

Zitteliana

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45



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Cover illustration: Ostracod *Callistocythere intricatoides* (RUGGIERI, 1953) from the Thyrrenian of Altinova (Turkey). Left: Right valve, external view, BSPG 1980 X 1313 (length 0.640 mm). Right: Left valve, external view, BSPG 1980 X 1314 (length 0.646 mm). SEM Photograph: R. MATZKE-KARASZ (LMU München, Department für Geo- und Umweltwissenschaften, Sektion Paläontologie)

Umschlagbild: Ostrakode *Callistocythere intricatoides* (RUGGIERI, 1953) aus dem Thyrrenium von Altinova (Türkei). Links: Rechte Klappe, Außenansicht, BSPG 1980 X 1313 (Länge 0,640 mm). Rechts: Linke Klappe, Außenansicht, BSPG 1980 X 1314 (Länge 0,646 mm). REM-Foto: R. MATZKE-KARASZ (LMU München, Department für Geo- und Umweltwissenschaften, Sektion Paläontologie)

*Short Communication***Phylogenetic relationships of the Thalattosuchia**

By

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Key words: Thalattosuchia, relationships, phylogeny**Schlüsselwörter:** Thalattosuchia, Verwandtschaft, Phylogese

The Thalattosuchia is a basal clade within the Crocodyliformes, consisting of *Pelagosaurus typus*, the Metriorhynchidea and the Teleosauridea (BENTON & CLARK 1988; CLARK 1994). In this note, the phylogenetic in-group relationships of metriorhynchids and teleosaurids as well as their relation to the taxon *Pelagosaurus typus* are presented. Previously, these relationships have only rarely been investigated (BUFFETAUT 1980, 1982; VIGNAUD 1995; WESTPHAL 1962), and the present study also provides the first phylogenetic in-group analysis.

The phylogenetic analysis was performed using PAUP 4.0 b10 (SWOFFORD 2003). In total, the matrix consists of the following 29 taxa including two outgroups: *Dakosaurus maximus* (PLIENINGER, 1846), *Geosaurus giganteus* (SOEMMERING, 1816), *Geosaurus gracilis* (MEYER, 1830), *Geosaurus suevicus* (FRAAS, 1902), *Geosaurus vignaudi* FREY et al., 2002, *Machimosaurus hugii* MEYER, 1837, *Metriorhynchus superciliosus* (BLAINVILLE, 1853), *Metriorhynchus hastifer* (DESLONGCHAMPS, 1868), *Metriorhynchus leedsi* ANDREWS, 1913, *Pelagosaurus typus* BRONN, 1841, *Platysuchus multiscrobiculatus* BERCKHEMER, 1929, *Steneosaurus baroni* NEWTON, 1893, *Steneosaurus bollensis* (JAEGER, 1828), *Steneosaurus boutilieri* (DESLONGCHAMPS, 1868), *Steneosaurus brevior* (BLAKE, 1876), *Steneosaurus edwardsi* (DESLONGCHAMPS, 1868), *Steneosaurus gracilirostris* WESTPHAL, 1961, *Steneosaurus heberti* MOREL DE GLASVILLE, 1876, *Steneosaurus leedsi* ANDREWS, 1909 (including *Myceterosaurus natus* after VIGNAUD 1995), *Steneosaurus megarhinus* (HULKE, 1871), *Steneosaurus pictaviensis* VIGNAUD, 1998, *Steneosaurus priscus* (SOEMMERING, 1814), *Teleidosaurus calvadosi* DESLONGCHAMPS, 1866, *Teleidosaurus gaudryi* COLLOT, 1905, *Teleosaurus cadomensis* LAMOUREUX, 1820, *Pholidosaurus* and *Dyrosaurus*. *Protosuchus* and *Gracilisuchus* were entered as outgroups.

In total 189 characters were used in the analysis. The first 136 characters and codings were taken from CLARK (1994), TYKOSKI et al. (2002), and POL & NORELL (2004) but were modified if necessary. Additionally, 53 new, personally defined characters were added. The character states for 21 taxa were determined by

personal examination of original material and by data from the literature, whereas the character states for the remaining taxa were derived exclusively from the literature. Due to the large size of the data matrix, the heuristic search option with random stepwise addition and tree-bisection-reconnection (TBR) was used. The strict consensus tree presented here was derived from 37 equally parsimonious trees with a consistency index (CI) of 0.6291 (Fig. 1). All characters were unordered and not weighted, multi-state characters were treated as polymorphism. 37 characters proved to be constant during the analysis, and additionally 37 characters were parsimony-uninformative.

The teleosaurids and the metriorhynchids turned out to be monophyletic sister groups as expected (BENTON & CLARK 1988; CLARK 1994). However, the *Steneosaurus*-taxa within the Teleosauridae turned out to be paraphyletic. *Steneosaurus pictaviensis* repeatedly occurs in a sister-group relationship with *Teleosaurus cadomensis* and partly also with *Steneosaurus megarhinus*. Together with these taxa, it forms a sister group to most other *Steneosaurus* taxa. *Platysuchus multiscrobiculatus* falls mostly with *Teleosaurus cadomensis* and occurs as a sister to the remaining *Steneosaurus* taxa and *Machimosaurus hugii*. The suggestion by VIGNAUD (1995) that *Platysuchus multiscrobiculatus* should be put in a close relationship with the *Teleosaurus* taxa is therefore partly confirmed in the present investigation. The Liassic taxa *Steneosaurus brevior* and *Steneosaurus gracilirostris* repeatedly occur in a sister-group relationship, which fits well with the stratigraphic background (Yorkshire Lias). *Steneosaurus bollensis* shows variable relationships with the other Liassic *Steneosaurus* taxa, *Steneosaurus brevior* und *Steneosaurus gracilirostris*, but it mostly falls as a sister taxon to *Steneosaurus priscus* from the Tithonian of the Swabian Alb and *Steneosaurus edwardsi* from the French Callovian and Oxfordian. The Late Jurassic taxa *Steneosaurus leedsi* from England and *Steneosaurus heberti* from France constantly occur as sister groups, which again fits well with the stratigraphic background. Within the Teleosauridae, *Machimosaurus hugii* proves to be consistently the sister taxon of all *Steneosaurus* taxa, excluding *Steneosaurus megarhinus* and *Steneosaurus pictaviensis*, which fall with *Teleosaurus cadomensis*.

The monophyly of the genus *Metriorhynchus* within the

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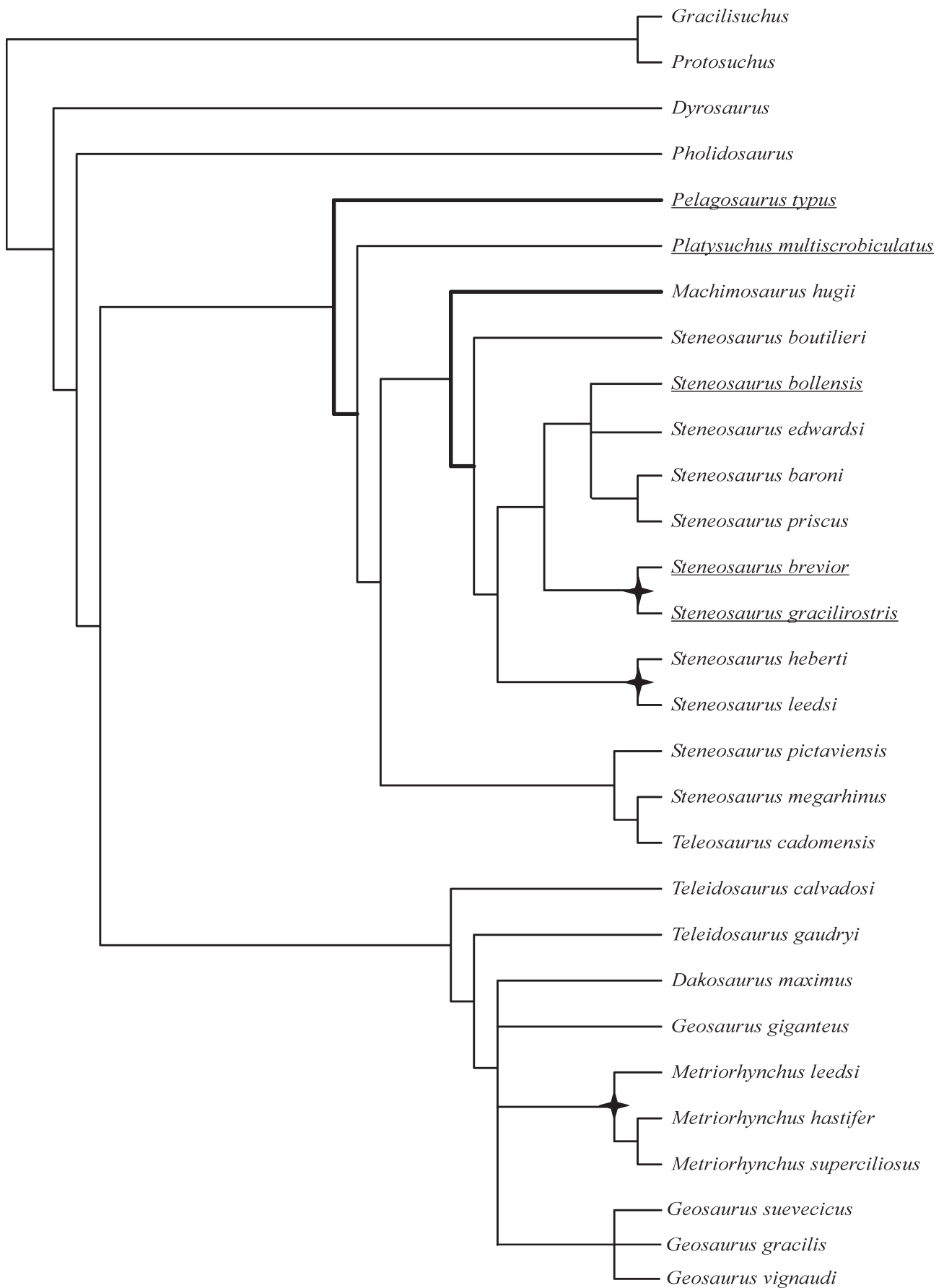


Figure 1: Strict consensus tree of 37 equally parsimonious trees (CI 0.6291). The matrix consists of 29 taxa. In total 189 characters were used in the analysis of which 115 are parsimony-informative. The Liassic taxa are underlined and well-supported relationships are marked either with thickened branches or with an asterisk.

Metriorhynchidae is also confirmed. However, the genus *Geosaurus* turns out to be paraphyletic within the Metriorhynchidae. *Geosaurus giganteus* shows a closer relationship with *Metriorhynchus* and *Dakosaurus* than with *Geosaurus gracilis*, which occurs, together with *Geosaurus giganteus*, in the Kimmeridgian of the Swabian Alb. *Geosaurus gracilis* often turns out as a sister to all remaining *Geosaurus* and *Metriorhynchus* taxa. However, it seems to be more closely related to *Geosaurus vignaudi* and *Geosaurus suevecicus* than to *Geosaurus giganteus*. It never occurs in a sister-group relationship with *Geosaurus giganteus*.

Pelagosaurus typus, which is thought to be basal to the Teleosauridae and the Metriorhynchidae (BENTON & CLARK 1988; CLARK 1994; BUCKLEY et al. 2000), occupies a basal position within the teleosaurids. The assumption by BUFFETAUT (1980) that *Pelagosaurus typus* is either a close relative of metriorhynchids or a very primitive metriorhynchid itself cannot be confirmed in the present analysis.

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