Supporting Information (SI)

The evolution of vertebral numbers in recent and fossil amniotes: The roles of homeotic effects and somitogenesis

Johannes Müller*. Museum für Naturkunde – Leibniz-Institut für Evolutions- und Biodiversitätsforschung an der Humboldt-Universität zu Berlin, Invalidenstr. 43, D-10115 Berlin, Germany, johannes.mueller@mfn-berlin.de

Torsten M. Scheyer. Paläontologisches Institut und Museum, Universität Zürich, Karl-Schmid Strasse 4, CH-8006 Zürich, Switzerland

Jason J. Head. Dept. of Biology, University of Toronto at Mississauga, 3359 Mississauga Rd., Mississauga, ON, L5L 1C6, Canada

Paul M. Barrett. Department of Palaeontology, Natural History Museum, Cromwell Road, London SW7 5BD, UK

Ingmar Werneburg. Paläontologisches Institut und Museum, Universität Zürich, Karl-Schmid Strasse 4, CH-8006 Zürich, Switzerland

Per G. P. Ericson. Department of Vertebrate Zoology, Swedish Museum of Natural History, P.O. Box 50007, SE-10405 Stockholm, Sweden

Diego Pol. CONICET, Museo Paleontológico Egidio Feruglio, Av. Fontana 140, Trelew CP 9100, Argentina

Marcelo R. Sánchez-Villagra*. Paläontologisches Institut und Museum,

Universität Zürich, Karl-Schmid Strasse 4, CH-8006 Zürich, Switzerland,

m.sanchez@pim.uzh.ch

Contents

1. Data set of vertebral count numbers

Synapsida

Taxon	Presacral	Cervical	References
Synapsida			
Casea	24.5	?	1 (Romer & Price 1940)
Casea broilii	25	6	2 (Williston 1916)
Casea nicholsi	24	6	3 (Olson 1968)
Cotylorhynchus romeri	26	6	3 (Olson1968) / 4 (Stovall et al. 1966)
Aerosaurus wellesi	26	5.5	5 (Langston & Reisz 1981)
Edaphosaurus boanerges	24	?	6 (Reisz 1986)
Haptodus (Pantelosaurus) saxonicus	27	5.5	7 (von Huene 1925)
Hipposaurus	28	7	8 (Colbert 1948)
Tapinocaninus pamelae	29	8	9 (Govender et al. 2002)
Scymnognathus	27	7	8 (Colbert 1948)
Arctognathoides	?	7	8 (Colbert 1948)
Aelurognathus	?	7	8 (Colbert 1948)
Inostrancevia	26	7	8 (Colbert 1948)
Diictodon feliceps	27	6	10 (Ray & Chinsamy 2003)
Cistecephalus	?	5	11 (Cluver1978)
Aulacocephalodon peavoti	26	?	12 (Olson and Byrne 1938)
Wadiasaurus indicus	25	7	13 (Ray 2006)
Lystrosaurus	?	6	13 (Ray 2006)
Glanosuchus	27.5	5.5	14 (Fourie & Rubidge 2007)

Cynariognathus	27	7	14 (Fourie & Rubidge 2007)
Macroscelesaurus	27	7	14 (Fourie & Rubidge 2007)
Mirothentes	?	7	14 (Fourie & Rubidge 2007)
Homodontosaurus kitchingi	?	?	15 (Brink 1950)
Zorillodontops	?	6.5	14 (Fourie & Rubidge 2007)
Regisaurus	28	6	14 (Fourie & Rubidge 2007)
Scaloposaurus	?	6	14 (Fourie & Rubidge 2007)
Ericiolacerta	?	6.5	14 (Fourie & Rubidge 2007)
Theriognathus (=Aneugomphius)	27	5.5	14 (Fourie & Rubidge 2007)
Procynosuchus (=Levachia duvenhagei)	26	6	16 (Broom 1948); 17 (Brink & Kitching 1953)
Thrinaxodon liorhinus	26	5	18 (Brink 1954)
Thrinaxodon liorhinus	27	7	19 (Jenkins 1971); 20 (Colbert & Kitching 1977)
Massetognathus pascuali	26	7	21 (Jenkins 1970)
Cynognathus	29	7	22 (Seeley 1895); 19 (Jenkins 1971)
Exaeretodon sp.	28	?	23 (Bonaparte 1963)
Monotremata	26	7	24 (Sánchez-Villagra et al. 2007)
Eutheria	26	7	24 (Sánchez-Villagra et al. 2007)
Metatheria	26	7	24 (Sánchez-Villagra et al. 2007)

Parareptilia

Taxon	Presacral	Cervical	References
Mesosauridae			
Stereosternum	30	12	25 (Modesto 1999); 26 (Oelofsen and Araújo 1987)
Mesosaurus	29	11	pers. obs. JM
Millerettidae			
Broomia	25	?	27 (Thommasen and Carroll 1981)
Milleretta	24	?	28 (Gow 1972)
Milleropsis	31	4	29 (Watson 1957)
Eunotosaurus	15	5	30 (Gow 1997); 31 (Gow and de Klerk 1997)
Nyctiphruretus	24	8	pers. obs. JM
Macroleter	23	4 to 5	Linda Tsuji, pers. Comm.
Bolosauridae			
Belebey	23 to 24	?	pers. obs. JM
Eudibamus	26	5 to 6	32 (Berman et al. 2000); pers. Obs. JM
Procolophonoidea			
Barasaurus	26	6	pers. obs. JM
'Owenetta'	26 to 27	6	33 (Reisz and Scott 2002)
Procolophon	27	8	34 (DeBraga 2003); 35 (Cisneros 2008)
Pareiasauridae			
Bradysaurus	20	5	36 (Lee 1997); Linda Tsuji pers. comm.
Embrithosaurus	20	?	36 (Lee 1997); Linda Tsuji pers. comm.
Deltavjatia	19	?	36 (Lee 1997); Linda Tsuji pers. comm.
Pareiasuchus	19	?	36 (Lee 1997); Linda Tsuji pers. comm.
Scutosaurus	19	5	36 (Lee 1997); Linda Tsuji pers. comm.
Anthodon	19	5	36 (Lee 1997); Linda Tsuji pers. comm.

Diadectomorpha

Taxon	Presacral	Cervical	References
Diadectomorpha			
Diadectes	21	?	37 (Berman et al. 2004), 38 (Carroll 1969)
Diasparactus	22	?	37 (Berman et al. 2004)
Limnoscelis	26	5	pers. obs. JM
Orobates	26	6	37 (Berman et al. 2004); cervical no. corrected by JM

Early Eureptilia and Diapsida

Taxon	Presacral	Cervical	References
Basal Eureptilia			
Captorhinidae			
Thuringothyris	26	5 to 6	39 (Müller et al. 2006)
Rhiodenticulatus	25	?	40 (Berman and Reisz 1986)
Captorhinus	25	5	41 (Heaton and Reisz 1980)
Labidosaurus	25	5	42 (Sumida 1987)
Protorothyris	23	5	43 (Clark and Carroll 1973)
Paleothyris	32	4	44 (Carroll 1969)
Hylonomus	26	5	45 (Carroll 1964)
Coelostegus	29	5	43 (Clark and Carroll 1973)
Anthracodromeus	32	4	43 (Clark and Carroll 1973)
Brouffia	31	4	43 (Clark and Carroll 1973)
Cephalerpeton	28	5	46 (Carroll and Baird 1972)
Basal Diapsida			
Petrolacosaurus	26	6	47 (Reisz 1981)
Araeoscelis	28 to 29	9	48 (Reisz et al. 1984)
Spinoaequalis	22	?	49 (de Braga and Reisz 1995)
Youngina	23	4 to 5	50 (Gow 1975)
Saurosternon	?	?	51 (Carroll 1975)
Palaeagama	23	6 to 7	51 (Carroll 1975)
Coelurosauravus	21	8	52 (Frey et al. 1997)
Claudiosaurus	24	8	53 (Carroll 1981)
Acerosodontosaurus	21	?	54 (Currie 1980)
Thadeosaurus	25	6	53 (Carroll 1981); 55 (Currie and Carroll 1984)
Kenyasaurus	17	?	56 (Harris and Carroll 1977)
Hovasaurus	25	5	57 (Currie 1981)
Tangasaurus	25	7	58 (Currie 1982)
Ichthyopterygia plus *Hupehsuchus*			
Hupehsuchus nanchangensis	37	9	59 (Carroll and Dong 1991)
Utatsusaurus hataii	40	?	60 (Motani et al. 1998)
Qianichthyosaurus zhoui	44	?	61 (Nicholls et al. 2002)
Besanosaurus leptorhynchus	60	11	62 (Dal Sasso and Pinna 1996)
Shonisaurus popularis	64	7	63 (Kosch 1990); 64 (McGowan and Motani 1999)
Guizhouichthyosaurus tangae	69	6	65 (Chen and Cheng 2003)
Suevoleviathan disinteger	44	?	66 (Maisch 1998)
Thalattosauriformes			

Askeptosaurus	38	13	67 (Müller 2005)
Anshunsaurus	38	15	68 (Liu and Rieppel 2005)
Endennasaurus	28	12	69 (Müller et al. 2005)
Clarazia	30	7	70 (Rieppel 1987)
Hescheleria	32	7 to 8	70 (Rieppel 1987)
Xinpusaurus	33 to 40	4	71 (Jiang et al. 2004)

Sauropterygia

Taxon	Presacral	Cervical	References
Sauropterygia, excl. Plesiosauria			
Placodus gigas	28	8	72 (Rieppel 2000)
Henodus chelyops	19	6	73 (Huene 1936); 74 (Pinna and Nosotti 1989)
Psephoderma alpinum	20	5	74 (Pinna and Nosotti 1989)
Keichousaurus hui	44	25.5	75 (Lin and Rieppel 1998)
Anarosaurus pumilio	45	19.5	76 (Rieppel and Lin 1995)
Dactylosaurus gracilis	36	17	76 (Rieppel and Lin 1995)
Serpianosaurus mirigiolensis	37.5	16	77 (Rieppel 1989)
Neusticosaurus pusillus	42	19	78 (Sander 1989)
Neusticosaurus peyeri	37	17.5	78 (Sander 1989)
Nothosaurus marchicus	38	18.5	72 (Rieppel 2000)
Nothosaurus giganteus	45	19	72 (Rieppel 2000)
Lariosaurus balsami	44	21	72 (Rieppel 2000)
Lariosaurus xingyiensis	43	19	79 (Rieppel et al. 2003)
Ceresiosaurus calcagnii	50	24	80 (Hänni 2004)
Ceresiosaurus lanzi	47	23	80 (Hänni 2004)
Corosaurus alcovensis	45	18	72 (Rieppel 2000); 81 (Rieppel et al. 2002)
PLESIOSAURIA			
Callawayasaurus columbiensis	81	56	82 (Carpenter 1999); 83 (Welles 1962)
Cryptoclidus eurymerus	55	30.5	84 (Creisler 2003)
Dolichorhynchops osborni	55.5	19	85 (Carpenter 1996); 84 (Creisler 2003); 86 (Hampe 1992)
Edgarosaurus muddi	?	26	87 (Smith 2003), 84 (Creisler 2003)
Elasmosaurus platyurus	97.5	71.5	82 (Carpenter 1999); 84 (Creisler 2003); 88, 89, 90 (Welles 1949, 1952, 1970)
Hydrotherosaurus alexandrae	79	60	84 (Creisler 2003); (Welles 1952, Welles 1962, Welles 1970
Kronosaurus queenslandicus	51	12	86 (Hampe 1992); 91 (Romer & Lewis 1959)
Leptocleidus capensis	38.5	18.5	84 (Creisler 2003); 87 (Smith 2003); 92 (Druckenmiller & Russel 2008)
Leptocleidus superstes	?	19	92 (Druckenmiller & Russel 2008)
Libonectes morgani	?	62	92 (Druckenmiller & Russel 2008)
Liopleurodon ferox	?	20	92 (Druckenmiller & Russel 2008)
Muraenosaurus leedsi	66	43.5	84 (Creisler 2003); 87 (Smith 2003)
Peloneusteus pilcharus	45.5	20.5	84 (Creisler 2003); 87 (Smith 2003); 93 (Linder 1913)
Plesiopterys wildi	61	39	94 (O'Keefe 2001)
Plesiosaurus dolichodeirus	65.5	40	95 (Storrs 1997)
Pliosaurus brachyspondylus	36	15	92 (Druckenmiller & Russel 2008)
Polycotylus latipinnis	54	26	84 (Creisler 2003); 85 (Carpenter 1996)
Rhomaleosaurus megacephalus	58.5	28.5	84 (Creisler 2003)
Rhomaleosaurus victor	?	27.5	pers. obs. Ingmar Werneburg
Simolestes vorax	51	20	92 (Druckenmiller & Russel 2008)
Thalassiodracon hawkinski	?	31.5	84 (Creisler 2003)

Squamata, Rhynchocephalia, Choristodera, Prolacertiformes, Rhynchosauria and Testudinata

Taxon	Presacral	Cervical	References
Squamata			
Gekkonidae	23	8	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Xantusidae	26	8	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Pygopodidae (limbless)	74	?	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Iguanidae	22	8	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Agamidae	20	?	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Chamaeleonidae	16	5	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Scincidae	26	?	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Dibamidae (limbless)	110	4	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Cordylidae	24	?	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Chamaesaura (limbless cordylid)	37	6	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Gerrhosauridae	27	8	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Tetradactylus (limbless gerrhosaurid)	31	?	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Lacertidae	23	8	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Teiidae	24	8	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Shinisaurus	26	8	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Xenosaurus	29	8	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Anguidae	29	8	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Limbless anguids	51	?	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Anniella	71	?	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Heloderma	33	8	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Lanthanotus	35	9	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Varanus	28	9	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Amphisbaeania (limbless)	82	?	96 (Hoffstetter & Gasc 1969); J. Head pers. obs.
Rhynchocephalia			
Sphenodon	25	8	pers. obs. JM
Pleurosaurus	37	7	97 (Carroll 1985)
Palaeopleurosaurus	49	7	97 (Carroll 1985)
Homeosaurus	24	7	pers. obs. JM
Kallimodon	24	7	pers. obs. JM
Sapheosaurus	24	7	pers. obs. JM

Choristodera			
Champsosaurus spp.	26	9	98 (Brown 1905); 99 (Gao & Fox 1998)
Monjurosuchus splendens	24	8	100 (Gao et al. 2000); 101 (Matsumoto et al. 2007)
Hyphalosaurus lingyuanensis	35.5	19	102 (Gao et al. 1999)
Hyphalosaurus baitaigouensis	42.5	26	103 (Ji et al. 2006)
Philydrosaurus proseilus	24	?	104 (Gao & Fox 2005)
"Prolacertiformes"			
Dinocephalosaurus orientalis	53	27	105 (Rieppel et al. 2008)
Malerisaurus robinsonae	25	9	106 (Chatterjee 1980)
Tanystropheus langobardicus	25	12	107 (Peyer 1931), 108 (Wild 1974)
Macrocnemus bassanii	24	8	109 (Peyer 1937)
Macrocnemus fuyuanensis	25.5	8	110 (Li et al. 2007)
Rhynchosauria			
Hyperodapedon gordoni	25	?	111 (Benton 1983)
Rhynchosaurus articeps	25	8	112 (Benton 1990)
Mesosuchus browni	25	8	113 (Dilkes 1998)
Testudinata			
Odontochelys semitestacea	17	8	114 (Li et al. 2008)
Proganochelys quenstedti	18	8	115 (Gaffney 1990)
Emydura subglobosa	18	8	TMS pers. obs.
Podocnemis erythrocephala	18	8	TMS pers. obs.
Testudo hermanni	18	8	TMS pers. obs.
Lissemys punctata	18	8	TMS pers. obs.
Apalone mutica	18	8	TMS pers. obs.
Pelodiscus sinensis	18	8	TMS pers. obs.

Early Archosauriformes, Crocodylomorpha and Pterosauria

Taxon	**Presacral**	**Cervical**	**References**
Early Archosauriformes			
Chasmatosaurus vanhoepeni	25	8	116 (Charig et al. 1976)
Euparkeria capensis	22	7	117 (Ewer 1965)
Parasuchus hislopi	25	8	118 (Chatterjee 1978)
Postosuchus kirkpatricki	24	8	119 (Chatterjee 1985)
Arizonasaurus babbitti	23	?	120 (Nesbitt 2005)
Yarasuchus deccanensis	25	8	121 (Sen 2005)
Ornithosuchus longidens	24	?	122 (Walker 1964)
Tikisuchus romeri	25	?	123 (Chatterjee & Majumdar 1987)
Ticinosuchus ferox	24	>6	124 (Krebs 1965)
Stagonolepis robertsoni	24	8	125 (Walker 1961)
Scleromochlus taylori	24.5	8	126. (Benton 1999)
Crocodylomorpha			
Protosuchus	24	9	127 (Colbert and Mook 1951) and D. Pol pers. obs.
Araripesuchus	25	9	D. Pol pers. obs.
Notosuchus	29	10	128 (Pol 2005)
Pelagosaurus	24	9	129 (Mueller-Töwe 2006)
Geosaurus	23	9	D. Pol pers. obs.
Steneosaurus	22	9	129 (Mueller-Töwe 2006)
Platysuchus	26	9	129 (Mueller-Töwe 2006)

Dyrosaurus	24	9	130 (Jouve et al. 2006)
Hyposaurus	25	9	131 (Schwarz et al. 2006)
Isisfordia	24	9	132 (Salisbury et al. 2006)
Alligator	24	9	D. Pol pers. obs.
Crocodylus	24	9	D. Pol pers. obs.
Gavialis	24	9	D. Pol pers. obs.
Pterosauria			
Anurognathus ammoni	20	8.5	133 (Rjabinin 1948); 134 (Bennet 2008)
Jeholopterus ningchengensis	20	7.5	135 (Wang et al. 2002)
Sordes pilosus	24	8	136 (Sharov 1971); 137 (Wellnhofer 1978)
Preondactylus buffarinii	22	8	138 (Wild 1983)
Scaphognathus crassirostris	23.5	8	139 (Wellnhofer 1975)
Eudimorphodon ranzii	22	8	140 (Wild 1978)
Rhamphorhynchus spp.	24	9	141 (Bennet 2001), 142 (Bennet 2004)
Pterorhynchus wellnhoferi	19.5	7	143 (Czerkas and Ji 2002)
Pterodactylus antiquus	21	7	141 (Bennet 2001)
Germanodactylus cristatus	20	7	144 (Wellnhofer 1970)
Huanhepterus quingyangensis	18	7	145 (Dong 1982)
Nyctosaurus gracilis	21	9	141 (Bennet 2001)
Pteranodon spp.	21	9	141 (Bennet 2001)
Anhanguera santanae	22	9	146 (Veldmeijer 2003)
Coloborhynchus spielbergi	21	9	146 (Veldmeijer 2003)

Dinosauria, excluding Aves

Taxon	**Presacral**	**Cervical**	**References**
DINOSAURIA, non Avian			
Staurikosaurus pricei	24	?	147 (Colbert 1970)
Coelophysis bauri	23	10	148 (Colbert 1989)
Carnotaurus sastrei	21	10	149 (Bonaparte et al. 1990)
Dilophosaurus' sinensis	24	9	150 (Hu 1993)
Dilophosaurus wetherilli	24	9	151 (Welles 1984)
Spinostropheus gautieri	23	10	152 (Sereno et al. 2004)
Majungasaurus crenatissimus	23	10	153 (O'Connor 2007)
Szechuanosaurus' zigongensis	23	10	154 (Gao 1993)
Sinraptor dongi	23	10	155 (Currie & Zhao 1993)
Sinraptor hepingensis	23	9	156 (Gao 1999)
Piatnitzkysaurus floresi	?	9.5	157 (Bonaparte 1986)
Acrocanthosaurus atokensis	23	10	158 (Harris 1998)
Allosaurus fragilis	23	9	159 (Madsen 1976)
Monolophosaurus jiangi	23	9	160 (Zhao & Currie 1993)
Eustreptospondylus oxoniensis	21	10	161 (Sadleir et al. 2008)
Scipionyx samniticus	23	10	162 (Dal Sasso & Signore 1998)
Sinosauropteryx prima	23	10	163 (Chen et al. 1998)
Huaxiagnathus orientalis	23	10	164 (Hwang et al. 2004)
Compsognathus longipes	23	10	165 (Ostrom 1978)
Heyuannia huangi	25	13	166 (Lü 2003)
Caudipteryx sp.	21	12	167 (Zhou et al. 2002)
Bambiraptor feinbergi	23	10	168 (Burnham et al. 2000)
Velociraptor mongoliensis	21	9	169 (Norell & Makovicky 2004)
Sinornithomimus dongi	22	10	170 (Kobayahshi & Lü 2003)
Gallimimus bullatus	23	10	171 (Osmólska et al. 1972)
Struthiomimus altus	23	10	172 (Osborn 1917)

Neimongosaurus yangi	?	13.5	173 (Zhang et al. 2001)
Nanshiungosaurus' bohlini	?	11	174 (Dong & Yu 1997)
Tyrannosaurus rex	23	9.5	175 (Brochu 2003)
Tarbosaurus bataar	23	9.5	176 (Maleev 1974)
Gorgosaurus liberatus	?	?	177 (Lambe 1914)
Efraasia minor	25.5	10	178 (Yates 2007)
Plateosaurus	25	10	179 (Galton and Upchurch 2004)
Massospondylus	25	10	Pol pers. obs.
Lufengosaurus	25	10	178 (Yates 2007)
Riojasaurus	24.5	9.5	Pol pers. obs.
Jingshanosaurus	25.5	10	178 (Yates 2007)
Melanorosaurus	25	9.5	178 (Yates 2007)
Shunosaurus	26	13	180 (Wilson and Sereno 1998)
Patagosaurus	25.5	13	D. Pol pers. obs.
Cetiosaurus	25.5	13	181 (Upchurch et al. 2004)
Omeisaurus	28.5	16.5	181 (Upchurch et al. 2004)
Mamenchisaurus	30	18	182 (Wilson 2002)
Jobaria	25	13	182 (Wilson 2002)
Haplocantosaurus	26	13	182 (Wilson 2002)
Dicraeosaurus	23	11	181 (Upchurch et al. 2004)
Amargasaurus	22.5	12	182 (Wilson 2002)
Diplodocus	25	15	181 (Upchurch et al. 2004)
Apatosaurus	25	15	181 (Upchurch et al. 2004)
Barosaurus	26	16	181 (Upchurch et al. 2004)
Camarasaurus	24	12	181 (Upchurch et al. 2004)
Brachiosaurus	25	13	182 (Wilson 2002)
Euhelopus	30	17	182 (Wilson 2002)
Titanosauria	25	14	180 (Wilson and Sereno 1998)
Heterodontosaurus tucki	21	9	183 (Santa-Luca 1980)
Scelidosaurus harrisonii	?	?	184 (Owen 1863)
Scutellosaurus lawleri	24	9	185 (Colbert 1981)
Huayangosaurus taibaii	25	9	186 (Maidment et al. 2006)
Gigantspinosaurus sichuanensis	24	8	187 (Peng et al. 2005)
Stegosaurus armatus	26	11.5	188 (Gilmore 1914)
Stegosaurus mjosi	24	13	189 (Carpenter et al. 2001)
Sauropelta edwardsorum	20	8	190 (Parish 2005)
Tianzhenosaurus youngi	21	8	191 (Pang & Cheng 1998)
Hylaeosaurus armatus	?	8	192 (Pereda-Suberbiola 1993)
Saichania chulsanensis	?	7	193 (Maryanska 1977)
Euoplocephalus tutus	16	7	194 (Carpenter 1982); 190 (Parish 2005)
Pinacosaurus mephistocephalus	?	7.5	195 (Godefroit et al. 1999)
Agilisaurus louderbacki	24	9	196 (Peng 1992)
Hexinlusaurus multidens	24	9	197 (He & Cai 1984)
Orodromeus makelai	24	9	198 (Scheetz 1999)
Hypsilophodon foxii	24	9	199 (Galton 1974)
Talenkauen santacrucensis	25	9	200 (Novas et al. 2004)
Dryosaurus lettowvorbecki	24	9	201 (Galton 1981)
Tenontosaurus tilletti	28	12	202 (Forster 1990)
Equijubus normani	25	11	203 (You et al. 2003)
Lurdusaurus arenatus	28	14	204 (Taquet & Russell 1999)
Iguanodon bernissartensis	28	11	205 (Norman 1980)
Mantellisaurus atherfieldensis	28	11	206 (Norman 1986)
Ouranosaurus nigeriensis	28	11	207 (Taquet 1976)
Camptosaurus dispar	25	9	208 (Gilmore 1909)

Camptosaurus prestwichii	25	9	209 (Galton & Powell 1980)
Brachylophosaurus canadensis	31	13	210 (Prieto-Marquez 2007)
Edmontosaurus regalis	31	13	211 (Lull & Wright 1942)
Edmontosaurus annectens	32	13	211(Lull & Wright 1942)
Gyposaurus incurvimanus	29	13	211 (Lull & Wright 1942)
Lambeosaurus lambei	30	14	211 (Lull & Wright 1942)
Corythosaurus casuarius	34	15	211 (Lull & Wright 1942)
Psittacosaurus mongoliensis	21	8	212 (Sereno 1987)
Psittacosaurus sinensis	22	9	212 (Sereno 1987)
Psittacosaurus xinjiangensis	21	?	213 (Sereno & Chao 1988)
Archaeoceratops oshimai	?	?	214 (You & Dodson 2003)
Protoceratops andrewsi	22	10	215 (Brown & Schlaikjer 1940)
Montanoceratops cerorhynchus	22	10	216 (Brown & Schlaikjer 1942)
Styracosaurus albertensis	22	10	217 (Brown 1917)
Pentaceratops sternbergii	21	10	218 (Wiman 1930)
Centrosaurus apertus	21	10	219 (Lull 1933)

Aves

Taxon	**Presacral**	**Cervical**	**References**
AVES			
Struthio	25	17	220 (Livezey and Zusi 2006)
Rhea	25	17	220 (Livezey and Zusi 2006)
Casuarius	25	17	220 (Livezey and Zusi 2006)
Dromaius	25	17	220 (Livezey and Zusi 2006)
Apteryx	25	17	220 (Livezey and Zusi 2006)
Eudromia	22	17	220 (Livezey and Zusi 2006)
Chauna	22	17	220 (Livezey and Zusi 2006)
Anseranas	22	17	220 (Livezey and Zusi 2006)
Anser	22	17	220 (Livezey and Zusi 2006)
Anas	20.5	15.5	220 (Livezey and Zusi 2006)
Megapodius	20.5	15.5	220 (Livezey and Zusi 2006)
Ortalis	20.5	15.5	220 (Livezey and Zusi 2006)
Phasianidae (7 Genera)	20.5	15.5	220 (Livezey and Zusi 2006)
Numida	20.5	15.5	220 (Livezey and Zusi 2006)
Diomedea	23.5	15.5	220 (Livezey and Zusi 2006)
Puffinus	23.5	15.5	220 (Livezey and Zusi 2006)
Pachyptila	20.5	15.5	220 (Livezey and Zusi 2006)
Oceanites	20.5	15.5	220 (Livezey and Zusi 2006)
Pelecanoides	20.5	15.5	220 (Livezey and Zusi 2006)
Spheniscus	23.5	15.5	220 (Livezey and Zusi 2006)
Gavia	21.5	13.5	220 (Livezey and Zusi 2006)
Podiceps	22	17	220 (Livezey and Zusi 2006)
Fregata	20.5	15.5	220 (Livezey and Zusi 2006)
Anhinga	22	17	220 (Livezey and Zusi 2006)
Phalacrocorax	22	17	220 (Livezey and Zusi 2006)
Sula	22	17	220 (Livezey and Zusi 2006)
Pelecanus	22	17	220 (Livezey and Zusi 2006)
Phaethon	20.5	15.5	220 (Livezey and Zusi 2006)
Ardeidae (5 Genera)	22	17	220 (Livezey and Zusi 2006)
Threskiornithidae (2 Genera)	22	17	220 (Livezey and Zusi 2006)
Scopus	20.5	15.5	220 (Livezey and Zusi 2006)
Ciconia	22	17	220 (Livezey and Zusi 2006)
Phoenicopterus	22	17	220 (Livezey and Zusi 2006)
Balaeniceps	22	17	220 (Livezey and Zusi 2006)

Accipiter	18.5	13.5	220 (Livezey and Zusi 2006)
Gyps	22	17	220 (Livezey and Zusi 2006)
Pandion	20.5	15.5	220 (Livezey and Zusi 2006)
Falconidae (2 Genera)	20.5	15.5	220 (Livezey and Zusi 2006)
Sagittarius	20.5	15.5	220 (Livezey and Zusi 2006)
Catharthes	26.5	15.5	220 (Livezey and Zusi 2006)
Turnix	26.5	15.5	220 (Livezey and Zusi 2006)
Mesitornis	26.5	15.5	220 (Livezey and Zusi 2006)
Afrotis	28	17	220 (Livezey and Zusi 2006)
Cariama	20.5	15.5	220 (Livezey and Zusi 2006)
Eurypyga	28	17	220 (Livezey and Zusi 2006)
Rhynochetos	23.5	15.5	220 (Livezey and Zusi 2006)
Psophia	25	17	220 (Livezey and Zusi 2006)
Aramus	28	17	220 (Livezey and Zusi 2006)
Grus	25	17	220 (Livezey and Zusi 2006)
Heliornis	23.5	15.5	220 (Livezey and Zusi 2006)
Porphyrula	25	17	220 (Livezey and Zusi 2006)
Pedionomus	26.5	15.5	220 (Livezey and Zusi 2006)
Jacana	26.5	15.5	220 (Livezey and Zusi 2006)
Rostratula	23.5	15.5	220 (Livezey and Zusi 2006)
Dromas	26.5	15.5	220 (Livezey and Zusi 2006)
Haematopus	26.5	15.5	220 (Livezey and Zusi 2006)
Ibidorhyncha	26.5	15.5	220 (Livezey and Zusi 2006)
Himantopus	26.5	15.5	220 (Livezey and Zusi 2006)
Cladorhynchus	23.5	15.5	220 (Livezey and Zusi 2006)
Burhinus	26.5	15.5	220 (Livezey and Zusi 2006)
Glareola	23.5	15.5	220 (Livezey and Zusi 2006)
Cursorius	26.5	15.5	220 (Livezey and Zusi 2006)
Pluvialis	23.5	15.5	220 (Livezey and Zusi 2006)
Chionis	23.5	15.5	220 (Livezey and Zusi 2006)
Heteroscelus	23.5	15.5	220 (Livezey and Zusi 2006)
Phalaropus	23.5	15.5	220 (Livezey and Zusi 2006)
Thinocorus	23.5	15.5	220 (Livezey and Zusi 2006)
Uria	23.5	15.5	220 (Livezey and Zusi 2006)
Stercorarius	23.5	15.5	220 (Livezey and Zusi 2006)
Rissa	23.5	15.5	220 (Livezey and Zusi 2006)
Chlidonias	23.5	15.5	220 (Livezey and Zusi 2006)
Rynchops	26.5	15.5	220 (Livezey and Zusi 2006)
Pterocles	26.5	15.5	220 (Livezey and Zusi 2006)
Columbidae (2 Genera)	24.5	13.5	220 (Livezey and Zusi 2006)
Columbidae (2 Genera)	20.5	15.5	220 (Livezey and Zusi 2006)
Columbidae (2 Genera)	18.5	13.5	220 (Livezey and Zusi 2006)
Trichoglossus	24.5	13.5	220 (Livezey and Zusi 2006)
Cacatua	24.5	13.5	220 (Livezey and Zusi 2006)
Psittacidae (2 Genera)	24.5	13.5	220 (Livezey and Zusi 2006)
Cuculidae (5 Genera)	24.5	13.5	220 (Livezey and Zusi 2006)
Corythaixoides	24.5	13.5	220 (Livezey and Zusi 2006)
Opisthocomus	26.5	15.5	220 (Livezey and Zusi 2006)
Tytonidae (2 Genera)	20.5	15.5	220 (Livezey and Zusi 2006)
Strigidae (2 Genera)	18.5	13.5	220 (Livezey and Zusi 2006)
Steatornis	26.5	15.5	220 (Livezey and Zusi 2006)
Podargus	24.5	13.5	220 (Livezey and Zusi 2006)
Nyctibius	24.5	13.5	220 (Livezey and Zusi 2006)
Aegotheles	24.5	13.5	220 (Livezey and Zusi 2006)
Caprimulgus	24.5	13.5	220 (Livezey and Zusi 2006)
Hemiprocne	24.5	13.5	220 (Livezey and Zusi 2006)

Apodidae (2 Genera)	24.5	13.5	220 (Livezey and Zusi 2006)
Glaucis	24.5	13.5	220 (Livezey and Zusi 2006)
Colius	24.5	13.5	220 (Livezey and Zusi 2006)
Trogonidae (2 Genera)	24.5	13.5	220 (Livezey and Zusi 2006)
Alcedinidae (2 Genera)	24.5	13.5	220 (Livezey and Zusi 2006)
Todus	26.5	15.5	220 (Livezey and Zusi 2006)
Momotus	26.5	15.5	220 (Livezey and Zusi 2006)
Merops	24.5	13.5	220 (Livezey and Zusi 2006)
Coracias	24.5	13.5	220 (Livezey and Zusi 2006)

2. Reconstructed values and CP ratio for selected taxa and nodes

Taxon	Presacral no.	Cervical no.	CP ratio
Cotylosauria	25.79	5.86	0.227219853
Diadectidae	24.74	6	0.242522231
Limnoscelidae	26	5	0.192307692
Amniota	26.07	6.1	0.233985424
Reptilia	26.68	6.49	0.243253373
Parareptilia	26.27	7.8	0.296916635
Mesosauridae	28.43	10.27	0.361238129
Millerettidae	23.82	4	0.167926113
Eunotosaurus	15	5	0.333333333
Bolosauridae	24.6	5.5	0.223577236
Nyctiphruretus	24	8	0.333333333
Macroleter	23	4.5	0.195652174
Procolophonoidea	25.79	6.77	0.262504847
Pareiasauria	20.96	5	0.238549618
Eureptilia	27.69	5.56	0.200794511
Coelostegus	29	5	0.172413793
Brouffia	31	4	0.129032258
Cephalerpeton	28	5	0.178571429
Hylonomus	26	5	0.192307692
Paleothyris	32	4	0.125
Protorothyris	23	5	0.217391304
Anthracodromeus	32	4	0.125
Captorhinidae	25.48	5	0.196232339
Thuringothyris	26	5.5	0.211538462
Diapsida	26.4	6.06	0.229545455
Areoscelidia	25.61	7.01	0.273721203
"Younginiformes"	24.78	5.77	0.232849072
Claudiosaurus	24	8	0.333333333
Coelurosauravus	21	8	0.380952381
Palaeagama	23	6.5	0.282608696
Drepanosauridae	24	8	0.333333333
Kuehneosauridae	26	7	0.269230769
Hupehsuchus	37	9	0.243243243
Ichthyopterygia	41.46	10	0.241196334
Thalattosauriformes	33.15	9.05	0.273001508
Lepidosauromorpha	40.5	10.8	0.266666667
Sauropterygia	37.07	12.77	0.34448341
Eosauropterygia	38.8	18.34	0.472680412
Placodontia	28.9	9.16	0.316955017
Placodus	28	8	0.285714286
Henodus	19	6	0.315789474
Psephoderma	20	5	0.25
Lepidosauria	52.38	8.21	0.156739213

Squamata	77.33	6.33	0.081856977
Rhynchocephalia	39.3	7.5	0.190839695
Sphenodontidae	25.95	7.22	0.27822736
Pleurosauridae	39.59	7.05	0.178075272
Choristodera	27.55	12.07	0.438112523
Archosauromorpha	31.19	12.92	0.414235332
Testudinata	18	8	0.444444444
Tanystropheus	25	12	0.48
Macrocnemus	25.54	8	0.313234143
Protorosaurus	26	8	0.307692308
Prolacerta	26	8	0.307692308
Dinocephalosaurus	53	27	0.509433962
Malerisaurus	23	9	0.391304348
Rhynchosauria	25.12	7.9	0.314490446
Archosauriformes	23.29	7.63	0.327608416
Euparkeria	22	7	0.318181818
Chasmatosaurus	25	8	0.32
Crurotarsi	23.84	8.15	0.341862416
Aetosauridae	24	8	0.333333333
Parasuchus	25	8	0.32
Postosuchus	24	8	0.333333333
Crocodylomorpha	25.09	8.75	0.34874452
Ornithodira	22.7	8.39	0.369603524
Pterosauria	21.64	7.99	0.36922366
Ornithischia	22.39	9.12	0.407324699
Saurischia	23.6	9.55	0.404661017
Sauropodomorpha	24.74	9.84	0.397736459
Theropoda	23.2	9.8	0.422413793
Neoceratosauria	22.8	9.86	0.43245614
Coelophysis	23	10	0.434782609
Carnosauria	22.93	9.42	0.410815526
Tyrannosauroidea	22.96	9.61	0.418554007
Compsognathidae	22.96	10.05	0.43771777
Aves	23	14.82	0.644347826
Neognathae	22.87	15.95	0.697420201
Palaeognathae	23.08	16.75	0.725736568
Synapsida	25.74	5.96	0.231546232
Caseidae	25.42	5.95	0.234067663
Varanopidae	26	5.5	0.211538462
Haptodus	27	5.5	0.203703704
Therapsida	27.52	6.75	0.245276163
Biarmosuchia	28	7	0.25
Gorgonopsia	26.73	6.95	0.260007482
Dicynodontia	26.6	6.2	0.233082707
Dinocephalia	29	8	0.275862069
Therocephalia	27.33	6.59	0.241126967
Thrinaxodontidae	26.49	6.09	0.229898075
Cynognathidae	29	7	0.24137931
Traversodontidae	26	7	0.269230769
Monotremata	26	7	0.269230769
Marsupialia	26	7	0.269230769
Eutheria	26	7	0.269230769

3. Source of phylogenetic framework for the clades examined

Diadectomorpha: Phylogeny was taken from (37) Berman et al. (2004) and (44) Carroll (1969).

Synapsida: To map the vertebral counts, we created an informal super-tree (a composite phylogeny) following works which do not present totally congruent phylogenies but which complement themselves. They are, for the general outline: (221) Sidor (2003) and (222) Kemp (2005) and for specific clades (223) Frobisch (2007) and most importantly the unpublished hypotheses and revsions kindly provided to us by Dr. F. Abdala (Johannesburg). Data are taken from several sources, as indicated. In cases in which different numbers are reported in the literature, we used the one reported in the most recent reference. In cases a range is given, we use the average. It may appear that many more taxa should be in this analysis, but many of the mounted skeletons of even familiar taxa are reconstructions for which the number of vertebrae is not reliable then. For example, (9) Govender et al. (2002), in their study of the exceptional dinocephalian *Tapinocaninus*, stated: 'The only other tapinocephalid with a relatively complete postcranial skeleton is a mounted specimen of *Moschops* (AMNH 5552)…that specimen has been *reconstructed* (italics added) as having a vertebral column consisting of 6 or 7 cervical vertebrae, 21 or 22 dorsal and lumbar vertebrae, 3 sacral vertebrae, and of the 29 caudal vertebrae only five are genuine.' The plesiomorphic numbers of the three major living groups of Mammalia were based on the survey conducted by (24) Sánchez-Villagra et al. (2007).

Parareptilia: the tree is based on (224) Müller and Tsuji (2007).

Early Eureptilia and Diapsida: The tree topology was generated based on the information from (225, 226) Müller (2003, 2004) and (227) Müller and Reisz (2006)

***Hupehsuchus* and Ichthyopterygia:** The tree topology is based on (233) Motani 1999, supplemented with *Quianichthyosaurus zhoui* and *Guizhouichthyosaurus tangae* following (234) Maisch and Matzke (2000) and (235) Maisch et al. (2006), whereas *Aegirosaurus leptospondylus* was added following (236) Fernández (2007).

Thalattosauriformes: The tree topology is based on the phylogenetic studies by (67, 228) Müller (2005, 2007).

Sauropterygia (without Plesiosauria): The tree topology is based on (72) Rieppel (2000), with the placodont topology taken from (75) Rieppel (2001). The relationships of the *Ceresiosaurus*-*Lariosaurus* clade follow (80) Hänni (2004).

Plesiosauria: The plesiosaur tree topology was based on the competing phylogenetic hypotheses of (94) O'Keefe (2001) and (92) Druckenmiller and Russell (2008), which means that two different topologies were generated, including only the taxa that are present in both phylogenetic studies and for which information on the complete presacral counts was available. These topologies were then combined with

that of the remaining sauropterygians. No matter what phylogeny was used, the ancestral values for Plesiosauria remained the same.

Squamata: The sources of phylogenetic framework were (229) Vidal and Hedges (2002) and (230) Townsend et al. (2004).

Rhynchocephalia: The tree topology is based on the study by (231) Reynoso (2005).

Testudinata: The tree topology was modified following (238) Gaffney and Meylan (1988), (239) Joyce et al. (2004), and (114) Li et al. (2008).

Choristodera/Archosauromorpha: General tree topology based on (240) Benton (2007), with modifications following (113) Dilkes (1998; Rhynchosauria, "Prolacertiformes"), (101) Matsumoto et al. (2007; Choristodera), and (241) Irmis et al. (2007).

Crocodylomorpha: The Crocodylomorpha tree is based on (232) Gasparini et al. (2006) and (132) Salisbury et al. (2006)

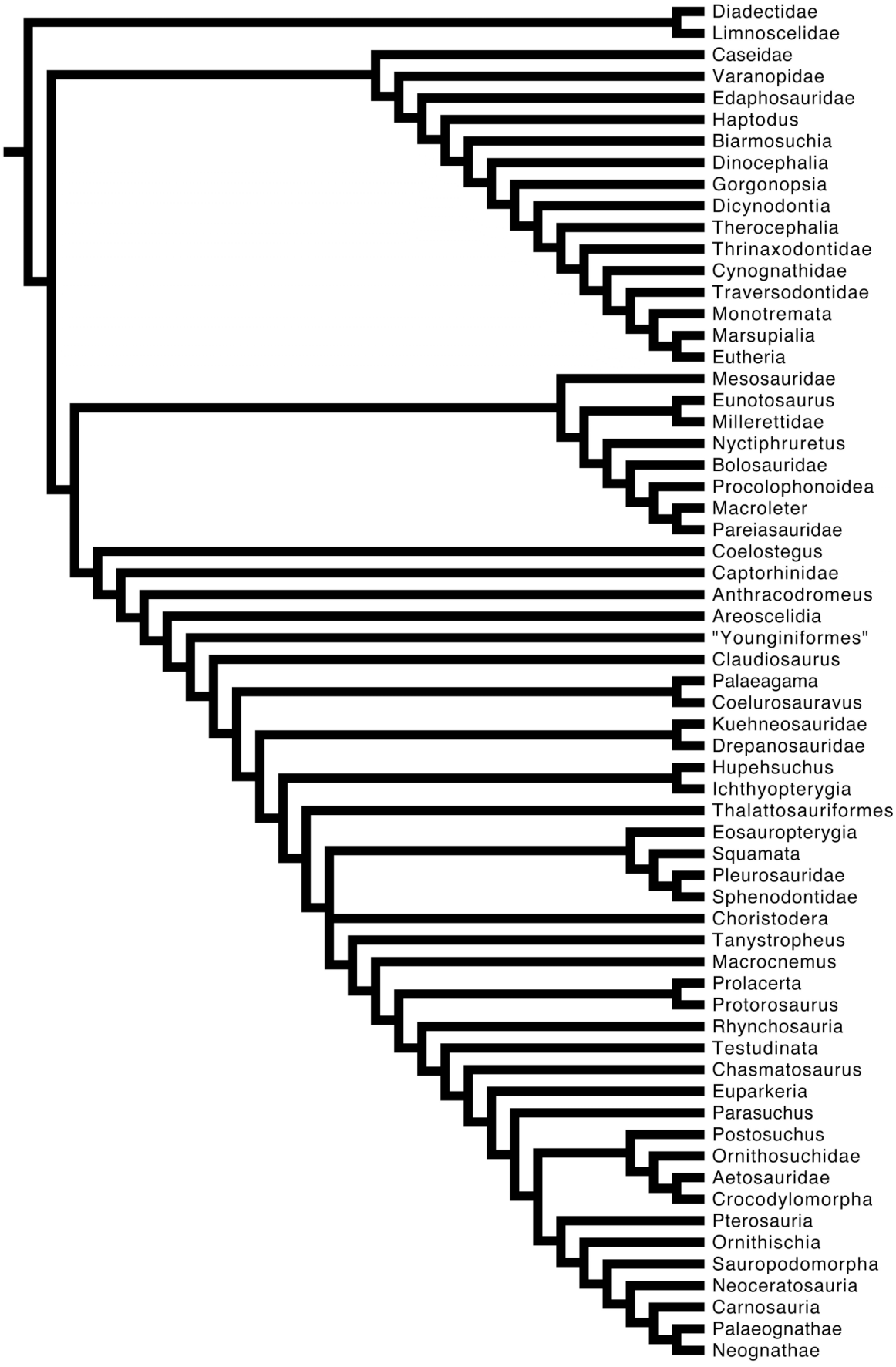
Pterosauria: Tree topology follows (242) Wang et al. (2008) and (243) Andres and Ji (2008), with data added from (143) Czerkas and Ji (2002) on *Pterorhynchus wellnhoferi*, as well as data from (146) Veldmejier (2003) added for *Coloborhynchus spielbergi*.

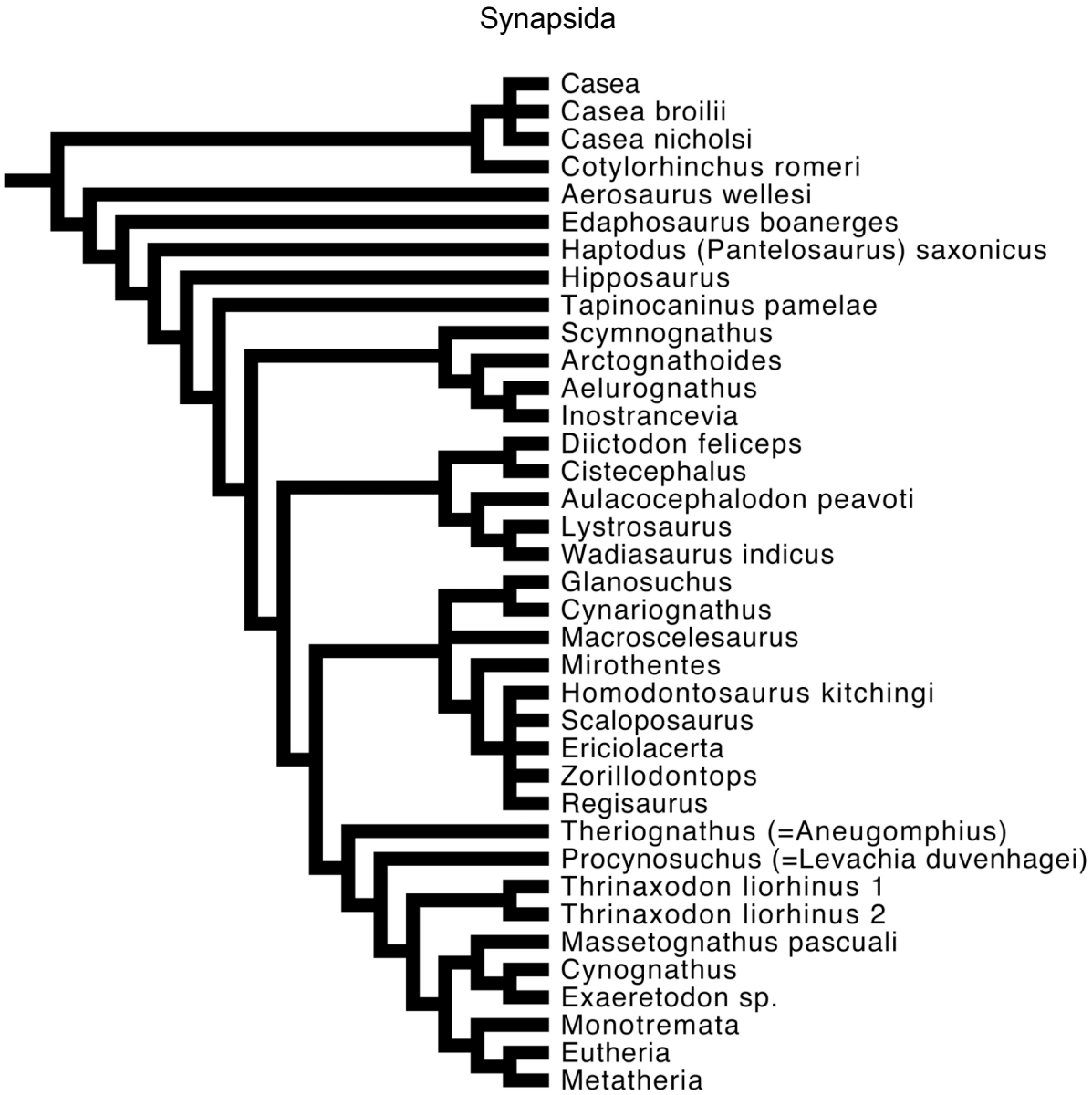
Dinosauria: The dinosaur tree topology follows (244) Barrett et al. 2009 and other references (245-255).

Aves: The information for Aves is based for the most part on (220) Livezey and Zusi (2006). Given the great diversity within Aves, a subject of research in itself, the individual counts were best lumped into ranges, for which an average was calculated, this way also masking some of the individual variation which exists. Potential differences among authors in birds' vertebral counts are often due to the definition of cervical vs. thoracic vertebrae. The first thoracic vertebra is that which has a complete rib (with both a vertebral and a sternal segment) and that articulates with the sternum. In birds there are often transitional vertebrae between the cervical and thoracic regions. These vertebrae, which have ribs that do no articulate with the sternum and sometimes are called vertebrae cervicodorsales, are counted as cervicals by Livezey and Zusi.

4. Tree topologies used

Amniota overall

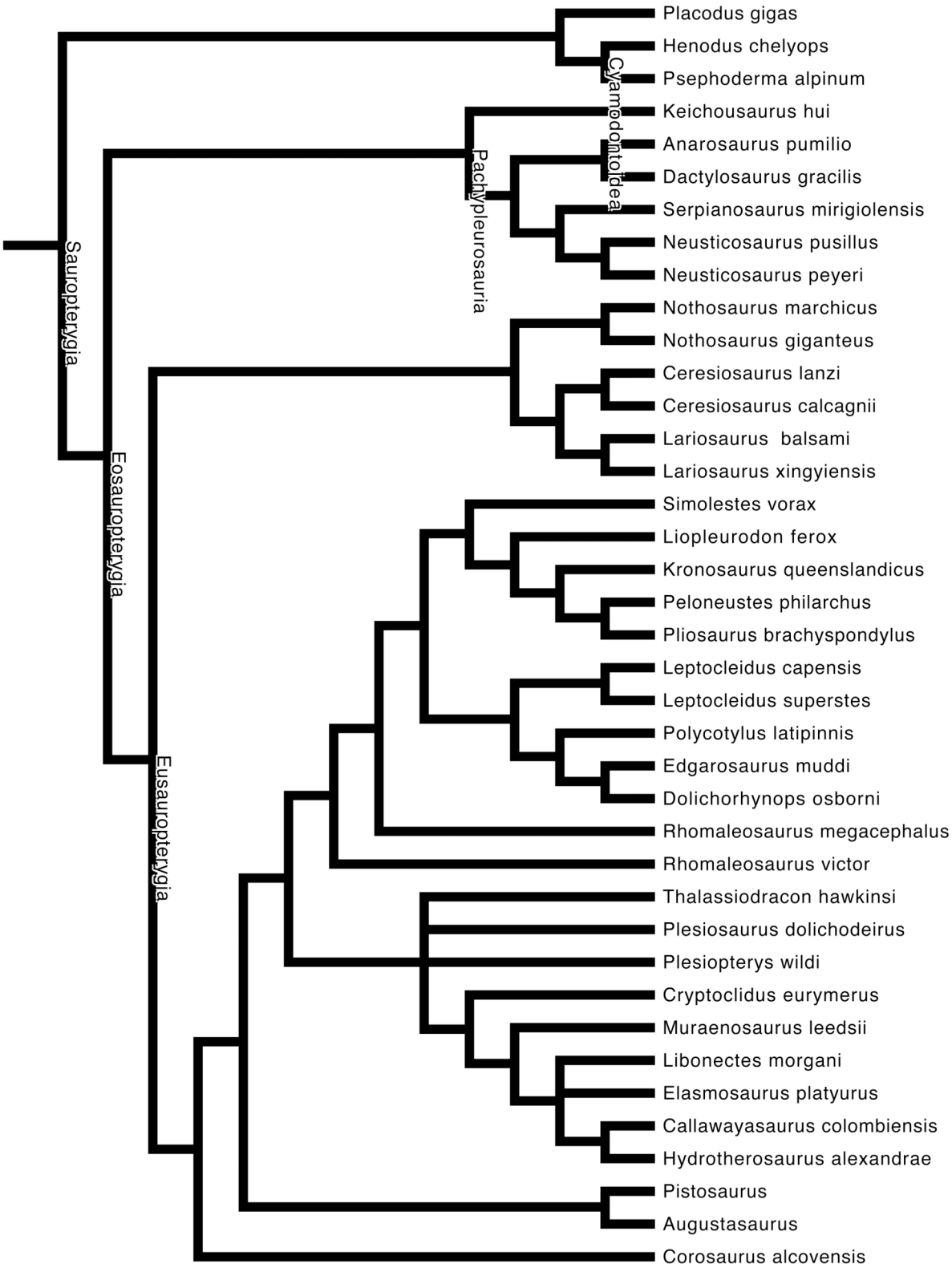



Synapsida
Casea
Casea broilii
Casea nicholsi
Cotylorhinchus romeri
Aerosaurus wellesi
Edaphosaurus boanerges
Haptodus (Pantelosaurus) saxonicus
Hipposaurus
Tapinocaninus pamelae
Scymnognathus
Arctognathoides
Aelurognathus
Inostrancevia
Diictodon feliceps
Cistecephalus
Aulacocephalodon peavoti
Lystrosaurus
Wadiasaurus indicus
Glanosuchus
Cynariognathus
Macroscelesaurus
Mirothentes
Homodontosaurus kitchingi
Scaloposaurus
Ericiolacerta
Zorillodontops
Regisaurus
Theriognathus (=Aneugomphius)
Procynosuchus (=Levachia duvenhagei)
Thrinaxodon liorhinus 1
Thrinaxodon liorhinus 2
Massetognathus pascuali
Cynognathus
Exaeretodon sp.
Monotremata
Eutheria
Metatheria

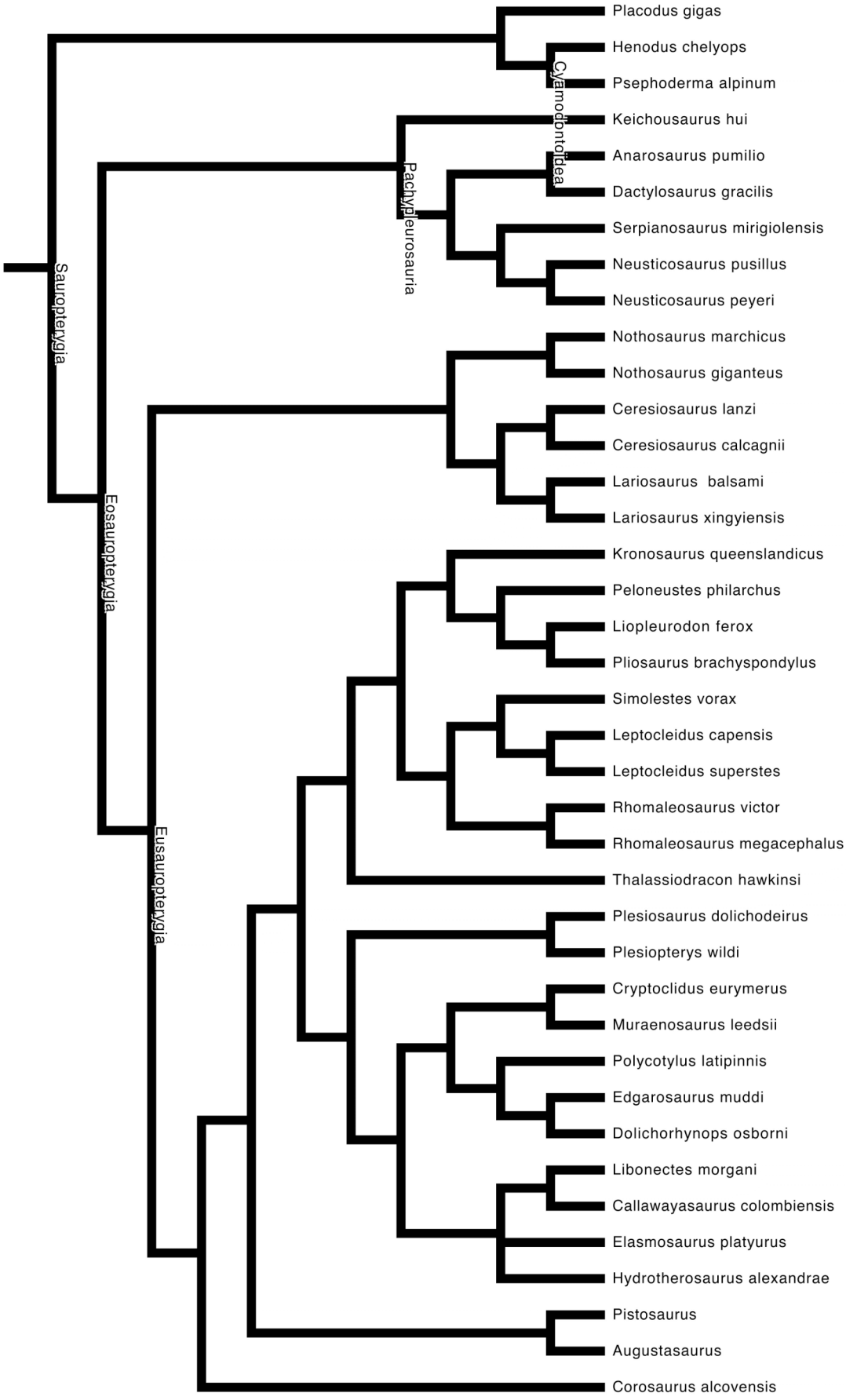

Basal Reptilia
Diadectes
Diasparactus
Orobates
Limnoscelis
Mesosaurus
Stereosternum
Broomia
Milleropsis
Milleretta
Eunotosaurus
Nyctiphruretus
Belebey
Eudibamus
Barasaurus
'Owenetta'
Procolophon
Macroleter
Bradysaurus
Embrithosaurus
Deltavjatia
Pareiasuchus
Scutosaurus
Anthodon
Coelostegus
Captorhinus
Labidosaurus
Rhiodenticulatus
Thuringothyris
Hylonomus
Protorothyris
Brouffia
Cephalerpeton
Anthracodromeus
Paleothyris
Claudiosaurus
Saurosternon
Palaeagama
Coelurosauravus
Youngina
Acerosodontosaurus
Thadeosaurus
Kenyasaurus
Hovasaurus
Tangasaurus
Spinoaequalis
Petrolacosaurus
Araeoscelis

Hupehsuchus/Ichthyopterygia

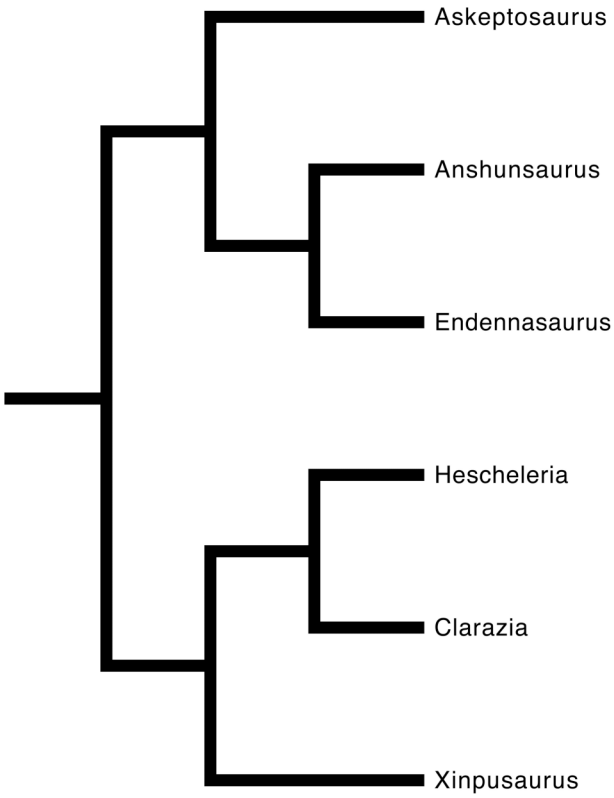
Sauropterygia with plesiosaurs according to (92) Druckenmiller and Russel



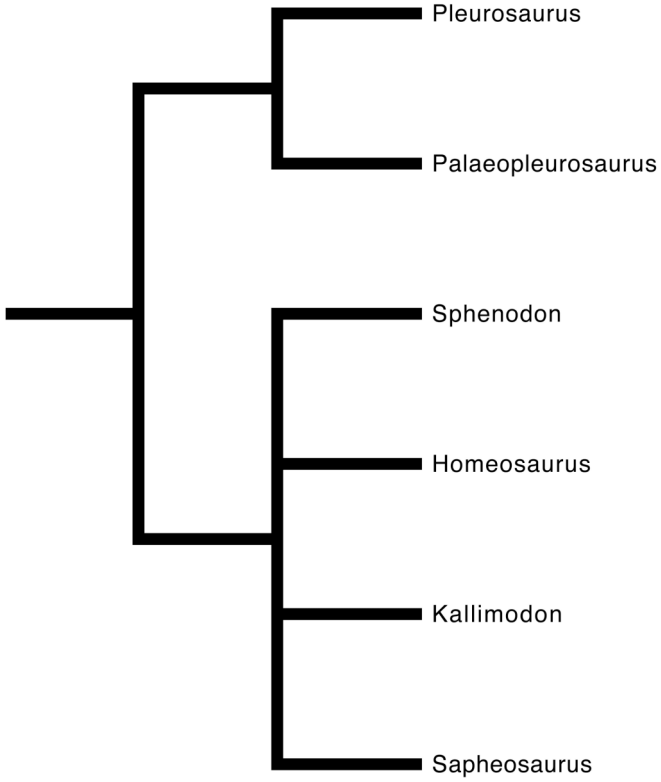
Sauropterygia with plesiosaurs according to (94) O'Keefe

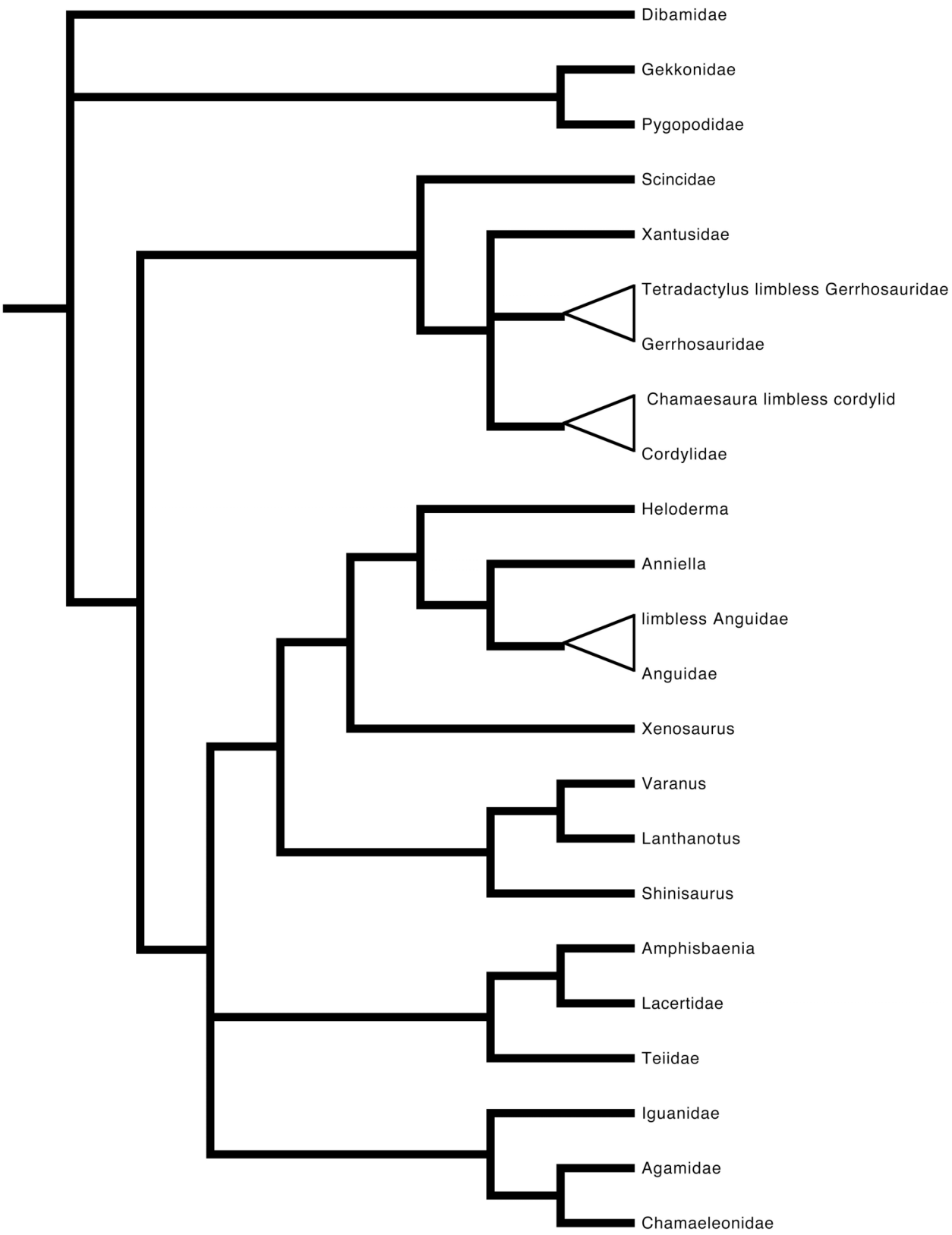


Thalattosauriformes

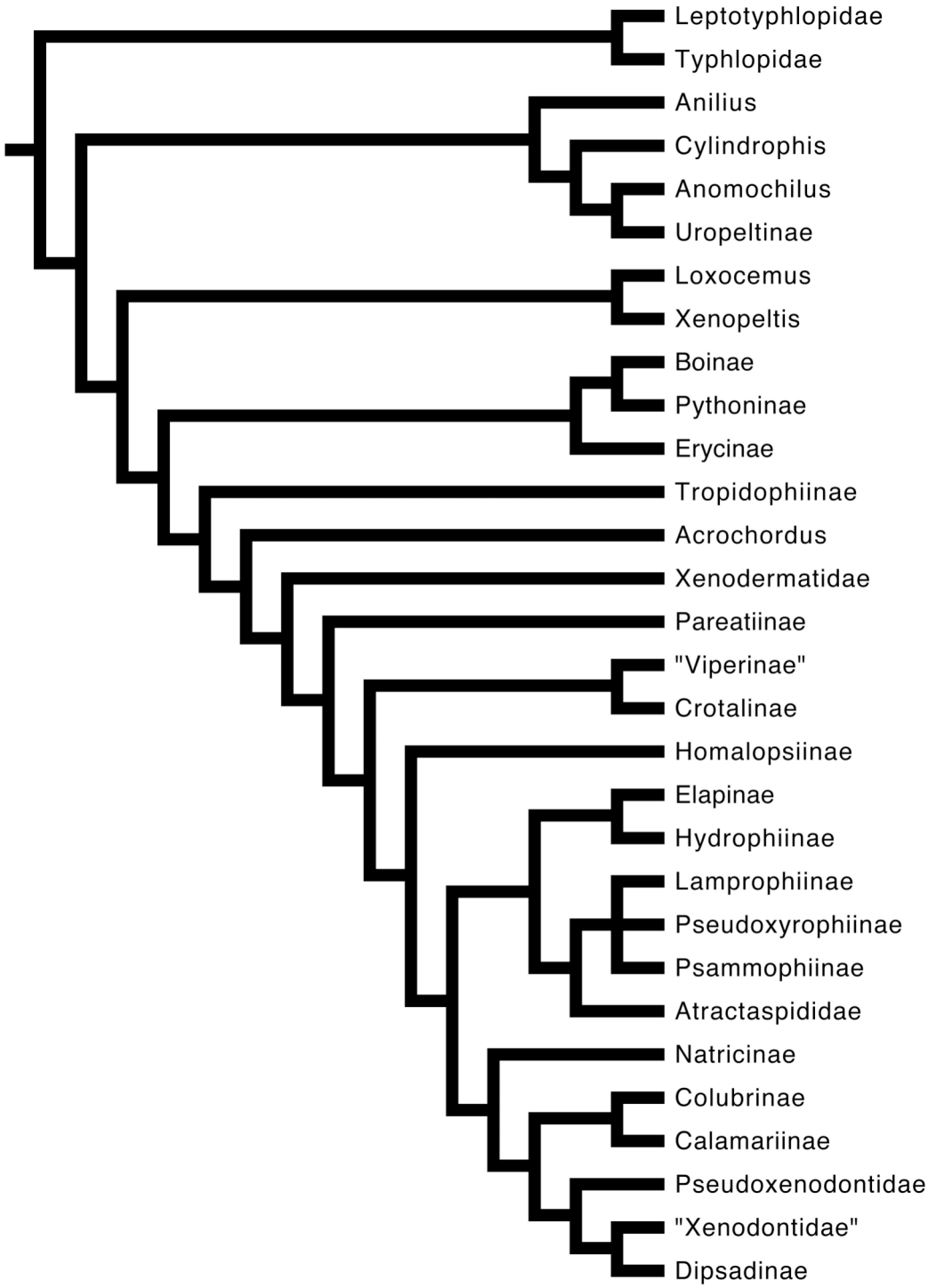


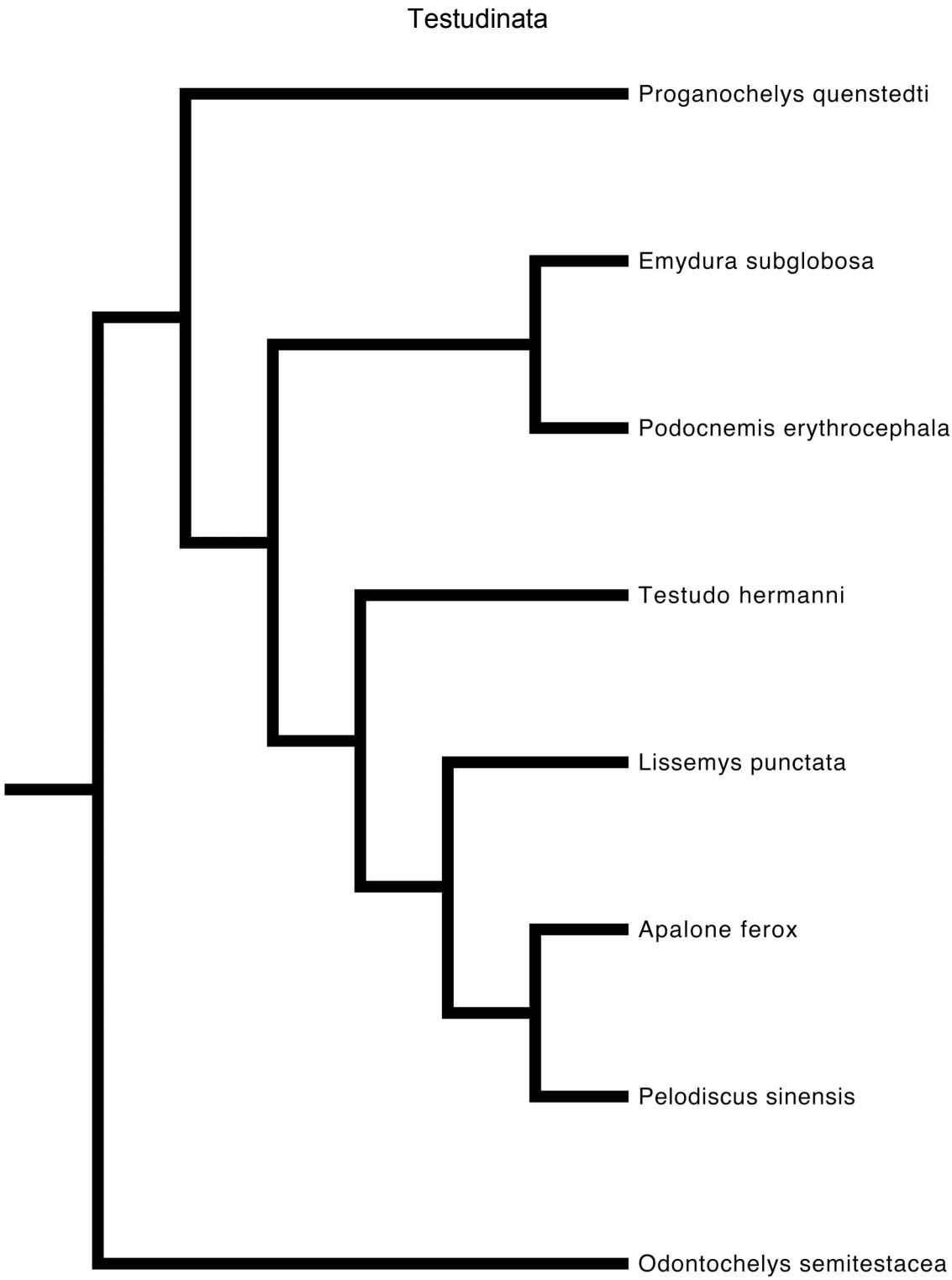
Rhynchocephalia



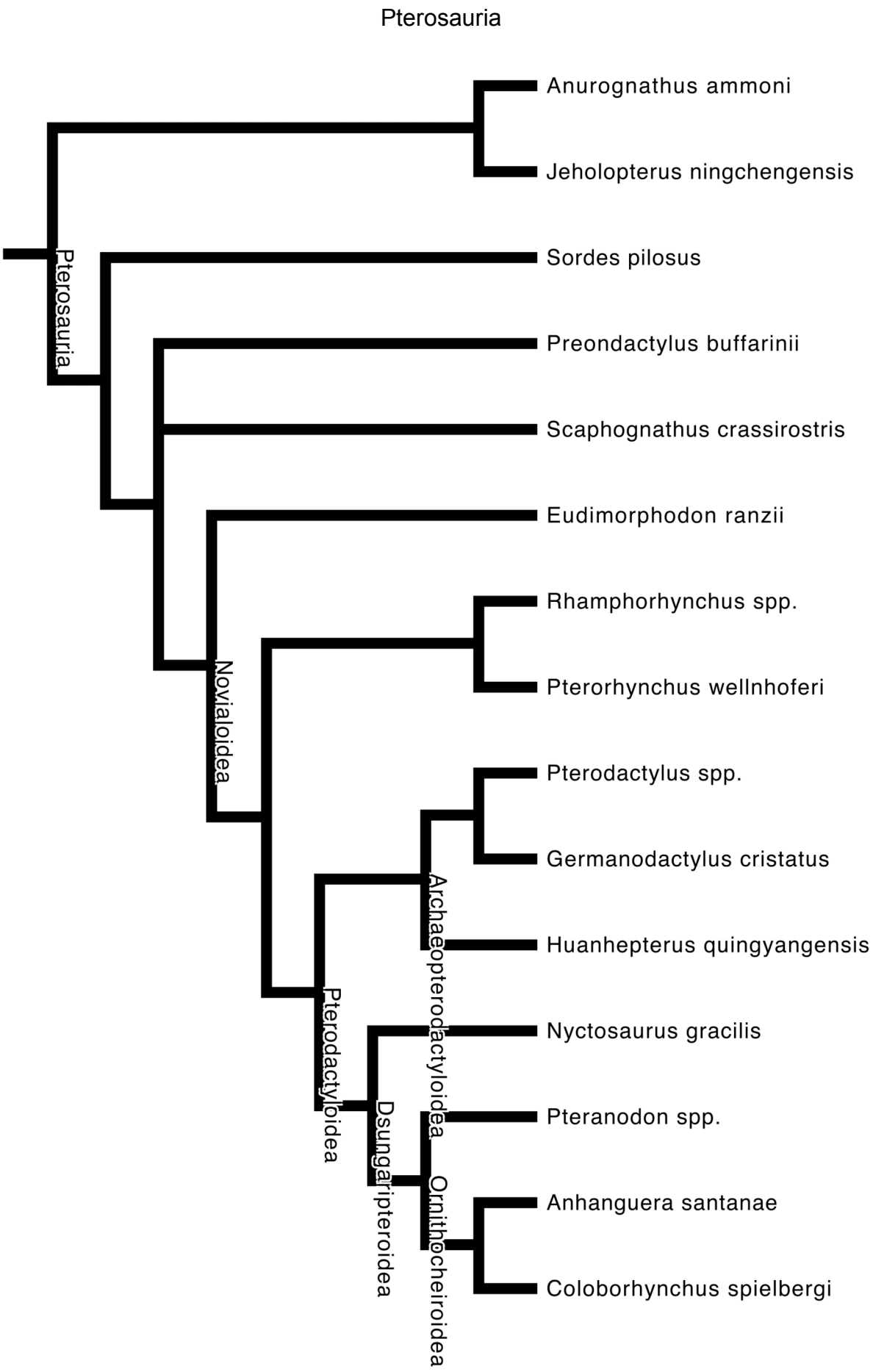

Squamata
Dibamidae
Gekkonidae
Pygopodidae
Scincidae
Xantusidae
Tetradactylus limbless Gerrhosauridae
Gerrhosauridae
Chamaesaura limbless cordylid
Cordylidae
Heloderma
Anniella
limbless Anguidae
Anguidae
Xenosaurus
Varanus
Lanthanotus
Shinisaurus
Amphisbaenia
Lacertidae
Teiidae
Iguanidae
Agamidae
Chamaeleonidae

Serpentes

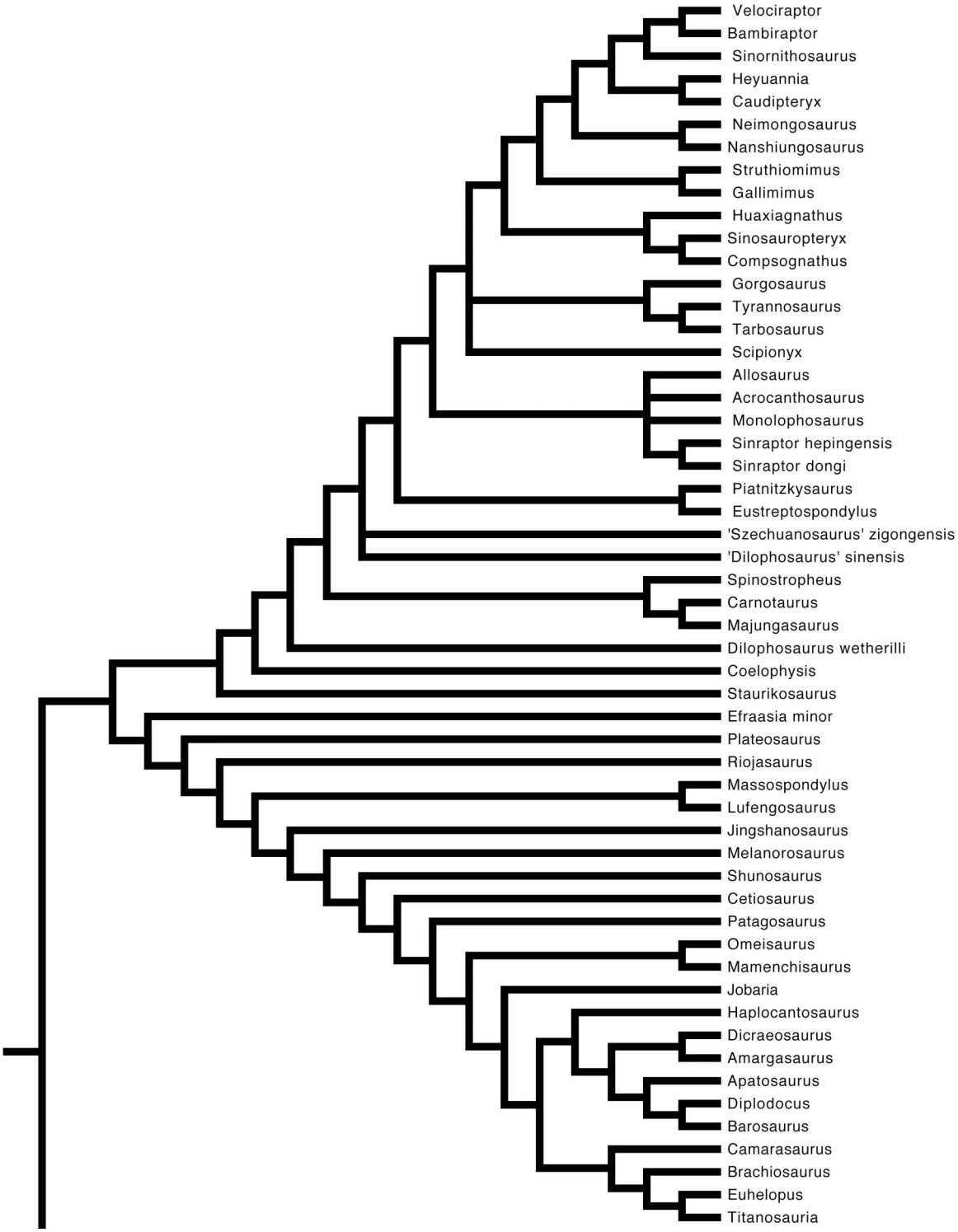

Leptotyphlopidae
Typhlopidae
Anilius
Cylindrophis
Anomochilus
Uropeltinae
Loxocemus
Xenopeltis
Boinae
Pythoninae
Erycinae
Tropidophiinae
Acrochordus
Xenodermatidae
Pareatiinae
"Viperinae"
Crotalinae
Homalopsiinae
Elapinae
Hydrophiinae
Lamprophiinae
Pseudoxyrophiinae
Psammophiinae
Atractaspididae
Natricinae
Colubrinae
Calamariinae
Pseudoxenodontidae
"Xenodontidae"
Dipsadinae

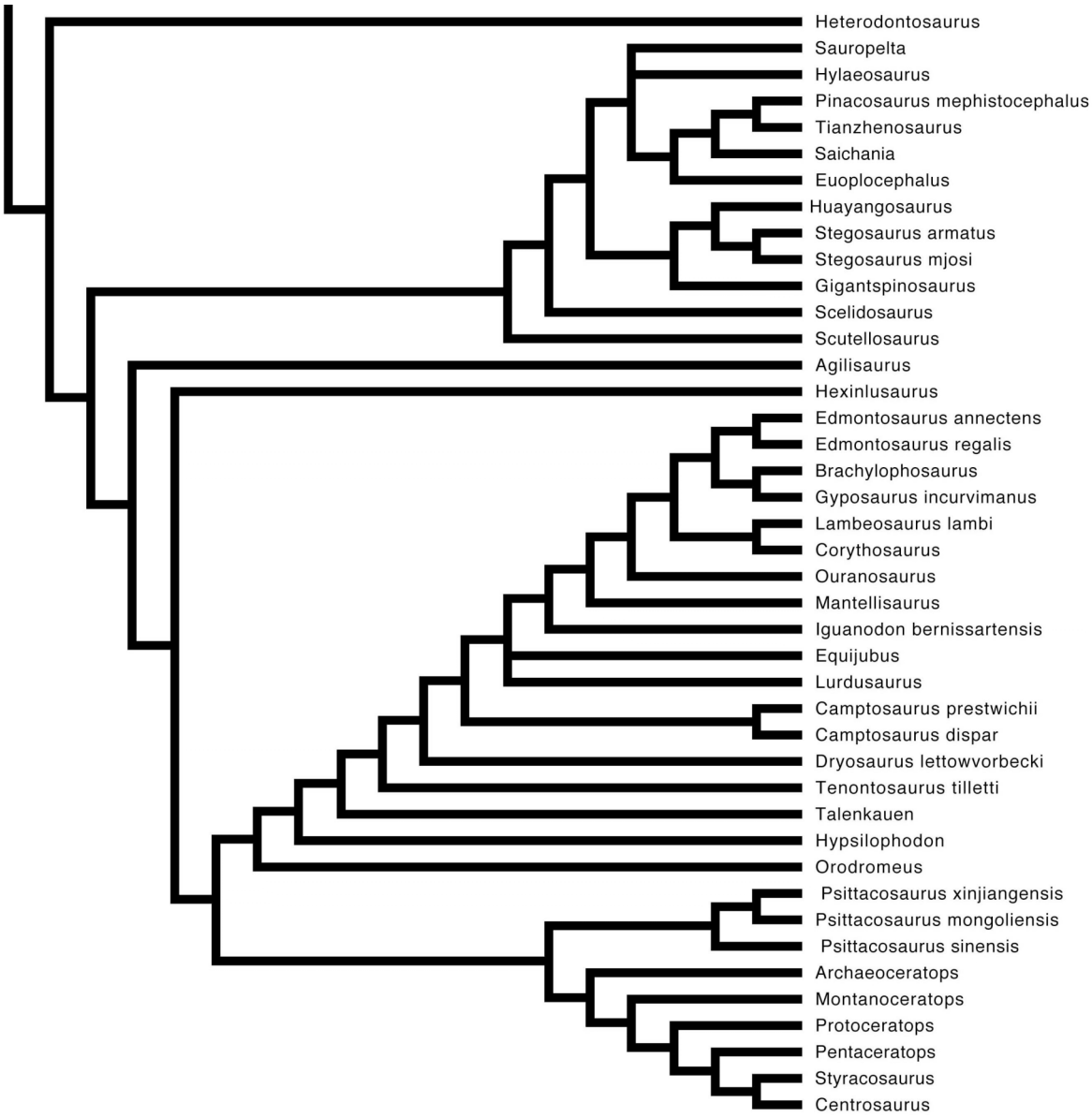

Testudinata
Proganochelys quenstedti
Emydura subglobosa
Podocnemis erythrocephala
Testudo hermanni
Lissemys punctata
Apalone ferox
Pelodiscus sinensis
Odontochelys semitestacea

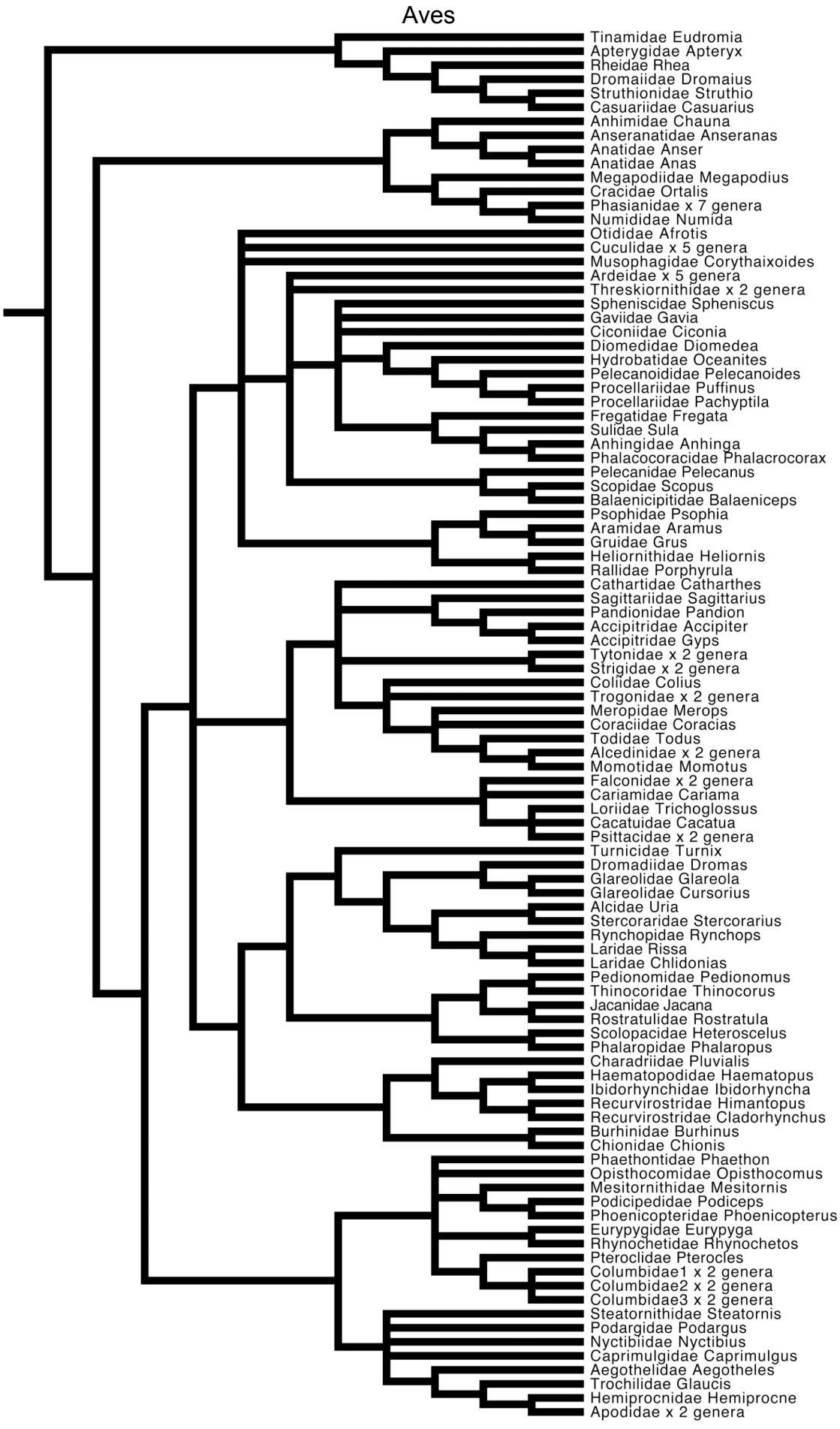
Choristodera/Archosauromorpha/Crurotarsi


Pterosauria
Anurognathus ammoni
Jeholopterus ningchengensis
Sordes pilosus
Preondactylus buffarinii
Scaphognathus crassirostris
Eudimorphodon ranzii
Rhamphorhynchus spp.
Pterorhynchus wellnhoferi
Pterodactylus spp.
Germanodactylus cristatus
Huanhepterus quingyangensis
Nyctosaurus gracilis
Pteranodon spp.
Anhanguera santanae
Coloborhynchus spielbergi
Pterosauria
Noviialoidea
Pterodactyloidea
Archaeopterodactyloidea
Dsungaripteroidea
Ornithocheiroidea

Dinosauria


Velociraptor
Bambiraptor
Sinornithosaurus
Heyuannia
Caudipteryx
Neimongosaurus
Nanshiungosaurus
Struthiomimus
Gallimimus
Huaxiagnathus
Sinosauropteryx
Compsognathus
Gorgosaurus
Tyrannosaurus
Tarbosaurus
Scipionyx
Allosaurus
Acrocanthosaurus
Monolophosaurus
Sinraptor hepingensis
Sinraptor dongi
Piatnitzkysaurus
Eustreptospondylus
'Szechuanosaurus' zigongensis
'Dilophosaurus' sinensis
Spinostropheus
Carnotaurus
Majungasaurus
Dilophosaurus wetherilli
Coelophysis
Staurikosaurus
Efraasia minor
Plateosaurus
Riojasaurus
Massospondylus
Lufengosaurus
Jingshanosaurus
Melanorosaurus
Shunosaurus
Cetiosaurus
Patagosaurus
Omeisaurus
Mamenchisaurus
Jobaria
Haplocantosaurus
Dicraeosaurus
Amargasaurus
Apatosaurus
Diplodocus
Barosaurus
Camarasaurus
Brachiosaurus
Euhelopus
Titanosauria


Heterodontosaurus
Sauropelta
Hylaeosaurus
Pinacosaurus mephistocephalus
Tianzhenosaurus
Saichania
Euoplocephalus
Huayangosaurus
Stegosaurus armatus
Stegosaurus mjosi
Gigantspinosaurus
Scelidosaurus
Scutellosaurus
Agilisaurus
Hexinlusaurus
Edmontosaurus annectens
Edmontosaurus regalis
Brachylophosaurus
Gyposaurus incurvimanus
Lambeosaurus lambi
Corythosaurus
Ouranosaurus
Mantellisaurus
Iguanodon bernissartensis
Equijubus
Lurdusaurus
Camptosaurus prestwichii
Camptosaurus dispar
Dryosaurus lettowvorbecki
Tenontosaurus tilletti
Talenkauen
Hypsilophodon
Orodromeus
Psittacosaurus xinjiangensis
Psittacosaurus mongoliensis
Psittacosaurus sinensis
Archaeoceratops
Montanoceratops
Protoceratops
Pentaceratops
Styracosaurus
Centrosaurus


Aves
Tinamidae Eudromia
Apterygidae Apteryx
Rheidae Rhea
Dromaiidae Dromaius
Struthionidae Struthio
Casuariidae Casuarius
Anhimidae Chauna
Anseranatidae Anseranas
Anatidae Anser
Anatidae Anas
Megapodiidae Megapodius
Cracidae Ortalis
Phasianidae x 7 genera
Numididae Numida
Otididae Afrotis
Cuculidae x 5 genera
Musophagidae Corythaixoides
Ardeidae x 5 genera
Threskiornithidae x 2 genera
Spheniscidae Spheniscus
Gaviidae Gavia
Ciconiidae Ciconia
Diomedidae Diomedea
Hydrobatidae Oceanites
Pelecanoididae Pelecanoides
Procellariidae Puffinus
Procellariidae Pachyptila
Fregatidae Fregata
Sulidae Sula
Anhingidae Anhinga
Phalacocoracidae Phalacrocorax
Pelecanidae Pelecanus
Scopidae Scopus
Balaenicipitidae Balaeniceps
Psophidae Psophia
Aramidae Aramus
Gruidae Grus
Heliornithidae Heliornis
Rallidae Porphyrula
Cathartidae Catharthes
Sagittariidae Sagittarius
Pandionidae Pandion
Accipitridae Accipiter
Accipitridae Gyps
Tytonidae x 2 genera
Strigidae x 2 genera
Coliidae Colius
Trogonidae x 2 genera
Meropidae Merops
Coraciidae Coracias
Todidae Todus
Alcedinidae x 2 genera
Momotidae Momotus
Falconidae x 2 genera
Cariamidae Cariama
Loriidae Trichoglossus
Cacatuidae Cacatua
Psittacidae x 2 genera
Turnicidae Turnix
Dromadiidae Dromas
Glareolidae Glareola
Glareolidae Cursorius
Alcidae Uria
Stercorariidae Stercorarius
Rynchopidae Rynchops
Laridae Rissa
Laridae Chlidonias
Pedionomidae Pedionomus
Thinocoridae Thinocorus
Jacanidae Jacana
Rostratulidae Rostratula
Scolopacidae Heteroscelus
Phalaropidae Phalaropus
Charadriidae Pluvialis
Haematopodidae Haematopus
Ibidorhynchidae Ibidorhyncha
Recurvirostridae Himantopus
Recurvirostridae Cladorhynchus
Burhinidae Burhinus
Chionidae Chionis
Phaethontidae Phaethon
Opisthocomidae Opisthocomus
Mesitornithidae Mesitornis
Podicipedidae Podiceps
Phoenicopteridae Phoenicopterus
Eurypygidae Eurypyga
Rhynochetidae Rhynochetos
Pteroclidae Pterocles
Columbidae1 x 2 genera
Columbidae2 x 2 genera
Columbidae3 x 2 genera
Steatornithidae Steatornis
Podargidae Podargus
Nyctibiidae Nyctibius
Caprimulgidae Caprimulgus
Aegothelidae Aegotheles
Trochilidae Glaucis
Hemiprocnidae Hemiprocne
Apodidae x 2 genera

5. References

1. Romer AS, Price LW (1940) Review of the Pelycosauria. *Geol Soc Amer Spec Pap* 28:1-538.

2. Williston SW (1916) Synopsis of the American Permo-Carboniferous Tetrapoda. *Contr Walker Mus* 1:193-236.

3. Olson EC (1968) The family Caseidae*. Field Geol* 17:225–349.

4. Stovall JW, Price LI, Romer AS (1966) The postcranial skeleton of the giant Permian Pelycosaur *Cotylorhynchus romeri*. *Bull Mus Comp Zool* 135:1-30.

5. Langston W, Reisz RR (1981) *Aerosaurus wellesi*, new species, a varanopseid mammal-like reptile (Synapsida: Pelycosauria) from the Lower Permian of New Mexico. *J Vert Paleontol* 1:73-96.

6. Reisz RR (1986) Pelycosauria. Pp. 1-102, In: Handbuch der Paläoherpetologie – (Part 17A), eds. Kuhn O, Wellnhofer P. Gustav Fischer Verlag. Stuttgart.

7. Von Huene F (1925) Ein neuer Pelycosaurier aus der Unteren Permformation Sachsens. *Geol und Palaeontol Abh* 14(5).

8. Colbert EH (1948) The mammal-like reptile *Lycaenops*. *Bull Amer Mus Nat Hist* 89:353-404.

9. Govender R, Rubidge BS, Renaut AJ (2002) The first complete vertebral columna of a basal tapinocephalid dinocephalian (Synapsida: Therapsida). *South Afr J Sci* 98:391-392.

10. Ray S, Chinsamy A (2003) Functional aspects of the postcranial anatomy of the Permian dicynodont *Diictodon* and its ecological implications. *Palaeontol* 46:151–183.

11. Cluver MA (1978) The skeleton of the mammal-like reptile *Cistecephalus* with evidence of a fossorial mode of life. *Ann South Afric Mus* 76:213–246.

12. Olson EC, Byrne F (1938) Osteology of *Aulacocephalodon peavoti*. *J Geol* 46:177–190.

13. Ray S (2006) Functional and evolutionary aspects of the postcranial anatomy of dicynodonts (Synapsida Therapsida). *Palaeontol* 49:1263–1286.

14. Fourie H, Rubidge BS (2007) The postcranial skeletal anatomy of the therocephalian *Regisaurus* (Therapsida: Regisauridae) and its utilization for biostratigraphic correlation. *Palaeont Afr* 42:1-16.

15. Brink AS (1950) Notes on a second specimen of *Homodontosaurus kitchingi*. *South Afric J Sci* 1950:118-119.

16. Broom R (1948) The skeleton of a very small therocephalian. *Ann Transvaal Mus* 21:39-41.

17. Brink AS, Kitching JW (1953) On *Levachia duvenhagei* and some other procynosuchids in the Rubidge collection. *South Afric J Sci* 1953:313-XXX.

18. Brink AS (1954) *Thrinaxodon* and some other *Lystrosaurus* zone cynodonts in the collection of the National Museum, Bloemfontein. *Researches of the Nasionale Museum* 1:115-126.

19. Jenkins FA JR (1971) The postcranial skeleton of African cynodonts. *Peabody Mus Nat Hist* 36:1-216.

20. Colbert EH, Kitching JW (1977) Triassic cynodont reptiles from Antarctica. *Amer Mus Novit* 2611:1-29.

21. Jenkins FA JR (1970) The Chanares (Argentina) Triassic reptile fauna. VII. The postcranial skeleton of the traversodontid *Massetognathus pascuali* (Therapsida, Cynodontia). *Breviora* 352:1-28.

22. Seeley HG (1895) Researches on the structure, organization and classification of fossil Reptilia. Part IX, Section 5. On the skeleton in new Cynodontia from the Karroo rocks. *Phil Trans R Soc Ser B* 186:59-148.

23. Bonaparte JF (1963) Descripción del esqueleto postcraneano de *Exaeretodon*. *Acta Geol Lilloana* 4:5-52.

24. Sánchez-Villagra MR, Narita Y, Kuratani S (2007) Thoracolumbar vertebral number: the first skeletal synapomorphy for afrotherian mammals. *Syst Biodiv* 5:1-7.

25. Modesto SP (1999) Observations on the structure of the Early Permian reptile *Stereosternum tumidum* Cope. *Pal afr* 35: 7–19.

26. Oelofsen B, Araújo DC (1987) *Mesosaurus tenuidens* and *Stereosternum tumidum* from the Permian Gondwana of both southern Africa and South America. *South Afric J Sci* 83:370–372.

27. Thommasen H, Carroll RL (1981) *Broomia*, the oldest known millerettid reptile. *Palaeontol* 24:379-390.

28. Gow CE (1972) The osteology and relationships of the Millerettidae (Reptilia: Cotylosauria). *J Zool Lond* 167:219–264.

29. Watson DMS (1957) Early history of the sauropsid reptiles. *Phil Trans Roy Soc Lond Ser B* 240(673):325–400.

30. Gow CE (1997) A reassessment of *Eunotosaurus africanus* Seeley (Amniota: Parareptilia). *Pal afr* 34:33–42.

31. Gow CE, De Klerk W (1997) First record of *Eunotosaurus* (Amniota: Parareptilia) from the Eastern Cape. *Pal afr* 34:27–31.

32. Berman DS, Reisz RR, Scott D, Henrici AC, Sumida SS, Martens T (2000) Early Permian bipedal reptile. *Science* 290:969–972.

33. Reisz RR, Scott D (2002) *Owenetta kitchingorum,* sp. nov., a small parareptile (Procolophonia: Owenettidae) from the Lower Triassic of South Africa. *J Vert Paleontol* 22:244–256.

34. deBraga M (2003) The postcranial skeleton, phylogenetic position, and probable lifestyle of the Early Triassic reptile *Procolophon trigoniceps*. *Canad J Earth Sci* 40:527–556.

35. Cisneros JC (2008) Taxonomic status of the reptile genus *Procolophon* from the Gondwanan Triassic. *Paleontologia Africana* 43:7–17.

36. Lee MSY (1997) A taxonomic revision of pareiasaurian reptiles: implications for Permian terrestrial Palaeoecology. *Modern Geology* 21:231–298.

37. Berman DS, Henrici AC, Kissel RA, Sumida SS, Martens T (2004) A new diadectid (Diadectomorpha*), Orobates pabsti*, from the Early Permian of central Germany. *Bull Carnegie Mus Nat Hist* 35:1–36.

38. Carroll RL (1969) A Middle Pennsylvanian captorhinomorph and the interrelationships of primitive reptiles. *J Paleont* 43:151–170.

39. Müller J, Berman DS, Henrici AC, Sumida SS, Martens T (2006) The basal eureptile *Thuringothyris mahlendorffae* from the Lower Permian of Germany. *J Paleont* 80: 726-739.

40. Berman DS, Reisz RR (1986) Captorhinid reptiles from the Early Permian of New Mexico, with description of a new genus and species. *Ann Carneg Mus* 55:1–28.

41. Heaton MJ, Reisz RR (1980) A skeletal reconstruction of the Early Permian captorhinid reptile *Eocaptorhinus laticeps* (Williston). *J Paleont* 54:136–143.

42. Sumida SS (1987) Two different vertebral forms in the axial column of *Labidosaurus* (Captorhinomorpha: Captorhinidae). *J Paleont* 61:155–167.

43. Clark J, Carroll RL (1973) Romeriid reptiles from the Lower Permian. *Bull Mus Comp Zool* 144:353–407.

44. Carroll RL (1969) A Middle Pennsylvanian captorhinomorph and the interrelationships of primitive reptiles. *J Paleont* 43:151–170.

45. Carroll RL (1964) The earliest reptiles. *J Linn Soc Lond Zool* 45:61–83.

46. Carroll RL, Baird D (1972) Carboniferous stem-reptiles of the family Romeriidae. *Bull Mus Comp Zool* 143:321–364.

47. Reisz RR (1981) A diapsid reptile from the Pennsylvanian of Kansas. PhD thesis. University of Kansas, Museum of Natural History. Special publication No.7.

48. Reisz RR, Berman DS, Scott D (1984) The anatomy and relationships of the Lower Permian reptile *Araeoscelis*. *J Vert Paleontol* 4: 57–67.

49. deBraga M, Reisz RR (1995) A new diapsid reptile from the uppermost Carboniferous (Stephanian) of Kansas. *Palaeontology* 38:199-212.

50. Gow CE (1975) The morphology and relationships of *Youngina capensis* Broom and Prolacerta broomi Parrington. *Paleontol Afr* 18:89–131.

51. Carroll RL (1975) Permo-Triassic “lizards” from the Karroo. *Paleontol Afr* 18:71–87.

52. Frey E, Sues H.-D, Munk W (1997) Gliding mechanism in the Late Permian Reptile *Coelurosauravus*. *Science* 275:1450-1452.

53. Carroll RL (1981) Plesiosaur ancestors from the Upper Permian of Madagascar. *Phil Trans Roy Soc Lond Ser B* 293:315–383.

54. Currie P (1980) A new younginid (Reptilia: Eosuchia) from the Upper Permian of Madagascar. *Canad J Earth Sci* 17:500–511.

55. Currie PJ, Carroll RL (1984) Ontogenic changes in the eosuchian reptile *Thadeosaurus*. *J Vert Paleontol* 4(1):68-84.

56. Harris JM, Carroll RL (1977) *Kenyasaurus*, a new eosuchian reptile from the Early Triassic of Kenya. *J Paleontol* 51(1):139–149.

57. Currie P (1981) *Hovasaurus boulei*, an aquatic eosuchian from the Upper Permian of Madagascar. *Paleontol Afr* 24:99–168.

58. Currie P (1982) The osteology and relationships of *Tangasaurus mennelli* Haughton (Reptilia, Eosuchia). *Ann South Afr Mus* 86(8):247–265.

Ichthyopterygia plus *Hupehsuchus*

59. Carroll RL, Dong Z-M (1991) *Hupehsuchus*, an enigmatic aquatic reptile from the Triassic of China, and the problem of establishing relationships. *Phil Trans Roy Soc Lond Ser B* 331:131-153.

60. Motani R, Minoura N, Ando T (1998) Ichthyosaurian relationships illuminated by new primitive skeletons from Japan. *Nature* 393:255-257.

61. Nicholls EL, Chen W, Manabe M (2002) New material of *Qianichthyosaurus* Li, 1999 (Reptilia, Ichthyosauria) from the Late Triassic of southern China, and implications for the distribution of Triassic ichthyosaurs. *J Vertebr Paleontol* 22:759-765.

62. Dal Sasso C, Pinna G (1996) *Besanosaurus leptorhynchus* n. gen. n. sp., a new shastasaurid ichthyosaur from the middleTriassic of Besano (Lombardy, N. Italy). *Paleontologia Lombarda Nuova serie* 4:3-23.

63. Kosch BF (1990) A revision of the skeletal reconstruction of *Shonisaurus popularis* (Reptilia: Ichthyosauria). *J Vertebr Paleontol* 10:512-514.

64. McGowan C, Motani R (1999) A reinterpretation of the Upper Triassic ichthyosaur *Shonisaurus*. *J Vertebr Paleontol* 19:42-49.

65. Chen X, Cheng L (2003) A new species of large-sized and long-body ichthyosaur from the Late Triassic Guanling biota, Guizhou, China [In Chinese, English abstract]. *Geol Bull China* 22:228-235.

66. Maisch MW (1998) A new ichthyosaur genus from the Posidonia Shale (Lower Toarcian, Jurassic) of Holzmaden, SW-Germany with comments on the phylogeny of post-Triassic ichthyosaurs. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* 209:47-78.

Thalattosauriformes

67. Müller J (2005): The anatomy of *Askeptosaurus italicus* from the Middle Triassic of Monte San Giorgio, and the interrelationships of thalattosaurs (Reptilia, Diapsida). *Canad J Earth Sci* 42:1347-1367.

68. Liu J, Rieppel O (2005) Restudy of *Anshunsaurus huangguoshuensis* (Reptilia: Thalattosauria) from the Middle Triassic of Guizhou, China. *Amer Mus Novit* 488:1–34.

69. Müller J, Renesto S, Evans SE (2005) The marine diapsid reptile *Endennasaurus* (Reptilia: Thalattosauriformes) from the Late Triassic of Italy. *Palaeontol* 48:15-30.

70. Rieppel O (1987) *Clarazia* and *Hescheleria*: a re-investigation of two problematical reptiles from the Middle Triassic of Monte San Giorgio (Switzerland). *Palaeontograph A* 195:101–129.

71. Jiang D-Y, Maisch MW, Sun YL, Matzke AT, Hao W-C (2004) A new species of *Xinpusaurus* (Thalattosauria) from the Upper Triassic of China. *J Vert Paleontol* 24:80–88.

72. Rieppel O (2000) Sauropterygia I - Placodontia, Pachypleurosauria, Nothosauroidea, Pistosauroidea. In: Handbuch der Paläoherpetologie 12A:1-134.

73. Huene F v (1936) *Henodus chelyops*, ein neuer Placodontier. *Palaeontographica, Abt. A* 84:99-148.

74. Pinna G, Nosotti S (1989) Anatomia, morfologia funzionale e paleoecologia del rettile placodonte *Psephoderma alpinum* Meyer, 1858. *Memoire della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano* 25:17-50.

75. Lin K, Rieppel O (1998) Functional morphology and ontogeny of *Keichousaurus hui* (Reptilia, Sauropterygia). *Fieldiana Geol* 39:1–39.

76. Rieppel O, Lin K (1995) Pachypleurosaurs (Reptilia: Sauropterygia) from the Lower Muschelkalk, and a review of the Pachypleurosauroidea. *Fieldiana (Geology), n.s.* 32:1-44.

77. Rieppel O (1989) A new pachypleurosaur (Reptilia: Sauropterygia) from the Middle Triassic of Monte San Giorgio, Switzerland. *Phil Trans Roy Soc Lond Ser B* 323:1-73.

78. Sander PM (1989) The pachypleurosaurids (Reptilia: Nothosauria) from the Middle Triassic of Monte San Giorgio (Switzerland) with the description of a new species. *Phil Trans Roy Soc Lond Ser B* 325:561-666.

79. Rieppel O, Li J, Liu J (2003) *Lariosaurus xingyiensis* (Reptilia: Sauropterygia) from the Triassic of China. *Canad J Earth Sci* 40:621-634.

80. Hänni K (2004) Die Gattung *Ceresiosaurus*. *Ceresiosaurus calgagni*i Peyer und *Ceresiosaurus lanzi* n.sp. (Lariosauridae, Sauropterygia). PhD Thesis. Paläontologisches Institut und Museum, University of Zürich, Zürich. 146p.

81. Rieppel O, Sander PM, Storrs GW (2002) The skull of the pistosaur *Augustasaurus* from the Middle Triassic of northwestern Nevada. J. Vertebr. Paleontol. 22:577-592.

Plesiosauria

82. Carpenter K (1999) Revision of North American elasmosaurs from the Cretaceous of the Western Interior. *Paludicola* 2:148-173.

83. Welles SP (1962) A new species of elasmosaur from the Aptian of Columbia and a review of the cretaceous plesiosaurs. *University of California Publications in Geological Science* 44:1-96.

84. Creisler (2003) Plesiosauria translation and pronunciation guide: http://www.dinosauria.com/dml/names/ples.html.

85. Carpenter K (1996) A review of short-necked plesiosaurs from the Cretaceous of the Western Interior, North America. *N Jb Geol Paläont Abh* 201:259-287.

86. Hampe O (1992) Ein großwüchsiger Pleiosauridae (Reptilia: Plesiosauria) aus der Unterkreide (oberes Aptium) von Kolumbien. *Courier Forschungsinstitut Senckenberg* 145:1-32.

87. Smith AS (2003) Cladistic analysis ot the Plesiosauria (Reptilia: Sauropterygia). In Department of Earth Science, Faculty of Science, pp. 91. Bristol: University of Bristol.

88. Welles SP (1949) A new elasmosaur from the Eagle Ford Shale of Texas. *Fondren Science Series* 1:1-28.

89. Welles SP (1952) A review of the North American creaceous elasmosaurs. *University of California Publications in Geological Science* 29:47-144.

90. Welles SP (1970) The longest neck in the ocean. *University of Nebraska NEWS* 50:1-2.

91. Romer AS, Lewis AD (1959) A mounted skeleton of the giant plesiosaur *Kronosaurus*. *Breviora* 112:1-15.

92. Druckenmiller PS, Russel AP (2008) A phylogeny of Plesiosauria (Sauropterygia) and its bearing on the systematic status of *Leptocleidus* Andrews, 1922. *Zootaxa* 1863, 1-120.

93. Linder H (1913) Beiträge zur Kenntnis der Plesiosaurier-Gattungen *Peloneustes* und *Pliosaurus*. Nebst Anhang: Über die beiden ersten Halswirbel der Plesiosaurier. *Geologische und Palaeontologische Abhandlungen, Neue Folge* 11:339-409.

94. O'Keefe FR (2001) A cladistic analysis and taxonomic revision of the Plesiosauria (Reptilia: Sauropterygia). *Acta Zool Fennica* 213:1-63.

95. Storrs GW (1997) Morphological and taxonomic clarification of the genus *Plesiosaurus*. In: Callaway JM, Nichols EL (Eds.), Ancient Marine Reptiles, pp. 145-190. San Diego: Academic Press.

Squamata

96. Hoffstetter R, Gasc J-P (1969) Vertebrae and ribs of modern reptiles. In Biology of the Reptilia, Volume 1: Morphology (Gans C. ed.). Academic Press, London. Pp. 201-310.

Rhynchocephalia

97. Carroll RL (1985) A pleurosaur from the Lower Jurassic and the taxonomic position of the Sphenodontida. Palaeontographica, Abteilung A 189:1–28.

Choristodera

98. Brown B (1905) The osteology of *Champsosaurus* Cope. *Amer Mus Nat Hist Mem* 9(1):1-26.

99. Gao K, Fox RC (1998) New choristoderes (Reptilia: Diapsida) from the Upper Cretaceous and Palaeocene, Alberta and Saskatchewan, Canada, and phylogenetic relationships of Choristodera. *Zool J Linn Soc* 124:303-353.

100. Gao K, Evans J, Ji Q, Norell M, Ji Sa (2000) Exceptional fossil material of a semi-aquatic reptile from China: the resolution of an enigma. *J Vertebr Paleontol* 20(3):417-421.

101. Matsumoto R, Evans SE, Manabe M (2007) The choristoderan reptile *Monjurosuchus* from the Early Cretaceous of Japan. *Acta Palaeontol Pol* 52 (2):329-350.

102. Gao K, Tang Z, Wang X (1999) A long-necked diapsid reptile from the Upper Jurassic/Lower Cretaceous of Liaoning Province, northeastern China. *Vertebrata PalAsiatica* 37:1-8.

103. Ji Q, Ji S-a, Lü J, You H, Yuan C-X (2006) Embryos of Early Cretaceous Choristodera (Reptilia) from the Jehol Biota in western Liaoning, China. *J Paleont Soc Korea* 22(1):111-118.

104. Gao K-Q, Fox RC (2005) A new choristodere (Reptilia: Diapsida) from the Lower Cretaceous of western Liaoning Province, China, and phylogenetic relationships of Monjurosuchidae. *Zool J Linn Soc* 145:427-444.

"Prolacertiformes"

105. Rieppel O, Li C, Fraser NC (2008) The skeletal anatomy of the Triassic protorosaur *Dinocephalosaurus orientalis* Li, from the Middle Triassic of Guizhou Province, Southern China. *J Vertebr Paleontol* 28:95-110.

106. Chatterjee S (1980) *Malerisaurus*, A new eosuchian reptile from the Late Triassic of India. *Phil Trans Roy Soc Lond Ser B* 291:163-200.

107. Peyer B (1931) B. Peyer: Die Triasfauna der Tessiner Kalkalpen II. *Tanystropheus longobardicus* Bass. sp. *Abhandlungen der schweizerischen Paläontologischen Gesellschaft* 50:5-110.

108. Wild R (1974) E. Kuhn-Schnyder und B. Peyer: Die Triasfauna der Tessiner Kalkalpen. XXIII. *Tanystropheus longobardicus* (Bassani) (Neue Ergebnisse). *Schweizerische Paläontologische Abhandlungen* 95:1-162.

109. Peyer B (1937) B. Peyer: Die Triasfauna der Tessiner Kalkalpen. XII. *Macrocnemus bassani* Nopcsa. *Abhandlungen der schweizerischen Paläontologischen Gesellschaft* 59 3–140.

110. Li C, Zhao L, Wang L (2007) A new species of *Macrocnemus* (Reptilia: Protorosauria) from the Middle Triassic of southwestern China and its palaeogeographical implication. *Science in China Series D: Earth Sciences* 50:1601-1605.

Rhynchosauria

111. Benton MJ (1983) The Triassic reptile *Hyperodapedon* from Elgin: functional morphology and relationships. *Phil Trans Roy Soc Lond Ser B* 302:605-717.

112. Benton MJ (1990) The Species of *Rhynchosaurus*, A rhynchosaur (Reptilia, Diapsida) from the Middle Triassic of England. *Phil Trans Roy Soc Lond Ser B* 328:213-306.

113. Dilkes DW (1998) The Early Triassic rhynchosaur *Mesosuchus browni* and the interrelationships of basal archosauromorph reptiles. *Phil Trans Roy Soc Lond Ser B* 353:501-541.

Testudinata

114. Li C, Wu X-C, Rieppel O, Wang L-T, Zhao L-J (2008) An ancestral turtle from the Late Triassic of southwestern China. *Nature* 456:497-501.

115. Gaffney ES (1990) The comparative osteology of the Triassic turtle *Proganochelys*. *Bull Amer Mus Nat Hist* 194:1-263.

Early Archosauriformes

116. Charig A, Krebs B, Sues H-D, Westphal F (1976) Thecodontia. In: Handbuch der Paläoherpetologie. 13:1-137.

117. Ewer RF (1965) The anatomy of the thecodont reptile *Euparkeria capensis* Broom. *Phil Trans Roy Soc Lond Ser B* 248(751):379-435.

118. Chatterjee S (1978) A primitive parasuchid (phytosaur) reptile from the Upper Triassic Maleri Formation of India. *Palaeontol* 21(1):83-127.

119. Chatterjee S (1985) *Postosuchus*, a new thecodontian reptile from the Triassic of Texas and the origin of tyrannosaurs. *Phil Trans Roy Soc Lond Ser B* 309:395-460.

120. Nesbitt SJ (2005) Osteology of the Middle Triassic pseudosuchian archosaur *Arizonasaurus babbitti*. *Historical Biology* 17:19-47.

121. Sen K (2005) A new rauisuchian archosaur from the Middle Triassic of India. *Palaeontol* 48:185-196.

122. Walker AD (1964) Triassic reptiles from the Elgin area: *Ornithosuchus* and the origin of carnosaurs. *Phil Trans Roy Soc Lond Ser B* 248:53-134.

123. Chatterjee S, Majumdar PK (1987) *Tikisuchus romeri*, a new rauisuchid reptile from the Late Triassic of India. *J Paleontol* 61(4):787-793.

124. Krebs B (1965) E. Kuhn-Schnyder und B. Peyer: Die Triasfauna der Tessiner Kalkalpen. XIX. *Ticinosuchus ferox* nov. gen. nov. sp. *Abhandlungen der schweizerischen Paläontologischen Gesellschaft* 81:1-140.

125. Walker, A. D. 1961. Triassic reptiles from the Elgin area: *Stagonolepis*, *Dasygnathus* and their allies. *Phil Trans R Soc Lond* B 244:103-204.

126. Benton MJ (1999) *Scleromochlus taylori* and the origin of dinosaurs and pterosaurs. *Phil Trans Roy Soc Lond Ser B* 354:1423-1446.

Crocodylomorpha

127. Colbert EH; Mook CC (1951) The ancestral crocodilian *Protosuchus*. *Bull Amer Museum Nat Hist* 97:143-182.

128. Pol D (2005) Postcranial remains of *Notosuchus terrestris* (Archosauria: Crocodyliformes) from the Upper Cretaceous of Patagonia, Argentina. *Ameghiniana* 42:21-38.

129. Mueller-Töwe I (2006) Anatomy, phylogeny, and palaeoecology of the basal thalattosuchians (Mesoeucrocodylia) from the Liassic of Central Europe: In *Fachbereich 09 Chemie, Pharmazie und Geowissenschaften* pp. 369. Johannes Gutenberg-Universität Mainz, Mainz.

130. Jouve S, Iarochène M, Bouya B, Amaghzaz M (2006) A new species of *Dyrosaurus* (Crocodylomorpha, Dyrosauridae) from the early Eocene of Morocco: phylogenetic implications. *Zool J Linn Soc* 148:603-656.

131. Schwarz D, Frey E, Martin T (2006) The postcranial skeleton of the Hyposaurinae (Dyrosauridae; Crocodyliformes). *Palaeontology* 49:695-718.

132. Salisbury SW, Molnar RE, Frey E, Willis PMA (2006) The origin of modern crocodyliforms: new evidence from the Cretaceous of Australia. *Proc Roy Soc B* 273:2439-2448.

Pterosauria

133. Rjabinin AN (1948) Remarks on a flying reptile from the Jurassic of the Kara-Tau. *Transactions of the Palaeontological Institute, Academy of Sciences, USSR* 15:86-93.

134. Bennet SC (2008) A second specimen of the pterosaur *Anuroganthus ammoni*. *Paläontol Zeit* 81:376-398.

135. Wang X, Zhou Z, Zhang F, Xu X (2002) A nearly completely articulated rhamphorhynchoid pterosaur with exceptionally well-preserved wing membranes and “hairs” from InnerMongolia, northeast China. *Chinese Science Bulletin* 47:226-230.

136. Sharov AG (1971) New flying Mesozoic reptiles from Kazakhstan and Kirgizija [in Russian; German translation by R. Wild]. *Proceedings of Paleontological Institute, USSR Academy of Sciences (Paleontologicheskii institut Akademii nauk SSSR. Trudy)* 130:104-113.

137. Wellnhofer P (1978) Pterosauria. In: Handbuch der Paläoherpetologie 19:1-82.

138. Wild R (1983) A new pterosaur (Reptilia, Pterosauria) from the Upper Triassic (Norian) of Friuli, Italy. *Atti Museo Friul Storia Nat* 5: 45-62.

139. Wellnhofer P (1975) Die Rhamphorhynchoidea (Pterosauria) der Oberjura-Plattenkalke Süddeutschlands. Teil II: Systematische Beschreibung. *Palaeontographica* 148:132-186.

140. Wild R (1978) Die Flugsaurier (Reptilia, Pterosauria) aus der Oberen Trias von Cene bei Bergamo, Italien. *Bollettino della Società Italiana* 17:176-256.

141. Bennet SC (2001) The osteology and functional morphology of the Late Cretaceous pterosaur *Pteranodon*. Part I. General description of osteology. *Palaeontographica Abt A* 260:1-112.

142. Bennet SC (2004) New information on the pterosaur *Scaphognathus crassirostris* and the pterosaur cervical series. *J Vert Paleontol* 25 (Suppl 3):38A.

143. Czerkas SA, Ji Q (2002) A new rhamphorhynchoid with a headcrest and complex integumentary structures; pp. 15-41 in Czerkas SJ, ed, Feathered Dinosaurs and the Origin of Flight. The Dinosaur Museum, Blanding, Utah.

144. Wellnhofer P (1970) Die Pterodactyloidea (Pterosauria) der Oberjura-Plattenkalke Süddeutschlands. *Abhandlung der Bayerischen Akademie der Wissenschaften, Neue Folge* 141:1-133.

145. Dong Z (1982) On a new Pterosauria (*Huanhepterus quingyangensis* gen. et sp. nov.) from Ordos, China. *Vertebrata PalAsiatica* 20:115-121.

146. Veldmeijer AJ (2003) Description of *Coloborhynchus spielbergi* sp. nov. (Pterodactyloidea) from the Albian (Lower Cretaceous) of Brazil. *Scripta Geologica* 125:35-139.

Dinosauria including Aves

147. Colbert EH (1970) A saurischian dinosaur from the Triassic of Brazil. *Amer Mus Novit* 2405:1-39.

148. Colbert EH (1989) The Triassic dinosaur *Coelophysis*. *Bull Mus North Ariz* 57:1-160.

149. Bonaparte JF, Novas FE, Coria RA (1990) *Carnotaurus sastrei* Bonaparte, the horned, lightly built carnosaur from the Middle Cretaceous of Patagonia. *Contributions in Science* 416:1-41.

150. Hu S-J (1993) A short report on the occurrence of *Dilophosaurus* from Jinning County, Yunnan Province. *Vertebrata PalAsiatica* 31:65-69 (in Chinese).

151. Welles SP (1984) *Dilophosaurus wetherilli* (Dinosauria: Theropoda): osteology and comparisons. *Palaeontographica Abteilung A* 185:85-180.

152. Sereno PC, Wilson JA, Conrad JL (2004) New dinosaurs link southern landmasses in the mid-Cretaceous. *Proc Roy Soc Lond Ser B* 271:1325-1330.

153. O'Connor PM (2007) The postcranial axial skeleton of *Majungasaurus crenetissimus* (Theropoda: Abelisauridae) from the Late Cretaceous of Madagascar. *Soc Vertebr Paleontol Mem* 8:127-162.

154. Gao Y-H (1993) A new species of *Szechuanosaurus* from the Middle Jurassic of Dashanpu, Zigong, Sichuan. *Vertebrata PalAsiatica* 31: 308-314 (in Chinese with English summary).

155. Currie PJ, Zhao X-J (1993) A new carnosaur (Dinosauria, Theropoda) from the Jurassic of Xinjiang, People's Republic of China. *Can J Earth Sci* 30:2037-2081.

156. Gao Y-H (1999) A complete carnosaur skeleton from Zigong, Sichuan. *Yangchuanosaurus hepingensis*. Sichuan Publishing House of Science and Technology, Chengdu, 100 pp (in Chinese with English summary).

157. Bonaparte JF (1986) Les dinosaures (Carnosaures, Allosauridés, Sauropodes, Cétiosauridés) du Jurassique Moyen de Cerro Cóndor (Chubut, Argentine). *Annales de Paléontologie (Vert.-Invert.)* 72:247-289.

158. Harris JD (1998) A re-analysis of *Acrocanthosaurus atokensis*, its phylogenetic status, and palaeobiogeographic implications, based on a new specimen from Texas. *Bull New Mexico Mus Nat Hist Sci* 13:1-75.

159. Madsen JH Jr (1976) *Allosaurus fragilis*: a revised osteology. *Bull Utah Geol Survey* 109:1-163.

160. Zhao X-J, Currie PJ (1993) A large crested theropod from the Jurassic of Xinjiang, People's Republic of China. *Canadian Journal of Earth Sciences* 30: 2027-2036.

161. Sadleir RW, Barrett PM, Powell HP (2008) The anatomy and systematics of *Eustreptospondylus oxoniensis*, a theropod dinosaur from the Middle Jurassic of Oxfordshire, England. *Palaeontographical Society Monographs* 160:1–82.

162. Dal Sasso C, Signore M (1998) Exceptional soft-tissue preservation in a theropod dinosaur from Italy. *Nature* 392:383-387.

163. Chen P-J, Dong Z-M, Zhen S-N (1998) An exceptionally well-preserved theropod dinosaur from the Yixian Formation of China. *Nature* 391:147-152.

164. Hwang SH, Norell MA, Ji Q, Gao K-Q (2004) A large compsognathid from the Early Cretaceous Yixian Formation of China. *J Syst Palaeontol* 2:13-30.

165. Ostrom JH (1978) The osteology of *Compsognathus longipes* Wagner. *Zitteliana* 4:73-118.

166. Lü J-C (2003) A new oviraptorosaurid (Theropoda: Oviraptorosauria) from the Late Cretaceous of southern China. *J Vert Paleontol* 22:871-875.

167. Zhou Z-H, Wang X-L, Zhang F-C, Xu X (2002) Important features of *Caudipteryx* – evidence from two nearly complete new specimens. *Vertebrata PalAsiatica* 38: 241-254 (in Chinese and English).

168. Burnham DA, Derstler KL, Currie PJ, Bakker RT, Zhou Z-H, Ostrom JH (2000) Remarkable new bird-like dinosaur (Theropoda: Maniraptora) from the Upper Cretaceous of Montana. *University of Kansis Paleontological Contributions* 13:1-13.

169. Norell MA, Makovicky PJ (2004) Dromaeosauridae. Pp. 196-209 in *The Dinosauria* (2nd Ed.) (Weishampel DB, Dodson P, Osmólska H, Eds), University of California Press.

170. Kobayashi Y, Lü J-C (2003) A new ornithomimid dinosaur with gregarious habits from the Late Cretaceous of China. *Acta Palaeontol Pol* 48:235-259.

171. Osmólska H, Roniewicz E, Barsbold R (1972) A new dinosaur, *Gallimimus bullatus* n. gen., n. sp. (Ornithomimidae) from the Upper Cretaceous of Mongolia. *Palaeontologia Polonica* 27:103-143.

172. Osborn HF (1917) Skeletal adaptations of *Ornitholestes*, *Struthiomimus*, *Tyrannosaurus*. *Bull Amer Mus Nat Hist* 35:733-771.

173. Zhang X-H, Xu X, Zhao X-J, Sereno PC, Kuang X-W. Tan L (2001) A long-necked therizinosauroid dinosaur from the Upper Cretaceous Iren Dabasu Formation of Nei Mongol, People's Republic of China. *Vertebrata PalAsiatica* 39: 282-290 (in Chinese and English).

174. Dong Z-M, Yu H-L (1997) A new segnosaur from Mazongshan Area, Gansu Province, China. Pp. 90-95 in *Sino-Japanese Silk Road dinosaur expedition* (Dong Z-M, Ed.). China Ocean Press.

175. Brochu CA (2003) Osteology of *Tyrannosaurus rex*: insights from a nearly complete skeleton and high-resolution computed tomographic analysis of the skull. *Soc Vertebr Paleontol Mem* 7:1-138.

176. Maleev YA (1974) [Gigantic carnosaurs of the Family Tyrannosauridae]. *Sovetsko-Mongolskaya Paleontologicheskaya Ekspeditsiya Trudy* 1:132-191 (in Russian).

177. Lambe LM (1914) On a new genus and species of carnivorous dinosaur from the Belly River Formation of Alberta, with a description of the skull of *Stephanosaurus marginatus* from the same horizon. *Ottawa Naturalist* 28:13-20.

178. Yates AM (2007) The first complete skull of the Triassic dinosaur *Melanorosaurus* Haughton (Sauropodomorpha: Anchisauria). *Spec Pap Palaeontol* 77:9-55.

179. Galton PM; Upchurch P (2004) Prosauropoda. pp: 232-258. In: Weishampel DB; Dodson P; Osmólska H. The Dinosauria, Second Edition. University of California Press, Berkeley, CA.

180. Wilson JA; Sereno PC (1998) Early evolution and higher-level phylogeny of sauropod dinosaurs. *Soc Vertebr Paleontol Mem* 5:1-68.

181. Upchurch P, Barrett PM, Dodson P (2004) Sauropoda. pp: 259-324. In: Weishampel DB; Dodson P; Osmólska H. The Dinosauria, Second Edition. University of California Press, Berkeley, CA.

182. Wilson JA (2002) Sauropod dinosaur phylogeny: critique and cladistic analysis. *Zool J Linn Soc Lond* 136:217-276.

183. Santa-Luca AP (1980) The postcranial skeleton of *Heterodontosaurus tucki* (Reptilia, Ornithischia) from the Stormberg of South Africa. *Annals of the South African Museum* 79:159-211.

184. Owen R (1863) Monograph of the fossil Reptilia of the Liassic formations. Part 2. *Scelidosaurus harrisonii* (continued). *Palaeontographical Society Monographs* 14 (for 1860): 1-26 + 9 pls.

185. Colbert EH (1981) A primitive ornithischian dinosaur from the Kayenta Formation of Arizona. *Museum of Northern Arizona, Bulletin* 53: 1-61.

186. Maidment SCR, Wei G-B, Norman DB (2006) Re-description of the postcranial skeleton of the Middle Jurassic stegosaur *Huayangosaurus taibaii*. *J Vert Paleontol* 26:944-956.

187. Peng G-Z, Ye Y, Gao Y-H, Shu C-K, Jiang S (2005) *Jurassic dinosaur faunas in Zigong*. 236 pp. (in Chinese with English summary).

188. Gilmore CW (1915) Osteology of *Thescelosaurus*, an orthopodous dinosaur from the Lance Formation of Wyoming. *Proc United States Nat Mus* 49:591-616.

189. Carpenter K, Miles CA, Cloward K (2001) New primitive stegosaur from the Morrison Formation, Wyoming. Pp. 55-75 in *The Armored Dinosaurs* (Carpenter K, ed.). Indiana University Press.

190. Parish JC (2005) *The evolution and paleobiology of the dinosaurs (Ornithischia, Ankylosauria)*. Unpublished PhD dissertation, University of Oxford, pp.

191. Pang Q-Q, Cheng Z-W (1998) A new ankylosaur of Late Cretaceous from Tianzhen, Shanxi. *Progress in Natural Science* 8:326-334.

192. Pereda-Suberbiola J (1993) *Hylaeosaurus*, *Polacanthus* and the systematics and stratigraphy of Wealden armoured dinosaurs. *Geological Magazine* 130:767-781.

193. Maryanska T (1977) Ankylosauridae (Dinosauria) from Mongolia. *Palaeontologica Polonica* 37:85-151.

194. Carpenter K (1982) Skeletal and dermal armour reconstruction of *Euoplocephalus tutus* (Ornithischia: Ankylosauridae) from the Late Cretaceous Oldman Formation of Alberta. *Canad J Earth Sci* 19: 689-697.

195. Godefroit P, Pereda-Suberbiola X, Li H, Dong Z-M (1999) A new species of the ankylosaurid dinosaur *Pinacosaurus* from the Late Cretaceous of Inner Mongolia (P. R. China). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Sciences de la Terre* 69 (Suppl. B): 17-36.

196. Peng G-Z (1992) Jurassic ornithopod *Agilisaurus louderbacki* (ornithopoda, Fabrosauridae) from Zigong, Sichuan, China. *Vertebrata PalAsiatica* 30:39-51 (in Chinese with English summary).

197. He X-L, Cai K-J (1984) *The Middle Jurassic dinosaurian fauna from Dashanpu, Zigong, Sichuan. Volume 1. The ornithopod dinosaurs*. Sichuan Scientific and Technical Publishing House, Chengdu, 71pp + 6 pls [in Chinese with English summary].

198. Scheetz RD (1999) *Osteology of* Orodromeus makelai *and the phylogeny of basal ornithopod dinosaurs*. Unpublished PhD dissertation, Montana State University, 186 pp.

199. Galton PM (1974) The ornithischian dinosaur *Hypsilophodon* from the Wealden of the Isle of Wight. *Bulletin of the British Museum (Natural History), Geology* 25: 1-152.

200. Novas FE, Cambiaso AV, Ambrosio A (2004) A new basal iguanodontian (Dinosauria, Ornithischia) from the Upper Cretaceous of Patagonia. *Ameghiniana* 41:75-82.

201. Galton PM (1981) *Dryosaurus*, a hypsilophodontid dinosaur from the Upper Jurassic of North America and Africa: postcranial skeleton. *Paläontologische Zeitschrift* 55:271-312.

202. Forster CA (1990) The postcranial skeleton of the ornithopod dinosaur *Tenontosaurus tilletti*. *J Vert Paleontol* 10:273-294.

203. You H-L, Luo Z-X, Shubin N-H, Witmer LM, Tang Z-L, Tang F (2003) The earliest-known duck-billed dinosaur from deposits of late Early Cretaceous age in northwest China and hadrosaur evolution. *Cretaceous Research* 24:347-355.

204. Taquet P, Russell DA (1999) A massively-constructed iguanodont from Gadoufaoua, Lower Cretaceous of Niger. *Annales de Paléontologie* 85:85-96.

205. Norman DB (1980) On the ornithischian dinosaur *Iguanodon bernissartensis* of Bernissart (Belgium). *Mémoires de l'Institut Royal des Sciences Naturelles de Belgique* 178: 1-103.

206. Norman DB (1986) On the anatomy of *Iguanodon atherfieldensis* (Ornithischia: Ornithopoda). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Sciences de la Terre* 56: 281-372.

207. Taquet P (1976) *Géologie et paléontologie du gisement de Gadoufaoua (Aptien du Niger)*. Cahiers de Paléontologie, Editions du Centre National de la Recherche Scientifique, 191 pp + 24 pls.

208. Gilmore CW (1909) Osteology of the Jurassic reptile *Camptosaurus*, with a revision of the species of the genus, and descriptions of two new species. *Proc United States Nat Mus* 36:197-302.

209. Galton PM, Powell HP (1980) The ornithischian dinosaur *Camptosaurus prestwichii* from the Upper Jurassic of England. *Palaeontol* 23:411-443.

210. Prieto-Marquez A (2007) Postcranial osteology of the hadrosaurid dinosaur *Brachylophosaurus canadensis* from the Late Cretaceous of Montana. Pp. 91-115 in *Horns and beaks: ceratopsian and ornithopod dinosaurs* (Carpenter K, ed.). Indiana University Press.

211. Lull RS, Wright NE (1942) Hadrosaurian dinosaurs of North America. *Geological Society of America, Special Paper* 40: 1-242.

212. Sereno PC (1987) The ornithischian dinosaur *Psittacosaurus* from the Lower Cretaceous of Asia and the relationships of the Ceratopsia. Unpublished PhD dissertation, Columbia University, 553 pp.

213. Sereno PC, Chao S-C (1988) *Psittacosaurus xinjiangensis* (Ornithischia: Ceratopsia), a new psittacosaur from the Lower Cretaceous of northwestern China. *J Vert Paleontol* 8:353-365.

214. You H-L, Dodson P (2003) Redescription of neoceratopsian dinosaur *Archaeoceratops* and the early evolution of Neoceratopsia. *Acta Palaeontol Pol* 48:261-272.

215. Brown B, Schlaikjer EM (1940) The structure and relationships of *Protoceratops*. *Annals of the New York Academy of Science* 40: 133-266.

216. Brown B, Schlaikjer EM (1942) The skeleton of *Leptoceratops* with the description of a new species. *Amer Mus Novit* 1169: 1-15.

217. Brown B (1917) A complete skeleton of the horned dinosaur *Monoclonius* and description of a second skeleton showing skin impressions. *Bull Amer Mus Nat Hist* 37: 281-306.

218. Wiman C (1930) Über Ceratopsia aus der Oberen Kreide in New Mexico. *Nova Acta Regiae Societatis Scientiarum Upsaliensis, Series 4* 7:1-19.

219. Lull RS (1933) A revision of the Ceratopsia or horned dinosaurs. *Memoirs of the Peabody Museum of Natural History* 3(3): 1-175.

220. Livezey BC, Zusi RL (2006) Higher-order phylogeny of modern birds (Theropoda, Aves: Neornithes) based on comparative anatomy: I. Methods and characters. *Bull Carneg Mus Nat Hist* 37:1–544.

Additional references used for generating the tree topologies

221. Sidor CA (2003) Evolutionary trends and the origin of the mammalian lower jaw. *Paleobiol* 29:605–640

222. Kemp TS (2005) The origin and evolution of mammals. Oxford University Press.

223. Fröbisch J (2007) The cranial anatomy of *Kombuisia frerensis* Hotton (Synapsida, Dicynodontia) and a new phylogeny of anomodont therapsids**.** *Zool J Linn Soc* 150: 117-144.

224. Müller J, Tsuji LA (2007) Impedance-matching hearing in Paleozoic reptiles: evidence of advanced sensory perception at an early stage of amniote evolution. *PLoS ONE* 2: e889. doi:10.1371/journal.pone.0000889.

225. Müller J (2003) Early Loss and Multiple Return of the Lower Temporal Arcade in Diapsid Reptiles. *Naturwissenschaften* 90:473-476.

226. Müller J (2004) The relationships among diapsid reptiles and the influence of taxon selection. in: Arratia G, Cloutier R, Wilson VH (eds.): Recent Advances in the Origin and Early Radiation of Vertebrates: 379-408, München (Dr. Friedrich Pfeil).

227. Müller J, Reisz RR (2006) The phylogeny of early eureptiles: comparing parsimony and Bayesian approaches in the investigation of a basal fossil clade. *Sys Biol* 55:503-511.

228. Müller J (2007) First record of a thalattosaur from the Upper Triassic of Austria. *J Vert Paleontol* 27: 236-240.

229. Vidal N, Hedges SB (2002) Higher-level relationships of caenophidian snakes inferred from four nuclear and mitochondrial genes. *Compt Rend Biologie* 325:987–995.

230. Townsend TM, Larson A, Louis E., Macey JR (2004) Molecular phylogenetics of Squamata: The position of snakes, amphisbanians, and dibamids, and the root of the squamate tree. *Sys Biol* 53:735-757.

231. Reynoso V-H (2005) Possible evidence of a venom apparatus in a Middle Jurassic sphenodontian from the Huizachal Red Beds of Tamaulipas, México. *J Vert Paleontol* 25:646–654.

232. Gasparini Z, Pol D, Spalletti L (2006) An unusual marine Crocodyliform from the Jurassic–Cretaceous boundary of Patagonia. *Science* 311:70–73.

233. Motani R (1999) Phylogeny of Ichthyopterygia. *J Vertebr Paleontol* 19:473-496.

234. Maisch MW, Matzke AT (2000) The Ichthyosauria. *Stuttgarter Beiträge zur Naturkunde B* 298:1-159.

235. Maisch MW, Pan XR, Sun ZY, Cai T, Zhang DP, Xie JL (2006) Cranial osteology of *Guizhouichthyosaurus tangae* (Reptilia: Ichthyosauria) from the Upper Triassic of China. *J Vertebr Paleontol* 26:588-597.

236. Fernández M (2007) Redescription and phylogenetic position of *Caypullisaurus* (Ichthyosauria: Ophthalmosauridae). *J Paleontol* 81:368-375.

237. Rieppel O (2001) The cranial anatomy of *Placochelys placodonta* Jaekel, 1902, and a review of the Cyamodontoidea (Reptilia, Placodonta). *Fieldiana Geol* 45:1-104.

238. Gaffney ES, Meylan PA (1988) A phylogeny of turtles. in Benton MJ (ed.): The Phylogeny and Classification of the Tetrapods. Volume 1: Amphibians, Reptiles, Birds: 157-219 Oxford (Clarendon Press).

239. Joyce WG, Gauthier JA (2004) Palaeoecology of Triassic stem turtles sheds new light on turtle origins. *Proc R Soc Lond B* 271:1-5.

240. Benton MJ (2007) Paläontologie der Wirbeltiere [German translation of ´Vertebrate Paleontology´ 3rd edition]. München (Dr. Friedrich Pfeil).

241. Irmis RB, Nesbitt SJ, Padian K, Smith ND, Turner AH, Woody D, Downs A (2007) A Late Triassic dinosauromorph assemblage from New Mexico and the rise of dinosaurs. *Science* 317:358-361.

242. Wang X, Kellner AWA, Zhou Z, d. Almeida Campos D (2008) Discovery of a rare arboreal forest-dwelling flying reptile (Pterosauria, Pterodactyloidea) from China. *Proc Nat Acad Sci* 105:1983-1987.

243. Andres B, Ji Q (2008) A new pterosaur from the Liaoning Province of China, the phylogeny of the Pterodactyloidea, and convergence in their cervical vertebrae. *Palaeontology* 51:453-469.

244. Barrett PM, McGowan AJ, Page V (2009) Dinosaur diversity and the rock record. *Proc R Soc Lond B:* 10.1098/rspb.2009.0352.

245. Butler RJ, Upchurch P, Norman DB (2008) The phylogeny of the ornithischian dinosaurs. *J Syst Palaeontol* 6:1-40.

246. Carrano MT, Sampson SD (2008) The phylogeny of Ceratosauria (Dinosauria: Theropoda). *J Syst Palaeontol* 6:183-236.

247. Gates TA, Sampson SD (2007) A new species of Gryposaurus (Dinosauria: Hadrosauridae) from the late Campanian Kaiparowits Formation, southern Utah, USA. *Zool J Linn Soc* 151:351-376.

248. Holtz TR Jr (2004) Tyrannosauroidea. 111-136. In The Dinosauria (Second Edition). Eds Weishampel DB, Dodson P, Osmolska H. University of California Press, Berkeley, 861 pp.

249. Holtz TR Jr, Molnar RE, Currie PJ (2004) Basal Tetanurae. 71-110. In The Dinosauria (Second Edition). Eds Weishampel DB, Dodson P, Osmolska H. University of California Press, Berkeley, 861 pp.

250. Langer MC, Benton MJ (2006) Early dinosaurs: a phylogenetic study. *J Syst Palaeontol* 4:309-358.

251. Maidment SCR, Norman DB, Barrett PM, Upchurch P (2008) Systematics and phylogeny of Stegosauria (Dinosauria: Ornithischia). *J Syst Palaeontol* 6:367-407.

252. Norman DB (2004) Basal iguanodontia. 413-437. In The Dinosauria (Second Edition). Eds Weishampel, DB., Dodson, P. & Osmolska, H. University of California Press, Berkeley, 861 pp.

253. Senter P (2007) A new look at the phylogeny of Coelurosauria (Dinosauria: Theropoda). *J Syst Palaeontol* 5:429-463.

254. Vickaryous MK, Maryanska T, Weishampel DB (2004) Ankylosauria. 363-392. In The Dinosauria (Second Edition). Eds Weishampel DB, Dodson P, Osmolska H. University of California Press, Berkeley, 861 pp.

255. You H-L, Dodson P (2004) Basal Ceratopsia. 478-493. In The Dinosauria (Second Edition). Eds Weishampel DB, Dodson P, Osmolska H. University of California Press, Berkeley, 861 pp.

6. Sources of sketches in Figure 1 of main text.

The sketches of representative skeletons among the diversity sampled in this study are modified versions from figures from different sources (256-259), listed below.

256. Ji Q et al. (2002) The earliest eutherian mammal. *Nature* 416:816-822.

257. Lydekker R (1896) The Royal Natural History. Vol V. (Frederick Warne & Co., London) pp 576.

258. Sander PM (1994) Reptilien. Enke, Stuttgart, 226 pp.

259. Mazin J-M (2001) Mesozoic marine reptiles: an overview. Pp. 95-117. In: Mazin J-M, de Buffrénil V (eds.), Secondary Adaptation of Tetrapods to Life in Water.

7. Output of the correlation analyses

Tree input:

(Diadectidae,Limnoscelidae),((Caseidae,(Varanopidae,(Haptodus,(Biarmosuchia,(Dinocephalia,(Gorgonopsia,(Dicynodontia,(Therocephalia,(Thrinaxodontidae,((Traversodontidae,Cynognathidae),(Monotremata,(Marsupialia,Eutheria)))))))))),((Mesosauridae,((Eunotosaurus,Millerettidae),(Nyctiphruretus,(Bolosauridae,(Procolophonoidea,(Macroleter,Pareiasauria)))))),(Coelostegus,((Captorhinidae,Thuringothyris),(Anthracodromeus,(Brouffia,(Cephalerpeton,(Hylonomus,(Paleothyris,(Protorothyris,(Areoscelidia,(Younginiformes,(Claudiosaurus,((Palaeagama,Coelurosauravus),((Kuehneosauridae,Drepanosauridae),((Hupehsuchus,Ichthyopterygia),(Thalattosauriformes,(((Eosauropterygia,(Placodus,(Henodus,Psephoderma))),(Squamata,(Pleurosauridae,Sphenodontidae))),(Choristodera,(Dinocephalosaurus,(Malerisaurus,(Tanystropheus,(Macrocnemus,((Prolacerta,Protorosaurus),(Rhynchosauria,(Testudinata,(Chasmatosaurus,(Euparkeria,(Parasuchus,((Postosuchus,(Aetosauridae,Crocodylomorpha)),(Pterosauria,(Ornithischia,(Sauropodomorpha,(Coelophysis,(Neoceratosauria,(Carnosauria,(Tyrannosauroidea,(Compsognathidae,(Palaeognathae,Neognathae)))))))))))))))):0.0010):0.0010):0.0010)):0.0010)))))))):0.0010):0.0010):0.0010):0.0010):0.0010)))))));

Values:

Taxa	Presacrals (trait 1)	CP ratio (trait 2)
Aetosauridae	24	0.33
Anthracodromeus	32	0.125
Areoscelidia	25.61	0.27
Bolosauridae	24.6	0.22
Brouffia	31	0.13
Captorhinidae	25.48	0.2
Carnosauria	22.93	0.41
Cephalerpeton	28	0.18
Chasmatosaurus	25	0.32
Choristodera	27.55	0.44
Claudiosaurus	24	0.33
Coelophysis	23	0.43
Coelostegus	29	0.17
Coelurosauravus	21	0.38
Compsognathidae	22.96	0.44
Dinocephalosaurus	53	0.51
Drepanosauridae	24	0.33
Eosauropterygia	38.8	0.47
Eunotosaurus	15	0.33
Euparkeria	22	0.32
Henodus	19	0.32
Hupehsuchus	37	0.24
Hylonomus	26	0.19
Ichthyopterygia	41.46	0.24
Kuehneosauridae	26	0.27
Macrocnemus	25.54	0.31
Macroleter	23	0.2
Malerisaurus	23	0.39
Mesosauridae	28.43	0.36
Millerettidae	23.82	0.17
Neoceratosauria	22.8	0.43
Nyctiphruretus	24	0.33

Ornithischia	22.39	0.4
Palaeagama	23	0.28
Paleothyris	32	0.125
Parasuchus	25	0.32
Pareiasauria	20.96	0.24
Placodus	28	0.29
Pleurosauridae	39.59	0.18
Postosuchus	24	0.33
Procolophonoidea	25.79	0.26
Prolacerta	26	0.3
Protorosaurus	26	0.3
Protorothyris	23	0.22
Psephoderma	20	0.25
Pterosauria	21.64	0.37
Rhynchosauria	25.12	0.31
Sauropodomorpha	24.74	0.4
Tanystropheus	25	0.48
Thalattosauriformes	33.15	0.27
Thuringothyris	26	0.21
Tyrannosauroidea	22.96	0.42
Younginiformes	24.78	0.23
Crocodylomorpha	25.09	0.35
Neognathae	22.87	0.7
Palaeognathae	23.08	0.73
Sphenodontidae	25.95	0.28
Squamata	77.33	0.08
Testudinata	18	0.44
Biarmosuchia	28	0.25
Caseidae	25.42	0.23
Cynognathidae	29	0.24
Dicynodontia	26.6	0.23
Dinocephalia	29	0.28
Gorgonopsia	26.73	0.26
Haptodus	27	0.2
Therocephalia	27.33	0.24
Thrinaxodontidae	26.49	0.23
Traversodontidae	26	0.27
Varanopidae	26	0.21
Eutheria	26	0.27
Marsupialia	26	0.27
Monotremata	26	0.27
Diadectidae	24.74	0.24
Limnoscelidae	26	0.19

COMPARE output:

```
Results of analyses using Phylogenetic GLS mode
Reg. Trait   1 on Trait   2
Alpha     Beta_0    (SE)_0     Beta_1    (SE)_1   % R^2   Sigma^2  Ln(Like)   Correlation
 14.71    33.23 (   3.246)   -22.76 (   9.621)   712.11    61.60  -187.145    -0.267
Reg. Trait   2 on Trait   1
Alpha     Beta_0    (SE)_0     Beta_1    (SE)_1   % R^2   Sigma^2  Ln(Like)   Correlation
  3.57     0.37 (   0.060)    0.00 (   0.0010)   657.97     0.01   153.292    -0.257
```

Reg Trait 1 on Trait 2

	N	Mean(PGLS-a)	Var(PGLS-a)	Mean(FIC)	Var(FIC)	Mean(TIPS)	Var(TIPS)
Alpha	1.00	14.71	0.00	0.00	0.00	0.00	0.00
Correlation	1.00	-0.27	0.00	-0.25	0.00	-0.25	0.00
Percent R^2	1.00	7.12	0.00	6.28	0.00	6.33	0.00
LnLikelihood	1.00	-187.15	0.00	-196.32	0.00	-190.38	0.00
Intercept 0	1.00	33.23	0.00	23.28	0.00	32.15	0.00
Slope 0	1.00	3.25	0.00	22.30	0.00	2.54	0.00
Intercept 1	1.00	-22.76	0.00	-26.11	0.00	-17.60	0.00
Slope 1	1.00	9.62	0.00	11.81	0.00	7.93	0.00

95% CI on the Regression Intercept (1 on 2) including sampling variance and variance due to unknown phylogeny =
33.23 +/- 6.36 = 26.86 - 39.59

95% CI on Regression Slope (1 on 2) including sampling variance and variance due to unknown phylogeny =
-22.76 +/- 18.86 = -41.62 - -3.90

Reg Trait 2 on Trait 1

	N	Mean(PGLS-a)	Var(PGLS-a)	Mean(FIC)	Var(FIC)	Mean(TIPS)	Var(TIPS)
Alpha	1.00	3.57	0.00	0.00	0.00	0.00	0.00
Correlation	1.00	-0.26	0.00	-0.25	0.00	-0.25	0.00
Percent R^2	1.00	6.58	0.00	6.28	0.00	6.33	0.00
LnLikelihood	1.00	153.29	0.00	152.16	0.00	128.24	0.00
Intercept 0	1.00	0.37	0.00	0.37	0.00	0.40	0.00
Slope 0	1.00	0.06	0.00	0.21	0.00	0.05	0.00
Intercept 1	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Slope 1	1.00	0.00	0.00	0.00	0.00	0.00	0.00

95% CI on the Regression Intercept (1 on 2) including sampling variance and variance due to unknown phylogeny =
0.37 +/- 0.12 = 0.25 - 0.49

95% CI on Regression Slope (1 on 2) including sampling variance and variance due to unknown phylogeny =
0.00 +/- 0.00 = 0.00 - 0.00