

Ichthyosauromorph Taxonomy

Benjamin Moon

Version 0.6.1618.20210308

Contents

Introduction 1

Layout of synonymy lists 1

‘Richter symbols’ & certainty of assignment 2

Life Science Identifiers (LSID) 2

Links in this document 3

List of Species 3

Ichthyosauromorpha 4

Hupehsuchia 4

Ichthyosauriformes 4

References 10

Introduction

This document presents a list of valid ichthyosauromorph species. It is a constant work in progress given the pace at which new ichthyosaur research happens. Perhaps not as rapidly as some other fossil groups, but certainly fast enough to require some attention.

It’s also intended to give some handle on the vast literature available for ichthyosaurs and their near relatives by means of synonymy lists. I’ve chosen this format for it’s familiarity, but also because I rather enjoy the process and trials to building a complete yet usable synonymy list.

I’ve used this also as an exercise in typography – like much of my more public output. This document is typeset in Lua^ATeX using typefaces with various nice features – old style figures, small capitals, optical sizes. The fonts used are nonetheless open source, courtesy of their development at Adobe.

Layout of synonymy lists

The synonymy lists are presented as unruled tables:

Example

Cartorhynchus lenticarpus Motani et al., 2015			
URN:LSID:ZOOBANK.ORG:ACT:FCCC9BB7-FD52-42F4-B2EC-B0B7E2A1CA32			
<status>	<year>	<Taxon>	<Authority, Year>
*	2015	Cartorhynchus lenticarpus	Motani et al., 2015
		LSID	
		<reference, page>	[<occurrence information>.] <comments>
		Motani et al.	p 485 [Upper Member, Nanlinghu Formation, Subcolumbites Ammonite Biozone (Olenekian, Lower Triassic, Triassic); Majishan Quarry, Chaohu City, Hefei, China (UTM WGS84 50R 577953 3499041 = 31° 37' 26" N 117° 49' 19" E).] LSID: URN:LSID:ZOOBANK.ORG:PUB:9CFFEE63-2B8A-4C01-B9C7-CD3C53D684F5

If a work names a new species or combination, the LSID of the act is included as a link button alongside the taxon name,¹ where this is available. Similarly all works that have publication LSIDs have those included too.

¹ i.e. 

'Richter symbols' & certainty of assignment

I've followed the recommendations of Matthews (1973), pretty much to the letter, for the symbols and styles included in the leftmost two columns.

In front of the year symbols in the leftmost column

- * (asterisk) this publication marks the name becoming valid under ICZN rules.
- . (dot/period) we accept responsibility for attaching this reference to the taxon in question.
- (no sign) we cannot responsibly attach this reference, but do not doubt it.
- ? (question mark) there is some doubt in attaching this reference to the current taxon.
- v* *vidimus*, we have checked the deposited specimens. Can be accompanied by the above tokens:
 - v** we have seen the type specimen(s).
 - v*. we take responsibility for attaching the deposited specimens.
 - v* we do not take responsibility for attaching the deposited specimens.
 - v*? the specimens cannot be certainly assigned to this taxon.
- (?) the year of publication is uncertain.
- p* only part of the deposited specimens can be assigned to the current taxon.
 - vp* the deposited specimens have been checked and only part of them belong to this taxon.

And by formatting the year surrounding or changing the font

- 1881* (italicised) this work does not add morphological information, only occurrence information.
- 1881 (upright) the work adds to our knowledge on this taxon.
- (1881) (parentheses surrounding the year) the date of this work is uncertain.

Life Science Identifiers (LSID)

*Life science identifiers*² are unique keys to identify and locate information important to the various life sciences. Relevant to this document are the identifiers used to link nomenclatural acts in *ZooBank*,³ the official registry of the International Commission on Zoological Nomenclature (ICZN). Naming new taxa in the recent literature requires registering the act in ZooBank to be 'officially' recognised.⁴

Many of the taxa included herein were named before ZooBank was yet a glint in anyone's eye, although they may well have been included in the printed equivalent *Zoological Record*. I've registered several new publications and acts where these were not in ZooBank before, that

² <https://en.wikipedia.org/wiki/LSID>

³ <http://zoobank.org>

⁴ [https://www.iczn.org/the-code/the-international-code-of-zoological-nomenclature-the-code-online/\(Article 8.5.3\);https://en.wikipedia.org/wiki/ZooBank](https://www.iczn.org/the-code/the-international-code-of-zoological-nomenclature-the-code-online/(Article%208.5.3);https://en.wikipedia.org/wiki/ZooBank)

may be used henceforth. At the moment, these include only the original naming of species, not new combinations of specific and generic names.

Links in this document

The L^AT_EX document from which this PDF is compiled includes the *hyperref* package to provide links within the document⁵ and to other references on the web.⁶ These have different colours, as follows:

⁵ e.g. citations and sections

⁶ e.g. LSIDs and DOIs

[Citation](#) links from the year of a citation to its reference in the bibliography.

[URL](#) often web links, particularly to websites, DOI links, LSID with the address fully written.

[LSID](#) link to a ZooBank LSID for an act.

List of Species

<i>Eohupehsuchus brevicollis</i>	4	<i>Himalayasaurus tibetensis</i>	7	<i>Platypterygius platydactylus</i>	8
<i>Eretmorrhhipis carrolldongi</i>	4	<i>Hudsonelpidia brevirostris</i>	7	<i>Platypterygius sachicarum</i>	8
<i>Huapehsuchus nanchangensis</i>	4	<i>Ichthyosaurus acutirostris</i>	7	<i>Protoichthyosaurus applebyi</i>	8
<i>Nanchangosaurus suni</i>	4	<i>Ichthyosaurus anningae</i>	7	<i>Protoichthyosaurus prostaxalis</i>	8
<i>Parahupehsuchus longus</i>	4	<i>Ichthyosaurus breviceps</i>	7	<i>Qianichthyosaurus xingyiensis</i>	8
<i>Acamptonectes densus</i>	4	<i>Ichthyosaurus communis</i>	7	<i>Qianichthyosaurus zhoui</i>	8
<i>Aegirosaurus leptospondylus</i>	4	<i>Ichthyosaurus conybeari</i>	7	<i>Quasianosteosaurus vikinghoegdai</i>	8
<i>Acuetzpalin carranzai</i>	4	<i>Ichthyosaurus larkini</i>	7	<i>Sclerocormus parviceps</i>	8
<i>Arthropterygius chrisorum</i>	4	<i>Ichthyosaurus somersetensis</i>	7	<i>Shastasaurus alexandrae</i>	8
<i>Arthropterygius hoybergeti</i>	4	<i>Isfjordosaurus minor</i>	7	<i>Shastasaurus liangae</i>	8
<i>Arthropterygius lundii</i>	5	<i>Leninia stellans</i>	7	<i>Shastasaurus pacificus</i>	8
<i>Arthropterygius thalassonotus</i>	5	<i>Leptonectes moorei</i>	7	<i>Shastasaurus sikkaniensis</i>	8
<i>Athabascasaurus bitumineus</i>	5	<i>Leptonectes solei</i>	7	<i>Shonisaurus popularis</i>	8
<i>Barracudasauroides panxianensis</i>	5	<i>Leptonectes tenuirostris</i>	7	<i>Simbirskiasaurus birjukovi</i>	8
<i>Besanosaurus leptorhynchus</i>	5	<i>Macgowania janiceps</i>	7	<i>Sisteronia seeleyi</i>	8
<i>Brachypterygius alekseevi</i>	5	<i>Maiaspondylus lindoei</i>	7	<i>Stenopterygius aaleniensis</i>	8
<i>Brachypterygius extremus</i>	5	<i>Malawania anachronus</i>	7	<i>Stenopterygius quadricissus</i>	8
<i>Brachypterygius pseudoscythica</i>	6	<i>Mikadocephalus gracilirostris</i>	7	<i>Stenopterygius triscissus</i>	8
<i>Californosaurus perrini</i>	6	<i>Mixosaurus cornalianus</i>	7	<i>Stenopterygius uniter</i>	8
<i>Callawayia neoscapularis</i>	6	<i>Mixosaurus kuhnschneyderi</i>	7	<i>Suevoleiathan disinteger</i>	8
<i>Cartorhynchus lenticarpus</i>	6	<i>Mixosaurus xindianensis</i>	7	<i>Suevoleiathan integer</i>	8
<i>Caypullisaurus bonapartei</i>	6	<i>Mollesaurus pariallus</i>	7	<i>Sveltonectes insolitus</i>	8
<i>Cetarthrosaurus walkeri</i>	6	<i>Muiscaosaurus catheti</i>	7	<i>Temnodontosaurus azerguensis</i>	8
<i>Chacaicosaurus cayi</i>	6	<i>Nannopterygius enthekiodon</i>	7	<i>Temnodontosaurus crassimanus</i>	8
<i>Chaohusaurus chaoxianensis</i>	6	<i>Nannopterygius savlejeviensis</i>	7	<i>Temnodontosaurus eurycephalus</i>	8
<i>Chaohusaurus geishanensis</i>	6	<i>Nannopterygius yasykovi</i>	7	<i>Temnodontosaurus nuertingensis</i>	8
<i>Chaohusaurus zhangjiawanensis</i>	6	<i>Ophthalmosaurus icenicus</i>	7	<i>Temnodontosaurus platyodon</i>	8
<i>Contectopalatus atavus</i>	6	<i>Ophthalmosaurus natans</i>	8	<i>Temnodontosaurus trigonus</i>	9
<i>Cymbospondylus buchseri</i>	6	<i>Parvinator wapitiensis</i>	8	<i>Thaisaurus chonglakmanii</i>	9
<i>Cymbospondylus nichollsi</i>	6	<i>Pervushovisaurus bannovkensis</i>	8	<i>Thalattoarchon saurophagis</i>	9
<i>Cymbospondylus petrinus</i>	6	<i>Pervushovisaurus campylodon</i>	8	<i>Tholodus schmidti</i>	9
<i>Cymbospondylus piscosus?</i>	6	<i>Pessopteryx nisseri</i>	8	<i>Toretocnemus californicus</i>	9
<i>Dearcmhara shawcrossi</i>	6	<i>Phalarodon callawayi</i>	8	<i>Toretocnemus zitteli</i>	9
<i>Eurhinosaurus longirostris</i>	6	<i>Phalarodon fraasi</i>	8	<i>Undorosaurus gorodischensis</i>	9
<i>Excalibosaurus costini</i>	6	<i>Phalarodon major</i>	8	<i>Undorosaurus kielanae</i>	9
<i>Gengasaurus nicosiai</i>	6	<i>Phantomosaurus neubigi</i>	8	<i>Undorosaurus nessovi</i>	9
<i>Grippia longirostris</i>	7	<i>Platypterygius hercynicus</i>	8	<i>Undorosaurus trautscholdi</i>	9
<i>Guizhouichthyosaurus tangae</i>	7	<i>Platypterygius americanus</i>	8	<i>Utatusaurus hataii</i>	9
<i>Guizhouichthyosaurus wolonggangense</i>	7	<i>Platypterygius australis</i>	8	<i>Wahlisaurus massarae</i>	9
<i>Gulosaurus helmi</i>	7	<i>Platypterygius hauthali</i>	8	<i>Wimanius odontopalatus</i>	9
<i>Hauffiopteryx typicus</i>	7	<i>Platypterygius ochevi</i>	8	<i>Xinminosaurus catactes</i>	9

ICHTHYOSAUIROMORPHA Motani *et al.*, 2015

HUPEHSUCHIA Carroll & Zhi-Ming, 1991

Eohupehsuchus brevicollis Chen *et al.*, 2014a

URN:LSID:ZOOBANK.ORG:ACT:94F905DD-8995-4477-841A-85DEDA8C8287

v * 2014a *Eohupehsuchus brevicollis* Chen *et al.*, 2014a

LSID

Chen *et al.* p 4 [Jialingjiang Formation (upper Spathian, Early Triassic, Triassic); Yangping, Yuan'an County, Hubei Province, China.]
URN:LSID:ZOOBANK.ORG:PUB:1B8887A9-F513-427D-BE9A-DBBB15DD9A44

Eretmorhipis carrolldongi Chen *et al.*, 2015

URN:LSID:ZOOBANK.ORG:ACT:317DA1DF-4381-43F5-90CE-ADFD680F7178

1991 *Hupehsuchia* n. gen. n. sp. Carroll & Zhi-Ming, 1991

Carroll & Zhi-Ming p 143 [Jialingjiang Formation (upper Spathian, Early Triassic, Triassic); Tuling, Baihechuan, Xunjiang District, Nanzhang County, Hubei Province, China.]

v * 2015 *eEretmorhipis carrolldongi* Chen *et al.*, 2015

LSID

Chen *et al.* p 4 [Jialingjiang Formation (upper Spathian, Early Triassic, Triassic); Yingzhishang, Yuan'an County, Hubei Province, China.]
URN:LSID:ZOOBANK.ORG:PUB:132627FE-9142-4EE2-BACB-08CAFC65C3E2

Hupehsuchus nanchangensis Young & Dong, 1972

URN:LSID:ZOOBANK.ORG:ACT:416BF673-273A-4F3D-99B3-F369DBEC6CEA

Nanchangosaurus suni Wang, 1959

Parahupehsuchus longus Chen *et al.*, 2014b

URN:LSID:ZOOBANK.ORG:ACT:0B2F1D4D-0435-496F-B1C0-6913F265240F

ICHTHYOSAUIRIFORMES Motani *et al.*, 2015

Acamptonectes densus Fischer *et al.*, 2012

URN:LSID:ZOOBANK.ORG:ACT:AAB4BA7E-F53D-4962-8A9C-3240DFE2C4D8

v * 2012 *Acamptonectes densus* Fischer *et al.*, 2012

LSID

Fischer *et al.* p 3 [Speeton Clay Formation, *Simbiskites concinnus/staffi* ammonite biozones (basal-upper Hauterivian, Lower Cretaceous, Cretaceous); Speeton, Yorkshire, U.K. and Cremlingen, Lower Saxony, Germany.]
URN:LSID:ZOOBANK.ORG:PUB:66B3821A-1025-48DC-9C5F-7E6277FFD975

Aegirosaurus leptospondylus (Wagner, 1853)

* 1853 *Ichthyosaurus leptospondylus* Wagner, 1853

Wagner [Solnhofen Formation (Lower Tithonian, Upper Jurassic, Jurassic); Germany.]

2000 *Aegirosaurus leptospondylus* (Wagner, 1853)

Bardet & Fernández p 504 [Malm ζ 2b, Solnhofen Formation (early Lower Tithonian, Upper Jurassic, Jurassic); Borsheim, Schrandel quarry district; Bavaria, Germany.]

Acuetzpalin carranzai Barrientos-Lara *et al.*, 2020

URN:LSID:ZOOBANK.ORG:ACT:90130A25-6901-4DA6-84B8-D0680DF9BCAB

* 2020 *Acuetzpalin carranzai* Barrientos-Lara *et al.*, 2020

LSID

Barrientos-Lara *et al.* p 3 [La Casita Formation (Kimmeridgian, Upper Jurassic, Jurassic); Cerro de Palotes, near of Cuencamé, Durango state, Northeast Mexico.]
URN:LSID:ZOOBANK.ORG:PUB:2287DBB3-3E85-409D-9D97-A946DE865FCB

Arthropterygius chrisorum (Russell, 1993)

* 1993 *Ophthalmosaurus chrisorum* Russell, 1993

Russell p 198 [Ringnes Formation (Oxfordian–Kimmeridgian, Upper Jurassic, Jurassic); Cape Grassy, Melville Island, Canada (UTM WGS84 12X 433220 8453461 = 76° 9' 4" N 113° 30' W).]

? 2017 *Keilhauia nui* Delsett *et al.*, 2017

Delsett *et al.* p 7 [Slottsmøya Member, Agardfjellet Formation (early Berriasian, Lower Cretaceous, Cretaceous); Janusfjellet, Spitsbergen, Svalbard (UTM WGS84 33X 0518847 8696044).] *fide* Zverkov & Prilepskaya (2019)

p 2018 *Palvennia hoybergeti* Druckenmiller *et al.*, 2012

2019 *Arthropterygius chrisorum* (Russell, 1993)

Delsett *et al.* p 8 [UTM WGS84 33X 0519622 8695649] PMO 222.669 *fide* Zverkov & Prilepskaya (2019)
Zverkov & Prilepskaya p 15

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

URN:LSID:ZOOBANK.ORG:ACT:03BA5E23-17B5-4AB1-B98A-681B9968A3F9

- * 2012 *Palvennia hoybergeti* Druckenmiller *et al.*, 2012 LSID Druckenmiller *et al.* p 326 [Slottsmøya Member, Agardfjellet Formation (Middle Volgian, Upper Jurassic, Jurassic); Spitsbergen, Svalbard (UTM WGS84 33X 0518775 8696150).] [URN:LSID:ZOOBANK.ORG:PUB:8791DF9D-E15B-4470-A02A-F05ECC3BB7D6](https://zoobank.org/PUB:8791DF9D-E15B-4470-A02A-F05ECC3BB7D6)
- p 2018 *Palvennia hoybergeti* Druckenmiller *et al.*, 2012 Delsett *et al.* p 8 [UTM WGS84 33X 0519622 8695649]
- 2019 *Arthropterygius hoybergeti* (Druckenmiller *et al.*, 2012) Zverkov & Prilepskaya p 31

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

[URN:LSID:ZOOBANK.ORG:ACT:71E65B35-7215-44AA-BCE7-E9A3B265E04F](https://zoobank.org/ACT:71E65B35-7215-44AA-BCE7-E9A3B265E04F)

- * 2014 *Janusaurus lundii* Roberts *et al.*, 2014 LSID Roberts *et al.* p 4 [Slottsmøya Member, Agardfjellet Formation (middle Volgian, Upper Jurassic, Jurassic); Janusfjellet, Spitsbergen, Svalbard (UTM WGS84 33X 518821 8696195 = 78° 20.264' N 15° 50.044' E).] [URN:LSID:ZOOBANK.ORG:PUB:FF4834F1-AEED-4B08-8E74-7125801C1B3E](https://zoobank.org/PUB:FF4834F1-AEED-4B08-8E74-7125801C1B3E) *fide* Zverkov & Prilepskaya (2019)
- 2016 *Janusaurus lundii* Roberts *et al.*, 2014 Delsett *et al.*
- 2017 *Janusaurus lundii* Roberts *et al.*, 2014 Delsett *et al.*
- 2019 *Arthropterygius lundii* (Roberts *et al.*, 2014) Zverkov & Prilepskaya p 40

Arthropterygius thalassonotus Campos *et al.*, 2019

[URN:LSID:ZOOBANK.ORG:ACT:3F09C714-961C-433C-B056-DFD3F8E3B5CD](https://zoobank.org/ACT:3F09C714-961C-433C-B056-DFD3F8E3B5CD)

- * 2019 *Arthropterygius thalassonotus* Campos *et al.*, 2019 LSID Campos *et al.* p 184 [Vaca Muerta Formation (late Tithonian, Upper Jurassic, Jurassic); Yesera del Tromen–Pampa Tril area, north-western Neuquén Province, Argentina.] [URN:LSID:ZOOBANK.ORG:PUB:A668AA96-CE4F-442E-AD3E-B757AD580CFC](https://zoobank.org/PUB:A668AA96-CE4F-442E-AD3E-B757AD580CFC)

Athabascasaurus bitumineus Druckenmiller & Maxwell, 2010

[URN:LSID:ZOOBANK.ORG:ACT:1CE8B3C1-8771-443A-8831-00025FB84CA6](https://zoobank.org/ACT:1CE8B3C1-8771-443A-8831-00025FB84CA6)

- v * 2010 *Athabascasaurus bitumineus* Druckenmiller & Maxwell, 2010 LSID Druckenmiller & Maxwell p 1039 [Wabiskaw Member, Clearwater Formation (lowermost Albian, Lower Cretaceous, Cretaceous); 35 km north of Fort McMurray, Alberta, Canada (UTM WGS84 12V 459464 6317120 = 56° 59' 45" N 111° 40' 02" W).] [URN:LSID:ZOOBANK.ORG:PUB:2540811F-95E5-45BB-9B32-8E0416F61681](https://zoobank.org/PUB:2540811F-95E5-45BB-9B32-8E0416F61681)

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

[URN:LSID:ZOOBANK.ORG:ACT:05C7C635-6E53-4070-8856-047553A6B0BF](https://zoobank.org/ACT:05C7C635-6E53-4070-8856-047553A6B0BF)

- * 2006 *Mixosaurus panxianensis* Jiang *et al.*, 2006 LSID Jiang *et al.* p 62 [Upper Member, Guanling Formation, *Nicoraella germanicus* Conodont Biozone (Pelsonian, Anisian, Middle Triassic, Triassic); Yangjuan Village, Xinmin District, Panxian County, Guizhou Province, China.] [URN:LSID:ZOOBANK.ORG:PUB:A3ED6813-7AA8-47CA-8197-04CA562417DF](https://zoobank.org/PUB:A3ED6813-7AA8-47CA-8197-04CA562417DF)
- 2010 *Barracudasauroides panxianensis* (Maisch, 2010) Maisch p 161

Besanosaurus leptorhynchus Dal Sasso & Pinna, 1996

[URN:LSID:ZOOBANK.ORG:ACT:47C32E1B-18FE-40CF-B98E-E9A537601E43](https://zoobank.org/ACT:47C32E1B-18FE-40CF-B98E-E9A537601E43)

- * 1996 *Besanosaurus leptorhynchus* Dal Sasso & Pinna, 1996 LSID Dal Sasso & Pinna p 4 [Besano Formation, *Nevadites secedensis* Ammonite Biozone (Ilyrian, Anisian, Middle Triassic, Triassic); Sasso Caldo quarry, Besano, Varese Province, Lombardy, Northern Italy.] [URN:LSID:ZOOBANK.ORG:PUB:EEA0F11C-D7BF-41BE-856E-DC2F3599273A](https://zoobank.org/PUB:EEA0F11C-D7BF-41BE-856E-DC2F3599273A)

Brachypterygius alekseevi (Arkhangelsky, 2001)

- * 2001 *Otschevia alekseevi* Arkhangelsky, 2001 Arkhangelsky p 629 [*Dorsoplanites panderi* Ammonite Biozone (Volgian, Upper Jurassic, Jurassic); Volga River, 18 km north of Ulyanovsk, Ulyanovsk District, Ulyanovsk Region, Russian.]
- 2010 *Brachypterygius alekseevi* (Arkhangelsky, 2001) Maisch p 167
- 2015 *Grendelius alekseevi* (Zverkov *et al.*, 2015) Zverkov *et al.* p 562

Brachypterygius extremus (Boulenger, 1904)

[URN:LSID:ZOOBANK.ORG:ACT:5B04A1AF-9081-417D-9BFC-DC3AFA6DAAE3](https://zoobank.org/ACT:5B04A1AF-9081-417D-9BFC-DC3AFA6DAAE3)

- v * 1904 *Ichthyosaurus extremus* Boulenger, 1904 LSID Boulenger p 425 [Kimmeridge Clay Formation (Kimmeridgian–Tithonian, Upper Jurassic, Jurassic); Smallmouth Sands, Weymouth, Dorset, U.K.] [URN:LSID:ZOOBANK.ORG:PUB:98E5CD50-9FAF-458D-9D0A-9464EF76F429](https://zoobank.org/PUB:98E5CD50-9FAF-458D-9D0A-9464EF76F429)
- v 1922 *Brachypterygius extremus* (Boulenger, 1904) von Huene p 97 [URN:LSID:ZOOBANK.ORG:PUB:2E316B82-8A25-43AE-A1C5-3785124EA6AE](https://zoobank.org/PUB:2E316B82-8A25-43AE-A1C5-3785124EA6AE)

v * 1976 *Grendelius mordax* McGowan, 1976

McGowan p 671 [Kimmeridge Clay Formation, *Aulacostephanus autissiodorensis* Ammonite Biozone (middle Kimmeridgian, Upper Jurassic, Jurassic); Stowbridge, Norfolk, U.K. (UTM WGS84 31U 321960 5835045).]

Brachypterygius pseudoscythica (Efimov, 1998)

* 1998 *Otschevia pseudoscythica* Efimov, 1998

Efimov p 83 [*Illoaiskya pseudoscythica* Ammonite Biozone (Volgian, Upper Jurassic, Jurassic); Volga River, Ulyanovsk District, Ulyanovsk Region, Russia.]

2000 *Brachypterygius pseudoscythius* (Efimov, 1998) [sic.]

Maisch & Matzke p 79

2015 *Grendelius pseudoscythicus* (Efimov, 1998) [sic.]

Zverkov *et al.* p 561

Californosaurus perrini (Merriam, 1902)

* 1902 *Shastasaurus perrini* Merriam, 1902

Merriam p 89 [Hosselkus Limestone Formation; Shasta County, California, U.S.A.]

1905 *Delphinosaurus perrini* (Merriam, 1902)

Merriam p 24

1934 *Californosaurus perrini* (Merriam, 1902)

Kuhn p 27 [*non Delphinosaurus* von Eichwald, 1853]

Callawayia neoscapularis (McGowan, 1994)

* 1994 *Shastasaurus neoscapularis* McGowan, 1994

McGowan p 170 [Pardonet Formation, *Epigondolella triangularis* Conodont Biozone (Norian, Upper Triassic, Triassic); Peace Reach, Williston Lake, British Columbia, Canada.]

2000 *Callawayia neoscapularis* (McGowan, 1994)

Maisch & Matzke p 69 New combination takes priority over *Metashastasaurus* (Nicholls & Manabe, 2001, p. 1001).

2001 *Metashastasaurus neoscapularis* (McGowan, 1994)

Nicholls & Manabe p 985 [Pardonet Formation (Norian, Upper Triassic, Triassic); Chicken Creek, British Columbia, Canada.]

Cartorhynchus lenticarpus Motani *et al.*, 2015

URN:LSID:ZOOBANK.ORG:ACT:FCCC9BB7-FD52-42F4-B2EC-B0B7E2A1CA32

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

LSID

Motani *et al.* p 485 [Upper Member, Nanlinghu Formation, *Subcolumbites* Ammonite Biozone (Olenekian, Lower Triassic, Triassic); Majishan Quarry, Chaohu City, Hefei, China (UTM WGS84 50R 577953 3499041 = 31° 37' 26" N 117° 49' 19" E).]

URN:LSID:ZOOBANK.ORG:PUB:9CFFEE63-2B8A-4C01-B9C7-CD3C53D684F5

Caypullisaurus bonapartei Fernández, 1997

URN:LSID:ZOOBANK.ORG:ACT:046EED7E-C624-465F-B0D4-1BB782CCD97D

* 1997 *Caypullisaurus bonapartei* Fernández, 1997

LSID

Fernández p 480 [Vaca Muerta Formation, *Virgatosphinctes mendozanus* Ammonite Biozone (late Tithonian, Upper Jurassic, Jurassic); Cerro Lotena, Neuquén Province, northwest patagonia, Argentina (UTM WGS84 19H 442358 5661434 = 39° 11' 40" N 69° 40' 03" S).] URN:LSID:ZOOBANK.ORG:PUB:1A5DDCD0-1713-410A-AE1B-F02EA1F1DF77

Cetarthrosaurus walkeri (Seeley, 1873)

* 1869 *Ichthyosaurus walkeri* Seeley, 1869

Seeley p 65 [Gault Formation (late Albian, Lower Cretaceous, Cretaceous).] Re-worked into Cambridge Greensand Member (Lower Chalk Formation; early Cenomanian). Described from a cast.

1873 *Cetarthrosaurus walkeri* (Seeley, 1869)

Seeley p 505

2014a *Cetarthrosaurus walkeri* (Seeley, 1869)

Fischer *et al.* p 17

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

Gengasaurus nicosiai Paparella *et al.*, 2016

Grippia longirostris Wiman, 1929
Guizhouichthyosaurus tangae 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 conybeari Lydekker, 1888
Ichthyosaurus larkini Lomax & Massare, 2017
Ichthyosaurus somersetensis Lomax & Massare, 2017
Isffordosaurus minor (Wiman, 1910)
Leninia stellans Fischer *et al.*, 2014b
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 pariallus Fernández, 1999
Muiscasaurus catheti Maxwell *et al.*, 2016

* 2016 *Muiscasaurus catheti* Maxwell *et al.*, 2016 Maxwell *et al.* p 61 [Arcillolitas abigarradas Member, Paja Formation (Barremian-Aptian, Lower Cretaceous, Cretaceous); Vereda Llanitos, Sachica, Boyaca, Colombia (UTM WGS84 18N 662860 616018 = 05° 34.278' N 73° 31.781' W).]

Nannopterygius enthekiodon (Hulke, 1871)

URN:LSID:ZOOBANK.ORG:ACT:8467F95F-AC53-4EA7-9612-230E922A6FC

v * 1871 *Ichthyosaurus enthekiodon* Hulke, 1871 **LSID** Hulke p 441 [Kimmeridge Clay Formation (Kimmeridgian-Tithonian, Upper Jurassic, Jurassic); Kimmeridge Bay, Dorset, U.K.] URN:LSID:ZOOBANK.ORG:PUB:4F0E90D0-27FF-409A-9CD5-976F182B8B4C
 1922 *Nannopterygius enthekiodon* (Hulke, 1871) von Huene p 98 URN:LSID:ZOOBANK.ORG:PUB:2E316B82-8A25-43AE-A1C5-3785124EA6AE

Nannopterygius saveljeviensis (Arkhangelsky, 1997)

* 1997 *Paraophthalmosaurus savejeviensis* Arkhangelsky p 88
 Arkhangelsky, 1997
 1999a *Yasykovia kabanovi* Efimov, 1999a Efimov p 98
 2020 *Nannopterygius savejeviensis* (Arkhangelsky, 1997) Zverkov & Jacobs p 246 [Volgian, Upper Jurassic, Jurassic.]

Nannopterygius yasykovi (Efimov, 1999a)

* 1999a *Yasykovia sumini* Efimov, 1999a Efimov p 98

Ophthalmosaurus icenicus Seeley, 1874

URN:LSID:ZOOBANK.ORG:ACT:F598EAB9-08BF-44CF-BBF3-BB940BD24DBE

v * 1874 *Ophthalmosaurus icenicus* Seeley, 1874 **LSID** Seeley p 707 [Peterborough Member, Oxford Clay Formation (Callovian, Middle Jurassic, Jurassic); Peterborough, Cambridgeshire.]
 URN:LSID:ZOOBANK.ORG:PUB:4C83C9B2-665D-4AD7-8AF8-D365E5491831

Ophthalmosaurus natans (Marsh, 1879)

Parvinatator wapitiensis Nicholls & Brinkman, 1995

Pervushovisaurus bannovkensis Arkhangelsky, 1998

Pervushovisaurus campylodon (Carter, 1846)

- * 1846 *Ichthyosaurus campylodon* Carter, 1846 Carter p 60 [Upper Greensand Formation (Albian–Cenomanian, Lower–Upper Cretaceous, Cretaceous); Cambridge, Cambridgeshire, U.K.]
- 1922 *Myopterygius campylodon* (Carter, 1846) von Huene p 98 [URN:LSID:ZOOBANK.ORG:PUB:2E316B82-8A25-43AE-A1C5-3785124EA6AE](https://zoobank.org/PUB:2E316B82-8A25-43AE-A1C5-3785124EA6AE)
- 1972 *Platypterygius campylodon* (Carter, 1846) McGowan p 17
- 2016 *Pervushovisaurus campylodon* (Carter, 1846) Fischer p 8

Pessopteryx nisseri Wiman, 1910

Phalarodon callawayi Schmitz *et al.*, 2004

Phalarodon fraasi Merriam, 1910

Phalarodon major von Huene, 1916

Phantomosaurus neubigi (Sander, 1997)

Platypterygius hercynicus Kuhn, 1946

Platypterygius americanus Nace, 1939

- * 1939 *Myopterygius americanus* Nace, 1939 Nace p 674 [Mowry Shale Member, Graneros Formation; Crook County Wyoming, U.S.A.]
- 1968 *Myopterygius americanus* Nace, 1939 Romer p 27 [Mowry Shale Member, Graneros Formation; Osage, Wyoming, U.S.A.]
- 1972 *Platypterygius americanus* (Nace, 1939) McGowan p 17

Platypterygius australis (M'Coy, 1867)

Platypterygius hauthali (von Huene, 1927)

Platypterygius ochevi Arkhangelsky *et al.*, 2008

Platypterygius platydactylus (Broili, 1907)

- 1922 *Platypterygius platydactylus* (Broili, 1907) von Huene p 99 [URN:LSID:ZOOBANK.ORG:PUB:2E316B82-8A25-43AE-A1C5-3785124EA6AE](https://zoobank.org/PUB:2E316B82-8A25-43AE-A1C5-3785124EA6AE)

Platypterygius sachicarum Páramo, 1997

Protoichthyosaurus applebyi Lomax *et al.*, 2017

Protoichthyosaurus prostaxalis Appleby, 1979

Qianichthyosaurus xingyiensis 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 *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.*, 2014a

Stenopterygius aaleniensis Maxwell *et al.*, 2012

Stenopterygius quadriscissus (Quenstedt, 1858)

Stenopterygius triscissus (Quenstedt, 1858)

Stenopterygius uniter von Huene, 1931b

Suevoleviathan disinteger (von 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 (von Huene, 1931a)

Temnodontosaurus platyodon (Conybeare, 1822)

Temnodontosaurus trigonus (von Theodori, 1843)

Thaisaurus chonglakmanii Mazin *et al.*, 1991


Thalattoarchon saurophagis Fröbisch *et al.*, 2013

Tholodus schmidi von Meyer, 1849

Toretocnemus californicus Merriam, 1903

Toretocnemus zitteli (Merriam, 1903)

Undorosaurus gorodischensis Efimov, 1999b

- * 1999b *Undorosaurus gorodischensis* Efimov, 1999b Efimov p 52 [*Epivirgatites nikitini* Ammonite Biozone (Volgian, Upper Jurassic, Jurassic); Undory, Volga Oblast, Russia.]
- 2012 *Cryptopterygius kristiansenae* Druckenmiller *et al.*, 2012  Druckenmiller *et al.* p 313 [Slottsmøya Member, Agardfjellet Formation (middle Volgian, Upper Jurassic, Jurassic); Janusfjellet, Spitsbergen, Svalbard (UTM WGS84 33X 0518842 8696067).] [URN:LSID:ZOOBANK.ORG:PUB:8791DF9D-E15B-4470-A02A-F05ECC3BB7D6](https://zoobank.org/PUB:8791DF9D-E15B-4470-A02A-F05ECC3BB7D6) fide Zverkov & Efimov (2019)
- 2019 *Undorosaurus gorodischensis* Efimov, 1999b Zverkov & Efimov p 1189

Undorosaurus kielanae (Tyborowski, 2016)

- * 2016 *Cryptopterygius kielanae* Tyborowski, 2016 Tyborowski p 793 [Ślawno Limestone Member, Kcynia Formation (uppermost Lower Tithonian = Middle Volgian, Upper Jurassic, Jurassic); Owadów-Brzezinki Quarry, Ślawno (UTM WGS84 34U 439831 5692022 = 51.3762583 N 20.1355167 E).]
- ? 2019 *Undorosaurus kielanae* (Tyborowski, 2016) Zverkov & Efimov p 1187

Undorosaurus nessovi Efimov, 1999b

Undorosaurus trautscholdi Arkhangelsky & Zverkov, 2014

Utatsusaurus hataii Shikama *et al.*, 1978

Wahlisaurus massarae Lomax, 2016

- * 2016 *Wahlisaurus massarae* Lomax, 2016 Lomax p 388 [Barnstone Member?, Scunthorpe Mudstone Formation?, Pre-*planorbis* or *Psiloceras planorbis* beds (lowermost Hettangian, Lower Jurassic, Jurassic); Normanton Hills near Normanton on Soar, Nottinghamshire, U.K.]

Wimanius odontopalatus Maisch & Matzke, 1998

Xinminosaurus catactes Jiang *et al.*, 2008

References

- APPLEBY, R.M. 1979. The affinities of Liassic and later ichthyosaurs. *Palaeontology*, **22**, 921–946.
- ARKHANGELSKY, M.S. 1997. On a new genus of ichthyosaurs from the Lower Volgian Substage of the Saratov, Volga Region. *Paleontologicheskii Zhurnal*, **1997**, 87–91.
- . 1998. On the ichthyosaurian genus *Platypterygius*. *Paleontologicheskii Zhurnal*, **1998**, 65–69.
- . 2001. On a new ichthyosaur of the Genus *Otschevia* from the Volgian Stage of the Volga Region near Ulyanovsk. *Paleontological Journal*, **35**, 629–635.
- & ZVERKOV, N.G. 2014. On a new ichthyosaur of the genus *Undorosaurus*. *Proceedings of the Zoological Institute RAS*, **318**, 187–196.
- , AVERIANOV, A.O., PERVUSHOV, E.M., RATNIKOV, V.Y. & ZOZYREV, N.Y. 2008. On ichthyosaur remains from the Cretaceous of the Voronezh Region. *Paleontological Journal*, **42**, 287–291. DOI: [10.1134/S0031030108030106](#).
- 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](#).
- BARRIENTOS-LARA, J.I., ALVARADO-ORTEGA, J. & FERNÁNDEZ, M.S. 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](#).
- BASSANI, F. 1886. Sui fossili e sull'età degli schisti bituminosi Triasici di Besano in Lombardia. *Atti della Società Italiana di Scienza Naturali*, **29**, 1–58.
- BLAKE, J.F. 1876. Order Ichthyopterygia. 253–254. In.
- BOULENGER, G.A. 1904. Exhibition of, and remarks upon, a paddle of a new species of ichthyosaur. *Proceedings of the Zoological Society of London*, **1904**, 424–426.
- BRINKMANN, W. 1998. *Sangiorgiosaurus* n. g. – eine neue Mixosaurier-gattung (Mixosauridae, Ichthyosauria) mit Quetschzähnen aus der Grenzbitumenzone (Mitteltrias) des Monte San Giorgio (Schweiz, Kanton Tessin). *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, **207**, 125–144. DOI: [10.1127/njgpa/207/1998/125](#).
- BROILI, F. 1907. Ein neuer *Ichthyosaurus* aus der norddeutschen Kreide. *Palaeontographica*, **54**, 139–162.
- BRONN, H.G. 1844. Über Ichthyosauren in den Lias-Schiefern der Gegend von Boll in Württemberg. *Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefakten-Kunde*, **1844**, 385–408.
- BRUSATTE, S.L., YOUNG, M.T., CHALLANDS, T.J., CLARK, N.D.L., FISCHER, V., FRASER, N.C., LISTON, J.J., MACFADYEN, C.C.J., ROSS, D.A., WALSH, S.A. & WILKINSON, M. 2015. Ichthyosaurs from the Jurassic of Skye, Scotland. *Scottish Journal of Geology*, **51**, 1–13. DOI: [10.1144/sjg2014-018](#).
- CAMP, C.L. 1976. Vorläufige Mitteilung über große Ichthyosaurier aus der oberen Trias von Nevada. *Sitzungsberichte der Österreichischen Akademie der Wissenschaften*, **185**, 125–134.
- CAMPOS, L., FERNÁNDEZ, M.S. & HERRERA, Y. 2019. A new ichthyosaur from the Late Jurassic of north-west Patagonia (Argentina) and its significance for the evolution of the narial complex of the ophthalmosaurids. *Zoological Journal of the Linnean Society*, **118**, 180–201. DOI: [10.1093/zoolinnean/zlz095](#).
- CARROLL, R.L. & ZHI-MING, D. 1991. *Hupehsuchus*, an enigmatic aquatic reptile from the Triassic of China, and the problem of establishing relationships. *Philosophical Transactions of the Royal Society B: Biological Sciences*, **331**, 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. *Report of the British Association for the Advancement of Science*, **15**, 60.
- CHEN, L. 1985. Ichthyosaurs from the Lower Triassic of Chao County, Anhui. *Regional Geology of China*, **15**, 139–146.
- CHEN, X.-h. & CHENG, L. 2010. A new species of *Mixosaurus* (Reptilia: Ichthyosauria) from the Middle Triassic of Pu'an, Guizhou, China. *Acta Palaeontologica Sinica*, **49**, 251–260.
- & SANDER, P.M. 2007. A new species of *Callawayia* (Reptilia: Ichthyosauria) from the Late Triassic in Guanling, Guizhou. *Geology in China*, **34**, 974–982.
- , SANDER, P.M., CHENG, L. & WANG, X. 2013. A new Triassic primitive ichthyosaur from Yuanan, South China. *Acta Geologica Sinica*, **87**, 672–677. DOI: [10.1111/1755-6724.12078](#).
- , MOTANI, R., CHENG, L., JIANG, D. & RIEPEL, O.C. 2014a. A small short-necked hupehsuchian from the Lower Triassic of Hubei Province, China. *PLoS ONE*, **9**, e115244. DOI: [10.1371/journal.pone.0115244](#).
- & ——— 2014b. A carapace-like bony body tube in an Early Triassic marine reptile and the onset of marine tetrapod predation. *PLoS ONE*, **9**, e94396. DOI: [10.1371/journal.pone.0094396](#).
- & ——— 2015. A new specimen of Carroll's mystery hupehsuchian from the Lower Triassic of China. *PLoS ONE*, **10**, e0126024. DOI: [10.1371/journal.pone.0126024](#).
- CONYBEARE, W.D. 1822. Additional notices on the fossil genera *Ichthyosaurus* and *Plesiosaurus*. *Transactions of the Geological Society of London*, **1**, 103–123. DOI: [10.1144/transgslb.1.1.103](#).
- CUTHBERTSON, R.S., RUSSELL, A.P. & ANDERSON, J.S. 2013. Cranial morphology and relationships of a new grippid (Ichthyopterygia) from the Vega–Phroso Siltstone Member (Lower Triassic) of British Columbia, Canada. *Journal of Vertebrate Paleontology*, **33**, 831–847. DOI: [10.1080/02724634.2013.755989](#).
- DAL SASSO, C. & PINNA, G. 1996. *Besanosaurus leptorhynchus* n. gen. n. sp. a new shastasaurid ichthyosaur from the Middle Triassic of Besano (Lombardy, N. Italy). *Paleontologia Lombarda*, **4**, 3–23.
- DELSETT, L.L., NOVIS, L.K., ROBERTS, A.J., KOEVOETS, M.J., HAMMER, Ø., DRUCKENMILLER, P.S. & HURUM, J.H. 2016. The Slottsmøya marine reptile Lagerstätte: depositional environments, taphonomy and diagenesis. *Geological Society, London, Special Publications*, **434**, 165–188. DOI: [10.1144/SP434.2](#).
- DELSETT, L.L., ROBERTS, A.J., DRUCKENMILLER, P.S. & HURUM, J.H. 2017. A new ophthalmosaurid (Ichthyosauria) from Svalbard, Norway, and evolution of the ichthyopterygian pelvic girdle. *PLoS ONE*, **12**, e0169971–39. DOI: [10.1371/journal.pone.0169971](#).
- , DRUCKENMILLER, P.S., ROBERTS, A.J. & HURUM, J.H. 2018. A new specimen of *Palvenia hoybergeti*: implications for cranial and pectoral girdle anatomy in ophthalmosaurid ichthyosaurs. *PeerJ*, **6**, e5776. DOI: [10.7717/peerj.5776](#).
- DRUCKENMILLER, P.S. & MAXWELL, E.E. 2010. A new Lower Cretaceous (lower Albian) ichthyosaur genus from the Clearwater Formation, Alberta, Canada. *Canadian Journal of Earth Sciences*, **47**, 1037–1053. DOI: [10.1139/E10-028](#).
- , HURUM, J.H., KNUTSEN, E.M. & NAKREM, H.A. 2012. Two new ophthalmosaurids (Reptilia: Ichthyosauria) from the Agardhjellet Formation (Upper Jurassic: Volgian/Tithonian), Svalbard, Norway. *Norwegian Journal of Geology*, **92**, 311–339.
- EFIMOV, V.M. 1998. The ichthyosaur *Otschevia pseudoscythica* gen. et sp. nov. from the Upper Jurassic of Ulyanovsk Volga. *Paleontologicheskii Zhurnal*, **1998**, 82–86.
- 1999a. Ichthyosaurs of a new genus *Yasykovia* from the Upper Jurassic strata of European Russia. *Paleontologicheskii Zhurnal*, **1999**, 91–98.
- 1999b. A new family of ichthyosaurs, the *Undorosauridae* fam. nov. from the Volgian Stage of the European part of Russia. *Paleontologicheskii Zhurnal*, **1999**, 174–181.
- FERNÁNDEZ, M.S. 1994. A new long-snouted ichthyosaur from the Early Bajocian of Neuquén Basin (Argentina). *Ameghiniana*, **31**, 291–297.

- . 1997. A new ichthyosaur from the Tithonian (Late Jurassic) of the Neuquén Basin, north-western Patagonia, Argentina. *Journal of Paleontology*, **71**, 479–484. doi: [10.1017/S0022336000039494](#).
- . 1999. A new ichthyosaur from the Los Molles Formation (Early Bajocian), Neuquen Basin, Argentina. *Journal of Paleontology*, **73**, 677–681. doi: [10.1017/S0022336000032492](#).
- FISCHER, V. 2016. Taxonomy of *Platypterygius cam-pylodon* and the diversity of the last ichthyosaurs. *PeerJ*, **4**, e2604–21. doi: [10.7717/peerj.2604](#).
- , MASURE, E., ARKHANGELSKY, M.S. & GODEFROIT, P. 2011. A new Barremian (Early Cretaceous) ichthyosaur from western Russia. *Journal of Vertebrate Paleontology*, **31**, 1010–1025. doi: [10.1080/02724634.2011.595464](#).
- , MAISCH, M.W., NAISH, D., KOSMA, R., LISTON, J.J., JOGER, U., KRÜGER, F.J., PÉREZ, J.P., TAINSH, J. & APPLEBY, R.M. 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](#).
- , APPLEBY, R.M., NAISH, D., LISTON, J.J., RIDING, J.B., BRINDLEY, S. & GODEFROIT, P. 2013. A basal thunnosaurian from Iraq reveals disparate phylogenetic origins for Cretaceous ichthyosaurs. *Biology Letters*, **9**, 20130021–20130021. doi: [10.1098/rsbl.2013.0021](#).
- , BARDET, N., GUIOMAR, M. & GODEFROIT, P. 2014a. High diversity in Cretaceous ichthyosaurs from Europe prior to their extinction. *PLoS ONE*, **9**, e84709. doi: [10.1371/journal.pone.0084709](#).
- , ARKHANGELSKY, M.S., USPENSKY, G.N., STENSHIN, I.M. & GODEFROIT, P. 2014b. A new Lower Cretaceous ichthyosaur from Russia reveals skull shape conservatism within Ophthalmosaurinae. *Geological Magazine*, **151**, 60–70. doi: [10.1017/S0016756812000994](#).
- FRÖBISCH, N.B., SANDER, P.M. & RIEPPEL, O.C. 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. *Zoological Journal of the Linnean Society*, **147**, 515–538. doi: [10.1111/j.1096-3642.2006.00225.x](#).
- , FRÖBISCH, J., SANDER, P.M., SCHMITZ, L. & RIEPPEL, O.C. 2013. Macropredatory ichthyosaur from the Middle Triassic and the origin of modern trophic networks. *Proceedings of the National Academy of Sciences*, **110**, 1393–1397. doi: [10.1073/pnas.1216750110](#).
- HULKE, J.W. 1871. Note on an *Ichthyosaurus* (*I. enthekiodon*) from Kimmeridge Bay, Dorset. *Quarterly Journal of the Geological Society*, **27**, 440–441. doi: [10.1144/GSL.JGS.1871.027.01-02.52](#).
- JIANG, D., MOTANI, R., HUANG, J.-D., TINTORI, A., HU, Y.-C., RIEPPEL, O.C., FRASER, N.C., JI, C., KELLEY, N.P., FU, W. & ZHANG, R. 2016. A large aberrant stem ichthyosauriform indicating early rise and demise of ichthyosauromorphs in the wake of the end-Permian extinction. *Scientific Reports*, **6**, 26232–9. doi: [10.1038/srep26232](#).
- JIANG, D.-Y., SCHMITZ, L., HAO, W. & SUN, Y.-L. 2006. A new mixosaurid ichthyosaur from the Middle Triassic of China. *Journal of Vertebrate Paleontology*, **26**, 60–69. doi: [10.1671/0272-4634\(2006\)26\[60:ANMIFT\]2.0.CO;2](#).
- , MOTANI, R., HAO, W., SCHMITZ, L., RIEPPEL, O.C., SUN, Y.-L. & SUN, Z.-Y. 2008. New primitive ichthyosaurian (Reptilia, Diapsida) from the Middle Triassic of Panxian, Guizhou, south-western China and its position in the Triassic biotic recovery. *Progress in Natural Science*, **18**, 1315–1319. doi: [10.1016/j.pnsc.2008.01.039](#).
- KUHN, O. 1934. Pars 63: Ichthyosauria. 1–76. In *Fossilium catalogus. I: Animalia*. Ed. by W. Quenstedt.
- . 1946. Ein Skelett von *Ichthyosaurus* (*Platypterygius*) *hercynicus* n. sp. aus dem Aptium von Gitter. *Bericht der Naturforschenden Gesellschaft in Bamberg*, **29**, 69–82.
- LEIDY, J. 1868. Notice of some reptilian remains from Nevada. *Proceedings of the Academy of Natural Sciences of Philadelphia*, **20**, 177–178.
- LI, C. 1999. Ichthyosaur from Guizhou, China. *Chinese Science Bulletin*, **44**, 1329–1333. doi: [10.1007/BF02885856](#).
- LOMAX, D.R. 2016. A new leptonektid ichthyosaur from the Lower Jurassic (Hettangian) of Nottinghamshire, England, UK, and the taxonomic usefulness of the ichthyosaurian coracoid. *Journal of Systematic Palaeontology*, **15**, 1–15. doi: [10.1080/14772019.2016.1183149](#).
- & MASSARE, J.A. 2015. A new species of *Ichthyosaurus* from the Lower Jurassic of West Dorset, England, U.K. *Journal of Vertebrate Paleontology*, **35**, e903260. doi: [10.1080/02724634.2014.903260](#).
- & ———. 2017. Two new species of *Ichthyosaurus* from the lowermost Jurassic (Hettangian) of Somerset, England. *Papers in Palaeontology*, **3**, 1–20. doi: [10.1002/spp2.1065](#).
- & MISTRY, R.T. 2017. The taxonomic utility of forefin morphology in Lower Jurassic ichthyosaurs: *Protoichthyosaurus* and *Ichthyosaurus*. *Journal of Vertebrate Paleontology*, **37**, e1361433. doi: [10.1080/02724634.2017.1361433](#).
- LYDEKKER, R. 1888. *Ichthyosaurus acutirostris*, *Zetlandicus* & *longifrons*. *Geological Magazine*, **6**, 44. doi: [10.1017/S0016756800175818](#).
- M’Coy, F. 1867. On the occurrence of *Ichthyosaurus* and *Plesiosaurus* in Australia. *Annals and Magazine of Natural History*, **19**, 1–3.
- MAISCH, M.W. 2008. Revision der Gattung *Stenopterygius* Jaekel, 1904 emend. von Huene, 1922 (Reptilia: Ichthyosauria) aus dem unteren Jura Westeuropas. *Palaeodiversity*, **1**, 227–271.
- . 2010. Phylogeny, systematics, and origin of the Ichthyosauria – the state of the art. *Palaeodiversity*, **3**, 151–214.
- & MATZKE, A.T. 1997. *Mikadocephalus gracilirostris* n. gen., n. sp. a new ichthyosaur from the Grenzbitumenzone (Anisian–Ladinian) of Monte San Giorgio (Switzerland). *Paläontologische Zeitschrift*, **71**, 267–289. doi: [10.1007/BF02988496](#).
- & ———. 1998. Observations on Triassic ichthyosaurs. Part II: a new ichthyosaur with palatal teeth from Monte San Giorgio. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, **1998**, 26–41. doi: [10.1127/njgpm/1998/1998/26](#).
- & ———. 2000. The Ichthyosauria. *Stuttgarter Beiträge zur Naturkunde, Serie B (Geologie und Paläontologie)*, **298**, 1–159.
- & ———. 2003. Observations on Triassic ichthyosaurs. Part XII. A new Early Triassic ichthyosaur genus from Spitzbergen. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, **229**, 317–338. doi: [10.1127/njgpa/229/2003/317](#).
- 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. *Annals and Magazine of Natural History*, **3**, 175–176. doi: [10.1080/00222937908682501](#).
- MARTIN, J.E., FISCHER, V., VINCENT, P. & SUAN, G. 2012. A longirostrine *Temnodontosaurus* (Ichthyosauria) with comments on Early Jurassic ichthyosaur niche partitioning and disparity. *Palaeontology*, **55**, 995–1005. doi: [10.1111/j.1475-4983.2012.01159.x](#).
- MATTHEWS, S.C. 1973. Notes on open nomenclature and on synonymy lists. *Palaeontology*, **16**, 713–719. doi: [10.1234/12345678](#).
- MAXWELL, E.E. & CALDWELL, M.W. 2006. A new genus of ichthyosaur from the Lower Cretaceous of Western Canada. *Palaeontology*, **49**, 1043–1052. doi: [10.1111/j.1475-4983.2006.00589.x](#).
- , DICK, D.G., PADILLA, S. & PARRA, M.L. 2016. A new ophthalmosaurid ichthyosaur from the Early Cretaceous of Colombia. *Papers in Palaeontology*, **2**, 59–70. doi: [10.1002/spp2.1030](#).
- , FERNÁNDEZ, M.S. & SCHOCH, R.R. 2012. First diagnostic marine reptile remains from the Aalenian (Middle Jurassic): a new ichthyosaur from southwestern Germany. *PLoS ONE*, **7**, e41692. doi: [10.1371/journal.pone.0041692](#).
- MAZIN, J.-M., SUTEETHORN, V., BUFFETAUT, E., JAEGER, J.-J. & ELMCKE-INGAVAT, R. 1991. Preliminary description of *Thaisaurus chonglakmanii* n.g., n.sp., a new ichthyopterygian (Reptilia) from the Early Triassic of Thailand.

- Comptes rendus de l'Académie des sciences. Série 2, Mécanique, Physique, Chimie, Sciences de l'univers, Sciences de la Terre*, **313**, 1207–1212.
- MCGOWAN, C. 1972. The systematics of Cretaceous ichthyosaurs with particular reference to the material from North America. *Contributions to Geology, University of Wyoming*, **2**, 9–29.
- 1974. A revision of the longipinnate ichthyosaurs of the Lower Jurassic of England, with descriptions of two new species. *Life Sciences Contributions of the Royal Ontario Museum*, **97**, 1–37. DOI: [10.5962/bhl.title.52055](#).
- 1976. The description and phenetic relationships of a new Ichthyosaur genus from the Upper Jurassic of England. *Canadian Journal of Earth Sciences*, **13**, 668–683. DOI: [10.1139/e76-070](#).
- 1986. A putative ancestor for the swordfish-like ichthyosaur *Eurhinosaurus*. *Nature*, **322**, 454–456. DOI: [10.1038/322454a0](#).
- 1993. A new species of large, long-snouted ichthyosaur from the English lower Lias. *Canadian Journal of Earth Sciences*, **30**, 1197–1204. DOI: [10.1139/e93-101](#).
- 1994. A new species of *Shastasaurus* (Reptilia: Ichthyosauria) from the Triassic of British Columbia: the most complete exemplar of the genus. *Journal of Vertebrate Paleontology*, **14**, 168–179. DOI: [10.1080/02724634.1994.10011550](#).
- 1995. A remarkable small ichthyosaur from the Upper Triassic of British Columbia, representing a new genus and species. *Canadian Journal of Earth Sciences*, **32**, 292–303. DOI: [10.1139/e95-024](#).
- 1996. A new and typically Jurassic ichthyosaur from the Upper Triassic of British Columbia. *Canadian Journal of Earth Sciences*, **33**, 24–32. DOI: [10.1139/e96-003](#).
- & MILNER, A.C. 1999. A new Pliensbachian ichthyosaur from Dorset, England. *Palaeontology*, **42**, 761–768. DOI: [10.1111/1475-4983.00096](#).
- MERRIAM, J.C. 1895. On some reptilian remains from the Triassic of Northern California. *American Journal of Science*, **50**, 55–57. DOI: [10.2475/ajs.s3-50.295.55](#).
- 1902. Triassic Ichthyopterygia from California and Nevada. *University of California, Bulletin of the Department of Geology*, **3**, 63–108.
- 1903. New ichthyosauria from the Upper Triassic of California. *University of California, Bulletin of the Department of Geology*, **3**, 249–263.
- 1905. The types of limb-structure in the Triassic Ichthyosauria. *American Journal of Science*, **19**, 23–30. DOI: [10.2475/ajs.s4-19.109.23](#).
- 1910. The skull and dentition of a primitive ichthyosaurian from the Middle Triassic. *University of California, Bulletin of the Department of Geology*, **5**, 381–390.
- MOTANI, R., JIANG, D.-Y., CHEN, G., TINTORI, A., RIEPPEL, O., JI, C. & HUANG, J.-D. 2015. A basal ichthyosauriform with a short snout from the Lower Triassic of China. *Nature*, **517**, 485–488. DOI: [10.1038/nature13866](#).
- NACE, R.L. 1939. A new ichthyosaur from the Upper Cretaceous Mowry formation of Wyoming. *American Journal of Science*, **237**, 673–686. DOI: [10.2475/ajs.237.9.673](#).
- NICHOLLS, E.L. & BRINKMAN, D.B. 1995. A new ichthyosaur from the Triassic Sulphur Mountain formation of British Columbia. 521–535. In *Vertebrate Fossils and the Evolution of Scientific Concepts*. Ed. by W.A.S. Sarjeant.
- & MANABE, M. 2001. A new genus of ichthyosaur from the Late Triassic Pardonet Formation of British Columbia: bridging the Triassic Jurassic gap. *Canadian Journal of Earth Sciences*, **38**, 983–1002. DOI: [10.1139/cjes-38-6-983](#).
- & ——— 2004. Giant ichthyosaurs of the Triassic—a new species of *Shonisaurus* from the Pardonet Formation (Norian: Late Triassic) of British Columbia. *Journal of Vertebrate Paleontology*, **24**, 838–849. DOI: [10.1671/0272-4634\(2004\)024\[0838:GIOTTN\]2.0.CO;2](#).
- OTSCHEV, V.G. & EFIMOV, V.M. 1985. A new genus of ichthyosaur from the Ulyanovsk Volga Region. *Paleontologicheskii Zhurnal*, **1985**, 76–80.
- OWEN, R. 1840. Report on British fossil reptiles. Part I. *Report of the British Association for the Advancement of Science*, **9**, 43–126.
- 1881. A monograph of the fossil Reptilia of the Liassic Formations. Part Third. *Ichthyosaurus*. *Monographs of the Palaeontographical Society*, **35**, 83–134. DOI: [10.1080/02693445.1881.12027969](#).
- PAPARELLA, I., MAXWELL, E.E., CIPRIANI, A., RONCACÈ, S. & CALDWELL, M.W. 2016. The first ophthalmosaurid ichthyosaur from the Upper Jurassic of the Umbrian–Marchean Apennines (Marche, Central Italy). *Geological Magazine*, **154**, 837–858. DOI: [10.1017/S0016756816000455](#).
- PÁRAMO, M.E. 1997. *Platypterygius sachicarum* (Reptilia, Ichthyosauria) nueva especie del Cretácico de Colombia. *Revista Ingeominas*, **6**, 1–12.
- QUENSTEDT, F.A. 1852. *Handbuch der Petrefaktenkunde*. Tübingen: Verlag der H. Laupp'schenn Buchhandlung.
- 1858. *Der Jura*. Tübingen: Verlag der H. Laupp'schenn Buchhandlung.
- ROBERTS, A.J., DRUCKENMILLER, P.S., SÆTRE, G.-P. & HURUM, J.H. 2014. A new Upper Jurassic ophthalmosaurid ichthyosaur from the Slottsmøya Member, Agardhfjellet formation of Central Spitsbergen. *PLoS ONE*, **9**, e103152. DOI: [10.1371/journal.pone.0103152](#).
- ROMER, A.S. 1968. An ichthyosaur skull from the Cretaceous of Wyoming. *Contributions to Geology, University of Wyoming*, **7**, 27–41.
- RUSSELL, D. 1993. Jurassic marine reptiles from Cape Grassy, Melville Island, Arctic Circle. *Bulletin of the Geological Survey of Canada*, **6**, 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. *Journal of Vertebrate Paleontology*, **9**, 163–173. DOI: [10.1080/02724634.1989.10011750](#).
- 1997. The paleobiogeography of *Shastasaurus*. 1–27. In *Ancient Marine Reptiles*. Ed. by J.M. Callaway & E.L. Nicholls. DOI: [10.1016/B978-0-12-155210-7.X5000-5](#).
- SCHMITZ, L., SANDER, P.M., STORRS, G.W. & RIEPEL, O.C. 2004. New Mixosauridae (Ichthyosauria) from the Middle Triassic of the Augusta Mountains (Nevada, USA) and their implications for mixosaur taxonomy. *Palaeontographica Abteilung A: Paläozoologie—Stratigraphie*, **270**, 133–162.
- SEELEY, H.G. 1869. *Index to the Fossil Remains of Aves, Ornithosauria, and Reptilia from the Secondary System of Strata Arranged in the Woodwardian Museum of the University of Cambridge*. Cambridge: Deighton, Bell, and Co.
- 1873. On *Cetarthrosaurus walkeri* (Seeley), an ichthyosaurian from the Cambridge Upper Greensand. *Quarterly Journal of the Geological Society*, **29**, 505–507. DOI: [10.1144/GSL.JGS.1873.029.01-02.43](#).
- 1874. On the pectoral arch and fore limb of *Ophthalmosaurus*, a new ichthyosaurian genus from the Oxford Clay. *Quarterly Journal of the Geological Society*, **30**, 696–707. DOI: [10.1144/GSL.JGS.1874.030.01-04.64](#).
- SHIKAMA, T., KAMEI, T. & MURATA, M. 1978. Early Triassic *Ichthyosaurus*, *Utatusaurus hataii* gen. et sp. nov., from the Kitakami Massif, Northeast Japan. *Science Reports of Tohoku University (Geology)*, **48**, 77–97.
- TYBOROWSKI, D. 2016. A new ophthalmosaurid ichthyosaur species from the Late Jurassic of Owadów-Brzezinki Quarry, Poland. *Acta Palaeontologica Polonica*, **61**, 791–803. DOI: [10.4202/app.00252.2016](#).
- VON EICHWALD, C.E. 1853. Einige palaeontologische Bemerkungen über den Eisenstand von Kursk. *Bulletin de la Société impériale des naturalistes de Moscou*, **25**, 209–231.
- VON HUENE, F.F. 1927. Beitrag zur Kenntnis mariner mesozoischer Wirbeltiere in Argentinien. *Zentralblatt für Mineralogie, Geologie und Paläontologie. B.*, **1927**, 22–29.
- 1916. Beiträge Zur Kenntnis Der Ichthyosaurier Im Deutschen Muschelkalk. *Palaeontographica*, **62**, 1–68.
- 1922. *Die Ichthyosaurier des Lias und Ihre Zusammenhänge*. Berlin: Verlag von Gebrüder Borntraeger. 114 pp.
- 1926. Neue Ichthyosaurierfunde aus dem schwäbischen Lias. *Neues Jahrbuch für Mineralogie, Geologie und Paläontologie, Beilage Band B*, **55**, 66–86.

- . 1931a. Neue Ichthyosaurier aus Württemberg. *Neues Jahrbuch für Mineralogie, Geologie und Paläontologie, Beilage-Band B*, **65**, 305–320.
- . 1931b. Neue Studien über Ichthyosaurier aus Holzmaden. *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft*, **42**, 345–382.
- VON MEYER, H. 1849. Fossile Fische aus dem Muschelkalk von Jena, Querfurt und Esperstädt. *Palaeontographica*, 1–16.
- VON THEODORI, C. 1843. Über einen kolossalen *Ichthyosaurus trigonodon*. *Gelehrte Anzeigen Königl. Akademie der Wissenschaften. Mathematisch-Physikalisch Classe*, **34**, 905–912.
- WAGNER, A. 1853. Die Characteristic einer neuen Art von *Ichthyosaurus* aus den lithographischen Schiefer und eines Zahnes von *Polyp-tychodon* aus dem Grünsandstein von Kelheim. *Bulletin der königl. Akademie der Wissenschaft, Gelehrte Anzeigen*, **3**, 25–35.
- WANG, K. 1959. Ueber eine neue fossile Reptilform von Provinz Hupeh, China. *Acta Palaeontologica Sinica*, **7**, 47–52.
- WIMAN, C. 1910. Ichthyosaurier aus der Trias Spitzbergens. *Bulletin of the Geological Institute of Upsala*, **10**, 124–148.
- . 1929. Eine neue marine Reptilien-Ordnung aus der Trias Spitzbergens. *Bulletin of the Geological Institute of Upsala*, **22**, 1–14.
- YANG, P.-F., CHENG, J., JIANG, D.-y., MOTANI, R., TINTORI, A., SUN, Y.-l. & SUN, Z.-y. 2013. A new species of *Qianichthyosaurus* (Reptilia: Ichthyosauria) from Xingyi Fauna (Ladinian, Middle Triassic) of Guizhou. *Acta Scientiarum Naturalium Universitatis Pekinensis*, **49**, 1002–1008.
- YIN, G.-z., ZHOU, X., CAO, Z., YU, Y. & LUO, Y. 2000. A preliminary study on the Early Late Triassic marine reptiles from Guanling, Guizhou, China. *Geology, Geochemistry*, **28**, 1–23.
- YOUNG, C.-C. & DONG, Z.M. 1972. On the Triassic marine reptiles of China. *Memoires of the Nanjing Institute of Geology and Palaeontology*, **9**, 1–34.
- ZVERKOV, N.G. & EFIMOV, V.M. 2019. Revision of *Undorosaurus*, a mysterious Late Jurassic ichthyosaur of the Boreal Realm. *Journal of Systematic Palaeontology*, 1–31. DOI: [10.1080/14772019.2018.1515793](https://doi.org/10.1080/14772019.2018.1515793).
- & PRILEPSKAYA, N.E. 2019. A prevalence of *Arthropterygius* (Ichthyosauria: Ophthalmosauridae) in the Late Jurassic–Earliest Cretaceous of the Boreal Realm. *PeerJ*, **7**, e6799. DOI: [10.7717/peerj.6799](https://doi.org/10.7717/peerj.6799).
- & JACOBS, M.L. 2020. Revision of *Nannopterygius* (Ichthyosauria: Ophthalmosauridae): reappraisal of the ‘inaccessible’ holotype resolves a taxonomic tangle and reveals an obscure ophthalmosaurid lineage with a wide distribution. *Zoological Journal of the Linnean Society*, **191**, 228–275. DOI: [10.1093/zoolinnean/zlaa028](https://doi.org/10.1093/zoolinnean/zlaa028).
- , ARKHANGELSKY, M.S. & STENSHIN, I.M. 2015. A review of Russian Upper Jurassic ichthyosaurs with an intermedium/humeral contact. Reassessing *Grendelius* McGowan, 1976. *Proceedings of the Zoological Institute RAS*, **319**, 558–588.