

Ichthyosauromorph taxonomy

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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:

Cartorhynchus lenticarpus Motani et al., 2015				
LSID: URN:LSID:ZOOBANK.ORG:ACT:FCCC9BB7-FD52-42F4-B2EC-B0B7E2A1CA32				
<status>	<year>	<Taxon>	<Authority, Year>	<reference, page> [<occurrence information>.] <comments>
*	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).] 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.

‘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 * (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 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.

ICHTHYOSAUIROMORPHA 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

ICHTHYOSAUIRIFORMES Motani et al., 2015

Acamptonectes densus Fischer et al., 2012

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

- v * 2012 *Acamptonectes densus* Fischer et al., 2012 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.] LSID: 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 and 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

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

- * 2020 *Acuetzpalin carranzai* Barrientos-Lara et al., 2020 [La Casita Formation (Kimmeridgian, Upper Jurassic, Jurassic); Cerro de Palotes, near of Cuencamé, Durango state, Northeast Mexico.] LSID: 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 *Keilhaia 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 and Prilepskaya (2019)
- p 2018 *Palvennia hoybergeti* Druckenmiller et al., 2012 Delsett et al. p 8 [UTM WGS84 33X 0519622 8695649] PMO 222.669 *fide* Zverkov and Prilepskaya (2019)
- 2019 *Arthropterygius chrisorum* (Russell, 1993) Zverkov and Prilepskaya p 15

Arthropterygius hoybergeti (Druckenmiller et al., 2012)

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

- * 2012 *Palvennia hoybergeti* Druckenmiller et al., 2012 [Slottsmøya Member, Agardfjellet Formation (Middle Volgian, Upper Jurassic, Jurassic); Spitsbergen, Svalbard (UTM WGS84 33X 0518775 8696150).] LSID: URN:LSID: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 and Prilepskaya p 31

Arthropterygius lundii (Roberts et al., 2014)

LSID: URN:LSID: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).] LSID: URN:LSID:ZOOBANK.ORG:PUB:FF4834F1-AEED-4B08-8E74-7125801C1B3E *fide* Zverkov and 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 and Prilepskaya p 40

Athabascasaurus bitumineus Druckenmiller and Maxwell, 2010

- v * 2010 *Athabascasaurus bitumineus* Druckenmiller and Maxwell, 2010 Druckenmiller and 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).]

Barracudasauroides panxianensis (Jiang et al., 2006)

- * 2006 *Mixosaurus panxianensis* Jiang et al., 2006 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.]
 2010 *Barracudasauroides panxianensis* (Maisch, 2010) Maisch p 161

Besanosaurus leptorhynchus Dal Sasso and Pinna, 1996

- * 1996 *Besanosaurus leptorhynchus* Dal Sasso and Pinna, 1996 Dal Sasso and Pinna p 4 [Besano Formation, *Nevadites secedensis* Ammonite Biozone (Ilyrian, Anisian, Middle Triassic, Triassic); Sasso Caldo quarry, Besano, Varese Province, Lombardy, Northern Italy.]

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)

- v * 1904 *Ichthyosaurus extremus* Boulenger, 1904 Boulenger p 425 [Kimmeridge Clay Formation (Kimmeridgian-Tithonian, Upper Jurassic, Jurassic); Smallmouth Sands, Weymouth, Dorset, U.K.]
 v 1922 *Brachypterygius extremus* (Boulenger, 1904) von Huene p 97
 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 [*Illovaishya pseudoscythica* Ammonite Biozone (Volgian, Upper Jurassic, Jurassic); Volga River, Ulyanovsk District, Ulyanovsk Region, Russia.]
 2000 *Brachypterygius pseudoscythius* (Efimov, 1998) [sic.] Maisch and 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* 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 and Matzke p 69 New combination takes priority over *Metashastasaurus* (Nicholls and Manabe, 2001, p. 1001).
- 2001 *Metashastasaurus neoscapularis* (McGowan, 1994) Nicholls and Manabe p 985 [Pardonet Formation (Norian, Upper Triassic, Triassic); Chicken Creek, British Columbia, Canada.]

Cartorhynchus lenticarpus Motani et al., 2015

LSID: [URN:LSID:ZOOBANK.ORG:ACT:FCCC9BB7-FD52-42F4-B2EC-B0B7E2A1CA32](https://zoobank.org/URN:LSID:ZOOBANK.ORG:ACT:FCCC9BB7-FD52-42F4-B2EC-B0B7E2A1CA32)

- * 2015 *Cartorhynchus lenticarpus* Motani et al., 2015 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:9CFEE63-2B8A-4C01-B9C7-CD3C53D684F5](https://zoobank.org/PUB:9CFEE63-2B8A-4C01-B9C7-CD3C53D684F5)

Caypullisaurus bonapartei Fernández, 1997

Cetarthrosaurus walkeri Seeley, 1873

Chacaicosaurus cayi Fernández, 1994

Chaohusaurus chaoxianensis (Chen, 1985)

Chaohusaurus geishanensis Young and Dong, 1972

Chaohusaurus zhangjiawanensis Chen et al., 2013

Contectopalatus atavus (Quenstedt, 1852)

Cymbospondylus buchseri Sander, 1989

Cymbospondylus nicholli 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 and Dong, 1972

Hudsonelpidia brevirostris McGowan, 1995

Ichthyosaurus acutirostris Owen, 1840

Ichthyosaurus anningae Lomax and Massare, 2015

Ichthyosaurus breviceps Owen, 1881

Ichthyosaurus communis Conybeare, 1822

Ichthyosaurus conybearei Lydekker, 1888

Ichthyosaurus larkini Lomax and Massare, 2017

Ichthyosaurus somersetensis Lomax and Massare, 2017

Isfordosaurus minor (Wiman, 1910)

Leninia stellans Fischer et al., 2014a

Leptonectes moorei McGowan and Milner, 1999

Leptonectes solei (McGowan, 1993)

Leptonectes tenuirostris (Conybeare, 1822)

Macgowania janiceps (McGowan, 1996)

Maiaespondylus lindoei Maxwell and Caldwell, 2006

Malawania anachronus Fischer et al., 2013

Mikadocephalus gracilirostris Maisch and Matzke, 1997

Mixosaurus cornalianus (Bassani, 1886)

Mixosaurus kuhnschneyderi (Brinkmann, 1998)

Mixosaurus xindianensis Chen and 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)

v * 1871 *Ichthyosaurus enthekiodon* Hulke, 1871 Hulke p 441 [Kimmeridge Clay Formation (Kimmeridgian–Tithonian, Upper Jurassic, Jurassic); Kimmeridge Bay, Dorset, U.K.]
1922 *Nannopterygius enthekiodon* (Hulke, 1871) von Huene p 98

Nannopterygius saveljeviensis (Arkhangelsky, 1997)


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

Nannopterygius yasykovi (Efimov, 1999b)

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

Ophthalmosaurus icenicus Seeley, 1874

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

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

Ophthalmosaurus natans (Marsh, 1879)

Parvinatator wapitiensis Nicholls and Brinkman, 1995

Pervushovisaurus bannovkensis Arkhangelsky, 1998

Pervushovisaurus campylodon (Carter, 1846)

<p>* 1846 <i>Ichthyosaurus campylodon</i> Carter, 1846</p> <p>1922 <i>Myopterygius campylodon</i> (Carter, 1846)</p> <p>1972 <i>Platypterygius campylodon</i> (Carter, 1846)</p> <p>2016 <i>Pervushovisaurus campylodon</i> (Carter, 1846)</p>	<p>Carter p 60 [Upper Greensand Formation (Albian–Cenomanian, Lower–Upper Cretaceous, Cretaceous); Cambridge, Cambridgeshire, U.K.]</p> <p>von Huene p 98</p> <p>McGowan p 17</p> <p>Fischer p 8</p>
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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

<p>* 1939 <i>Myopterygius americanus</i> Nace, 1939</p> <p>1968 <i>Myopterygius americanus</i> Nace, 1939</p> <p>1972 <i>Platypterygius americanus</i> (Nace, 1939)</p>	<p>Nace p 674 [Mowry Shale Member, Graneros Formation; Crook County Wyoming, U.S.A.]</p> <p>Romer p 27 [Mowry Shale Member, Graneros Formation; Osage, Wyoming, U.S.A.]</p> <p>McGowan p 17</p>
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Platypterygius australis (M'Coy, 1867)

Platypterygius hauthali (von Huene, 1927)

Platypterygius ochevi Arkhangelsky et al., 2008

Platypterygius platydactylus (Broili, 1907)

Platypterygius sachicarum Páramo, 1997

Protoichthyosaurus applebyi Lomax et al., 2017

Protoichthyosaurus prosaxalis Appleby, 1979

Qianichthyosaurus xingyiensis Yang et al., 2013

Qianichthyosaurus zhoui Li, 1999

Quasianosteosaurus vikinghoegdai Maisch and 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 and Manabe, 2004)

Shonisaurus popularis Camp, 1976

Simbirskiasaurus birjukovi Otschev and Efimov, 1985

Sisteronia seeleyi Fischer et al., 2014b

Stenopterygius aaleniensis Maxwell et al., 2012

Stenopterygius quadriscissus (Quenstedt, 1858)

Stenopterygius triscissus (Quenstedt, 1858)

Stenopterygius uniter von Huene, 1931a

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, 1931b)

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, 1999a

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

Undorosaurus kielanae (Tyborowski, 2016)

- * 2016 *Cryopterygius 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 and Efimov p 1187

Undorosaurus nessovi Efimov, 1999a

Undorosaurus trautscholdi Arkhangelsky and Zverkov, 2014

Utatusaurus hataii Shikama et al., 1978

Wahlisaurus massaræ 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 and Matzke, 1998

Xinminosaurus catactes Jiang et al., 2008

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- Brinkmann, W. (1998). '*Sangiorgiosaurus* n. g. – eine neue Mixosaurier-gattung (Mixosauridae, Ichthyosauria) mit Quetschzähnen aus der Grenzbundenzone (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](#).
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