

Ichthyosauromorpha Occurrences

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Occurrence Data

Initial occurrence data were downloaded from the Palaeobiology Database on 10 March 2020. Entries were vetted for consistency and occurrence dates were re-evaluated to as precise intervals as possible. Absolute ages were taken from Ogg *et al.*² to ammonite/conodont biozone level where possible using the TSCreator tool (<https://timescalecreator.org/index/index.php>).

² OGG, J.G. *et al.* 2016a. *A Concise Geological Time Scale* 2016. Oxford: Elsevier.

Acamptonectes densus

Three specimens of *Acamptonectes densus* are recorded by Fischer *et al.*³ from the Hauterivian. The two British specimens are from the D2D and D2C, which are identified to Lower Neocomian. Bed D2D is identified as the most basal *Endomoceras* bed,⁴ which approximately matches Boreal Realm ammonite zones from the base of the Hauterivian at 134.69 Ma.⁵ *Endomoceras* ammonite biozones correspond to the first two Tethyan ammonite biozones (*Acanthodiscus radiatus* and *Crioceratites loryi*).

A specimen referred to *Acaptonectes densus* from Cremlingen, Germany is identified to *Simbirskites (Milankowskia) concinnus/staffi* Ammonite Biozone.⁶ This is equivalent to the *Milankowskia speetonensis* Ammonite Biozone in the Boreal Realm.⁷

³ FISCHER, V. *et al.* 2012. New ophthalmosaurid ichthyosaurs from the European Lower Cretaceous demonstrate extensive ichthyosaur survival across the Jurassic–Cretaceous boundary. *PLoS ONE*, **7**, e29234–2. doi: 10.1371/journal.pone.0029234.

⁴ HOPSON, P.M. *et al.* 2008. *A Stratigraphical Framework for the Lower Cretaceous of England*. Research Report RR/08/03. Keyworth, Nottingham: British Geological Survey, pp. 1–77.

⁵ OGG, J.G. *et al.* 2016b. Cretaceous. 167–186. In *A Concise Geological Time Scale*. doi: 10.1016/B978-0-444-59467-9.00013-3.

⁶ SIEBERTZ, E. & KRÜGER, F.J. 2008. Biostratigraphie und Paläobiogeographie des Hauterivium von Cremlingen bei Braunschweig bestimmt mit Cephalopoden (Unterkreide, Ostniedersachsen). *Braunschweiger Naturkundliche Schriften*, **8**, 273–287.

⁷ OGG *et al.*, Cretaceous.

Taxon	Stratigraphy	Max Age (Ma)	Min Age (Ma)
<i>Acamptonectes densus</i>	<i>Endomoceras</i> ammonite biozones, Early Hauterivian	134.71	133.87
<i>Acamptonectes densus</i>	<i>Milankowskia speetonensis</i> Ammonite Biozone	133.32	132.85

Acuetzpalin carranzai

Acuetzpalin carranzai is found in the La Casita Formation of northern Mexico, but is limited only to the Kimmeridgian Stage.⁸ Further marine vertebrate remains are found through this formation, and others coeval formations, and certain concentrations have been correlated to *Hybonoticeras beckeri* Ammonite Biozone (153.55 Ma to 152.06 Ma).⁹

⁸ BARRIENTOS-LARA, J.I. *et al.* 2020. *Acuetzpalin carranzai* gen et sp. nov. a new ophthalmosauridae (Ichthyosauria) from the Upper Jurassic of Durango, North Mexico. *Journal of South American Earth Sciences*, 102456. doi: 10.1016/j.jsames.2019.102456.

⁹ ZELL, P. *et al.* 2014. Age and depositional conditions of the marine vertebrate concentration Lagerstätte at Gomez Farías, southern Coahuila, Mexico. *Journal of South American Earth Sciences*, **56**, 91–109. doi: 10.1016/j.jsames.2014.08.009.

Taxon	Stratigraphy	Max Age (Ma)	Min Age (Ma)
<i>Acuetzpalin carranzai</i>	Kimmeridgian	157.25	152.06

Table 2 Occurrence ages of *Acuetzpalin carranzai*.

Aegirosaurus leptospondylus

The neotype and one referred specimen of *Aegirosaurus leptospondylus* are referred to Malm 2b, the upper part of the part of the Altmühltal Formation.¹⁰ These lithographic limestones are in the *Hybonotoceras hybonotum* Ammonite Biozone, the most basal of the Tithonian. Together with the other two specimens referred by Bardet & Fernández¹¹ all known occurrences of *Aegirosaurus leptospondylus* are from the same general time and locality.

¹⁰ BARDET, N. & FERNÁNDEZ, M.S. 2000. A new ichthyosaur from the Upper Jurassic lithographic limestones of Bavaria. *Journal of Paleontology*, **74**, 503–511. doi: 10.1017/S0022336000031760.

¹¹ BARDET & FERNÁNDEZ, A new ichthyosaur from the Upper Jurassic lithographic limestones of Bavaria. *Journal of Paleontology*, **74**, 503–511. doi: 10.1017/S0022336000031760.

Taxon	Stratigraphy	Max Age (Ma)	Min Age (Ma)
<i>Aegirosaurus leptospondylus</i>	<i>Hybonotoceras hybonotum</i> Ammonite Biozone	152.06	150.94

Arthropterygius

Ophthalmosaurus natans

Previously referred to *Baptanodon*, it's currently found most often to be a species within *Ophthalmosaurus*, although the exact affinities to *Ophthalmosaurus icenicus* are uncertain. Several specimens of Jurassic ichthyosaurs have been found in the American mid-West, primarily from the Sundance Formation. More recent finds are most often found in the Redwater Shale member, however historical remains don't have such precise lithostratigraphy.

Other synonymous taxa here assigned to *Ophthalmosaurus natans* include *Apatodonosaurus grayi* from Wyoming.¹²

¹² MEHL, M.G. 1928. *Apatodonosaurus*, a new genus of ichthyosaurs from the Jurassic of Wyoming. *Journal of the Scientific Laboratories of Denison University, Granville*, **23**, 111–126.

Taxon	Stratigraphy	Max Age (Ma)	Min Age (Ma)
<i>Ophthalmosaurus natans</i>	Oxfordian	163.1	157.25
<i>Ophthalmosaurus natans</i>	<i>Cardioceras cordatum</i> – <i>Perisphinctes plicatilis</i> ammonite biozones	161.18	159.88

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