is a hamlet of Miasteczko Śląskie town, near Tarnowskie Góry, Upper Silesia, Southern Poland. This locality is famous from great abundance of Middle Triassic marine reptiles remains, especially nothosaurs (Surmik 2010). The outcrops in Gogolin area, including nearby Zakrzów, (formerly in German – Sacrau) quarry are famous historical localities, well known in scientific literature due to findings of numerous taxa of Muschelkalk sauropterygians, including holotypes (e.g. *Proneusticosaurus*

silesiacus). The main Muschelkalk outcrops in Gogolin and Zakrzów are right now not accessible because of side devastation and overgrown by plants.

As in Żyglin and Gogolin areas, in local quarries, the carbonate rocks of Lower Gogolin Formation are exposed, and represents the shallow-water marine carbonate succession, constituting the lowest part of the Lower Muschelkalk, rich in vertebrate fossils from an Early Anisian.

Material & Methods

We presented two similar predators' teeth from Middle Triassic (Muschelkalk) of Silesia. The first specimen (Fig. 1A) was found at local quarry in Żyglin by one of us (T.B.) and comes from weathering crust of the Lower Gogolin formation (the Lowest Anisian). Second one specimen comes from Lower Gogolin formation of Gogolin (the

Lowest Anisian) and is located on small fragment of crinoid limestone with *Dadocrinus gracilis* (Fig.1B).

To make macroscopic photos of investigate teeth, camera Canon 350D was used. Tooth from Żyglin quarry was ammonium chloride-coated.

Discussion

Originally, both of mentioned teeth have been considered as archosaurian, especially tooth from Żyglin quarry is distinct because of the fairly strong curvature and the serrated cutting edges (Fig. 2).

Żyglin tooth is 23mm in length and is very similar to rauisuchian teeth, for example *Qianosuchus*. Chinese taxon *Qianosuchus* is aquatic poposaurid, lived in near-shore environments (Li et al. 2006). The taxon was described from marine deposits of Middle Triassic (Anisian) of Guanling Formation, Pan County in China. Mysterious tooth from Żyglin quarry also comes from Anisian marine sediments.

The specimen from Gogolin measures 37mm in length and includes central and apical part of crown. We suspect that it is only a fragment of the whole specimen. Unfortunately, a poor state of preservation makes it impossible to identification of the

presence of edge serration, however it still shows a slightly curvature and specific both sides flattening.

The serrated edges with both sides flattening is a characteristic feature of archosaurs, however serration occurs also in huge Middle Triassic piscivorous ichthyosaurs from central Nevada, USA (Frobisch et al. 2013). Also tooth curvature is known already in the early reptiles, so both of these features have no appreciable systematic significance and should be analyzed in terms of functional morphology than phylogenetic relationships. Historical records from Muschelkalk of Silesia described the remains, originally assigned to the archosaurs. The oldest scientific literature (see in Surmik 2010) quote dorsal vertebra of "*Thecodontosaurus*" *primus*, comes from Gogolin Formation of Gogolin quarry and femur of "*Zanclodon*" *silesiacus* from the same outcrop.

Both of these finds are now considered to be the remains of a large specimens of proleptiform genus – *Tanystropheus* (Surmik 2010). Genus *Ticinosuchus*, probably from Anisian/Ladynian borderline of Stare Gliny quarry deposits, near Olkusz was mentioned by Benton (1986).

Remains of archosaurs were found in grey clays of Ladynian outcrop in Miedary (Sulej et al. 2011), near Tarnowskie Góry. The analysis of archosaurian tooth found in mentioned locality indicates the strong affinity to *Batrachotomus kupferzellensis* from Ladynian sediment of Southern Germany

(Sulej et al. 2011 and literature cited therein). Also the remains of ichtyosaurian/ichtyopterygians were described from Lower Muschelkalk of Poland (Surmik, 2010 and literature cited therein). Huene (1916) mentions *Pachygonosaurus* (nomen dubium) dorsal vertebra and *Mixosaurus* cf. *atavus* (current name *Contectopalatus atavus*, see Maisch & Matzke, 2001) scapula.

Also Hagdorn & Rieppel (1999) mention giant genus *Cymbospondylus*, and Sander & Mazin (1993) described lower jaw of *Tholodus* with characteristic durophagous dentition.

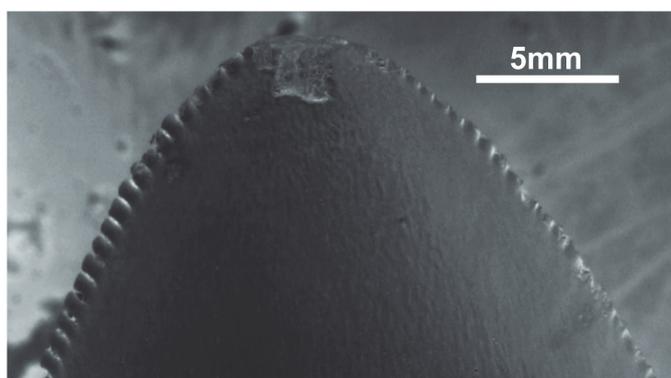


Fig. 2. The serrated cutting edges of tooth from Żyglin quarry.

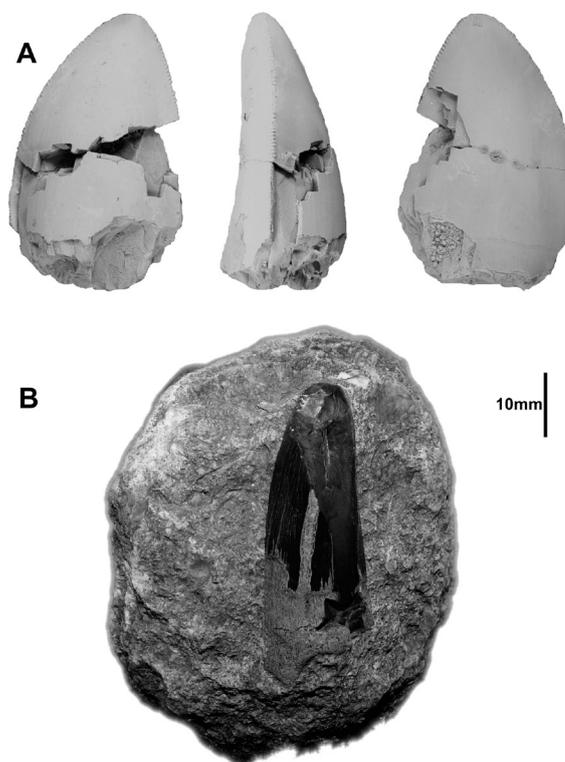


Fig.1. Superpredators' teeth from Middle Triassic of Poland. A) Specimen from Żyglin quarry, B) Specimen from Gogolin quarry.

Summary

The teeth described here confirmed the occurrence of large predators in the early stages of marine transgression in the lowest part of Anisian at Upper Silesia. Tooth from Żyglin quarry is closer to archosaurs (rauisuchians) in origin, and probably it has been delivered to marine deposits by elution from

the land. Tooth from Gogolin seems archosaurian teeth, however the fact that it cannot be dissected from the rock (as an important museum specimen) decreases its scientific value, because it makes impossible to recognize significant features.

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