

# Ichthyosauromorph taxonomy

Benjamin Moon

Version O.4.232.20210218

ICHTHYOSAURIMORPHA Motani et al., 2015

HUPEHSUCHIA Carroll & Dong, 1991

*Eohupehsuchus brevicollis* Chen et al, 2014b

- \* 2014b *Eohupehsuchus brevicollis* Chen et al.; p 4 [Jialingjiang Formation (Upper Spathian, Lower Triassic); Yangping, Yuan'an County, Hubei Province, China].

*Eretmorhipis carrolldongi* Chen et al., 2015

- 1991 Hupehsuchia n. g., n. s.; p 143 [Jialingjiang Formation (Upper Spathian, Lower Triassic); Tuling, Baihechuan, Xunjian District, Nanzhang County, Hubei Province, China].
- \* 2015 *Eretmorhipis carrolldongi* Chen et al.; p 4 [Jialingjiang Formation (Upper Spathian, Lower Triassic); Yingzhishang, Yuan'an County, Hubei Province, China].

*Hupehsuchus nanchangensis* Young & Dong, 1972

*Nanchangosaurus suni* Wang, 1959

*Parahupehsuchus longus* Chen et al., 2014a

ICHTHYOSAURIFORMES Motani et al., 2015

*Acamptonectes densus* Fischer et al., 2012

- \* 2012 *Acamptonectes densus* Fischer et al.; p 3 [Speeton Clay Formation–*Simbiskites concinnus/staffi* ammonite biozones (basal–upper Hauterivian, Lower Cretaceous); Speeton, Yorkshire, UK and Cremlingen, Lower Saxony, Germany].

*Aegirosaurus leptospondylus* (Wagner, 1853)

- \* 2000 *Aegirosaurus leptospondylus* (Wagner); p 504 [Solnhofen Formation (Tithonian, Upper Jurassic); Borsheim and Langenaltheim, Bavaria, Germany].

*Arthropterygius chrisorum* (Russell, 1993)

- \* 1993 *Ophthalmosaurus chrisorum* Russell; p 198 [Ringnes Formation (Oxfordian–Kimmeridgian, Upper Jurassic); Cape Grassy, Melville Island, Canada (76° 9' 4" N, 113° 30' W = UTM WGS84 12X 433220 8453461)]
- 2019 *Arthropterygius chrisorum* (Russell); Zverkov & Prilepskaya, p 15.
- 2019 *Palvennia hoybergeri* (*pars*) (Russell); Zverkov & Prilepskaya, p 15 [Slottsmøya Member, Agardfjellet Formation (Tithonian, Upper Jurassic); Spitsbergen, Svalbard].
- ? 2019 *Keilhauia nui* Delsett et al.; Zverkov & Prilepskaya p 15.
- ? 2019 Ophthalmosauridae indet.; Zverkov & Prilepskaya, tbl 1.

*Arthropterygius hoybergeri* (Druckenmiller et al., 2012)

- \* 2012 *Palvennia hoybergeri* Druckenmiller et al.; p 326 [Slottsmøya Member, Agardfjellet Formation (Middle Volgian, Upper Jurassic); Spitsbergen, Svalbard (UTM WGS84 33N 0518775 8696150)].
- 2018 *Palvennia hoybergeri* Druckenmiller et al..
- 2019 *Arthropterygius hoybergeri* (Druckenmiller et al.); p 31.

*Arthropterygius lundii* (Roberts et al., 2014)

- \* 2014 *Janusaurus lundi* Roberts *et al.*; p 4 [Slottsmøya Member, Agardfjellet Formation (Tithonia, Upper Jurassic); Spitsbergen, Svalbard (UTM WGS84 N78 20.264 E15 50.044)].
- 2019 *Arthropterygius lundi* (Roberts *et al.*); p 40.

*Athabascasaurus bitumineus* Druckenmiller & Maxwell, 2010

*Barracudasauroides panxianensis* (Jiang *et al.*, 2006)

*Besanosaurus leptorhynchus* Dal Sasso & Pinna, 1996

*Brachypterygius alekseevi* (Arkhangelsky, 2001)

*Brachypterygius extremus* (Boulenger, 1904)

- \* 1904 *Ichthyosaurus extremus* Boulenger [Kimmeridge Clay Formation (Kimmeridgian); Weymouth, Dorset, UK].
- 1976 *Grendelius mordax* McGowan [*Aulacostephanus autissiodorensis* Ammonite Biozone, Kimmeridge Clay Formation (Kimmeridgian); Norfolk, UK].

*Brachypterygius pseudoscythica* (Efimov, 1998)

*Californosaurus perrini* (Merriam, 1902)

*Callawayia neoscapularis* (McGowan, 1994)

*Cartorhynchus lenticarpus* Motani *et al.*, 2015

*Caypullisaurus bonapartei* Fernández, 1997

*Cetarthrosaurus walkeri* Seeley, 1873

*Chacaicosaurus cayi* Fernández, 1994

*Chaohusaurus chaoxianensis* (Chen, 1985)

*Chaohusaurus geishanensis* Young & Dong, 1972

*Chaohusaurus zhangjiawanensis* Chen *et al.*, 2013

*Contectopalatus atavus* (Quenstedt, 1852)

*Cymbospondylus buchseri* Sander, 1989

*Cymbospondylus nichollsi* Fröbisch *et al.*, 2006

*Cymbospondylus petrinus* Leidy, 1868

*Cymbospondylus piscosus?* Leidy, 1868

*Dearcmhara shawcrossi* Brusatte *et al.*, 2015

*Eurhinosaurus longirostris* (Mantell, 1851)

*Excalibosaurus costini* McGowan, 1986

*Gegasaurus nicosiai* Paparella *et al.*, 2016

*Grippia longirostris* Wiman, 1929

*Guizhouichthyosaurus tangae* Cao & Luo in Yin *et al.*, 2000

*Guizhouichthyosaurus wolonggangense* (Chen *et al.*, 2007)

*Gulosaurus helmi* Cuthbertson *et al.*, 2013

*Hauffiopteryx typicus* Maisch, 2008

*Himalayasaurus tibetensis* Young & Dong, 1972

*Hudsonelpidia brevirostris* McGowan, 1995

*Ichthyosaurus acutirostris* Owen, 1840

*Ichthyosaurus anningae* Lomax & Massare, 2015

*Ichthyosaurus breviceps* Owen, 1881

*Ichthyosaurus communis* Conybeare, 1822  
*Ichthyosaurus conybearei* Lydekker, 1888  
*Ichthyosaurus larkini* Lomax & Massare, 2017  
*Ichthyosaurus somersetensis* Lomax & Massare, 2017

*Isfjordosaurus minor* (Wiman, 1910)

*Keihauia nui*? Delsett et al., 2017

- \* 2017 *Keihauia nui* Delsett et al.; p 7 [Slottsmøya Member, Agardfjellet Formation (lower Berriasian, Lower Cretaceous); northside of Janusfjellet, Spitsbergen, Svalbard (UTM WGS84 33X 0518847 8696044 = 78.33637° N, 015.83513° E)].
- ? 2019 *Arthropterygius chrisorum* (Russell); Zverkov & Prilepskaya, p 15.

*Leninia stellans* Fischer et al., 2014a

*Leptonectes moorei* McGowan & Milner, 1999

*Leptonectes solei* (McGowan, 1993)

*Leptonectes tenuirostris* (Conybeare, 1822)

*Macgowania janiceps* (McGowan, 1996)

*Maiaspondylus lindoei* Maxwell & Caldwell, 2006

*Malawania anachronus* Fischer et al., 2013

*Mikadocephalus gracilirostris* Maisch & Matzke, 1997

*Mixosaurus cornalianus* (Bassani, 1886)

*Mixosaurus kuhnschneyderi* (Brinkmann, 1998)

*Mixosaurus xindianensis* Chen & Cheng, 2010

*Mollesaurus periallus* Fernández, 1999

*Muiscasaurus catheti* Maxwell et al., 2016

- \* 2016 *Muiscasaurus catheti* Maxwell et al.; p 3 [Arcillolitas abigarradas Member, Paja Formation (Barremian–Aptian, Lower Cretaceous); Vereda Llanitos, Sáchica, Boyacá, Colombia (UTM WGS84 18N 662859 616018 = 05.5713000° N, 073.5296833° W)].

*Nannopterygius enthekiodon* (Hulke, 1871)

*Ophthalmosaurus icenicus* Seeley, 1874

*Ophthalmosaurus natans* (Marsh, 1879)

*Ophthalmosaurus yasykovi* (Efimov, 1999b)

*Paraophthalmosaurus kabanovi* (Efimov, 1999b)

*Paraophthalmosaurus sevaljeviensis* Arkhangelsky, 1997

*Parvinatator wapitiensis* Nicholls & Brinkman, 1995

*Pervushovisaurus bannovkensis* Arkhangelsky, 1998

*Pervushovisaurus campylodon* (Carter, 1846)

- \* 1846 *Ichthyosaurus campylodon* Carter.
- 1922 *Myopterygius campylodon* (Carter); Huene.
- 1972 *Platypterygius campylodon* (Carter); McGowan.
- 2016 *Pervushovisaurus campylodon* (Carter); Fischer, p 8 [(Cambridge Greensand Member,) West Melbury Marly Chalk Formation (Cenomanian, Upper Cretaceous); Cambridgeshire and Kent, UK].

*Pessopteryx nisseri* Wiman, 1910

*Phalarodon callawayi* Schmitz et al., 2004

*Phalarodon fraasi* Merriam, 1910

*Phalarodon major* Huene, 1916

*Phantomosaurus neubigi* (Sander, 1997)

*Platypterygius americanus* Nace, 1939

- \* 1939 *Myopterygius americanus* Nace [Mowry Shale Member, Graneros Formation; Crook County, Wyoming.]
- 1968 *Myopterygius americanus* Nace; Romer.
- 1972 *Platypterygius americanus* (Nace); McGowan.

*Platypterygius australis* (M'Coy, 1867)

*Platypterygius hauthali* (Huene, 1927)

*Platypterygius hercynicus* Kuhn, 1946

*Platypterygius ochevi* Arkhangelsky et al., 2008

*Platypterygius platydactylus* (Broili, 1907)

*Platypterygius sachicarum* Páramo, 1997

*Protoichthyosaurus applebyi* Lomax et al., 2017

*Protoichthyosaurus prostaxalis* Appleby, 1979

*Qianichthyosaurus xingyiensis* Ji, Jiang & Motani in Yang et al., 2013

*Qianichthyosaurus zhoui* Li, 1999

*Quasianosteosaurus vikinghoegdai* Maisch & Matzke, 2003

*Sclerocormus parviceps* Jiang et al., 2016

*Shastasaurus alexandrae* Merriam, 1902

*Shastasaurus liangae* (Yin in Yin et al., 2000)

*Shastasaurus pacificus* Merriam, 1895

*Shastasaurus sikkaniensis* (Nicholls & Manabe, 2004)

*Shonisaurus popularis* Camp, 1976

*Simbirskiasaurus birjukovi* Otschev & Efimov, 1985

*Sisteronia seeleyi* Fischer et al., 2014b

*Stenopterygius aaleniensis* Maxwell et al., 2012

*Stenopterygius quadriscissus* (Quenstedt, 1858)

*Stenopterygius triscissus* (Quenstedt, 1858)

*Stenopterygius uniter* Huene, 1931a

*Suevoleviathan disinteger* (Huene, 1926)

*Suevoleviathan integer* (Bronn, 1844)

*Sveltonectes insolitus* Fischer et al., 2011

*Temnodontosaurus azerguensis* Martin et al., 2012

*Temnodontosaurus crassimanus* (Blake, 1876)

*Temnodontosaurus eurycephalus* McGowan, 1974

*Temnodontosaurus nuertingensis* (Huene, 1931b)

*Temnodontosaurus platyodon* (Conybeare, 1822)

*Temnodontosaurus trigonus* (Theodori, 1843)

*Thaisaurus chonglakmanii* Mazin et al., 1991

*Thalattoarchon saurophagis* Fröbisch et al., 2013

*Tholodus schmidi* Meyer, 1849

*Toretocnemus californicus* Merriam, 1903

*Toretocnemus zitteli* (Merriam, 1903)

*Undorosaurus gorodischensis* Efimov, 1999a

- \* 1999a *Undorosaurus gorodishensis* Efimov; p 51.
- 2019 *Cryptopterygius kristiansenae* Druckenmiller *et al.*; p 313 [Slottsmøya Member, Agardfjellet Formation (Middle Volgian, Upper Jurassic); Spitsbergen, Svalbard (UTM WGS84 33N 0518842 8696067)].
- 2019 *Undorosaurus gorodishensis* Efimov; p 5.

*Undorosaurus kielanae* (Tyborowski, 2016)

- \* 2016 *Cryptopterygius kielanae* Tyborowski; p 793 [Sławno Limestone Member, Kcynia Formation (uppermost Lower Tithonian = Middle Volgian, Upper Jurassic); Owadów-Brzezinki Quarry, Sławno, Poland (UTM WGS84 34U 439831 5692022 = 51.3762583° N, 020.1355167° E)].
- ? 2019 *Undorosaurus kielanae* (Tyborowski); p 5.

*Undorosaurus nessovi* Efimov, 1999a

*Undorosaurus trautscholdi* Arkhangelsky & Zverkov, 2014

*Utatsusaurus hataii* Shikama *et al.*, 1978

*Wahlisaurus massarae* Lomax, 2016

- \* 2016 *Wahlisaurus massarae* Lomax; p 2 [Barnstone Member?, Scunthorpe Mudstone Formation?, Pre-*planorbis* or *Psiloceras planorbis* beds (lowermost Hettangian, Lower Jurassic); Normanton Hills, Normanton on Soar, UK].

*Wimanius odontopalatus* Maisch & Matzke, 1998

*Xinminosaurus catactes* Jiang *et al.*, 2008

## References

- Appleby, R. M. (1979). 'The Affinities of Liassic and Later Ichthyosaurs'. In: *Palaeontology* 22.4, pp. 921–946.
- Arkhangelsky, M. S. (1997). 'On a new genus of ichthyosaurs from the Lower Volgian Substage of the Saratov, Volga Region'. In: *Paleontologicheskii Zhurnal* 1997.1, pp. 87–91.
- Arkhangelsky, M. S. (2001). 'On a New Ichthyosaur of the Genus *Otschevia* from the Volgian Stage of the Volga Region near Ulyanovsk'. In: *Paleontological Journal* 35.6, pp. 629–635.
- Arkhangelsky, M. S., A. O. Averianov, E. M. Pervushov, V. Y. Ratnikov and N. Y. Zozyrev (2008). 'On Ichthyosaur Remains from the Cretaceous of the Voronezh Region'. In: *Paleontological Journal* 42.3, pp. 287–291. DOI: 10.1134/S0031030108030106.
- Arkhangelsky, M. S. and N. G. Zverkov (2014). 'On a New Ichthyosaur of the Genus *Undorosaurus*'. In: *Proceedings of the Zoological Institute RAS* 318.3, pp. 187–196.
- Arkhangelsky, M. S. (1998). 'On the Ichthyosaur Genus *Platypterygius*'. In: *Paleontological Journal* 32.6, pp. 611–615.
- Bardet, N. and M. S. Fernández (2000). 'A New Ichthyosaur from the Upper Jurassic Lithographic Limestones of Bavaria'. In: *Journal of Paleontology* 74.3, pp. 503–511. DOI: 10.1017/S0022336000031760.
- Bassani, F. (1886). 'Sui Fossili e Sull'età Degli Schisti Bituminosi Triasici Di Besano in Lombardia'. In: *Atti della Società Italiana di Scienza Naturali* 29, pp. 1–58.
- Blake, J. F. (1876). 'Order Ichthyopterygia'. In: London: John van Voorst, pp. 253–254.
- Boulenger, G. A. (1904). 'Exhibition of, and Remarks upon, a Paddle of a New Species of Ichthyosaur'. In: *Proceedings of the Zoological Society of London* 1904.1, pp. 424–426.

- Brinkmann, W. (1998). ‘*Sangiorgiosaurus* n. g. – eine neue Mixosauriergattung (Mixosauridae, Ichthyosauria) mit Quetschzähnen aus der Grenzbitumenzone (Mitteltrias) des Monte San Giorgio (Schweiz, Kanton Tessin)’. In: *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* 207.1, pp. 125–144. DOI: 10.1127/njgpa/207/1998/125.
- Broili, F. (1907). ‘Ein neuer *Ichthyosaurus* aus der norddeutschen Kreide’. In: *Palaeontographica* 54, pp. 139–162.
- Bronn, H. G. (1844). ‘Über Ichthyosauren in den Lias-Schiefen der Gegend von Boll in Württemberg’. In: *Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefakten-Kunde* 1844, pp. 385–408.
- Brusatte, S. L., M. T. Young, T. J. Challands, N. D. L. Clark, V. Fischer, N. C. Fraser, J. J. Liston, C. C. J. MacFadyen, D. A. Ross, S. A. Walsh and M. Wilkinson (2015). ‘Ichthyosaurs from the Jurassic of Skye, Scotland’. In: *Scottish Journal of Geology* 51.1, pp. 1–13. DOI: 10.1144/sjg2014-018.
- Camp, C. L. (1976). ‘Vorläufige Mitteilung über große Ichthyosaurier aus der oberen Trias von Nevada’. In: *Sitzungsberichte der Österreichischen Akademie der Wissenschaften* 185.5–7, pp. 125–134.
- Carroll, R. L. and D. Zhi-Ming (1991). ‘*Hupehsuchus*, an Enigmatic Aquatic Reptile from the Triassic of China, and the Problem of Establishing Relationships’. In: *Philosophical Transactions of the Royal Society B: Biological Sciences* 331.1260, pp. 131–153. DOI: 10.1098/rstb.1991.0004.
- Carter, A. M. (1846). ‘Notice of the Jaws of an *Ichthyosaurus* from the Chalk in the Neighbourhood of Cambridge’. In: *Report of the British Association for the Advancement of Science* 15, p. 60.
- Chen, L. (1985). ‘Ichthyosaurs from the Lower Triassic of Chao County, Anhui’. In: *Regional Geology of China* 15, pp. 139–146.
- Chen, X.-h., R. Motani, L. Cheng, D. Jiang and O. C. Rieppel (2014a). ‘A Carapace-like Bony Body Tube in an Early Triassic Marine Reptile and the Onset of Marine Tetrapod Predation’. In: *PLoS ONE* 9.4, e94396. DOI: 10.1371/journal.pone.0094396.
- Chen, X.-h., R. Motani, L. Cheng, D. Jiang and O. C. Rieppel (2014b). ‘A Small Short-Necked Hupehsuchian from the Lower Triassic of Hubei Province, China’. In: *PLoS ONE* 9.12, e115244. DOI: 10.1371/journal.pone.0115244.
- Chen, X.-h., R. Motani, L. Cheng, D. Jiang and O. C. Rieppel (2015). ‘A New Specimen of Carroll’s Mystery Hupehsuchian from the Lower Triassic of China’. In: *PLoS ONE* 10.5, e0126024. DOI: 10.1371/journal.pone.0126024.
- Chen, X. and L. Cheng (2010). ‘A new species of *Mixosaurus* (Reptilia: Ichthyosauria) from the Middle Triassic of Pu’an, Guizhou, China’. In: *Acta Palaeontologica Sinica* 49.2, pp. 251–260.
- Chen, X., L. Cheng and P. M. Sander (2007). ‘A new species of *Callawayia* (Reptilia: Ichthyosauria) from the Late Triassic in Guanling, Guizhou’. In: *Geology in China* 34, pp. 974–982.
- Chen, X., P. M. Sander, L. Cheng and X. Wang (2013). ‘A New Triassic Primitive Ichthyosaur from Yuanan, South China’. In: *Acta Geologica Sinica* 87.3, pp. 672–677. DOI: 10.1111/1755-6724.12078.

- Conybeare, W. D. (1822). 'Additional Notices on the Fossil Genera *Ichthyosaurus* and *Plesiosaurus*'. In: *Transactions of the Geological Society of London* 1.1, pp. 103–123. DOI: 10.1144/transgs1b.1.1.103.
- Cuthbertson, R. S., A. P. Russell and J. S. Anderson (2013). 'Cranial Morphology and Relationships of a New Grippidian (Ichthyopterygia) from the Vega–Phroso Siltstone Member (Lower Triassic) of British Columbia, Canada'. In: *Journal of Vertebrate Paleontology* 33.4, pp. 831–847. DOI: 10.1080/02724634.2013.755989.
- Dal Sasso, C. and G. Pinna (1996). '*Besanosaurus leptorhynchus* n. gen. n. sp. a New Shastasaurid Ichthyosaurus from the Middle Triassic of Besano (Lombardy, N. Italy)'. In: *Paleontologia Lombarda* 4.1, pp. 3–23.
- Delsett, L. L., P. S. Druckenmiller, A. J. Roberts and J. H. Hurum (2018). 'A New Specimen of *Palvennia hoybergeti*: Implications for Cranial and Pectoral Girdle Anatomy in Ophthalmosaurid Ichthyosaurs'. In: *PeerJ* 6, e5776. DOI: 10.7717/peerj.5776.
- Delsett, L. L., A. J. Roberts, P. S. Druckenmiller and J. H. Hurum (2017). 'A New Ophthalmosaurid (Ichthyosauria) from Svalbard, Norway, and Evolution of the Ichthyopterygian Pelvic Girdle'. In: *PLoS ONE* 12.1, e0169971–39. DOI: 10.1371/journal.pone.0169971.
- Druckenmiller, P. S. and E. E. Maxwell (2010). 'A New Lower Cretaceous (Lower Albian) Ichthyosaurus Genus from the Clearwater Formation, Alberta, Canada'. In: *Canadian Journal of Earth Sciences* 47.8, pp. 1037–1053. DOI: 10.1139/E10-028.
- Druckenmiller, P. S., J. H. Hurum, E. M. Knutsen and H. A. Nakrem (2012). 'Two New Ophthalmosaurids (Reptilia: Ichthyosauria) from the Agardhfjellet Formation (Upper Jurassic: Volgian/Tithonian), Svalbard, Norway'. In: *Norwegian Journal of Geology* 92, pp. 311–339.
- Efimov, V. M. (1998). 'The ichthyosaurus *Otschevia pseudoscythica* gen. et sp. nov. from the Upper Jurassic of Ulyanovsk Volga'. In: *Paleontologicheskii Zhurnal* 1998, pp. 82–86.
- Efimov, V. M. (1999a). 'A new family of ichthyosaurs, the Undorosauridae fam. nov. from the Volgian Stage of the European part of Russia'. In: *Paleontologicheskii Zhurnal* 1999, pp. 174–181.
- Efimov, V. M. (1999b). 'Ichthyosaurs of a new genus *Yasykovia* from the Upper Jurassic strata of European Russia'. In: *Paleontologicheskii Zhurnal* 1999, pp. 91–98.
- Fernández, M. S. (1994). 'A New Long-Snouted Ichthyosaurus from the Early Bajocian of Neuquén Basin (Argentina)'. In: *Ameghiniana* 31.3, pp. 291–297.
- Fernández, M. S. (1997). 'A New Ichthyosaurus from the Tithonian (Late Jurassic) of the Neuquén Basin, Northwestern Patagonia, Argentina'. In: *Journal of Paleontology* 71.3, pp. 479–484. DOI: 10.1017/S0022336000039494.
- Fernández, M. S. (1999). 'A New Ichthyosaurus from the Los Molles Formation (Early Bajocian), Neuquen Basin, Argentina'. In: *Journal of Paleontology* 73.4, pp. 677–681. DOI: 10.1017/S0022336000032492.

- Fischer, V. (2016). 'Taxonomy of *Platypterygius campylodon* and the Diversity of the Last Ichthyosaurs'. In: *PeerJ* 4, e2604–21. DOI: 10 . 7717/peerj . 2604.
- Fischer, V., R. M. Appleby, D. Naish, J. J. Liston, J. B. Riding, S. Brindley and P. Godefroit (2013). 'A Basal Thunnosaurian from Iraq Reveals Disparate Phylogenetic Origins for Cretaceous Ichthyosaurs'. In: *Biology Letters* 9.4, pp. 20130021–20130021. DOI: 10 . 1098/rsbl . 2013 . 0021.
- Fischer, V., M. S. Arkhangelsky, G. N. Uspensky, I. M. Stenshin and P. Godefroit (2014a). 'A New Lower Cretaceous Ichthyosaur from Russia Reveals Skull Shape Conservatism within Ophthalmosaurinae'. In: *Geological Magazine* 151.01, pp. 60–70. DOI: 10 . 1017/S0016756812000994.
- Fischer, V., N. Bardet, M. Guiomar and P. Godefroit (2014b). 'High Diversity in Cretaceous Ichthyosaurs from Europe Prior to Their Extinction'. In: *PLoS ONE* 9.1, e84709. DOI: 10 . 1371 / journal . pone . 0084709.
- Fischer, V., M. W. Maisch, D. Naish, R. Kosma, J. J. Liston, U. Joger, E. J. Krüger, J. P. Pérez, J. Tainsh and R. M. Appleby (2012). 'New Ophthalmosaurid Ichthyosaurs from the European Lower Cretaceous Demonstrate Extensive Ichthyosaur Survival across the Jurassic–Cretaceous Boundary'. In: *PLoS ONE* 7.1, e29234–2. DOI: 10 . 1371 / journal . pone . 0029234.
- Fischer, V., E. Masure, M. S. Arkhangelsky and P. Godefroit (2011). 'A New Barremian (Early Cretaceous) Ichthyosaur from Western Russia'. In: *Journal of Vertebrate Paleontology* 31.5, pp. 1010–1025. DOI: 10 . 1080/02724634 . 2011 . 595464.
- Fröbisch, N. B., P. M. Sander and O. C. Rieppel (2006). 'A New Species of *Cymbospondylus* (Diapsida, Ichthyosauria) from the Middle Triassic of Nevada and a Re-Evaluation of the Skull Osteology of the Genus'. In: *Zoological Journal of the Linnean Society* 147.4, pp. 515–538. DOI: 10 . 1111 / j . 1096-3642 . 2006 . 00225 . x.
- Fröbisch, N. B., J. Fröbisch, P. M. Sander, L. Schmitz and O. C. Rieppel (2013). 'Macropredatory Ichthyosaur from the Middle Triassic and the Origin of Modern Trophic Networks'. In: *Proceedings of the National Academy of Sciences* 110.4, pp. 1393–1397. DOI: 10 . 1073/pnas . 1216750110.
- Hulke, J. W. (1871). 'Note on an *Ichthyosaurus* (*I. Enthekeodon*) from Kimmeridge Bay, Dorset'. In: *Quarterly Journal of the Geological Society* 27.1-2, pp. 440–441. DOI: 10 . 1144/GSL . JGS . 1871 . 027 . 01-02 . 52.
- Jiang, D., R. Motani, W. Hao, L. Schmitz, O. C. Rieppel, Y.-L. Sun and Z.-Y. Sun (2008). 'New Primitive Ichthyosaurian (Reptilia, Diapsida) from the Middle Triassic of Panxian, Guizhou, Southwestern China and Its Position in the Triassic Biotic Recovery'. In: *Progress in Natural Science* 18.10, pp. 1315–1319. DOI: 10 . 1016 / j . pns . 2008 . 01 . 039.
- Jiang, D., R. Motani, J.-D. Huang, A. Tintori, Y.-C. Hu, O. C. Rieppel, N. C. Fraser, C. Ji, N. P. Kelley, W. Fu and R. Zhang (2016). 'A Large Aberrant Stem Ichthyosauriform Indicating Early Rise and Demise of Ichthyosauromorphs in the Wake of the End-Permian



- Extinction'. In: *Scientific Reports* 6, pp. 26232–9. DOI: 10 . 1038 / srep26232.
- Jiang, D., L. Schmitz, W. Hao and Y.-L. Sun (2006). 'A New Mixosaurid Ichthyosaur from the Middle Triassic of China'. In: *Journal of Vertebrate Paleontology* 26.1, pp. 60–69. DOI: 10 . 1671 / 0272 - 4634(2006)26[60:ANMIFT]2 . 0.CO;2.
- Kuhn, O. (1946). 'Ein Skelett von *Ichthyosaurus (Platypterygius) hercynicus* n. Sp. Aus Dem Aptium von Gitter'. In: *Bericht der Naturforschenden Gesellschaft in Bamberg* 29, pp. 69–82.
- Leidy, J. (1868). 'Notice of Some Reptilian Remains from Nevada'. In: *Proceedings of the Academy of Natural Sciences of Philadelphia* 20, pp. 177–178.
- Li, C. (1999). 'Ichthyosaur from Guizhou, China'. In: *Chinese Science Bulletin* 44.14, pp. 1329–1333. DOI: 10 . 1007/BF02885856.
- Lomax, D. R. (2016). 'A New Leptonectid Ichthyosaur from the Lower Jurassic (Hettangian) of Nottinghamshire, England, UK, and the Taxonomic Usefulness of the Ichthyosaurian Coracoid'. In: *Journal of Systematic Palaeontology* 15.5, pp. 1–15. DOI: 10 . 1080 / 14772019 . 2016 . 1183149.
- Lomax, D. R. and J. A. Massare (2015). 'A New Species of *Ichthyosaurus* from the Lower Jurassic of West Dorset, England, U.K.'. In: *Journal of Vertebrate Paleontology* 35.2, e903260. DOI: 10 . 1080/02724634 . 2014 . 903260.
- Lomax, D. R. and J. A. Massare (2017). 'Two New Species of *Ichthyosaurus* from the Lowermost Jurassic (Hettangian) of Somerset, England'. In: *Papers in Palaeontology* 3.1, pp. 1–20. DOI: 10 . 1002 / spp2 . 1065.
- Lomax, D. R., J. A. Massare and R. T. Mistry (2017). 'The Taxonomic Utility of Forefin Morphology in Lower Jurassic Ichthyosaurs: *Protoichthyosaurus* and *Ichthyosaurus*'. In: *Journal of Vertebrate Paleontology* 37.5, e1361433. DOI: 10 . 1080 / 02724634 . 2017 . 1361433.
- Lydekker, R. (1888). '*Ichthyosaurus acutirostris*, *Zetlandicus* & *longifrons*'. In: *Geological Magazine* 6.1, p. 44. DOI: 10 . 1017/S0016756800175818.
- M'Coy, F. (1867). 'On the Occurrence of *Ichthyosaurus* and *Plesiosaurus* in Australia'. In: *Annals and Magazine of Natural History* 19, pp. 1–3.
- Maisch, M. W. and A. T. Matzke (1997). '*Mikadocephalus gracilirostris* n. gen., n. sp. a New Ichthyosaur from the Grenzbitumenzone (Anisian–Ladinian) of Monte San Giorgio (Switzerland)'. In: *Paläontologische Zeitschrift* 71.3/4, pp. 267–289. DOI: 10 . 1007/BF02988496.
- Maisch, M. W. and A. T. Matzke (1998). 'Observations on Triassic Ichthyosaurs. Part II: A New Ichthyosaur with Palatal Teeth from Monte San Giorgio'. In: *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte* 1998.1, pp. 26–41. DOI: 10 . 1127/njgpm/1998/1998/26.
- Maisch, M. W. and A. T. Matzke (2003). 'Observations on Triassic Ichthyosaurs. Part XII. A New Early Triassic Ichthyosaur Genus from Spitzbergen'. In: *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* 229.3, pp. 317–338. DOI: 10 . 1127/njgpa/229/2003/317.

- Maisch, M. W. (2008). 'Revision der Gattung *Stenopterygius* Jaekel, 1904 emend. von Huene, 1922 (Reptilia: Ichthyosauria) aus dem unteren Jura Westeuropas'. In: *Palaeodiversity* 1, pp. 227–271.
- Mantell, G. A. (1851). *Petrifactions and Their Teachings; Or, a Hand-Book to the Gallery of Organic Remains of the British Museum*. London: Henry G. Bohn.
- Marsh, O. C. (1879). 'A New Order of Extinct Reptiles (Sauranodonta) from the Jurassic Formation of the Rocky Mountains'. In: *Annals and Magazine of Natural History* 3, pp. 175–176. DOI: 10.1080/00222937908682501.
- Martin, J. E., V. Fischer, P. Vincent and G. Suan (2012). 'A Longirostrine *Temnodontosaurus* (Ichthyosauria) with Comments on Early Jurassic Ichthyosaur Niche Partitioning and Disparity'. In: *Palaeontology* 55.5, pp. 995–1005. DOI: 10.1111/j.1475-4983.2012.01159.x.
- Maxwell, E. E. and M. W. Caldwell (2006). 'A New Genus of Ichthyosaur from the Lower Cretaceous of Western Canada'. In: *Palaeontology* 49.5, pp. 1043–1052. DOI: 10.1111/j.1475-4983.2006.00589.x.
- Maxwell, E. E., D. G. Dick, S. Padilla and M. L. Parra (2016). 'A New Ophthalmosaurid Ichthyosaur from the Early Cretaceous of Colombia'. In: *Papers in Palaeontology* 2.1, pp. 59–70. DOI: 10.1002/spp2.1030.
- Maxwell, E. E., M. S. Fernández and R. R. Schoch (2012). 'First Diagnostic Marine Reptile Remains from the Aalenian (Middle Jurassic): A New Ichthyosaur from Southwestern Germany'. In: *PLoS ONE* 7.8, e41692. DOI: 10.1371/journal.pone.0041692.
- Mazin, J.-M., V. Suteethorn, E. Buffetaut, J.-J. Jaeger and R. Elmcke-Ingavat (1991). 'Preliminary Description of *Thaisaurus chonglakmanii* n.g., n.sp., a New Ichthyopterygian (Reptilia) from the Early Triassic of Thailand'. In: *Comptes rendus de l'Académie des sciences. Série 2, Mécanique, Physique, Chimie, Sciences de l'univers, Sciences de la Terre* 313.10, pp. 1207–1212.
- McGowan, C. (1972). 'The Systematics of Cretaceous Ichthyosaurs with Particular Reference to the Material from North America'. In: *Contributions to Geology, University of Wyoming* 2.1, pp. 9–29.
- McGowan, C. (1974). 'A Revision of the Longipinnate Ichthyosaurs of the Lower Jurassic of England, with Descriptions of Two New Species'. In: *Life Sciences Contributions of the Royal Ontario Museum* 97, pp. 1–37. DOI: 10.5962/bhl.title.52055.
- McGowan, C. (1976). 'The Description and Phenetic Relationships of a New Ichthyosaur Genus from the Upper Jurassic of England'. In: *Canadian Journal of Earth Sciences* 13.5, pp. 668–683. DOI: 10.1139/e76-070.
- McGowan, C. (1986). 'A Putative Ancestor for the Swordfish-like Ichthyosaur *Eurhinosaurus*'. In: *Nature* 322.6078, pp. 454–456. DOI: 10.1038/322454a0.
- McGowan, C. (1993). 'A New Species of Large, Long-Snouted Ichthyosaur from the English Lower Lias'. In: *Canadian Journal of Earth Sciences* 30.6, pp. 1197–1204. DOI: 10.1139/e93-101.

- McGowan, C. (1994). 'A New Species of *Shastasaurus* (Reptilia: Ichthyosauria) from the Triassic of British Columbia: The Most Complete Exemplar of the Genus'. In: *Journal of Vertebrate Paleontology* 14.2, pp. 168–179. DOI: 10.1080/02724634.1994.10011550.
- McGowan, C. (1995). 'A Remarkable Small Ichthyosaur from the Upper Triassic of British Columbia, Representing a New Genus and Species'. In: *Canadian Journal of Earth Sciences* 32.3, pp. 292–303. DOI: 10.1139/e95-024.
- McGowan, C. (1996). 'A New and Typically Jurassic Ichthyosaur from the Upper Triassic of British Columbia'. In: *Canadian Journal of Earth Sciences* 33.1, pp. 24–32. DOI: 10.1139/e96-003.
- McGowan, C. and A. C. Milner (1999). 'A New Pliensbachian Ichthyosaur from Dorset, England'. In: *Palaeontology* 42.5, pp. 761–768. DOI: 10.1111/1475-4983.00096.
- Merriam, J. C. (1895). 'On Some Reptilian Remains from the Triassic of Northern California'. In: *American Journal of Science* 50.295, pp. 55–57. DOI: 10.2475/ajs.s3-50.295.55.
- Merriam, J. C. (1902). 'Triassic Ichthyopterygia from California and Nevada'. In: *University of California, Bulletin of the Department of Geology* 3.4, pp. 63–108.
- Merriam, J. C. (1903). 'New Ichthyosauria from the Upper Triassic of California'. In: *University of California, Bulletin of the Department of Geology* 3.12, pp. 249–263.
- Merriam, J. C. (1910). 'The Skull and Dentition of a Primitive Ichthyosaur from the Middle Triassic'. In: *University of California, Bulletin of the Department of Geology* 5.24, pp. 381–390.
- Motani, R., D.-Y. Jiang, G. Chen, A. Tintori, O. Rieppel, C. Ji and J.-D. Huang (2015). 'A Basal Ichthyosauriform with a Short Snout from the Lower Triassic of China'. In: *Nature* 517.7535, pp. 485–488. DOI: 10.1038/nature13866.
- Nace, R. L. (1939). 'A New Ichthyosaur from the Upper Cretaceous Mowry Formation of Wyoming'. In: *American Journal of Science* 237.9, pp. 673–686. DOI: 10.2475/ajs.237.9.673.
- Nicholls, E. L. and D. B. Brinkman (1995). 'A New Ichthyosaur from the Triassic Sulphur Mountain Formation of British Columbia'. In: *Vertebrate Fossils and the Evolution of Scientific Concepts*. Ed. by W. A. S. Sarjeant. London: Gordon and Breach Publishers, pp. 521–535. URL: [http://scholar.google.com/scholar?q=related:nE1862PPxCsJ:scholar.google.com/&hl=en&num=20&as\\_sdt=0,5](http://scholar.google.com/scholar?q=related:nE1862PPxCsJ:scholar.google.com/&hl=en&num=20&as_sdt=0,5).
- Nicholls, E. L. and M. Manabe (2004). 'Giant Ichthyosaurs of the Triassic—a New Species of *Shonisaurus* from the Pardonet Formation (Norian: Late Triassic) of British Columbia'. In: *Journal of Vertebrate Paleontology* 24.4, pp. 838–849. DOI: 10.1671/0272-4634(2004)024[0838:GIOTTN]2.0.CO;2.
- Otschev, V. G. and V. M. Efimov (1985). 'A new genus of ichthyosaur from the Ulyanovsk Volga Region'. In: *Paleontologicheskii Zhurnal* 1985.4, pp. 76–80.
- Owen, R. (1840). 'Report on British Fossil Reptiles. Part I'. In: *Report of the British Association for the Advancement of Science* 9, pp. 43–126.

- Owen, R. (1881). 'A Monograph of the Fossil Reptilia of the Liassic Formations. Part Third. *Ichthyosaurus*'. In: *Monographs of the Palaeontographical Society* 35, pp. 83–134. DOI: 10.1080/02693445.1881.12027969.
- Paparella, I., E. E. Maxwell, A. Cipriani, S. Roncacè and M. W. Caldwell (2016). 'The First Ophthalmosaurid Ichthyosaur from the Upper Jurassic of the Umbrian–Marchean Apennines (Marche, Central Italy)'. In: *Geological Magazine* 154.4, pp. 837–858. DOI: 10.1017/S0016756816000455.
- Páramo, M. E. (1997). '*Platypterygius sachicarum* (Reptilia, Ichthyosauria) Nueva Especie Del Cretácico de Colombia'. In: *Revista Ingeominas* 6, pp. 1–12. URL: [http://scholar.google.com/scholar?q=related:1tJk9I19J2kJ:scholar.google.com/&hl=en&num=20&as\\_sdt=0,5](http://scholar.google.com/scholar?q=related:1tJk9I19J2kJ:scholar.google.com/&hl=en&num=20&as_sdt=0,5).
- Quenstedt, F. A. (1852). *Handbuch der Petrefaktenkunde*. Tübingen: Verlag der H. Laupp'schenn Buchhandlung.
- Quenstedt, F. A. (1858). *Der Jura*. Tübingen: Verlag der H. Laupp'schenn Buchhandlung.
- Roberts, A. J., P. S. Druckenmiller, G.-P. Sætre and J. H. Hurum (2014). 'A New Upper Jurassic Ophthalmosaurid Ichthyosaur from the Slotsmøya Member, Agardhfjellet Formation of Central Spitsbergen.' In: *PLoS ONE* 9.8, e103152. DOI: 10.1371/journal.pone.0103152. pmid: 25084533.
- Romer, A. S. (1968). 'An Ichthyosaur Skull from the Cretaceous of Wyoming'. In: *Contributions to Geology, University of Wyoming* 7.1, pp. 27–41.
- Russell, D. (1993). 'Jurassic Marine Reptiles from Cape Grassy, Melville Island, Arctic Circle'. In: *Bulletin of the Geological Survey of Canada. The Geology of Melville Island, Arctic Canada 6: The Geology of Melville Island, Arctic Canada*, pp. 195–201.
- Sander, P. M. (1989). 'The Large Ichthyosaur *Cymbospondylus buchseri*, sp. nov. from the Middle Triassic of Monte San Giorgio (Switzerland), with a Survey of the Genus in Europe'. In: *Journal of Vertebrate Paleontology* 9.2, pp. 163–173. DOI: 10.1080/02724634.1989.10011750.
- Sander, P. M. (1997). 'The Paleobiogeography of *Shastasaurus*'. In: *Ancient Marine Reptiles*. Ed. by J. M. Callaway and E. L. Nicholls. 1st ed. San Diego: Academic Press, pp. 1–27. ISBN: 978-0-12-155210-7. DOI: 10.1016/B978-0-12-155210-7.X5000-5.
- Schmitz, L., P. M. Sander, G. W. Storrs and O. C. Rieppel (2004). 'New Mixosauridae (Ichthyosauria) from the Middle Triassic of the Augusta Mountains (Nevada, USA) and Their Implications for Mixosaur Taxonomy'. In: *Palaeontographica Abteilung A: Paläozoologie—Stratigraphie* 270.4–6, pp. 133–162.
- Seeley, H. G. (1873). 'On *Cetarthrosaurus Walkeri* (Seeley), an Ichthyosaur from the Cambridge Upper Greensand'. In: *Quarterly Journal of the Geological Society* 29.1-2, pp. 505–507. DOI: 10.1144/GSL.JGS.1873.029.01-02.43.
- Seeley, H. G. (1874). 'On the Pectoral Arch and Fore Limb of *Ophthalmosaurus*, a New Ichthyosaur Genus from the Oxford

- Clay'. In: *Quarterly Journal of the Geological Society* 30.1-4, pp. 696–707. DOI: 10.1144/GSL.JGS.1874.030.01-04.64.
- Shikama, T., T. Kamei and M. Murata (1978). 'Early Triassic *Ichthyosaurus*, *Utatusaurus hataii* Gen. et Sp. Nov., from the Kitakami Massif, Northeast Japan'. In: *Science Reports of Tohoku University (Geology)* 48.2, pp. 77–97.
- Tyborowski, D. (2016). 'A New Ophthalmosaurid Ichthyosaur Species from the Late Jurassic of Owadów-Brzezinki Quarry, Poland'. In: *Acta Palaeontologica Polonica* 61.4, pp. 791–803. DOI: 10.4202/app.00252.2016.
- Von Huene, F. F. (1926). 'Neue Ichthyosaurierfunde aus dem schwäbischen Lias'. In: *Neues Jahrbuch für Mineralogie, Geologie und Paläontologie, Beilage Band B* 55, pp. 66–86. URL: [http://scholar.google.com/scholar?q=related:XEMFbQyMcbMJ:scholar.google.com/&hl=en&num=20&as\\_sdt=0,5](http://scholar.google.com/scholar?q=related:XEMFbQyMcbMJ:scholar.google.com/&hl=en&num=20&as_sdt=0,5).
- Von Huene, F. F. (1927). 'Beitrag Zur Kenntnis Mariner Mesozoischer Wirbeltiere in Argentinien'. In: *Zentralblatt für Mineralogie, Geologie und Paläontologie. B.* 1927, pp. 22–29.
- Von Huene, F. F. (1931a). 'Neue Studien über Ichthyosaurier aus Holzmaden'. In: *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft* 42.4, pp. 345–382.
- Von Huene, F. F. (1916). 'Beiträge Zur Kenntnis Der Ichthyosaurier Im Deutschen Muschelkalk'. In: *Palaeontographica* 62, pp. 1–68.
- Von Huene, F. F. (1922). *Die Ichthyosaurier des Lias und Ihre Zusammenhänge*. Berlin: Verlag von Gebrüder Borntraeger. 114 pp. URL: [http://scholar.google.com/scholar?q=related:nbTHDtkxVQoJ:scholar.google.com/&hl=en&num=20&as\\_sdt=0,5](http://scholar.google.com/scholar?q=related:nbTHDtkxVQoJ:scholar.google.com/&hl=en&num=20&as_sdt=0,5).
- Von Huene, F. F. (1931b). 'Neue Ichthyosaurier aus Württemberg'. In: *Neues Jahrbuch für Mineralogie, Geologie und Paläontologie, Beilage-Band B* 65, pp. 305–320.
- Von Meyer, H. (1849). 'Fossile Fische Aus Dem Muschelkalk von Jena, Querfurt Und Esperstädt'. In: *Palaeontographica*, pp. 1–16.
- Von Theodori, C. (1843). 'Über Einen Kolossalen *Ichthyosaurus Triagonodon*'. In: *Gelehrte Anzeigen Königliche Akademie der Wissenschaften. Mathematisch-Physikalisch Classe* 34.113, pp. 905–912. URL: [http://scholar.google.com/scholar?q=related:uhk6vpCaIkJ:scholar.google.com/&hl=en&num=20&as\\_sdt=0,5](http://scholar.google.com/scholar?q=related:uhk6vpCaIkJ:scholar.google.com/&hl=en&num=20&as_sdt=0,5).
- Wagner, A. (1853). 'Die Characteristic Einer Neuen Art von *Ichthyosaurus* Aus Den Lithographischen Schieferen Und Eines Zahnes von *Polyptychodon* Aus Dom Grünsandstein von Kelheim'. In: *Bulletin der königliche Akademie der Wissenschaft, Gelehrte Anzeigen* 3, pp. 25–35.
- Wang, K. (1959). 'Ueber eine neue fossile Reptilform von Provinz Hupeh, China'. In: *Acta Palaeontologica Sinica* 7.5, pp. 47–52.
- Wiman, C. (1910). 'Ichthyosaurier Aus Der Trias Spitzbergens'. In: *Bulletin of the Geological Institute of Upsala* 10.3, pp. 124–148.
- Wiman, C. (1929). 'Eine Neue Marine Reptilien-Ordnung Aus Der Trias Spitzbergens'. In: *Bulletin of the Geological Institute of Upsala* 22, pp. 1–14.

- Yang, P.-F., J. Cheng, D. Jiang, R. Motani, A. Tintori, Y.-L. Sun and Z.-Y. Sun (2013). 'A new species of *Qianichthyosaurus* (Reptilia: Ichthyosauria) from Xingyi Fauna (Ladinian, Middle Triassic) of Guizhou'. In: *Acta Scientiarum Naturalium Universitatis Pekinensis* 49.6, pp. 1002–1008.
- Yin, G.-z., X. Zhou, Z. Cao, Y. Yu and Y. Luo (2000). 'A preliminary study on the Early Late Triassic marine reptiles from Guanling, Guizhou, China'. In: *Geology, Geochemistry* 28.3, pp. 1–23.
- Young, C.-C. and Z. M. Dong (1972). 'On the Triassic marine reptiles of China'. In: *Memoires of the Nanjing Institute of Geology and Palaeontology* 9, pp. 1–34.
- Zverkov, N. G. and V. M. Efimov (2019). 'Revision of *Undorosaurus*, a Mysterious Late Jurassic Ichthyosaur of the Boreal Realm'. In: *Journal of Systematic Palaeontology*, pp. 1–31. DOI: 10 . 1080 / 14772019.2018.1515793.
- Zverkov, N. G. and N. E. Prilepskaya (2019). 'A Prevalence of *Arthropterygius* (Ichthyosauria: Ophthalmosauridae) in the Late Jurassic–Earliest Cretaceous of the Boreal Realm'. In: *PeerJ* 7, e6799. DOI: 10.7717/peerj.6799.