Paleontología de Vertebrados

Archosauria basales y Pseudosuchia

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Arcosaurios constituyen el grupo corona que incluye a aves y cocodrilos

Origen de Archosauria

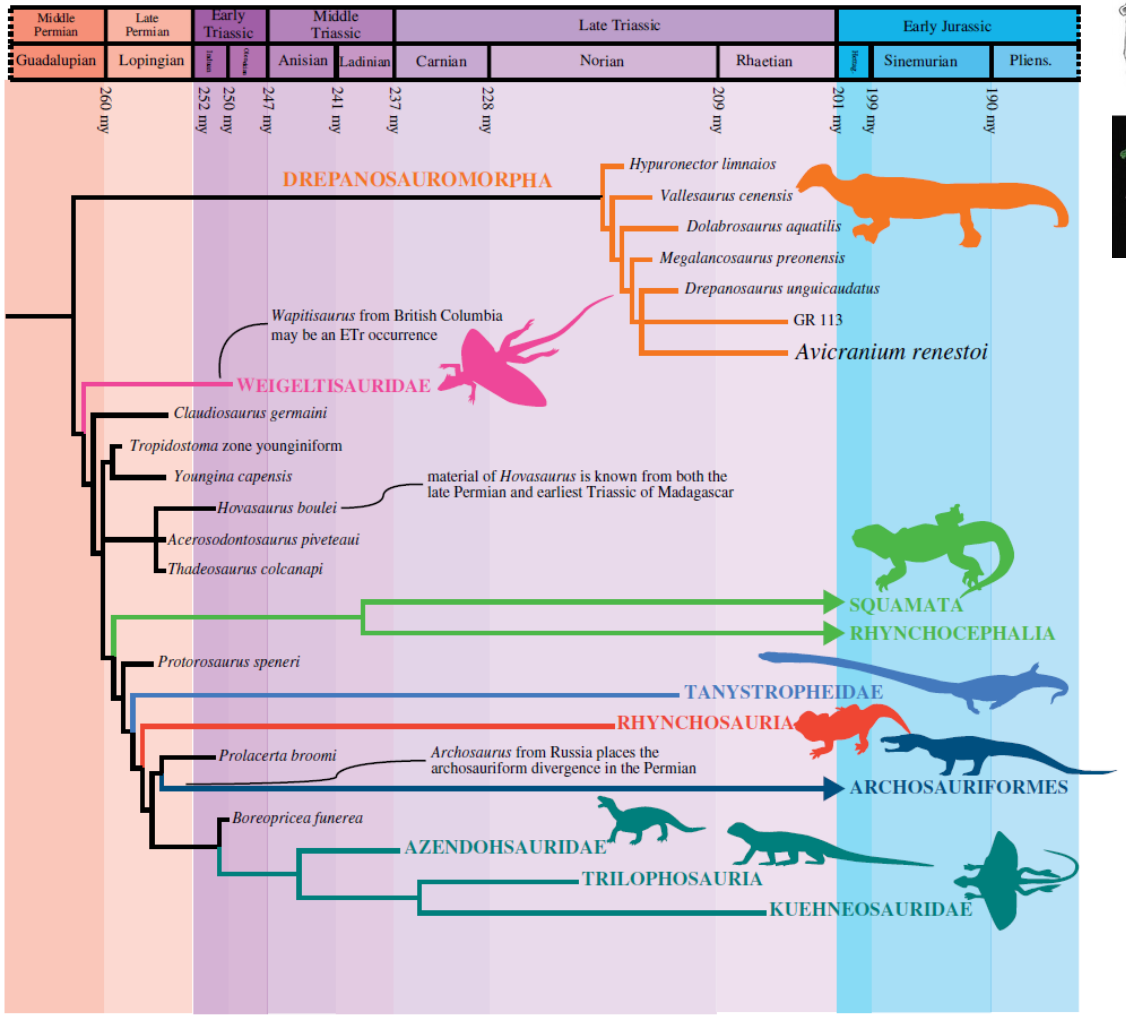
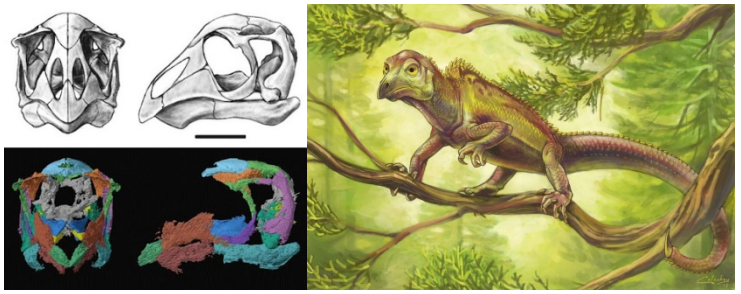
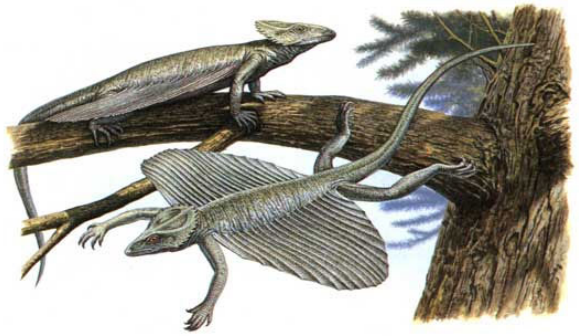


Figure 4. Strict consensus of most-parsimonious trees based on the phylogenetic analysis presented herein. *Petrolacosaurus kansensis* (not shown) was designated as the outgroup. Taxa listed in all-capitals are represented by multiple species-level terminal taxa in the analysis. The complete species-level topology is presented in figures 8 and 9.

Prittchard & Nesbitt 2017



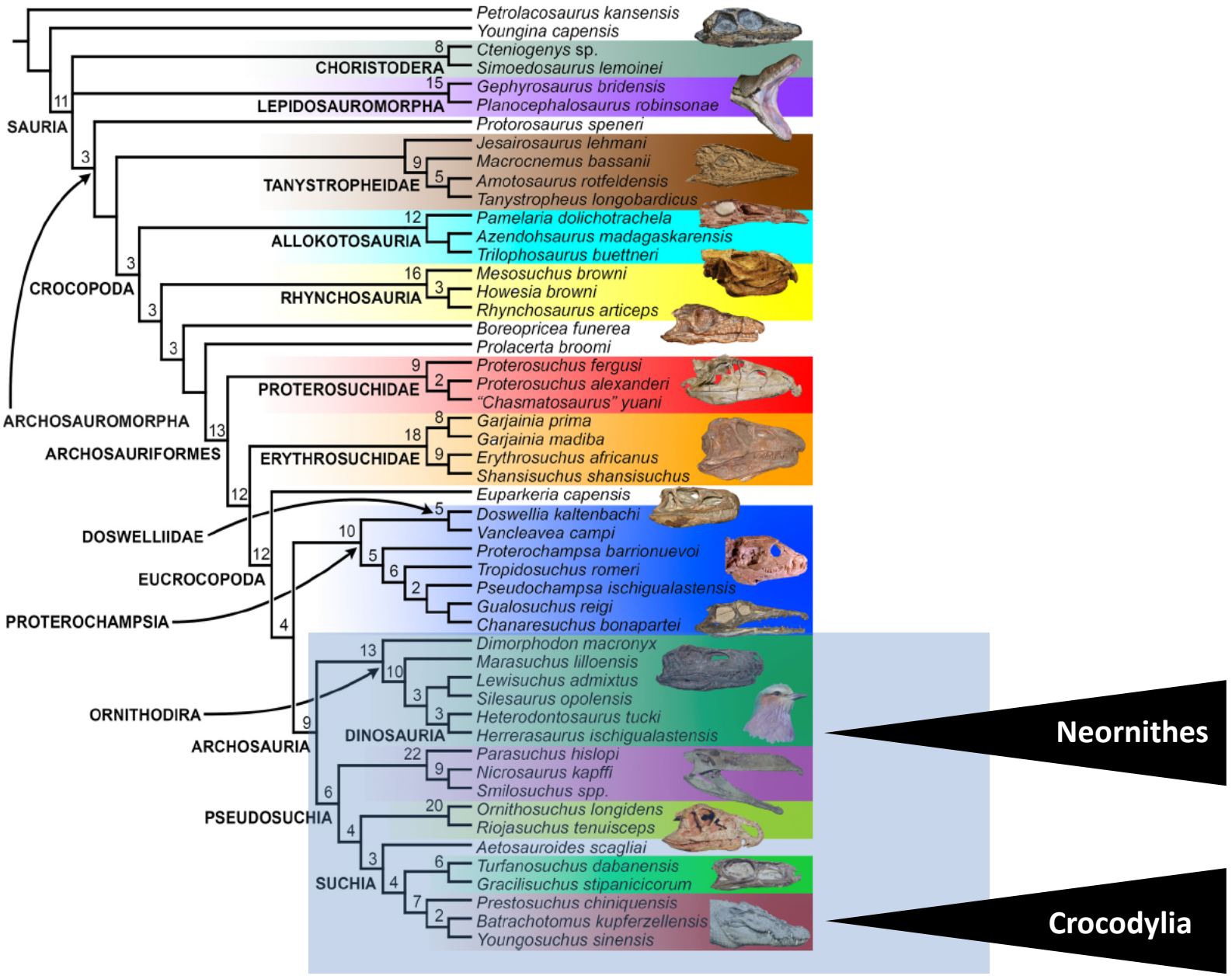
Avicranium renestoi (Drepanosauromorpha)



Coelurosauravus elivensis (Weigeltisauridae)

Claudiosaurus germaini (Claudiosauridae)

Archosauomorpha > Archosauria



Choristodera

Grupo de diápsidos semiacuáticos cuyo registro va desde el Jurásico al Mioceno. Las afinidades de este grupo son inciertas, algunos recientes trabajos los clasifican en el linaje conducente a aves y cocodrilos más que a lepidosaurios.

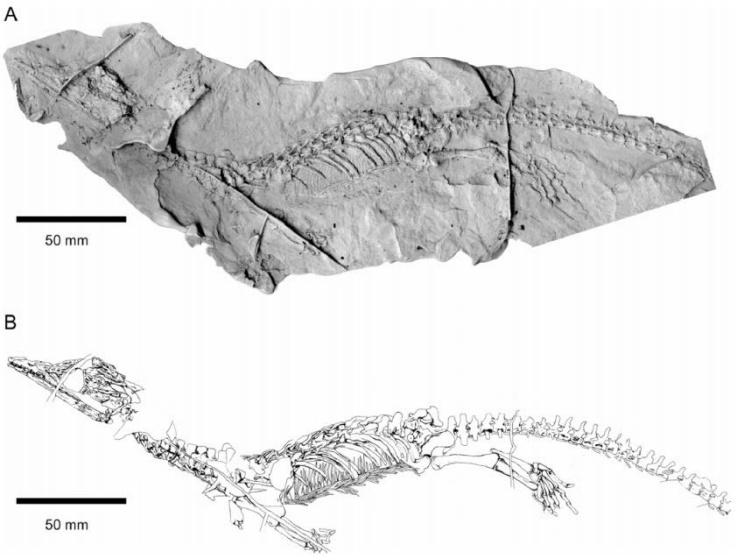
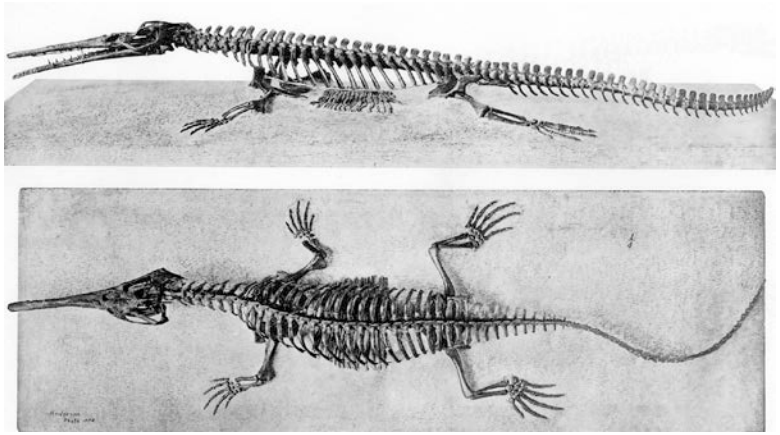


FIGURE 2. *Lazarussuchus* sp. Skeleton, BDL 1819. **A**, photograph of cast; **B**, explanatory line drawing of the specimen (excluding the posterior end of the tail).



Champsosaurus

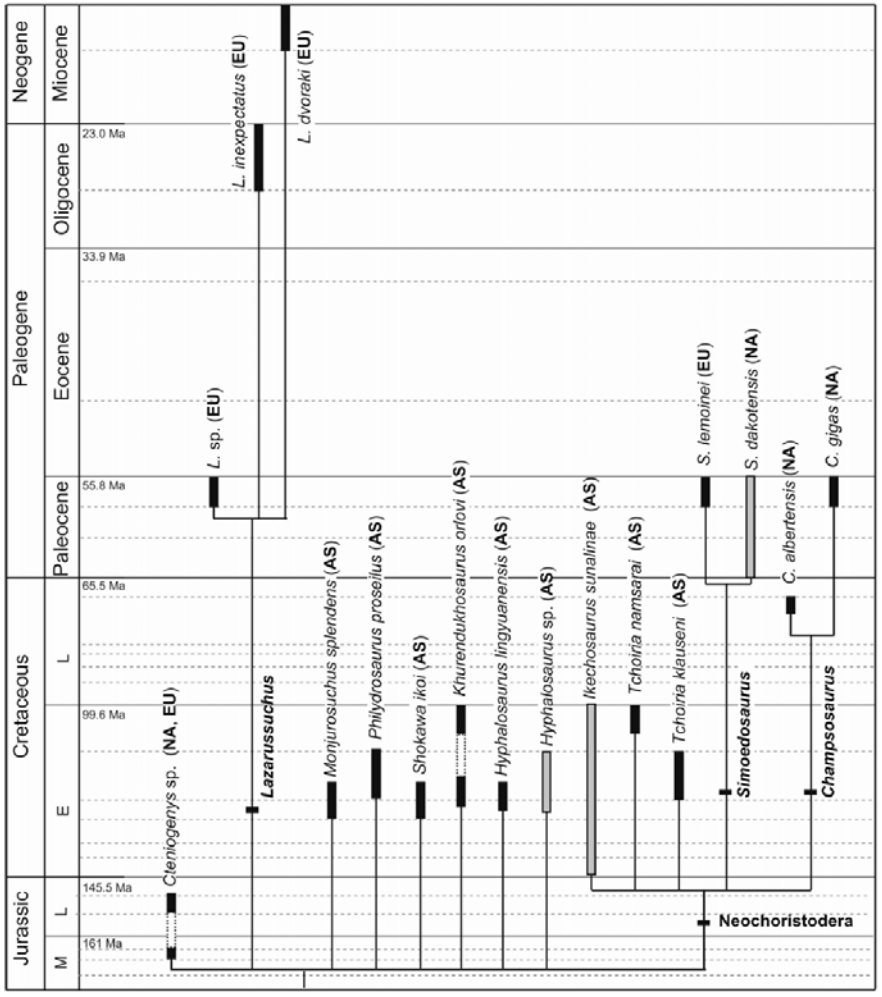


FIGURE 10. Stratigraphic record of the Choristodera. Black bars are used when the age of a locality is identified to stage level, and gray bars indicate the possible range of a formation across more than two stages. Dashed boxes indicate the expected range of the species based on other occurrences. **Abbreviations**: **AS**, Asia; **EU**, Europe; **NA**, North America.

Archosauromorpha

Definición: *Protorosaurus* y todos los saurios más cercanamente emparentados a *Protorosaurus* que a Lepidosauria (Dilkes, 1998). (=Clado menos inclusivo que contiene a cocodrilos y aves, pero no a lepidosaurios).

Rango Temporal: Pérmico medio – Presente.

Sinapomorfías (de acuerdo a Ezcurra, 2016):

- ~~Ausencia de notochordal pit~~ (310:0→1)
- Al menos un centro vertebral cervical alargado y con forma de paralelogramo en vista lateral, con superficie articular anterior más alta que la posterior (313:0→1)
- Vértebras cervical posterior y dorsal anterior con lámina centrodiapofisial o paradiapofisial anterior (315:0→1)
- Vértebras cervical y dorsal anterior con lámina centrodiapofisial posterior (316:0→1)
- Vértebras cervical posterior y/o dorsal anterior con lámina centrodiapofisial prezigapofisial (317:0→1)

Archosauromorpha incluyendo Choristodera:

- Cóndilo occipital semiesférico y antero-posteriormente alargado
- Húmero sin formane extepicondilar

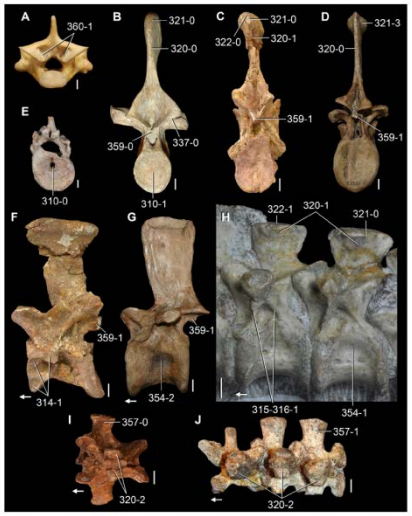


Figure 31 Presacral vertebrae of Permo-Triassic and Recent saurians in (A–E) posterior, (F–H) lateral, and (I, J) dorsal views. (A) *Salvator merianae* (MACN-He 47992); (B) *Tanystropheus longobardicus* (SMNS 55341); (C, F) *Guchengosuchus shiguiensis* (IVPP V8808-10); (D, G) *Butrachotemus kupferzellensis* (SMNS 80296, [G] mirrored); (E) *Aenigmastropheus parringtoni* (UMZC T836); (H) *Euparkeria capensis* (SAM-PK-6047A); (I) *Prolacerta broomi* (BP/1/2675); and (J) *Proterosuchus fergusi* (GHG 363). Numbers indicate character-states scored in the data matrix and the arrows indicate anterior direction. Scale bars equal 2 mm in (A, G, H), and 1 cm in (B–F, I).

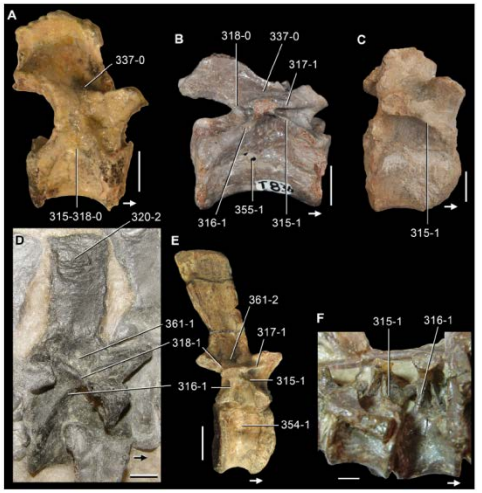


Figure 34 Dorsal vertebrae of Permo-Triassic neodiapsids in (A–E) lateral and (F) ventrolateral views. (A) Anterior-middle dorsal vertebra of *Youngina capensis* (BP/1/3859); (B) anterior dorsal vertebra of *Aenigmastropheus parringtoni* (UMZC T836); (C) anterior-middle dorsal vertebra of *Tarjadia ruthae* (PULR 63, mirrored); (D) first dorsal vertebra of *Protorosaurus speneri* (BSPG 1995 I 5 [cast of WMsN P47361]); (E) middle dorsal vertebra of *Erythrosuchus africanus* (NHMUK PV R3592); and (F) middle dorsal vertebrae of *Chanaresuchus bonapartei* (MCZ 4037). Numbers indicate character-states scored in the data matrix and the arrows indicate anterior direction. Scale bars equal 2 mm in (A), 5 mm in (B, D, F), 1 cm in (C), and 5 cm in (E).

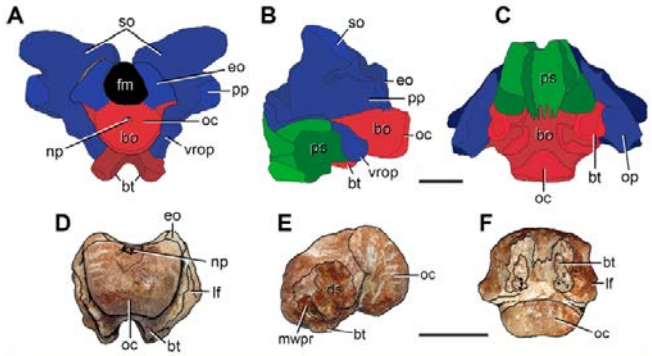


Figure 3 Anatomical comparison between (A–C) the pelycosaur *Secodontosaurus obtusidens* (modified from *Reisz, Berman & Scott, 1992*) and (D–F) FC-DPV 2641 in (A, D) posterior, (B, E) left lateral, and (C, F) ventral views. Supraoccipitals, opisthotics and exoccipitals are indicated in blue, basioccipital in red, and parasphenoid in green. Abbreviations: bo, basioccipital; bt, basal tubera; ds, damaged surface; eo, exoccipital; lf, lateral flange of the basioccipital; mwpr, medial wall of the pseudolagenar recess; np, notochordal pit; oc, occipital condyle; op, opisthotic; pp, paraoccipital process; ps, parasphenoid; so, supraoccipital; vrop, ventral ramus of the opisthotic. Scale bars equal 10 mm.

Este clado agrupa a una serie de linajes basales como los Protorosauria, Choristodera, Rhynchosauria, Trylophosauria, Prolacertiformes, Erythrosuchidae, Proterosuchidae y el grupo corona **Archosauria** que a su vez contiene 2 grandes clados:

Pseudosuchia: grupo que incluye a los cocodrilos y relativos.
Ornithodira: grupo que da origen a las aves. Incluye a dinosaurios (aves) y pterosaurios.

Diversidad de arcosauromorfos basales

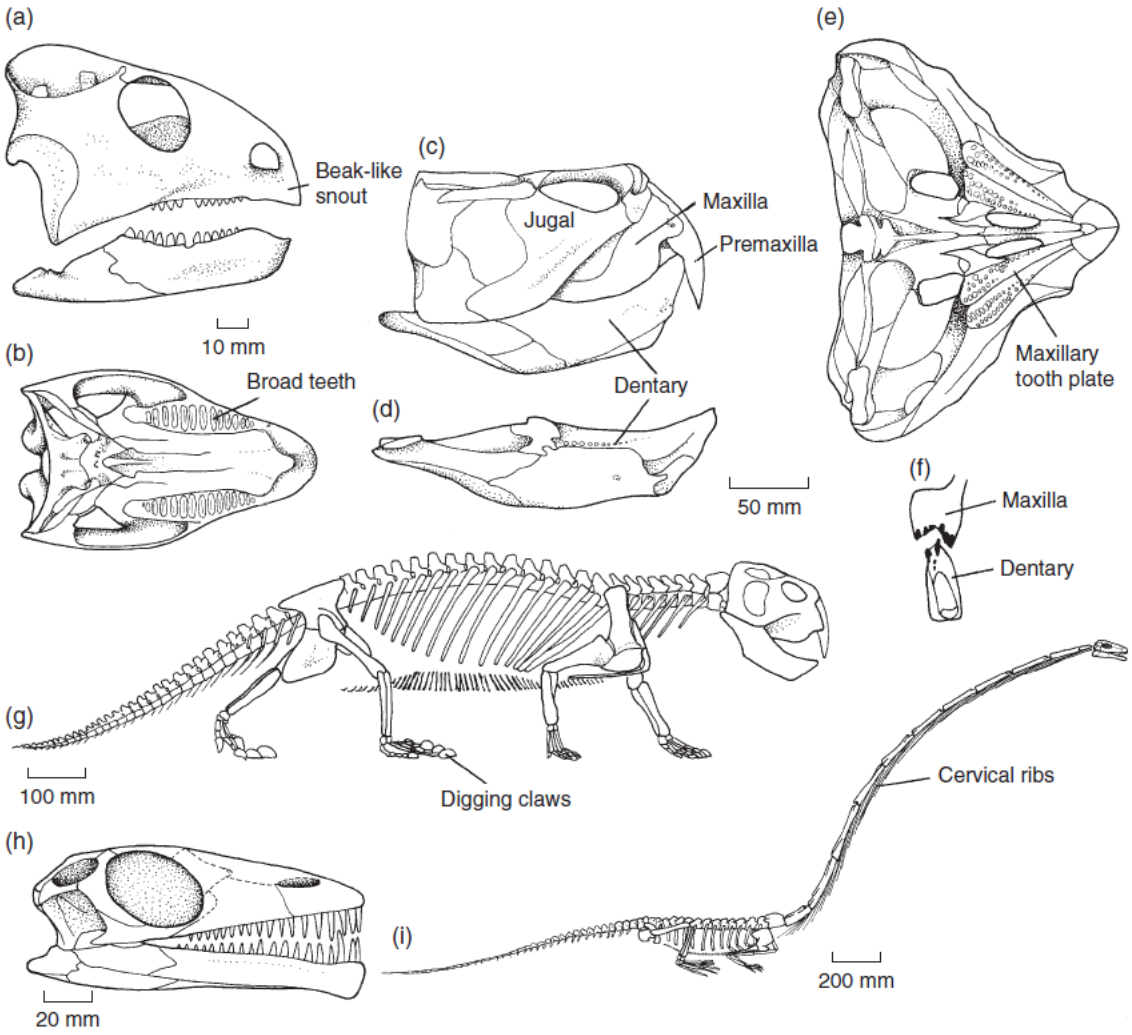


Figure 6.5 Archosauromorphs of the Triassic: (a,b) the trilophosaurid *Trilophosaurus*, skull in lateral and ventral views; (c–g) the rhynchosaur *Hyperodapedon*: (c) skull in lateral view, (d) lower jaw in medial view, (e) skull in ventral view, (f) vertical cross-section through the tooth-bearing bones of the skull (maxilla) and lower jaw (dentary) to show the precise fit, (g) skeleton; (h,i) the protorosaur *Tanystropheus*: (h) skull, (i) skeleton of a large species, showing the enormously elongated neck. Source: (a,b) Adapted from Gregory (1945). (c–g) Adapted from Benton (1983b). (h,i) Adapted from Wild (1973).

Phylogenia de Archosauromorpha

Actualmente Archosauromorpha contendría:

- Parte de "Protorosauria" (polifilético), *Protorosaurus*, Tanystropheidae
- Allokotosauria
- Rhynchosauria
- "Proterosuchia" (parafilético), Proterosuchidae, Erytrhosuchidae
- Proterochampsia
- Avemetatarsalia (Ornithodira+Aphanosauria)
- Pseudosuchia

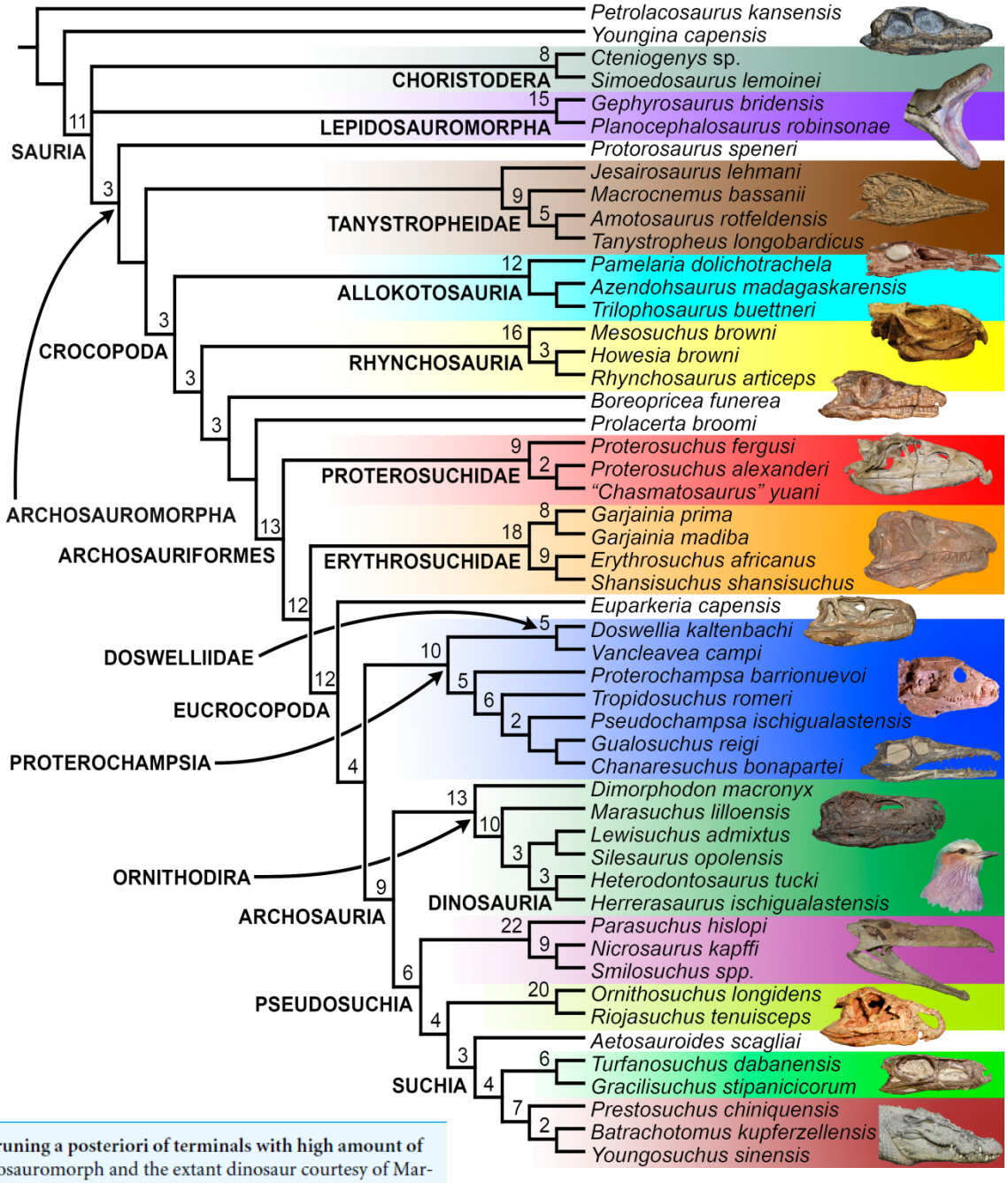


Figure 57 **Bremer supports recovered after the pruning a posteriori of terminals with high amount of missing data in analysis 3.** Photograph of the lepidosauromorph and the extant dinosaur courtesy of Mariana Grassetti and photograph of the allokotosaurian courtesy of Sterling Nesbitt.

Ezcurra, 2016

Biocrón de clados arcosauromorfos basales

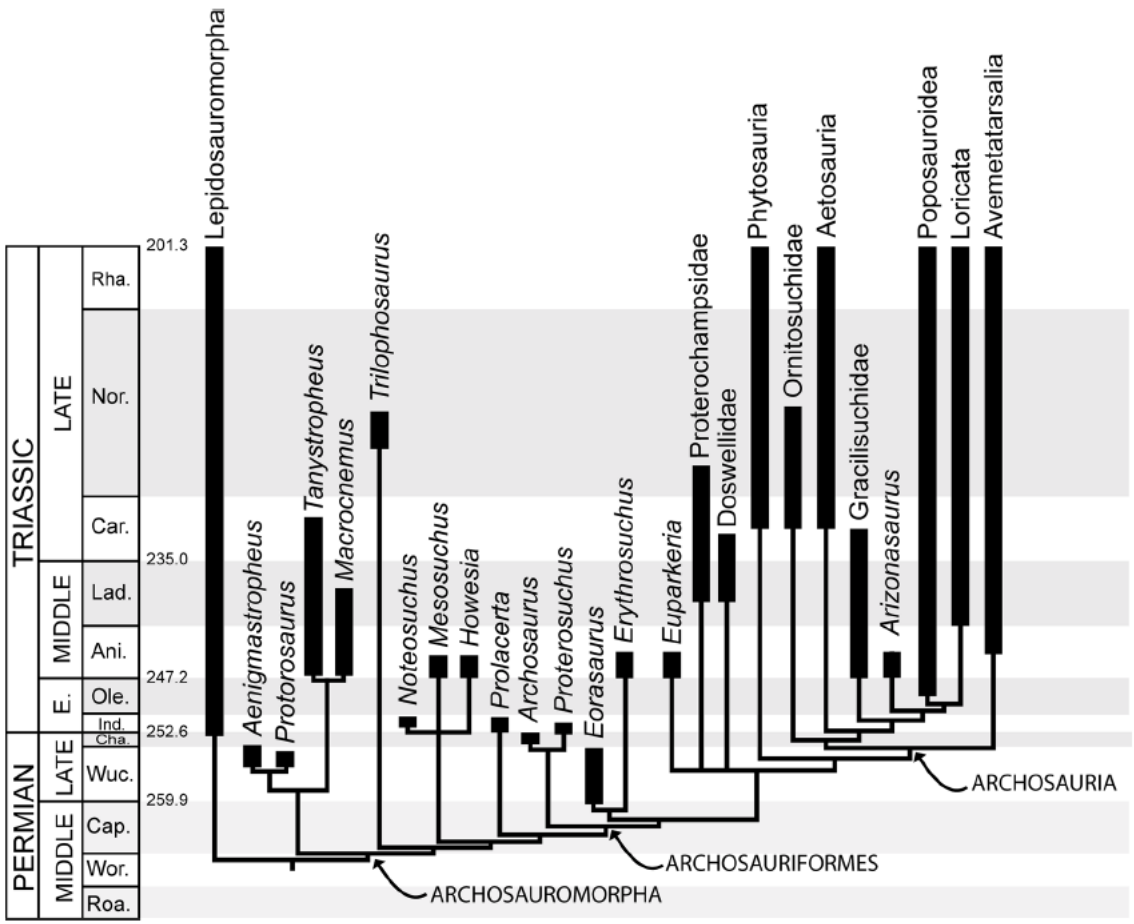


Fig 3. Time-calibrated cladogram of archosauromorhs discussed in the text based on skeletal remains only. Highly debated relatioships have been collapsed into polytomies. We here depict their position after [1,9,118–123]. Geological timescale after [193].

Bernardi et al 2015

Tanystropheidae

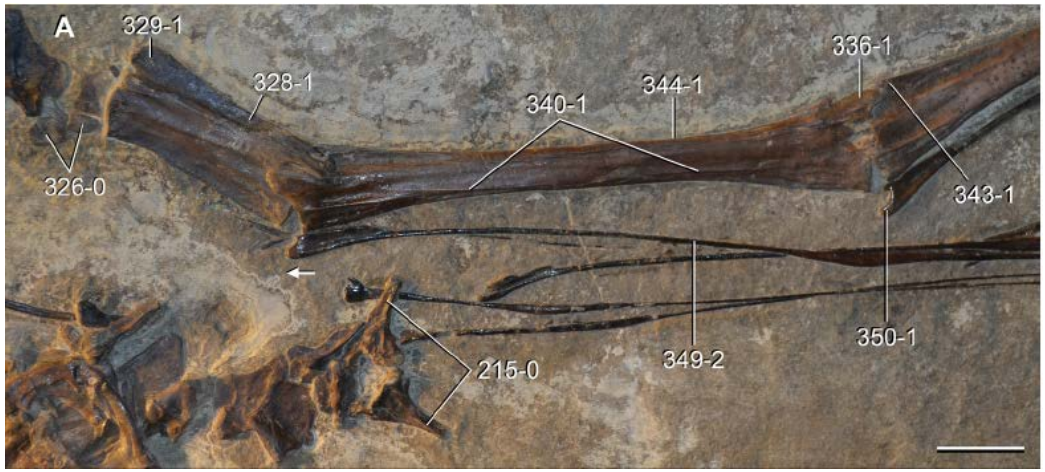
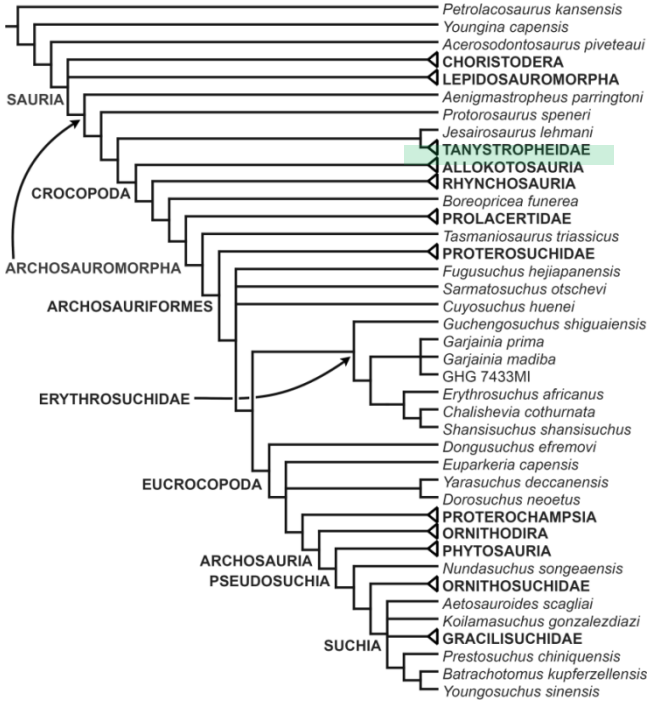
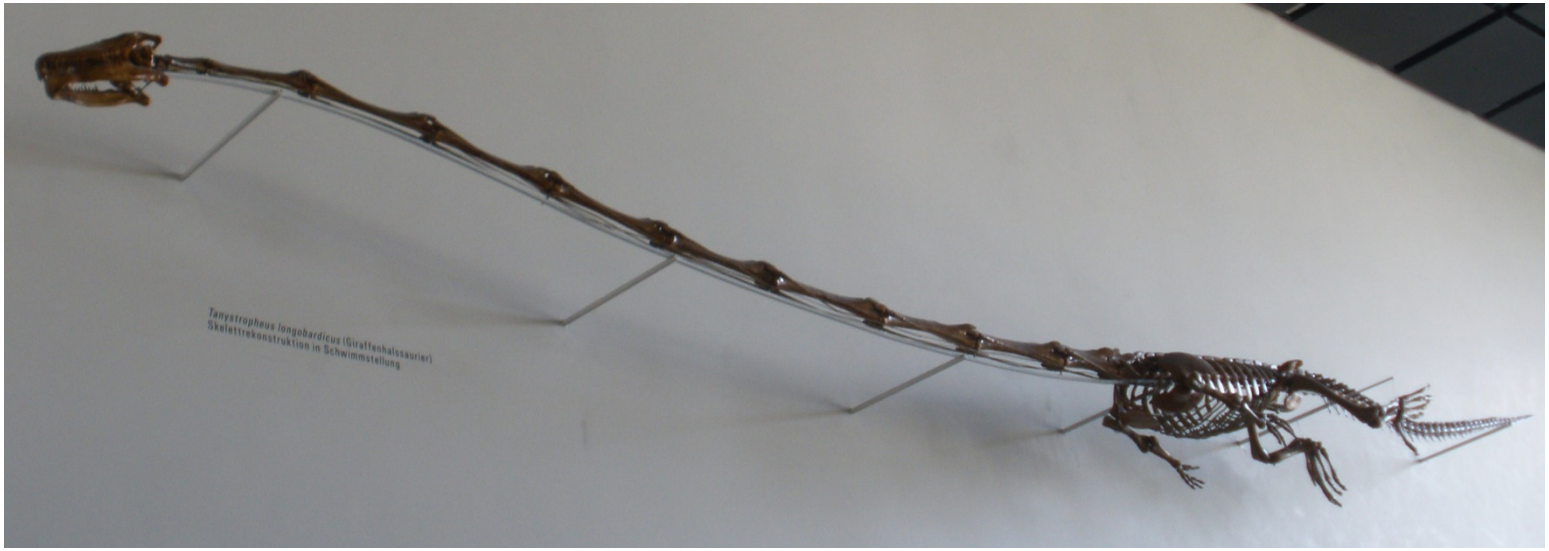


Figure 30 **Anterior cervical vertebrae of Triassic archosauromorphs in left lateral view.** (A) *Tanystropheus longobardicus* (PIMUZ T2189); (B) *Sarmatosuchus otschevi* (PIN 2865/68-22); (C) *Parasuchus hislopi* (ISI R42); and (D) *Silesaurus opolensis* (ZPAL AbIII unknown number). Numbers indicate character-states scored in the data matrix and the arrows indicate anterior direction. Scale bars equal 2 cm in (A), 5 mm in (B, C), and 2 mm in (D).





Viviparía en Archosauromorpha basales

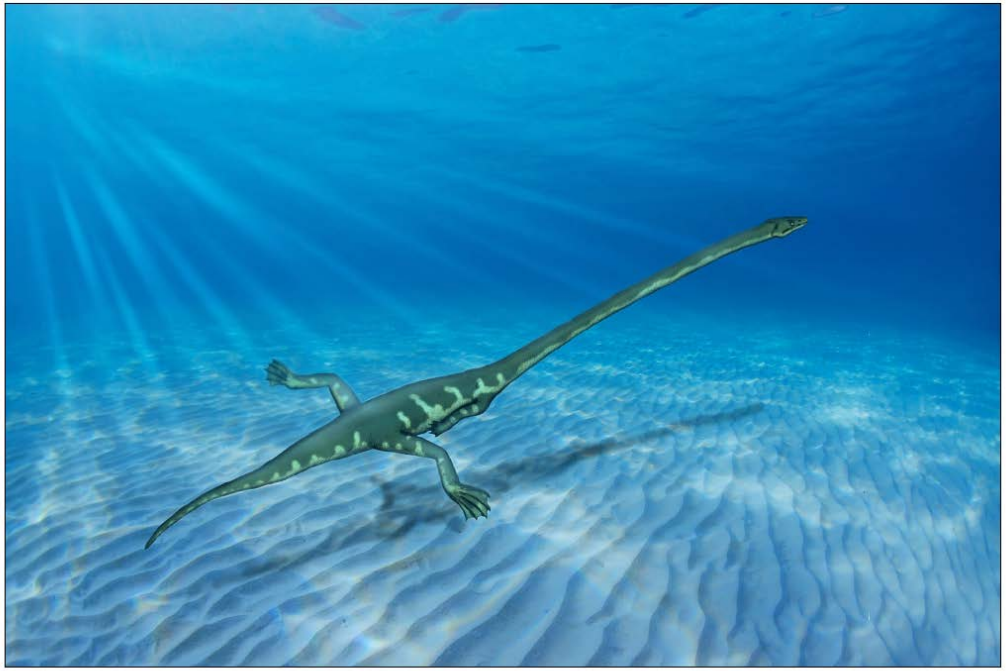


Fig. 6 - Reconstruction of *Tanystropheus* swimming in shallow sea.

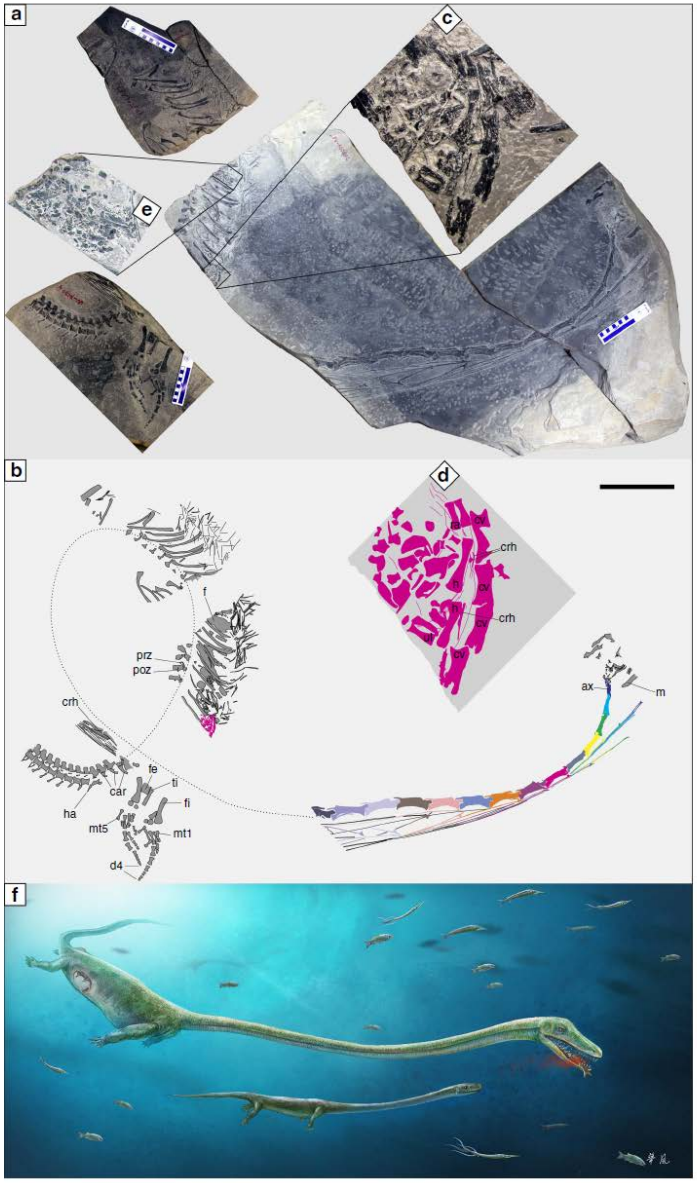
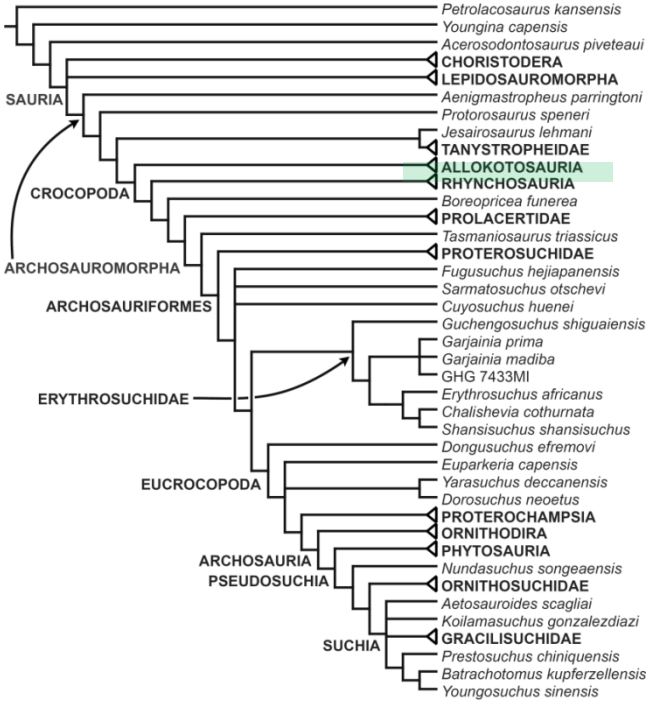


Figure 3 | Skeleton of the new *Dinocephalosaurus* specimen LPV 30280. (**a**) Photograph. The three separate blocks are arranged following their original positions in the field. (**b**) Interpretive drawing. Dotted line indicates the rough course of the vertebral column of the adult. The different colour in the cervical region aims to facilitate the association of cervical ribs with corresponding vertebrae. (**c**) Photo showing a close-up of the embryo preserved in the stomach region of LPV 30280. (**d**) Interpretive drawing of the embryo. (**e**) Photo showing a close-up of the perleidid fish preserved in the stomach region of LPV 30280. (**f**) Artist's reconstruction of *Dinocephalosaurus* showing the rough position of the embryo within the mother. ax, axis; car, caudal rib; crh, cervical rib head; cv, cervical vertebrae; d4, fourth digit; f, perleidid fish; fe, femur; fi, fibula; h, humerus; ha, haemal arch; m, mandible; mt1, metatarsal 1; mt5, metatarsal 5; poz, postzygapophysis; prz, prezygapophysis; ra, radius; ti, tibia; ul, ulna. Scale bar, 20 cm.

Allokotosauria

Definición: clado menos inclusivo que contiene a *Azendohsaurus madagaskarensis* y *Trilophosaurus buettneri* pero no a *Tanystropheus longobardicus*, *Proterosuchus fergusi*, *Protorosaurus speneri* o *Rhynchosaurus articeps* (Nesbitt et al., 2015).



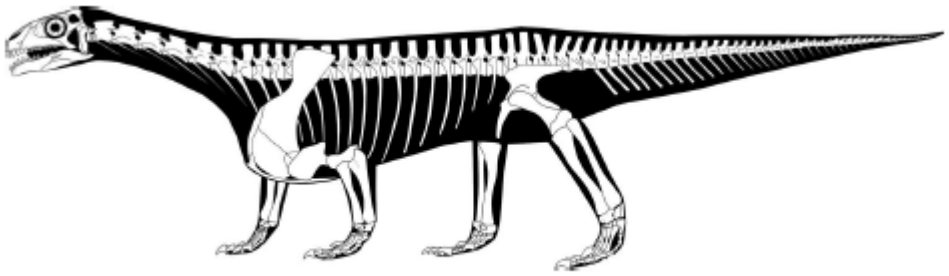


Fig. 1. Skeletal reconstruction of *Azendohsaurus madagaskarensis*.

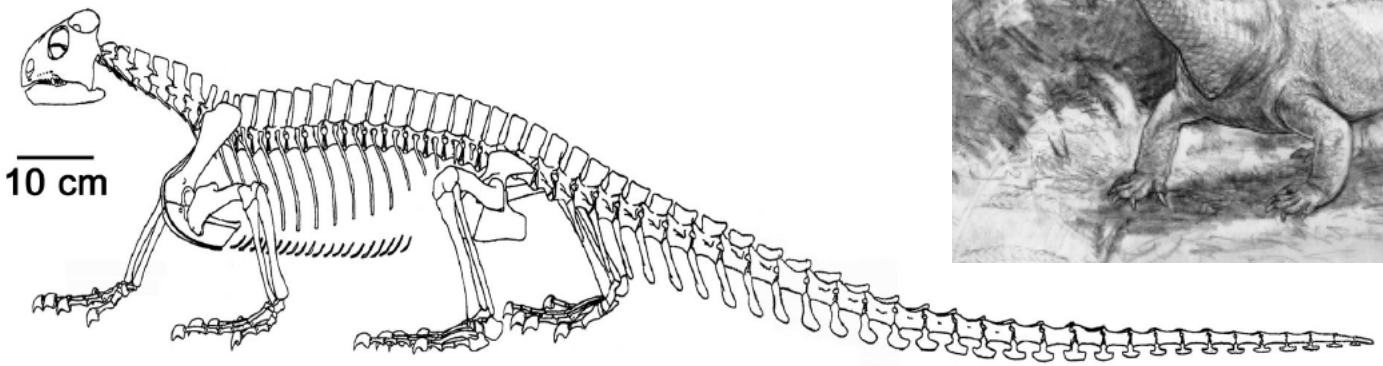
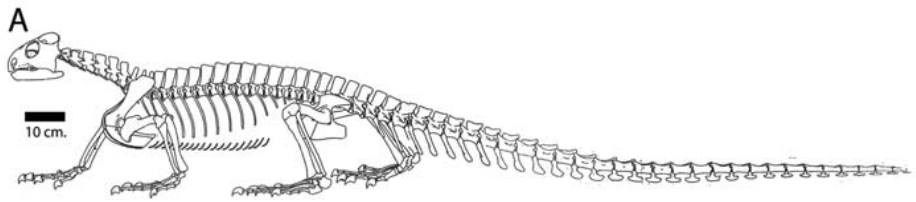


FIGURE 1. Full skeletal reconstruction of *Trilophosaurus buettneri* in a walking pose (from Gregory, 1945, pl. 33).

Trilophosauridae



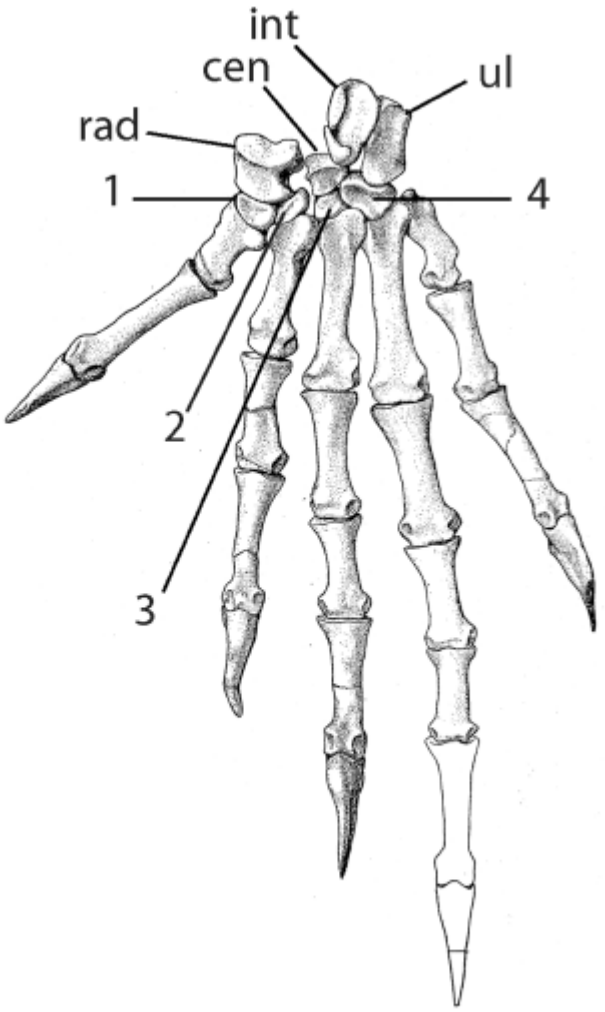


FIGURE 75. Reconstruction of the left manus of *Trilophosaurus buettneri*. After Gregory (1945, fig. 10). **Abbreviations:** cen, centrale; int, intermedium; rad, radiale; ul, ulnare; 1–4, distal carpals.

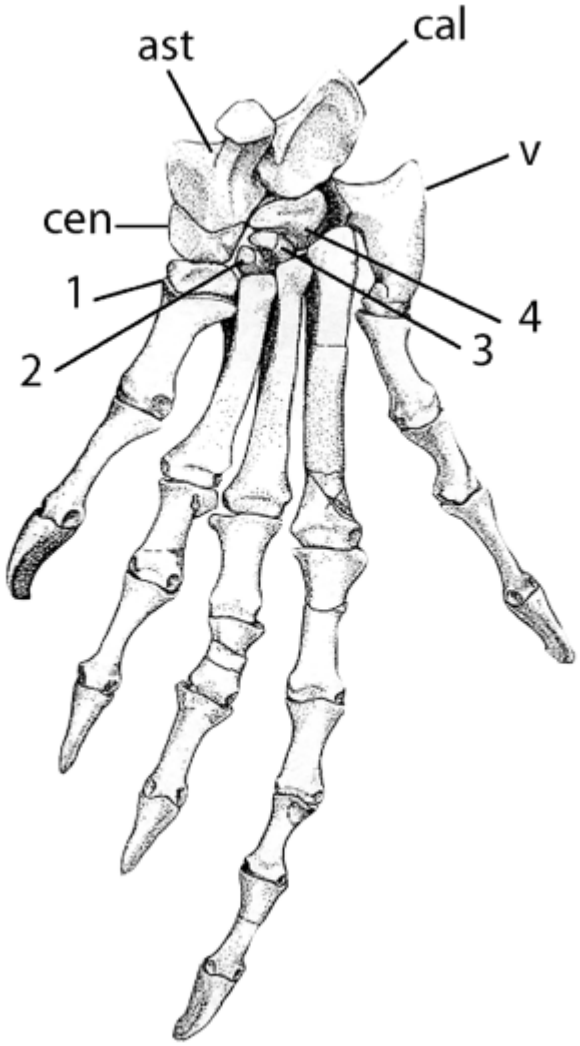
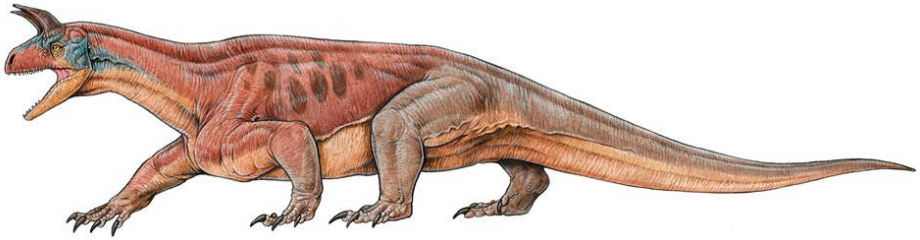


FIGURE 92. Reconstruction of the pes of *Trilophosaurus buettneri*. After Gregory (1945, fig. 11). Labeling is the same as in Figure 91.

Azhendosauridae



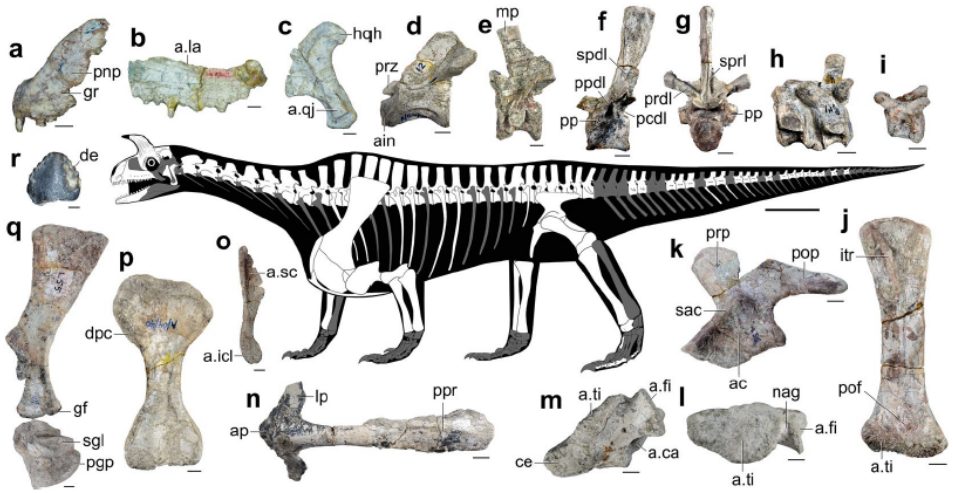


Figure 3. Skeletal anatomy of *Shringasaurus indicus* gen. et sp. nov. (**a**) Left premaxilla (ISIR 793) in lateral view. (**b**) Left maxilla (ISIR 795) in lateral view. (**c**) Left quadrate (ISIR 797) in lateral view. (**d**) Axis (ISIR 803) in left lateral view. (**e**) Posterior cervical vertebra (ISIR 820) in left lateral view. (**f**,**g**) Anterior dorsal vertebra (ISIR 825) in left lateral view in (**f**), and anterior view in (**g**). (**h**) Two anterior caudal vertebrae (ISIR 875) in right lateral view (mirrored). (**i**) Posterior caudal vertebra (ISIR 892) in left lateral view. (**j**) Right femur (ISIR 1016) in ventral view. (**k**) Left ilium (ISIR 991) in lateral view. (**l**), (**m**) Right astragalus and fused lateral centrale (ISIR 1059) in proximal view in (**l**), and dorsal view in (**m**). (**n**) Interclavicle (ISIR 950) in ventral view. (**o**) Left clavicle (ISIR 948) in medial view. (**p**) Left humerus (ISIR 951) in ventral view. (**q**) Left scapula (ISIR 929) and coracoid (ISIR 941) in lateral view. (**r**) Tooth crown (ISIR 801A) in labial view. Scales = 1 cm for (**a**–**c**,**i**,**m**,**l**), 2 cm for (**d**–**h**,**j**,**k**,**n**–**q**), and 1 mm for (**r**), and skeleton = 25 cm. a. articulates with; ac, acetabulum; ain, axial intercentrum; ap, anterior process; ca, calcaneum; ce, lateral centrale; de, denticles; dpc, deltopectoral crest; fi, fibula; gf, glenoid fossa; gr, groove; hqh, hooked quadrate head; icl, interclavicle; itr, internal trochanter; la, lacrimal; lp, lateral process; mp, mammillary process; nag, non-articular gap; pcdl, posterior centrodiapophyseal lamina; pgp, postglenoid process; pnp, postnasal process; pof, popliteal fossa; pop, postacetabular process; pp, parapophysis; ppr, posterior process; ppdl, paradiapophyseal lamina; prdl, prezygodiapophyseal lamina; prp, preacetabular process; prz, prezygapophysis; qj, quadratojugal; sac, supraacetabular crest; sc, scapula; sgl, subglenoid lip; spdl, spinodiapophyseal lamina; sprdl, spinoprezygapophyseal lamina; ti, tibia.

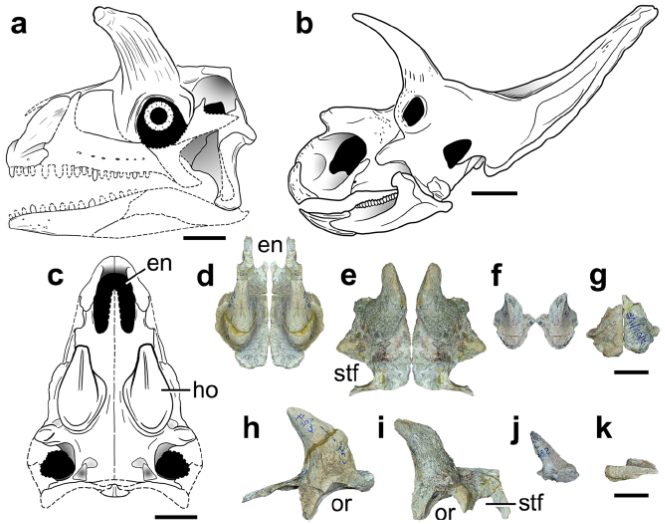


Figure 2. Cranial anatomy of *Shringasaurus indicus* gen. et sp. nov. and comparison with the skull of a ceratopsid dinosaur that possesses convergent supraorbital horns. (**a**) Reconstruction of the skull of *Shringasaurus indicus* in left lateral view. (**b**) Drawing of the skull of *Arrhinoceratops brachyops* in left lateral view (based on ROM 796[48]). (**c**) Reconstruction of the skull of *Shringasaurus indicus* in dorsal view. (**d**–**g**) Partial skull tables of *Shringasaurus indicus* in dorsal views (ISIR 781, 780, 786, 789, 790 from left to right), one side has been digitally mirrored in (**d**–**f**). (**h**–**k**) Partial skull tables of *Shringasaurus indicus* in left lateral views (ISIR 781, 780, 786, 790 from left to right). Specimens (**d**–**f**) and (**h**–**j**) possesses horns and specimen/s (**g**) and (**k**) lacks horns. Scales = 4 cm for (**a**) and (**c**–**k**), and 20 cm for (**b**). en, external naris; ho, horn; or, orbit; stf, supratemporal fenestra.

Segunpta et al 2017

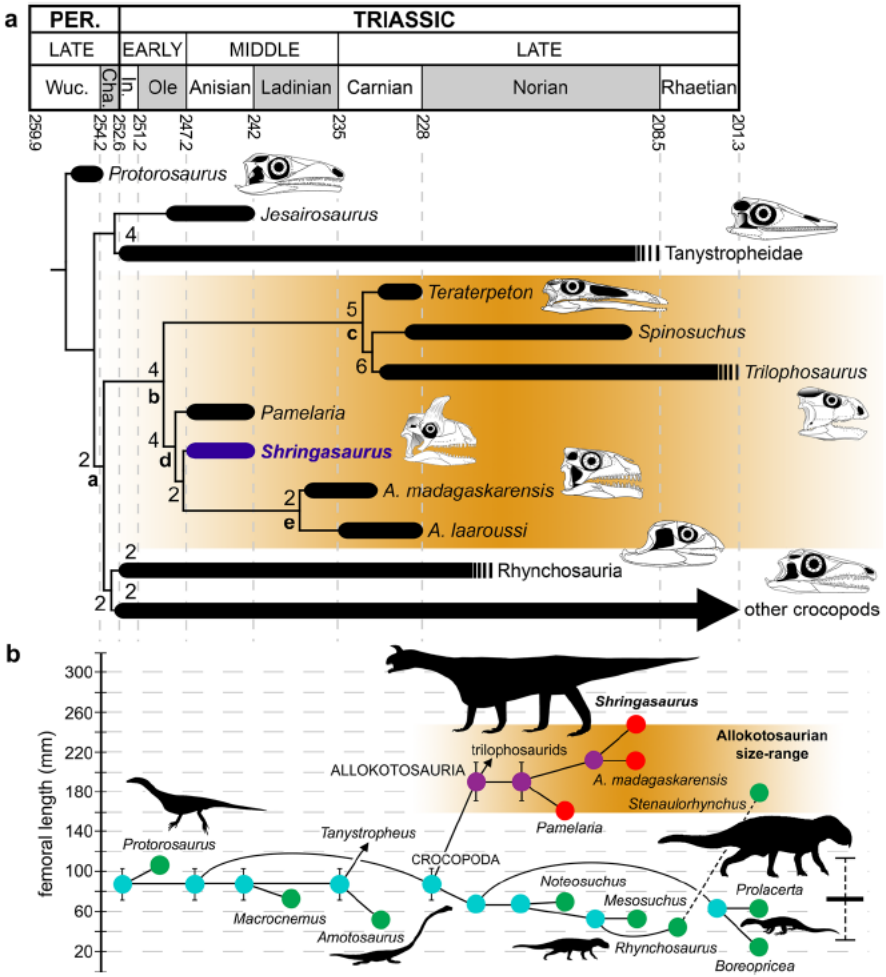
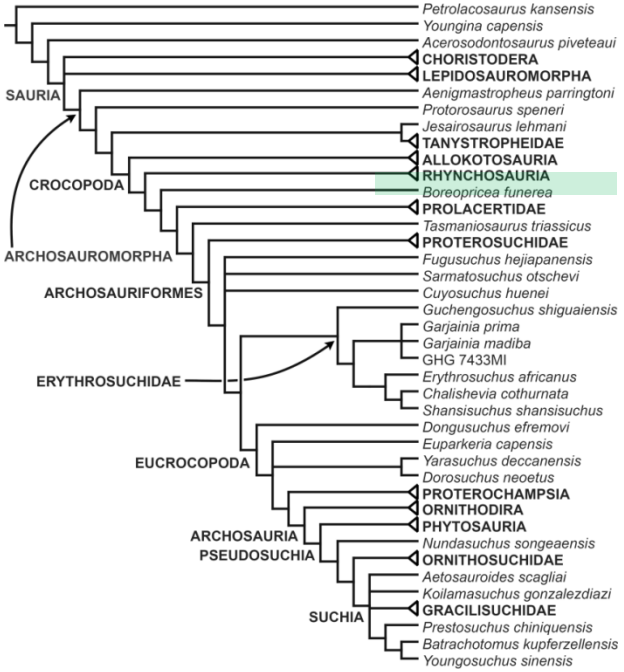


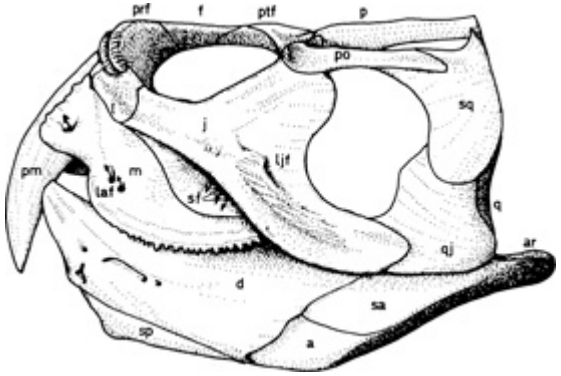
Figure 4. Phylogenetic relationships of *Shringasaurus indicus* gen. et sp. nov. and evolution of body size among early archosauromorphs. (**a**) Time calibrated strict consensus tree found in the data set analysed here (Supplementary Information). Diapsids more basal than *Protorosaurus* are not shown and all clades except Allokotosauria have been collapsed for clarity. Numbers at the nodes are Bremer support values higher than 1. (**b**) Evolution of femoral length (as proxy of body size) optimized as a continuous character using maximum parsimony among non-archosauriform archosauromorphs (Supplementary Information). The horizontal axis represents phylogenetic distance. Green circles represent non-allokotosaurian species, red circles represent allokotosaurians, light blue circles represent non-allokotosaurian ancestral femoral lengths, and violet circles represent allokotosaurian ancestral femoral lengths. The dotted line represents a branch not included in the phylogenetic analysis of this study and the horizontal bar with dotted vertical lines on the right side of the graphic represents the median and standard deviation of Permian to Middle Triassic non-allokotosaurian, non-archosauriform archosauromorph femoral length. a, Crocopoda; b, Allokotosauria; c, Trilophosauridae; d, Azendohsauridae; e, *Azendohsaurus*.

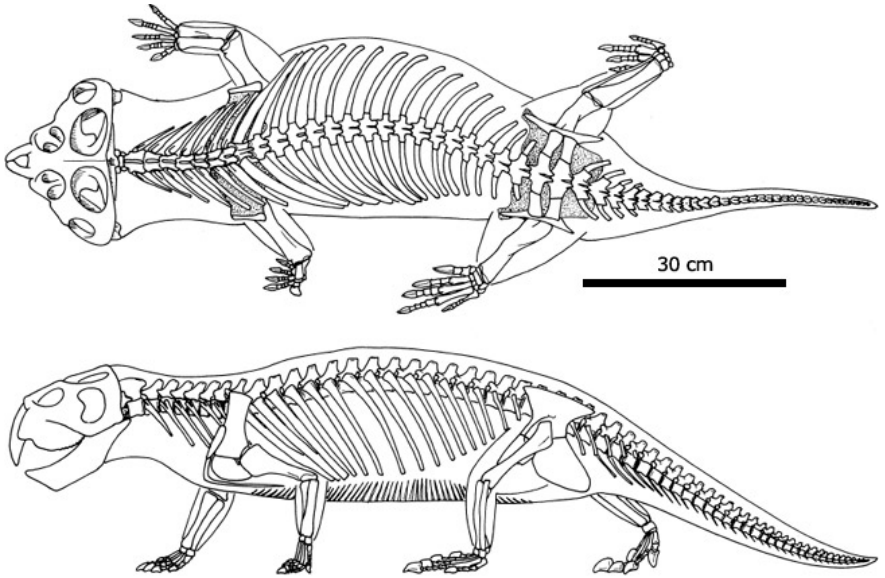
Segunpta et al 2017

Rhynchosauria

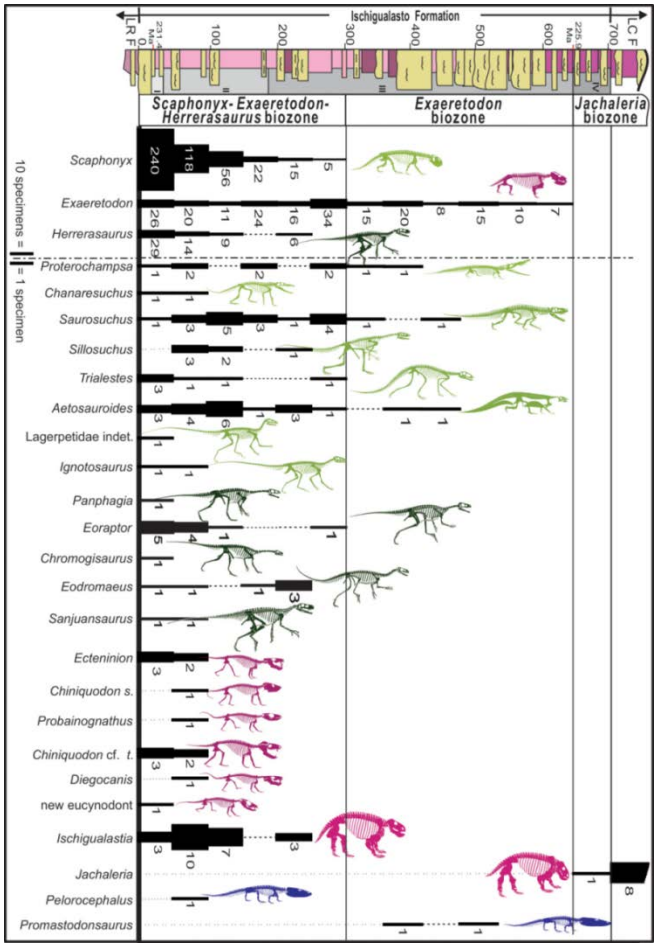
Definición: clado que incluye a las formas más cercanas a Rhynchosaurus articeps que a Trilophosaurus buettneri, Prolacerta broomi o Crocodylus niloticus (Ezcurra, 2016).







Bioestratigrafúa y biogeografía de Rincosaurios



Martínez et al 2013

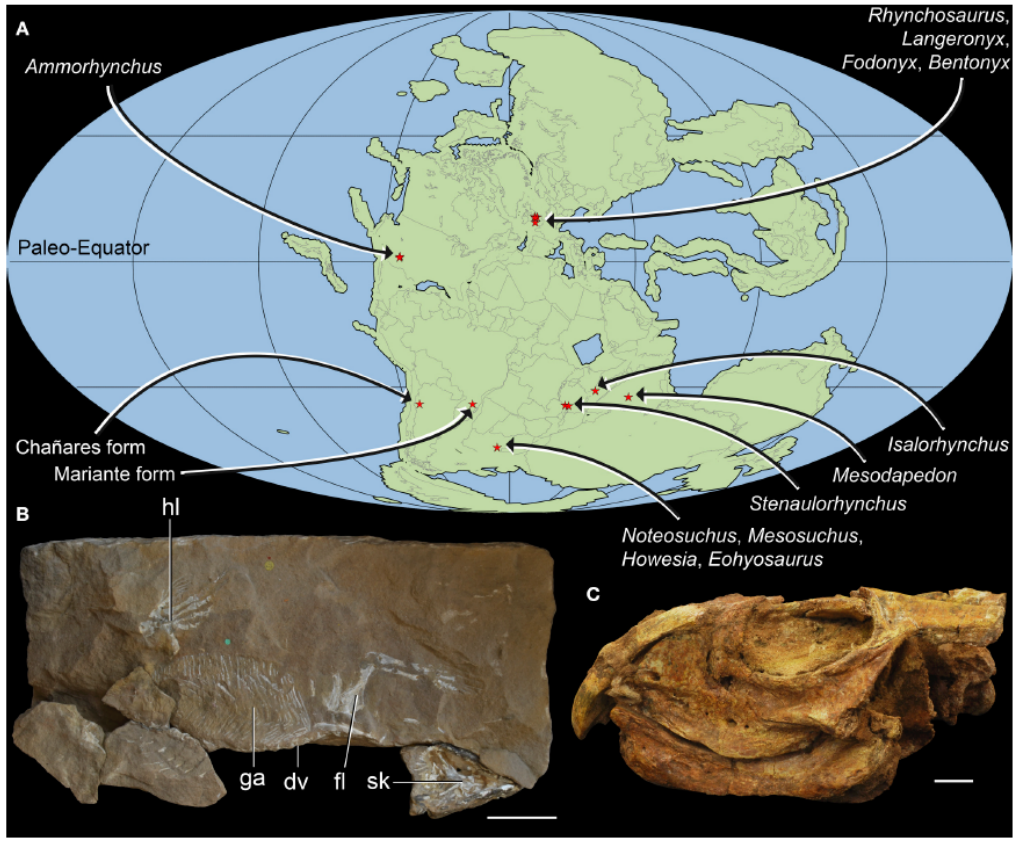


FIGURE 1 | Geographic distribution and overall morphology of Early-Middle Triassic rhynchosaurs. Paleomap showing geographical distribution **(A)** and early rhynchosaurid morphology exemplified by **(B)** a partial skeleton of *Rhynchosaurus articeps* (NHMUK PV R1237, R1238) and **(C)** the fairly complete skull of *Bentonyx sidensis* (BRSUG 27200, holotype). Abbreviations: dv, dorsal vertebrae; fl, forelimb; ga, gastralia; hl, hindlimb; sk, skull. Scale bars equal to 5 cm in **(B)** and 1 cm in **(C)**. Map **(A)** generated using Fossilworks tools created by Alroy (2013) using a map for 240 million years ago created by Scotese (2001) and data from the Paleobiology Database (www.paleobiodb.org).

Ezcurra et al 2016

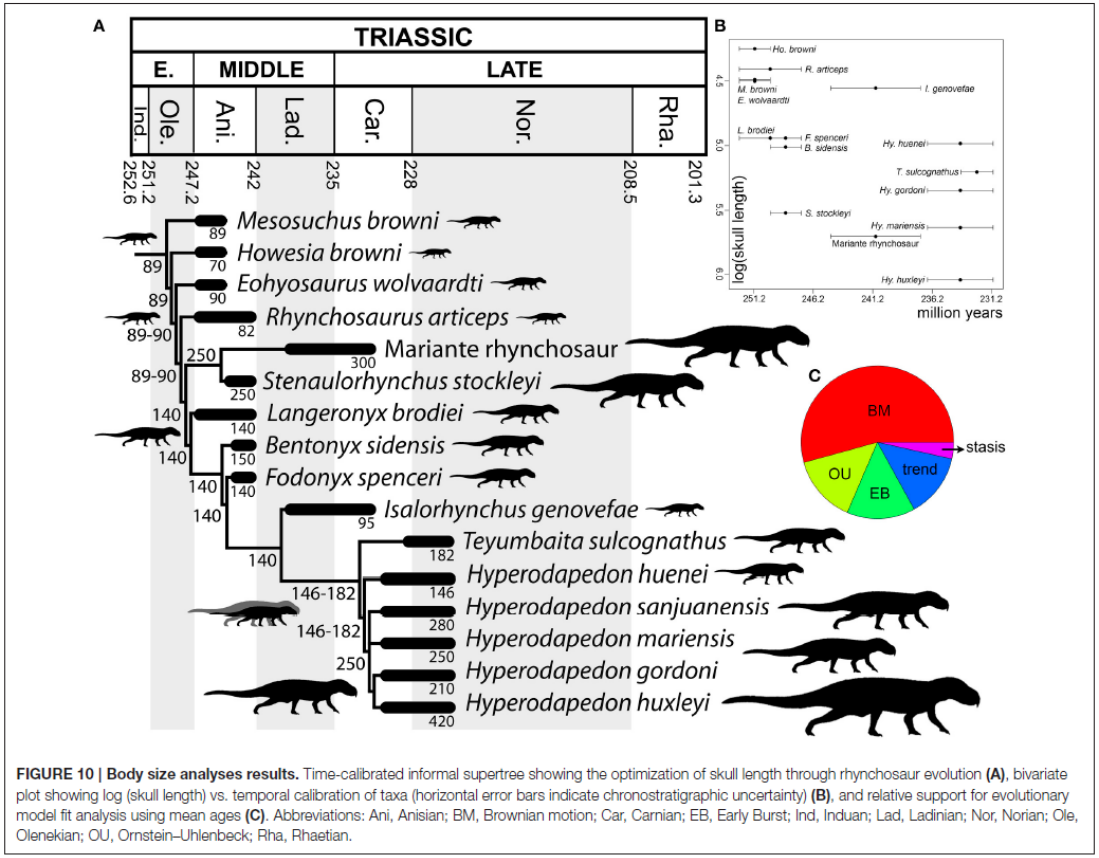
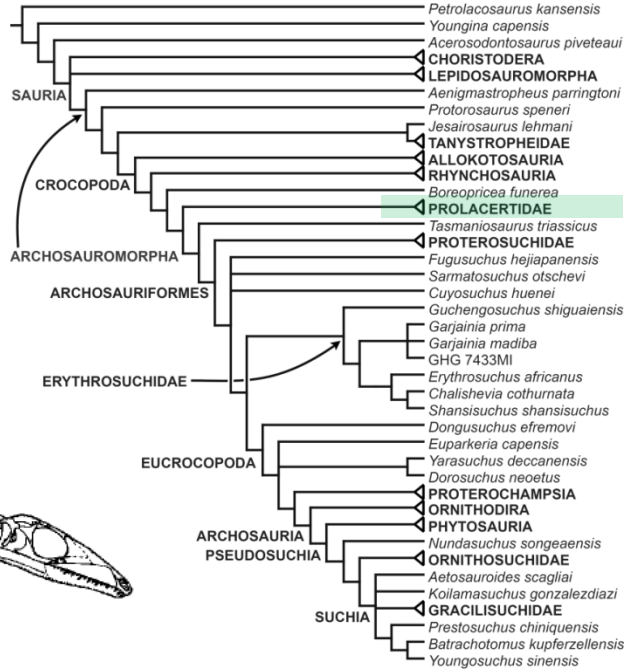


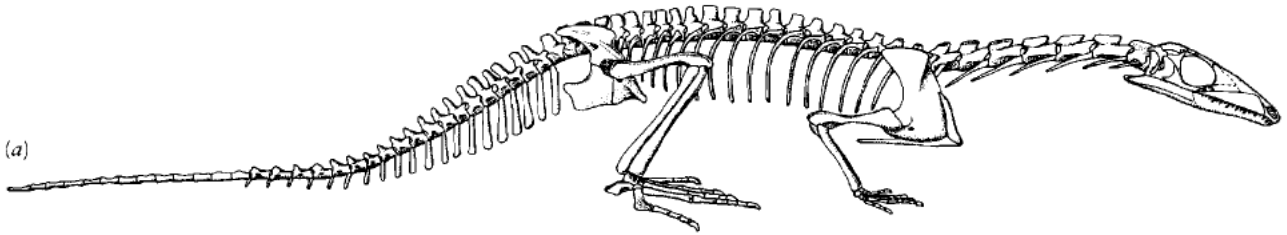
FIGURE 10 | Body size analyses results. Time-calibrated informal supertree showing the optimization of skull length through rhynchosaur evolution **(A)**, bivariate plot showing log (skull length) vs. temporal calibration of taxa (horizontal error bars indicate chronostratigraphic uncertainty) **(B)**, and relative support for evolutionary model fit analysis using mean ages **(C)**. Abbreviations: Ani, Anisian; BM, Brownian motion; Car, Carnian; EB, Early Burst; Ind, Induan; Lad, Ladinian; Nor, Norian; Ole, Olenekian; OU, Ornstein–Uhlenbeck; Rha, Rhaetian.

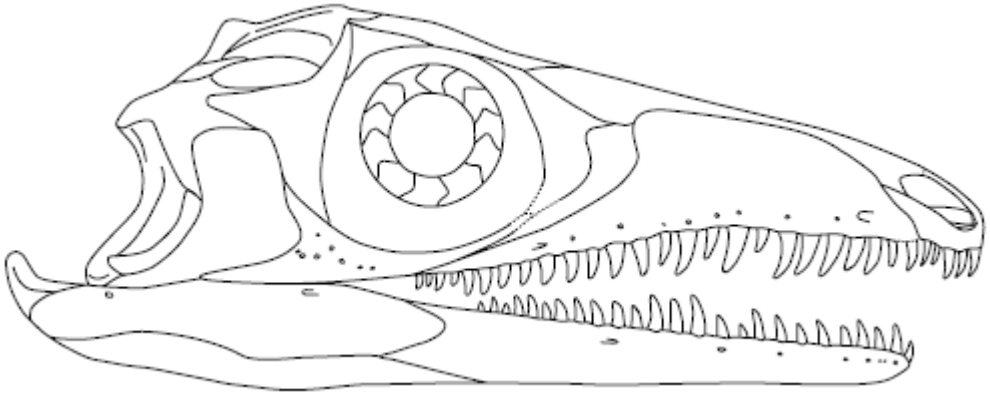
Ezcurra et al 2016

Prolacertidae

Definición: clado que incluye a las formas más cercanas a *Prolacerta broomi* que a *Protorosaurus fergusi*, *Tanystropheus longobardicus* o *Euparkeria capensis* (Ezcurra, 2016).







Archosauriformes

Definición: Clado menos inclusivo que contiene a *Crocodylus niloticus* y *Proterosuchus fergusi*.
Rango Temporal: Pérmico tardío – Presente.

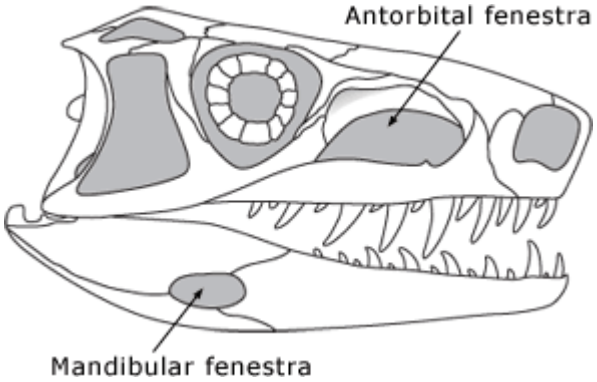
Sinapomorfías:

Archosauriformes + Tasmaniosaurus:

- Presencia de fenestra anteorbital
- Ausencia de foramen parietal
- Presencia de dientes aserrados

Archosauriformes

- Premaxilar curvado hacia abajo
- Presencia de placas interdentales
- Contacto Cuadrado-yugal presente
- Laterosphenoides osificado presente
- Fenestra mandibular presente



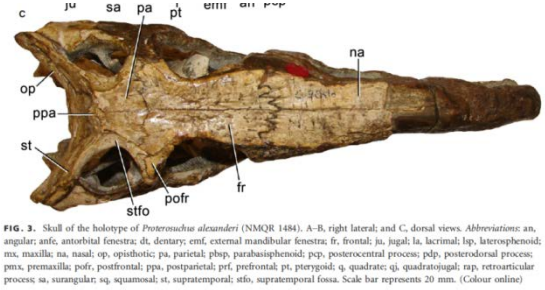
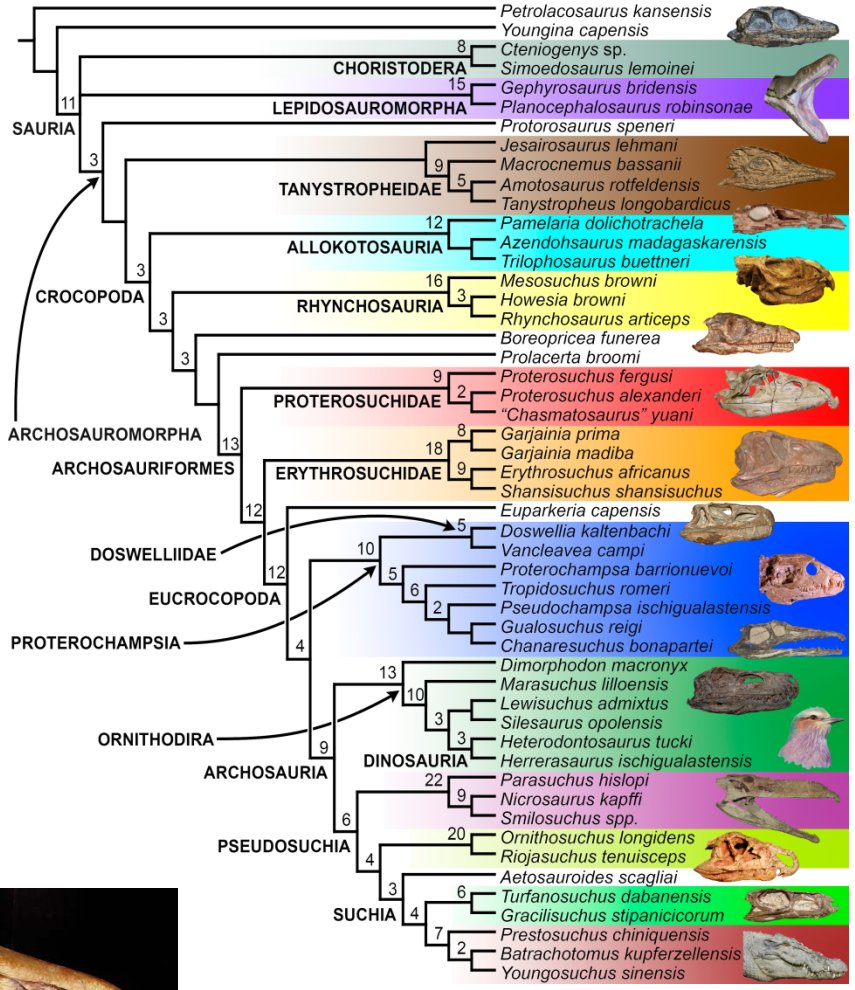


FIG. 3. Skull of the holotype of *Proterosuchus alexanderi* (NMQR 1484). A–B, right lateral; and C, dorsal views. *Abbreviations*: an, angular; anfe, antorbital fenestra; dt, dentary; emf, external mandibular fenestra; fr, frontal; ju, jugal; la, lacrimal; lsp, laterosphenoid; mx, maxilla; na, nasal; op, opisthotic; pa, parietal; pbsp, parabasisphenoid; pcp, posterocentral process; pdp, posterodorsal process; pmx, premaxilla; pofr, postfrontal; ppa, postparietal; prf, prefrontal; pt, pterygoid; q, quadrate; qj, quadratojugal; rap, retroarticular process; sa, surangular; sq, squamosal; st, supratemporal; stfo, supratemporal fossa. Scale bar represents 20 mm. (Colour online)



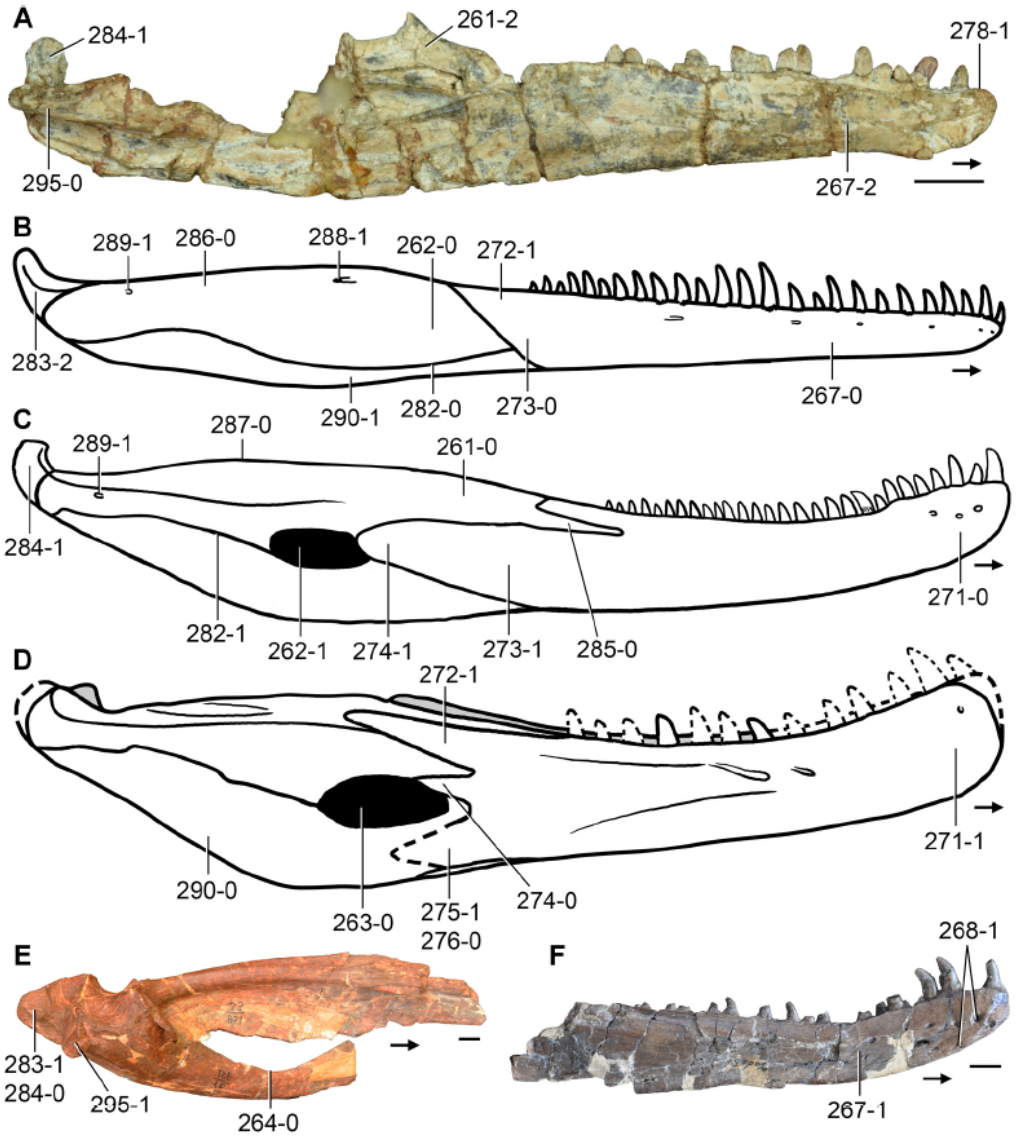
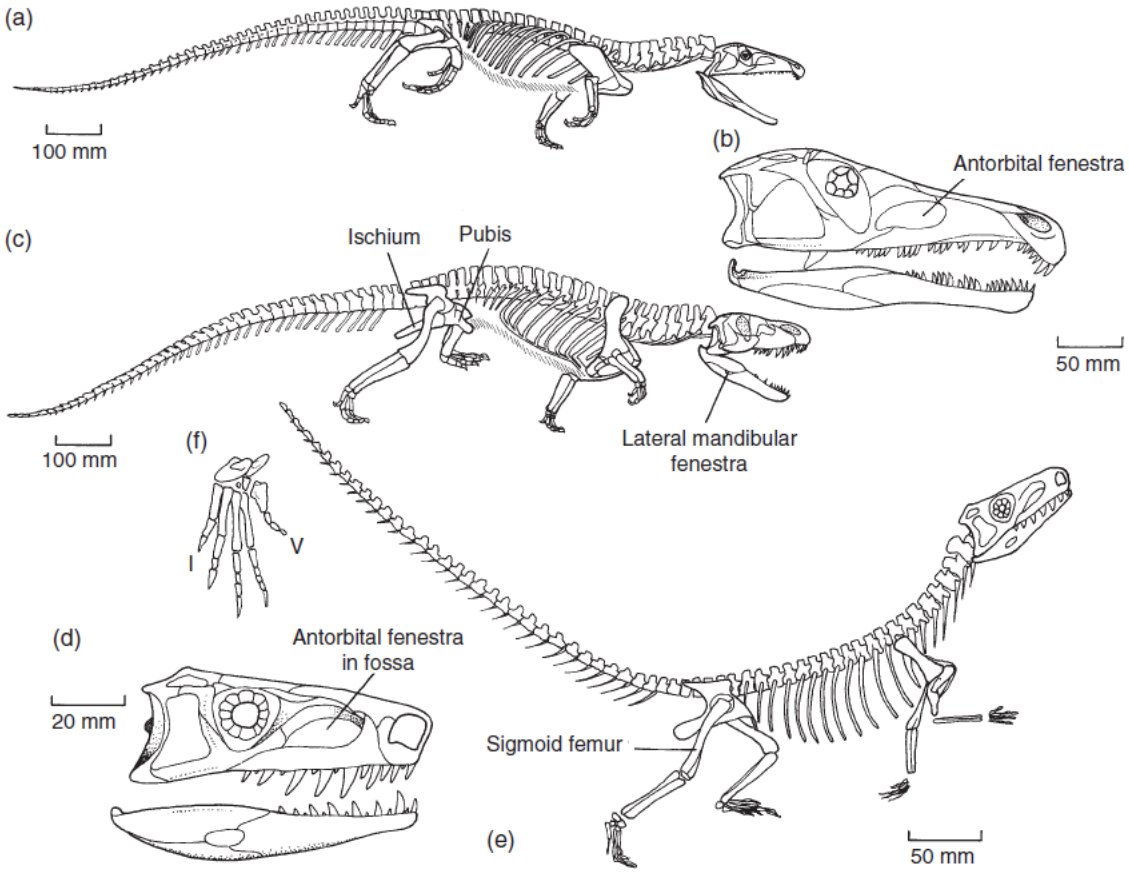


Figure 29 Lower jaws of Triassic archosauromorphs in (A, E) medial and (B–D, F) lateral views. (A) Left hemimandible of *Pamelaria dolichotrachela* (ISI R316/1); (B) reconstruction of *Prolacerta broomi*; (C) reconstruction of *Proterosuchus fergusi*; (D) reconstruction of *Garjainia prima*; (E) posterior half of the left hemimandible of *Garjainia prima* (PIN 951/33); and (F) right dentary of "*Chasmatosaurus*" *yuani* (IVPP V36315). Numbers indicate character-states scored in the data matrix and the arrows indicate anterior direction. Scale bars equal 1 cm in (A, E, F) and B–D not to scale.

Diversidad de arcosauriformes basales



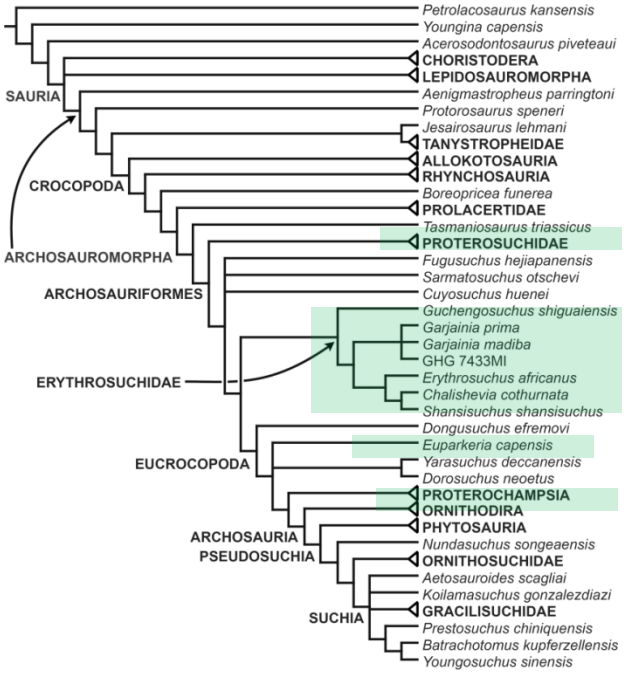


Figure 6.6 Early Triassic archosauriforms: (a,b) the proterosuchid *Proterosuchus*, skeleton in running posture and skull; (c) the erythrosuchid *Vjushkovia*, skeleton in running posture; (d–f) the agile *Euparkeria*, skull in lateral view, skeleton and foot. Source: (a,c) Adapted from G. Paul in Parrish (1986). (b) Adapted from Cruickshank (1972). (d–f) Adapted from Ewer (1965).

Proterosuchidae

Definición: clado que incluye a las formas más cercanas a *Proterosuchus fergusi* que a *Erythrosuchus africanus*, *Crocodylus niloticus* o *Passer domesticus* (Ezcurra et al., 2013).
Sinapomorfías: diastema entre premaxilar y maxilar.

Proterosuchus fergusi

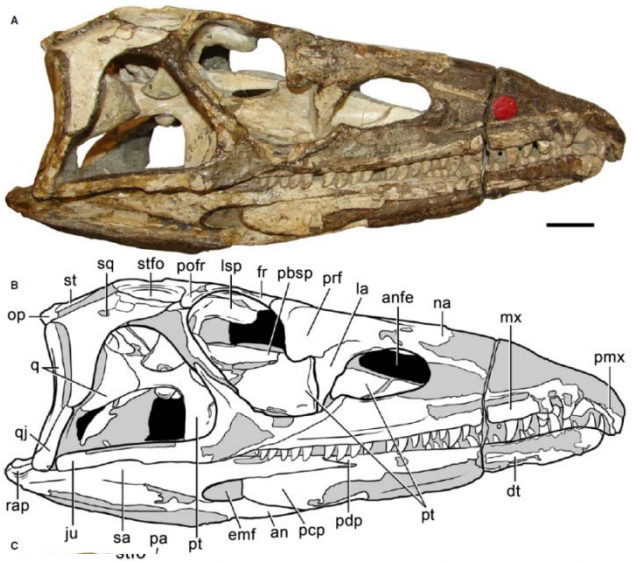
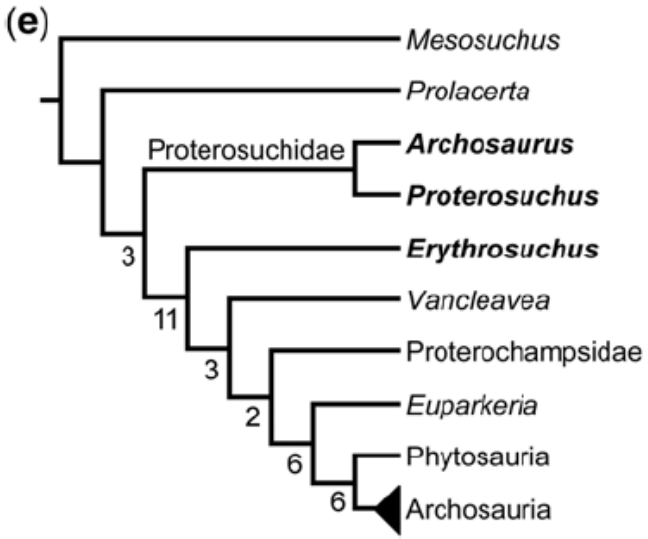
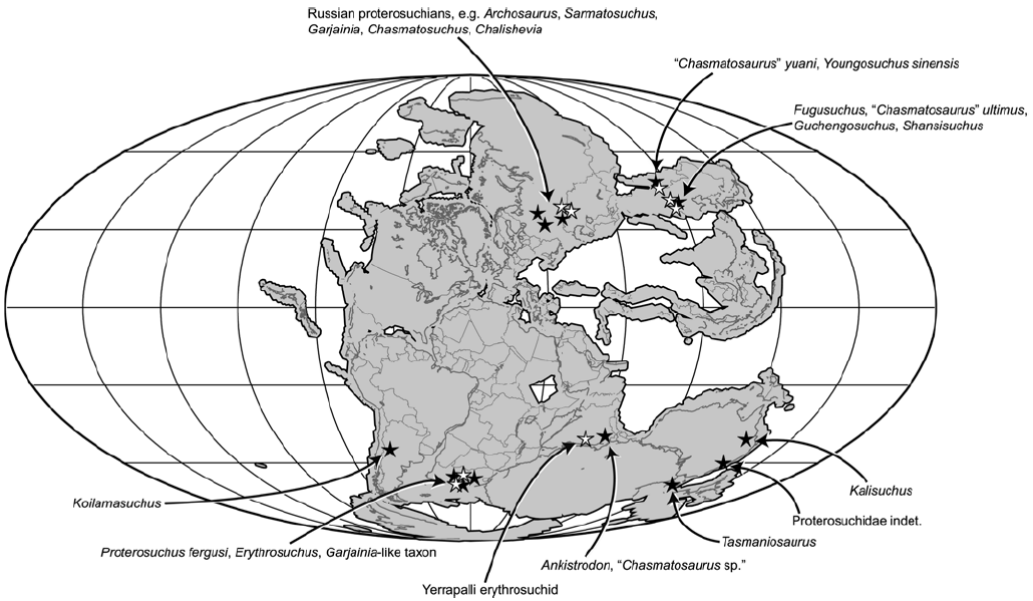


FIG. 3. Skull of the holotype of *Proterosuchus alexanderi* (NMQR 1484). A–B, right lateral; and C, dorsal views. *Abbreviations*: an, angular; anfe, antorbital fenestra; dt, dentary; emf, external mandibular fenestra; fr, frontal; ju, jugal; la, lacrimal; lsp, laterosphenoid; mx, maxilla; na, nasal; op, opisthotic; pa, parietal; pbsp, parabasisphenoid; pcp, posterocentral process; pdp, posterodorsal process; pmx, premaxilla; pofr, postfrontal; ppa, postparietal; prf, prefrontal; pt, pterygoid; q, quadrate; qj, quadratojugal; rap, retroarticular process; sa, surangular; sq, squamosal; st, supratemporal; stfo, supratemporal fossa. Scale bar represents 20 mm. (Colour online)





Erythrosuchidae

Definición: clado que incluye a las formas más cercanas a *Erythrosuchus africanus* que a *Proterosuchus fergusi* o *Passer domesticus* (Ezcurra et al., 2013).

Sinapomorfías: margen alveolar del maxilar (anterior a la fosa preorbital) abruptamente elevado. Parietal muy elevado en línea media.

Erythrosuchus africanus

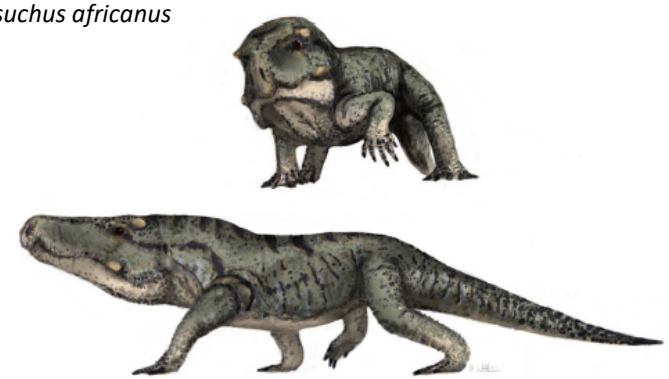


Figure 30. Life reconstruction of *Garjainia madiba* sp. nov. Total adult body length would have been approximately 2.5 metres, based on comparisons with *G. prima*. Reconstruction by Mark Witton. doi:10.1371/journal.pone.0111154.g030

Gower et al 2014

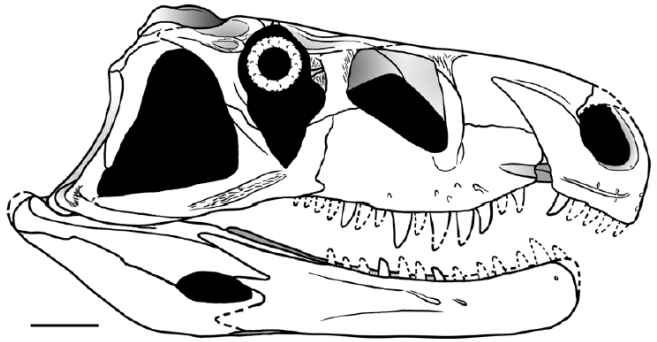


Figure 2. Skull reconstruction of holotype of *Garjainia prima* (PIN 2394/5) in lateral view based on both sides of the original skull and detached bones. Bones in pale grey are elements that are placed more medially than other bones. Scale bar: 5 cm.

Ezcurrra et al 2018

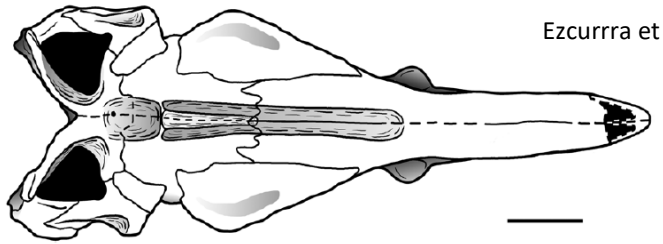
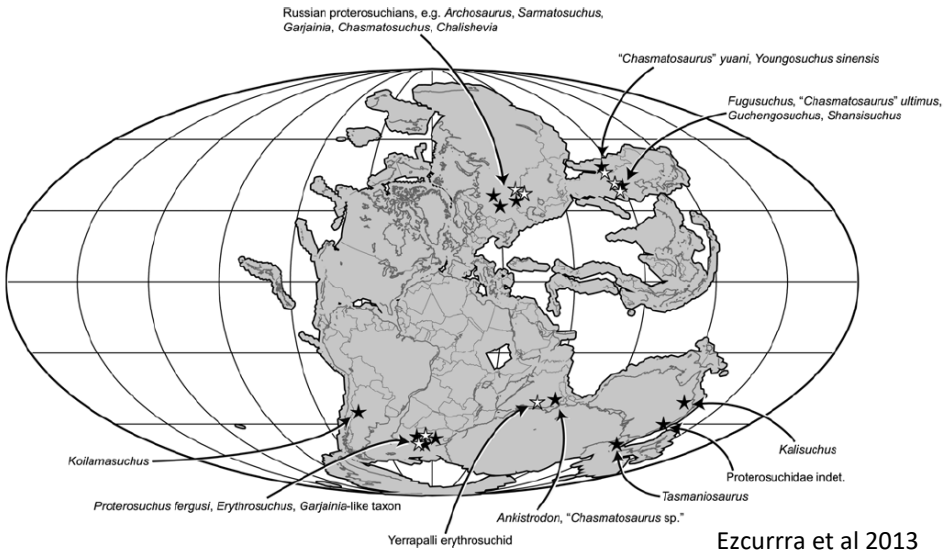


Figure 3. Skull reconstruction of holotype of *Garjainia prima* (PIN 2394/5) in dorsal view. The width of the skull was increased in order to match that of other erythrosuchids (e.g. *Erythrosuchus africanus*: NM QR 1473), because the original specimen suffered transverse post-mortem compression. Scale bar: 5 cm.



Ezcurrra et al 2013

Eucrocopoda: Evolución de la Mesaxonía

Definición: clado que incluye a formas más cercanas a *Euparkeria capensis* *Proterochampa barrionuevoi*, *Doswellia kaltenbachi*; *Parasuchus hislopi*, *Passer domesticus* o *Crocodylus niloticus* que a *Proterosuchus fergusi* o *Erythrosuchus africanus* (stem-based).

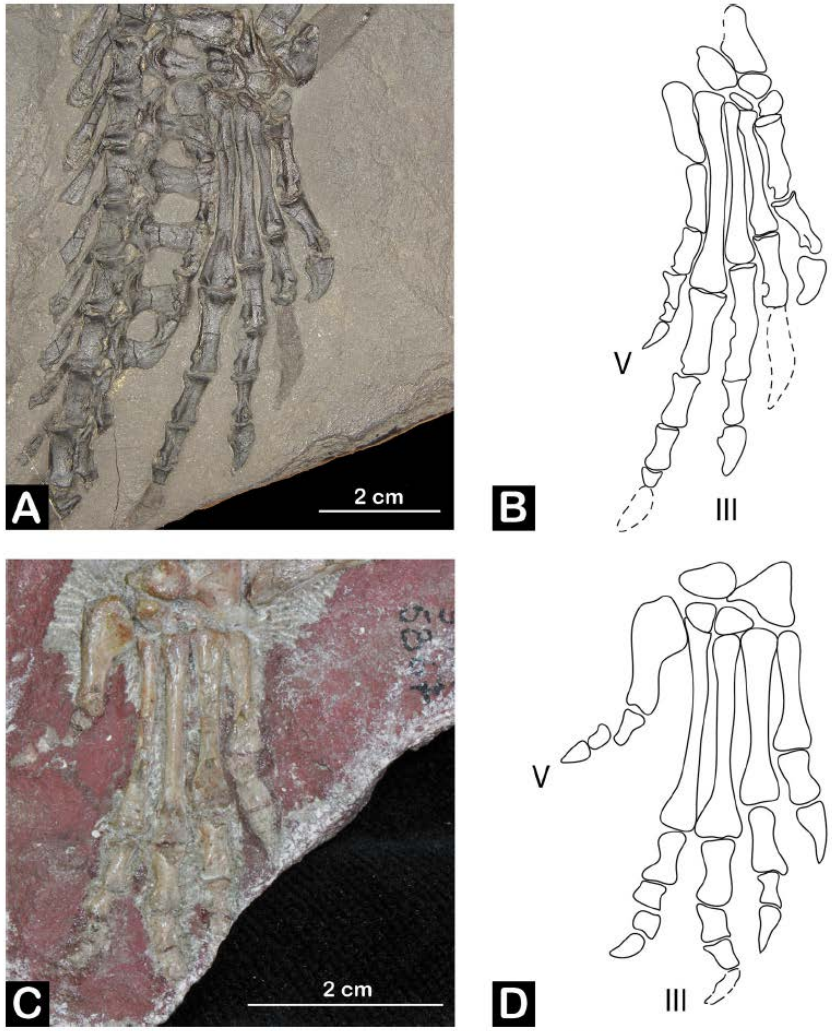


Fig 4. **Archosauromorph foot anatomy.** A, right pes skeleton of *Protorosaurus speneri* NHMW 1943l4, Naturhistorisches Museum Wien, Vienna, Austria. B, interpretative drawing. C, right pes skeleton of *Euparkeria capensis* SAM PK K8309. D, Intepretative drawing. Note that *Protorosaurus* has an ectaxonic pes, with digit IV>III>II>I while *Euparkeria* shows a mesaxonic foot with III being the longest.

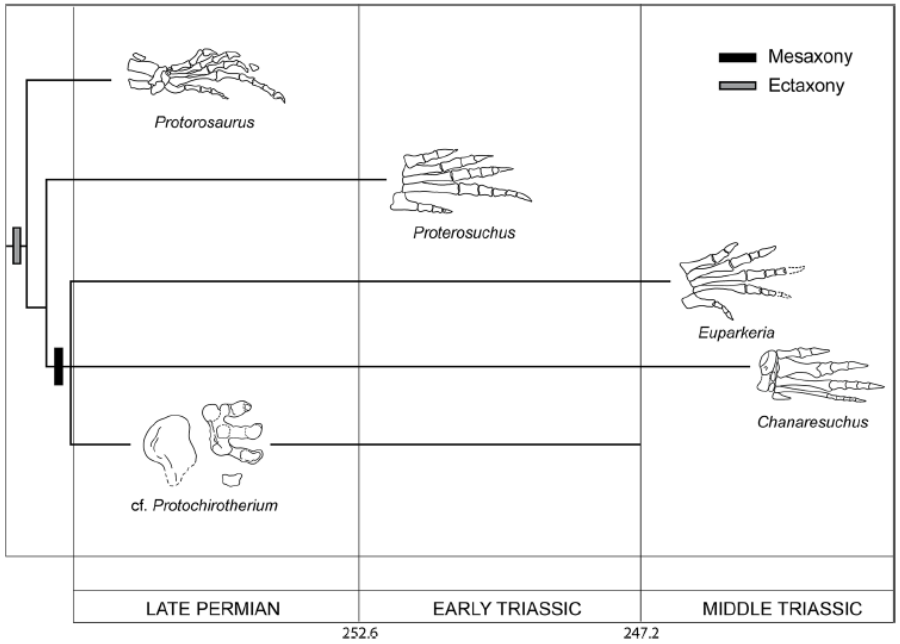
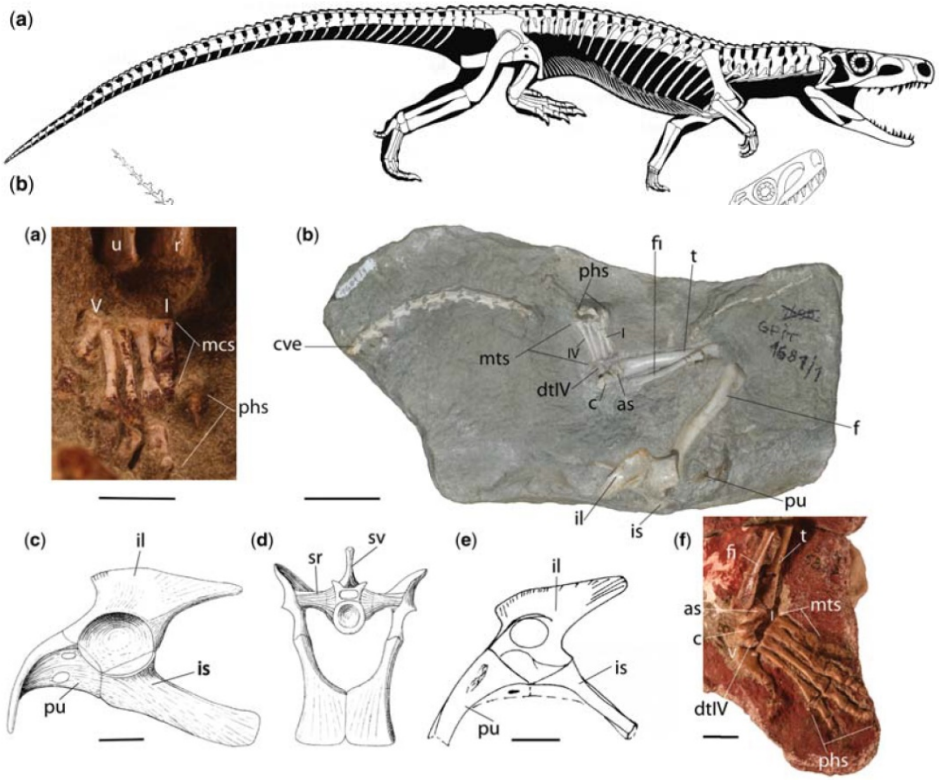


Fig 5. **Evolution of the mesaxonic pes in archosauromorphs.** Grey and black boxes indicate evolution of apomorphic characters: grey = ectaxony, black = mesaxony. Late Permian *Protochirotherium* pulls the evolution of mesaxony down the archosauriform tree and anticipates the oldest skeletal remain (*Euparkeria capensis*) by 10 Ma.

Bernardi et al 2015

Euparkeriidae

Fig. 1. Holotype of *Euparkeria*, SAM-PK-5867, skull and partial skeleton. Image courtesy of S. Nesbitt. Scale bar: 50 mm.



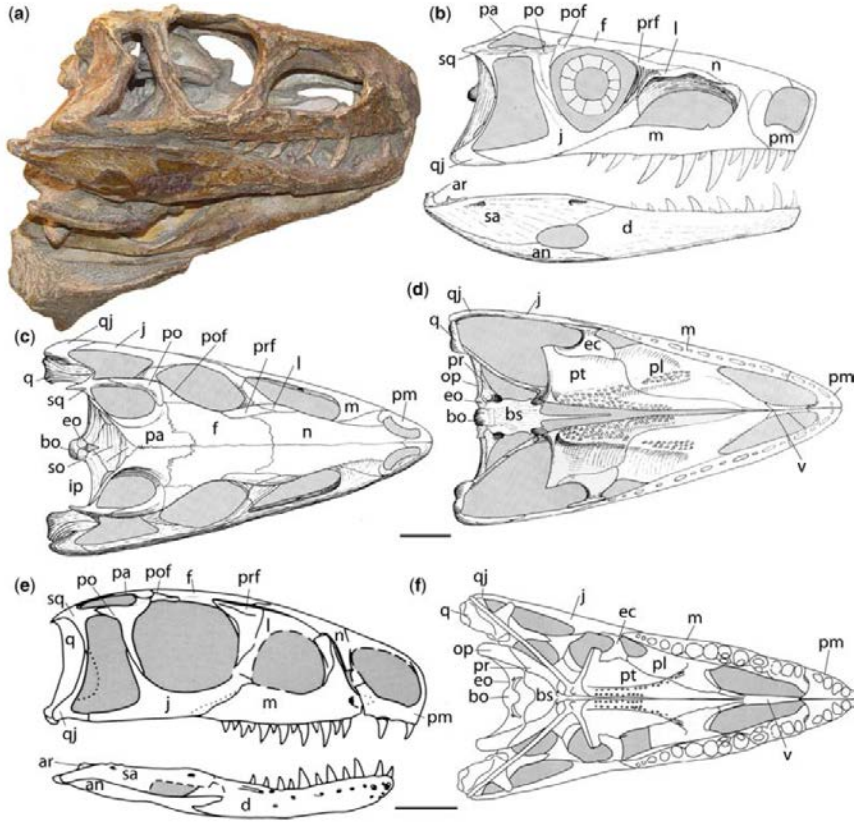
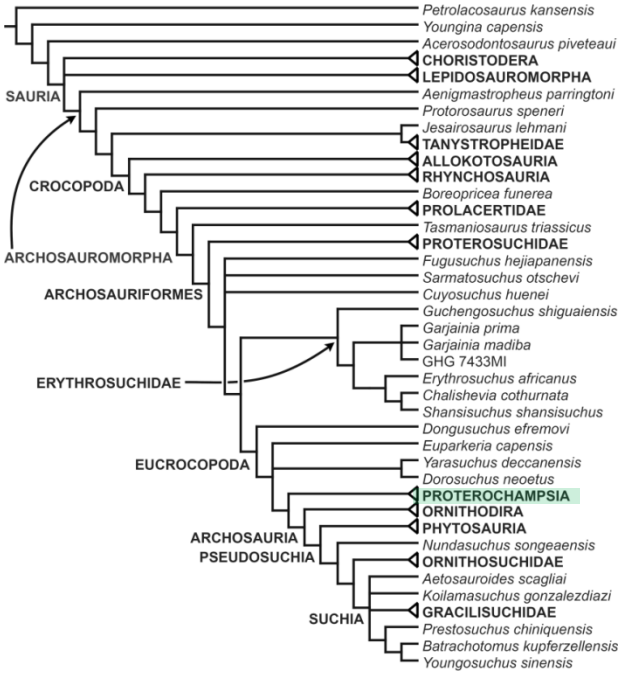


Fig. 3. Crania of *Euparkeria* and *Osmolskina*. Skull of holotype of *Euparkeria* SAM-PK-5867 in right lateral view (**a**, image courtesy of O. Rauhut); right lateral (**b**), dorsal (**c**) and ventral (**d**) skull reconstructions of *Euparkeria* from Ewer (1965); right lateral (**e**) and ventral (**f**) skull reconstructions of *Osmolskina* modified from Borsuk-Bialynicka & Evans (2009). Scale bars: 10 mm; upper scale bar applies to (a–d), lower scale bar to (e, f). Abbreviations: an, angular; ar, articular; b, basioccipital; bs, basisphenoid; d, dentary; ec, ectopterygoid; eo, exoccipital; f, frontal; ip, interparietal; j, jugal; l, lacrimal; m, maxilla; n, nasal; op, opisthotic; pa, parietal; pm, premaxilla; pof, postfrontal; po, postorbital; pl, palatal; pr, prootic; prf, prefrontal; pt, pterygoid; q, quadrate; qj, quadratojugal; sa, surangular; so, supraoccipital; sq, squamosal; v, vomer.

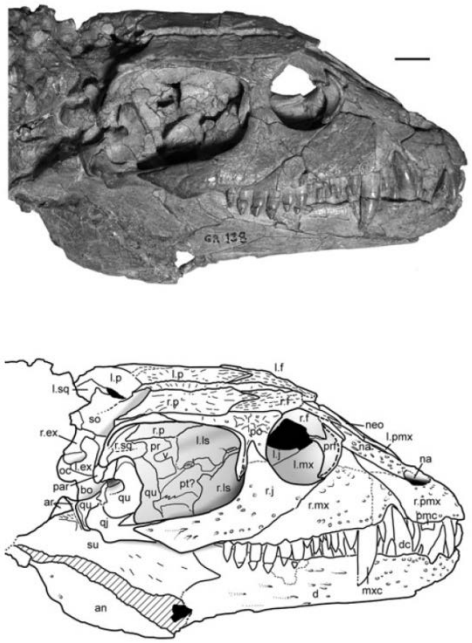
Proterochampsia

Definición: Clado menos inclusivo que incluye a *Proterochampsa barrionuevoi* pero no a *Euparkeria capensis*, *Erytrhosuchus africanus*, *Passer domesticus* o *Crocodylus niloticus* (Nesbitt 2011).
Rango Temporal: Triásico medio (Ladiniano) – Triásico tardio (Noriano).
Sinapomorfías: narinas externas dirigidas dorsalmente.



Doswelliidae

Definición: Clado menos inclusivo que incluye a *Doswellia kaltenbachi* pero no a *Proterochampsa barrionuevoi*, *Euparkeria capensis*, *Erytrhosuchus africanus*, *Passer domesticus* o *Crocodylus niloticus* (Desojo et al 2011).



. Right lateral view of the skull of *Vancleavea campi* (GR 138). Scale bar, 1 cm.

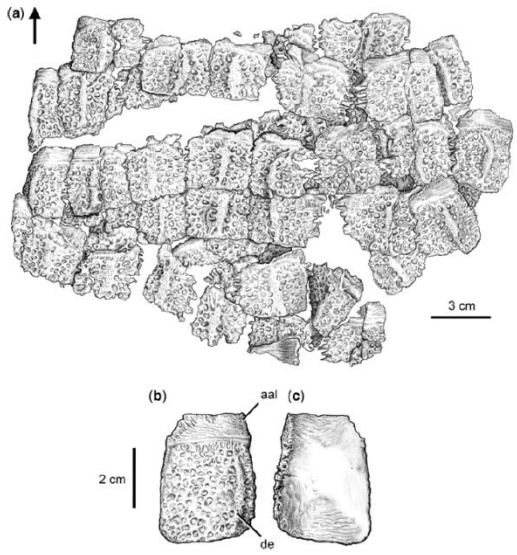


Fig. 3. (a) Portion of mostly articulated posterior dorsal armour of *Doswellia kaltenbachi* (USNM 244214, holotype). Arrow points in anterior direction. (b) and (c) Anterior dorsal osteoderm from the same specimen in (b) dorsal and (c) ventral views. Abbreviations: aal, anterior articular lamina; de, dorsal eminence. Institutional acronym: USNM, National Museum of Natural History, Smithsonian Institution, Washington, DC, USA.

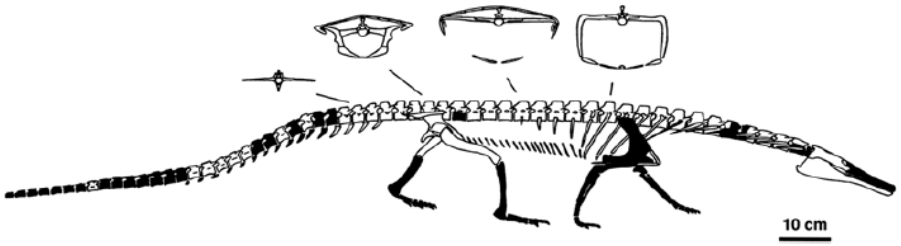


Fig. 2. Reconstructed skeleton of *Doswellia kaltenbachi* in lateral view with diagrammatic cross-sections at various points of the body. Reconstruction based on all known material from the Poor Farm Member of the Falling Creek Formation in Virginia, USA. Restored portions of the skeleton are highlighted in black. (Modified from Weems 1980.)

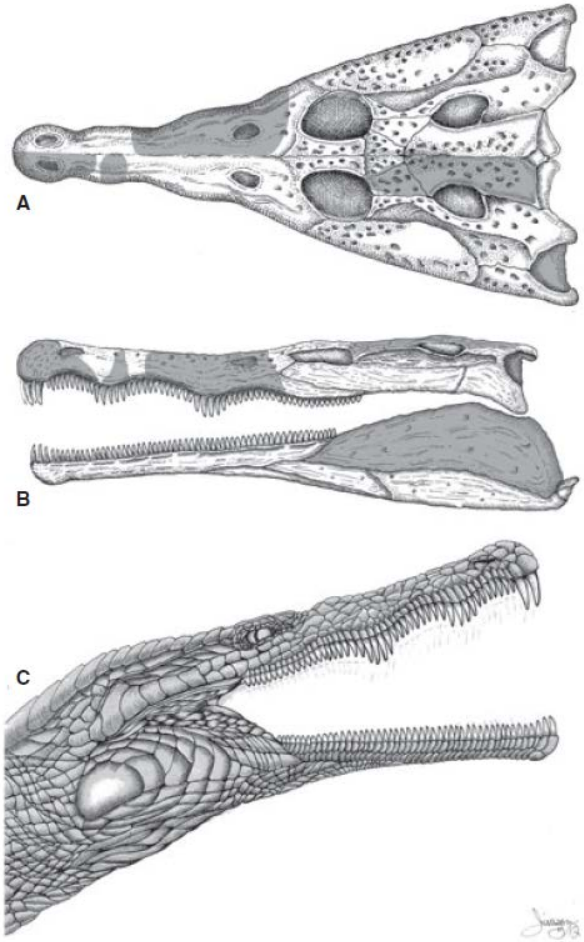


FIG. 6. Reconstructions of *Doswellia sixmilensis* based on the fossils described here, drawn by Pedro Toledo. A, B, skeletal reconstructions in A, dorsal and B, lateral views, with preserved elements shaded (right maxilla mirrored to left for lateral view). C, flesh reconstruction.

Proterochampsidae

Definición: Clado menos inclusivo que incluye a *Chanaresuchus bonapartei* y *Proterochampsa barrionuevoi*, pero no a *Euparkeria capensis*, Doswellia kaltenbachi, *Passer domesticus* o *Crocodylus niloticus* (Trotteyn, 2011).
Sinapomorfías: margen dorsal de la órbita con un reborde elevado sobre el techo craneal. Premaxilar en ángulo de 20° respecto a maxilar. Cráneo fuertemente comprimido con órbitas y fenestras anteorbitales dirigidas dorsalmente (*Proterochampsa*).

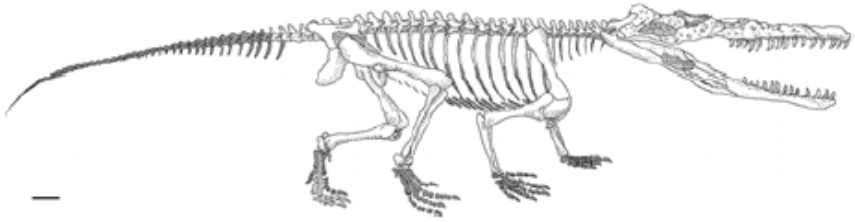


Fig. 3. Reconstruction of *Proterochampsa barrionuevoi*. Drawn by Guillermo Heredia.

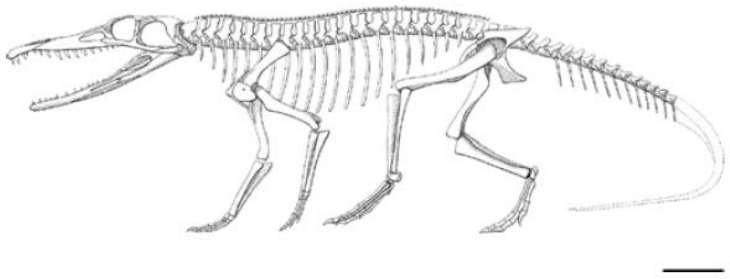
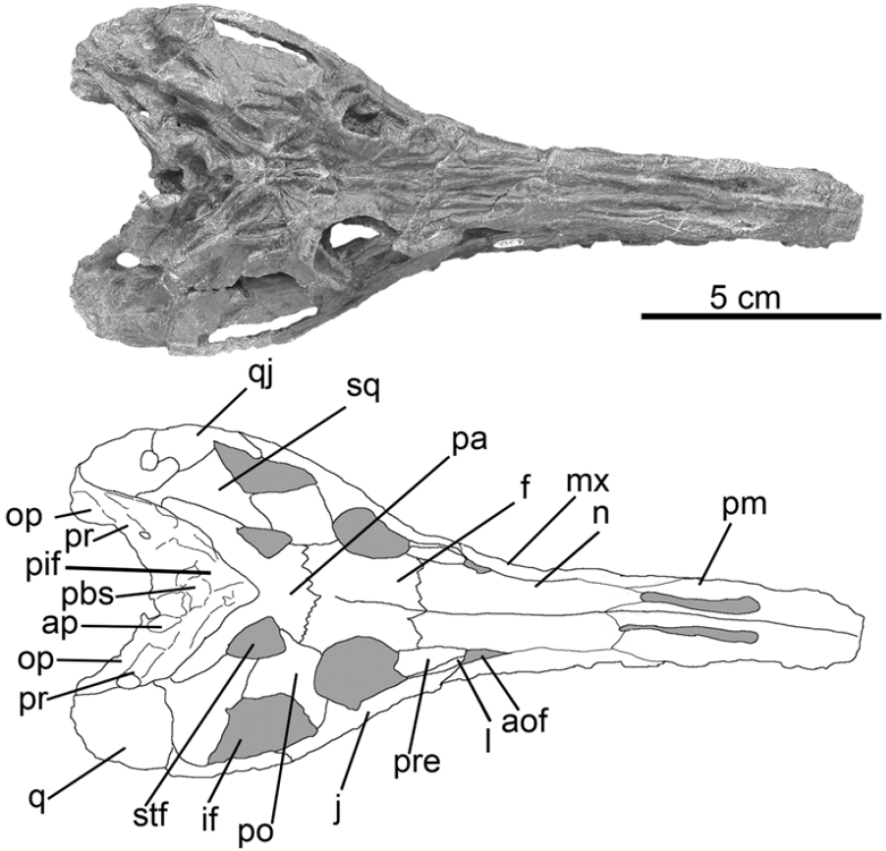


Fig. 9. Reconstruction of *Chanaresuchus bonapartei*. Extracted from Romer (1972).



Skull of C*hanaresuchus ischigualastensis* (PVSJ 567) in dorsal view. Modified from Trotteyn et al. (2012). Abbreviations: aof, antorbital fenestra; ap, alar process; f, frontal; if, infratemporal fenestra; j, jugal; l, lacrimal; mx, maxilla; n, nasal; op, opisthotic; pa, parietal; pbs, parabasisphenoid; pif, pituitary fossa; pm, premaxilla; po, postorbital; pr, prootic; pre, prefrontal; q, quadrate; qj, quadratojugal; sq, squamosal; stf, supratemporal fenestra. The scale bar equals 5

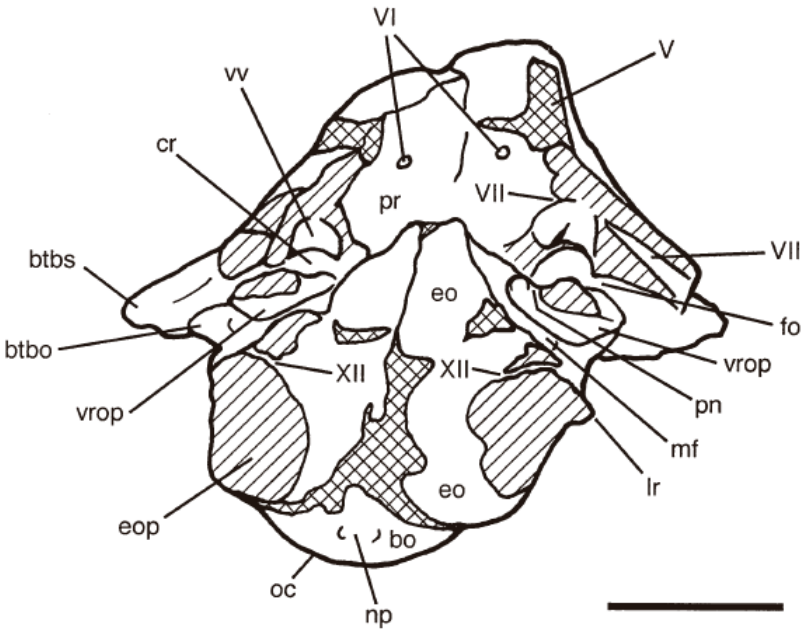
Archosauria

Definición: nodo menos inclusivo que contiene a *Crocodylus niloticus* y *Passer domesticus* (Sereno, 2005).

Rango Temporal: Triásico temprano (Olenekiano) – Presente.

Sinapomorfías:

- Proceso palatal de maxilar se juntan en línea media
- Foramen externo del nervio Abducens dentro del Proótico
- Fosa antorbital presente sobre el lacrimal, el proceso dorsal del maxilar y el margen dorsolateral del proceso posterior del maxilar.



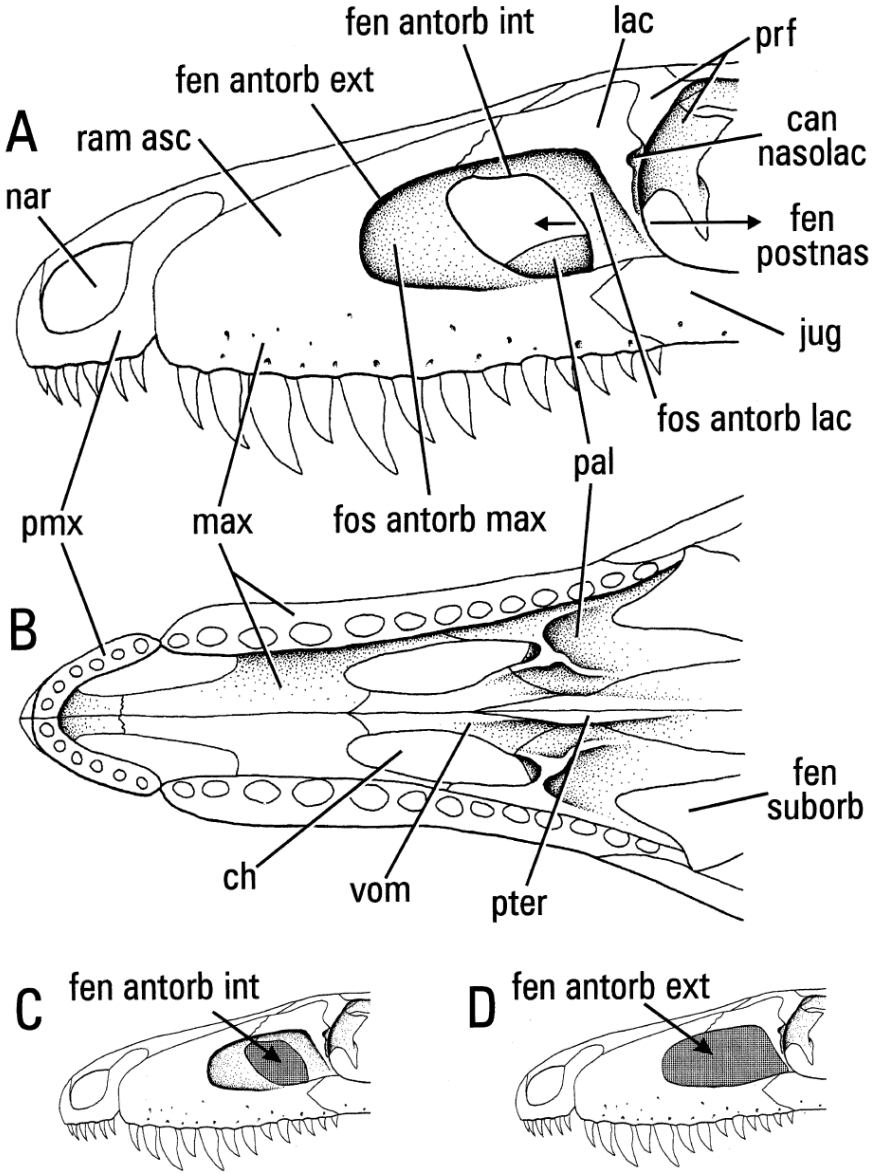


FIGURE 1. *Sphenosuchus acutus*, snout. **A**, left lateral view, showing morphology of antorbital cavity. **B**, ventral view. **C**, left lateral view with internal antorbital fenestra shaded. **D**, as **C**, but with external antorbital fenestra shaded. (Modified after Walker, 1990.)

Filogenia de Archosauria

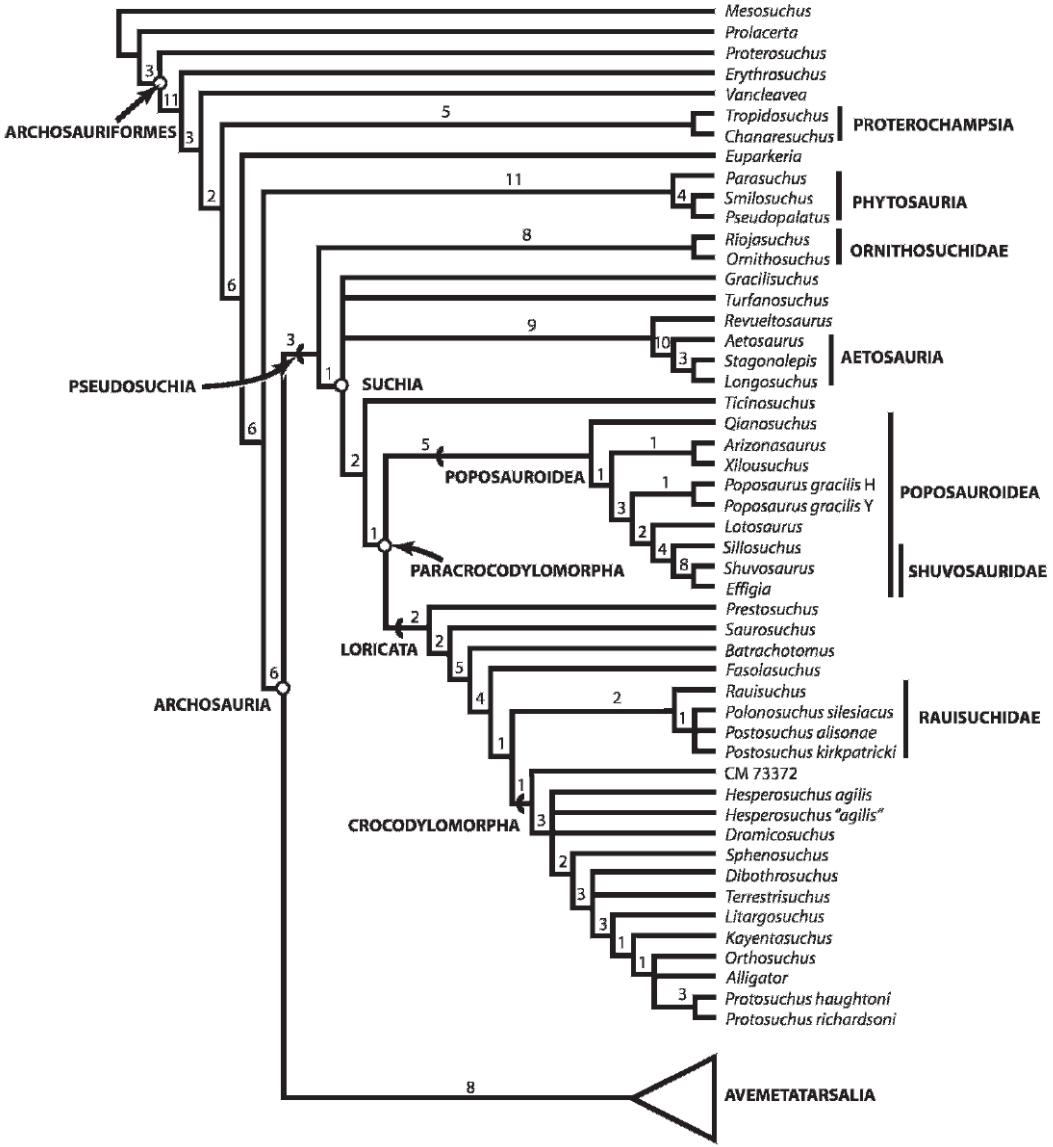


Fig. 51. Archosauriform relationships (77 taxa, 412 characters) highlighting Bremer support values. Consensus of 360 MPTs of length 1285. H = holotype, Y = YPM.

Pseudosuchia

Definición: nodo más inclusivo que contiene a *Crocodylus niloticus* pero no a *Passer domesticus* (Sereno, 2005).

Sinapomorfías:

- Fenestra postemporal menor que la supraoccipital.
- Proceso posterior del escamoso ventralmente curvado.
- Tubérculo calcáneo con extremo distal expandido
- Presencia de 2 filas de osteodermos parasagitales

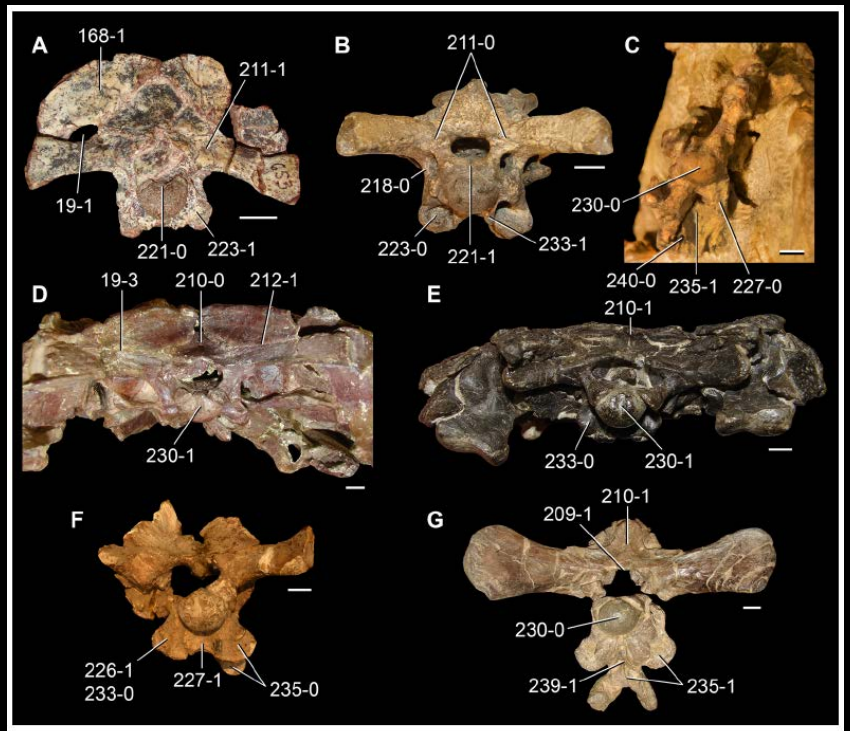


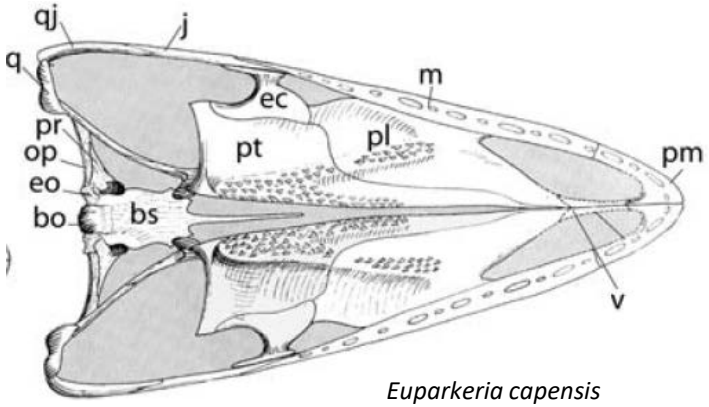
Figure 27 **Braincases of Triassic archosauromorphs in occipital view.** (A) *Azendohsaurus madagaskarensis* (UA 7-20-99653); (B) *Proterosuchus goweri* (NMQR 880); (C) *Euparkeria capensis* (UMZC T692); (D) *Chanaresuchus bonapartei* (MCZ 4037); (E) *Doswellia kaltenbachi* (USNM 214823); (F) *Parasuchus hislopi* (ISI R42); and (G) *Batrachotomus kupferzellensis* (SMNS 80260). Numbers indicate character-states scored in the data matrix. Scale bars equal 1 cm in (A, B, F, G), 2 mm in (C), and 5 mm in (D, E).

Crurotarsi (=Pseudosuchia)

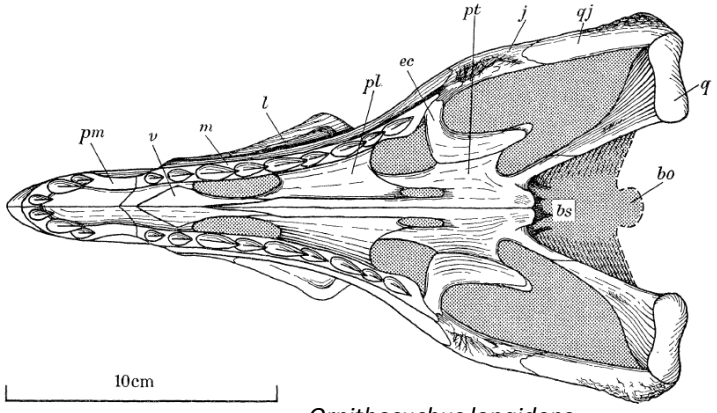
Definición: Clado menos inclusivo que Incluye a Rutiodon carolinensis Emmons, 1856, y Crocodylus niloticus Laurenti, 1768 (Nesbitt, 2011).

Sinapomorfías:

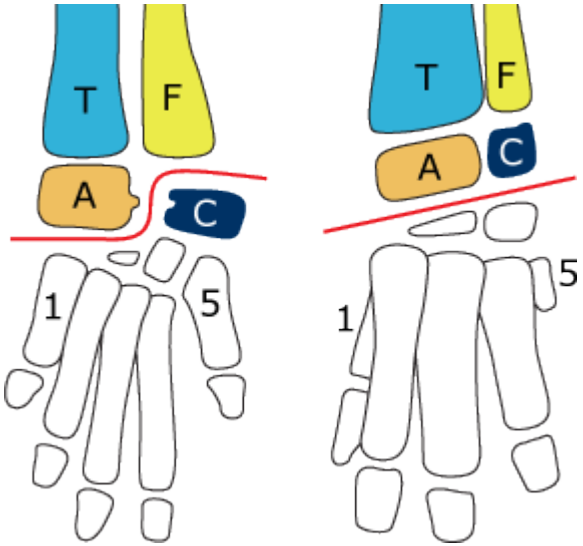
- ~~Ausencia de dientes en el proceso palatal del pterigoides~~
- Costillas cervicales cortas
- Superficie articular ventral del astrágalo-calcáneo cóncavoconvexa, con concavidad sobre el calcáneo
- Superficie articular ventral para el tarsal distal 4 y el extremo distal del tubérculo del calcáneo separado por un espacio
- Superficie articular para la fíbula y tarsal distal 4 continua sobre el calcáneo.



Euparkeria capensis



Ornithosuchus longidens



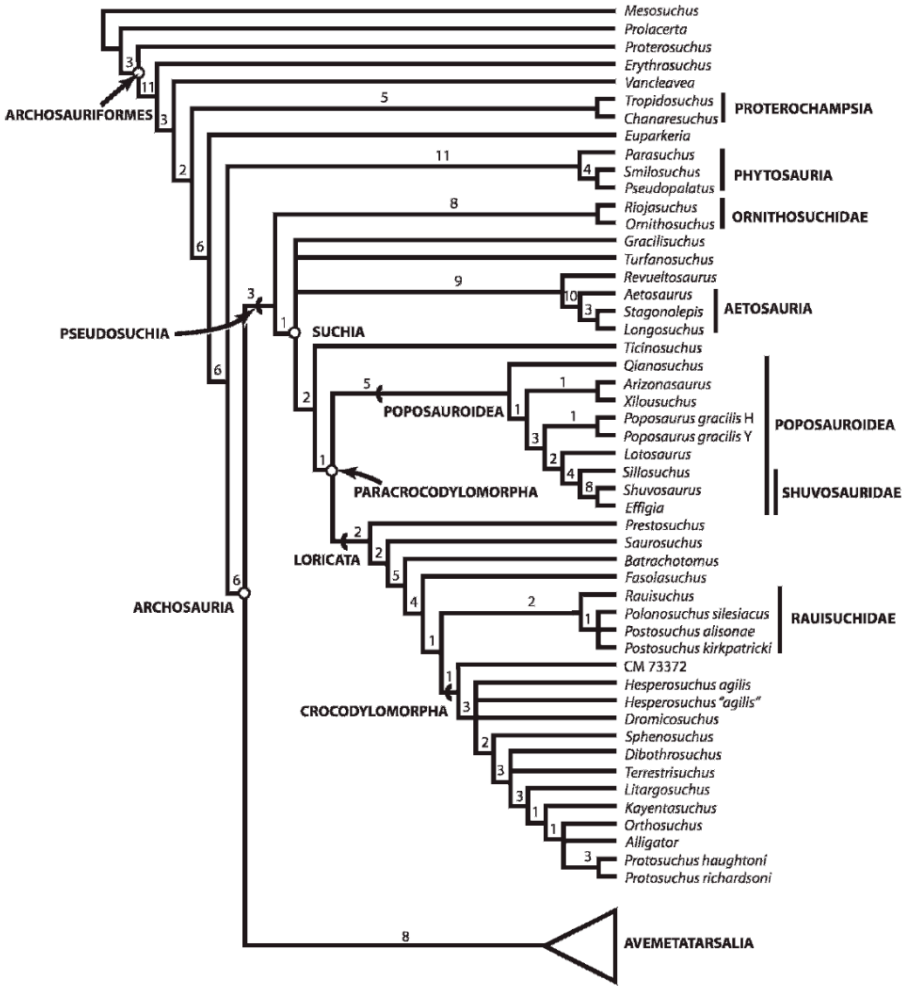
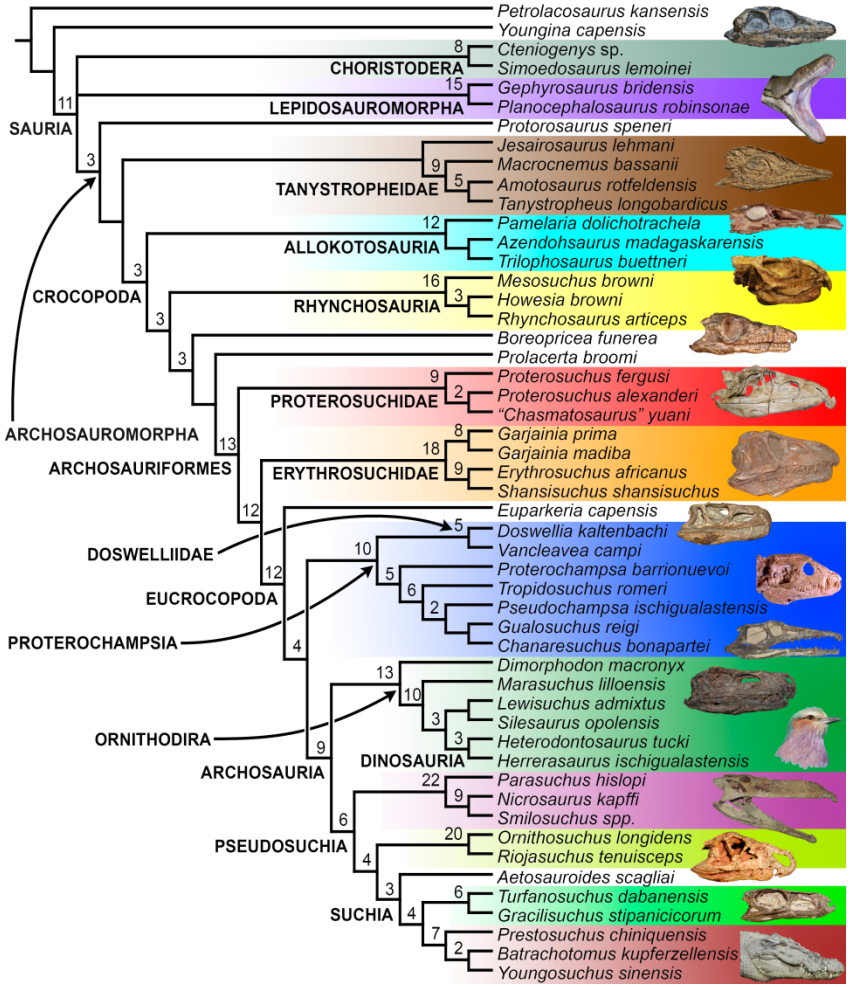


Fig. 51. Archosauriform relationships (77 taxa, 412 characters) highlighting Bremer support values. Consensus of 360 MPTs of length 1285. H = holotype, Y = YPM.

Nesbitt, 2011



Ezcurra, 2016

Phytosauria

Definición: Clado menos inclusivo que Incluye a Rutiodon carolinensis (Emmons, 1856) pero no a Aetosaurus ferratus Fraas, 1877, Rauisuchus tiradentes Huene, 1942, Prestosuchus chiniquensis Huene, 1942, Ornithosuchus longidens Huxley, 1877, y Crocodylus niloticus Laurenti, 1768 (sensu Sereno, 2005).

Rango Temporal: Triásico tardìo (Carniano) – Triásico tardío (Rhaetiano).

Sinapomorfías:

- 6 o más dientes premaxilares
- Premaxilar más grande que maxilar
- Cuadradoyugal subtriangular
- Narinas externas no terminales
- Osificación anterior a los nasales rodeada por la premaxila (“septomaxilar”)
- Sínfisis mandibular 1/3 de mandíbula.

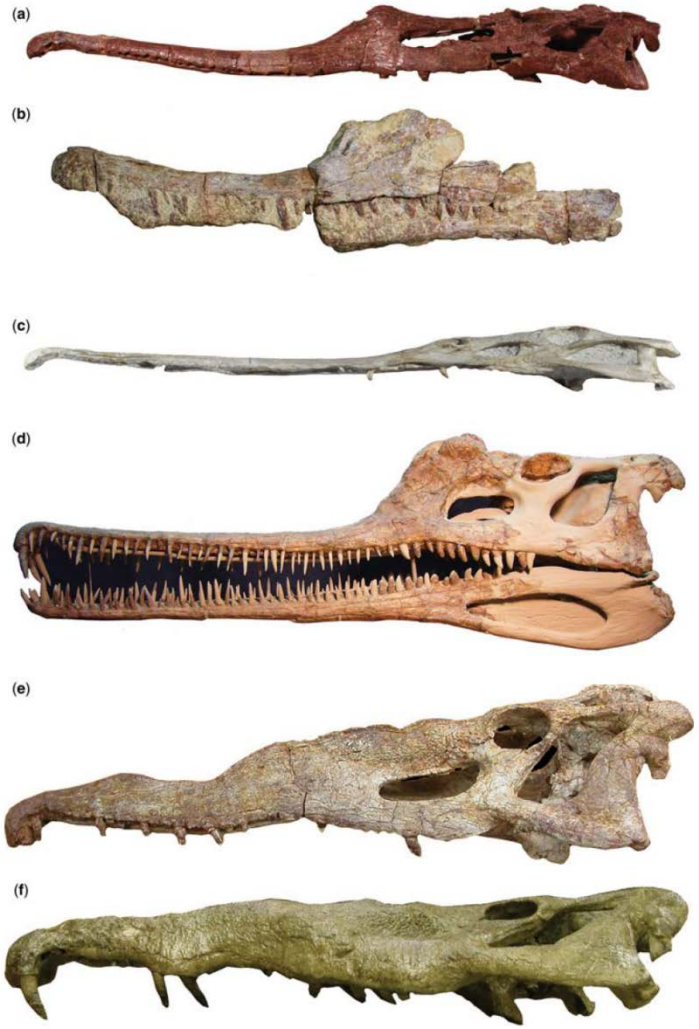


Fig. 5. Left lateral view of phytosaur skulls: (**a**) *Paleorhinus bransoni*, TMM 31100–101 (image reversed); (**b**) ‘*Paleorhinus*’ *parvus*, MU 530; (**c**) *Ebrachosuchus neukami*, BSPG 1931 X 501; (**d**) *Angistorhinus*, USNM 21376; (**e**) *Leptosuchus studeri*, UMMP 14267; (**f**) *Smilosuchus gregorii*, UCMP 27200. Skulls not to scale.

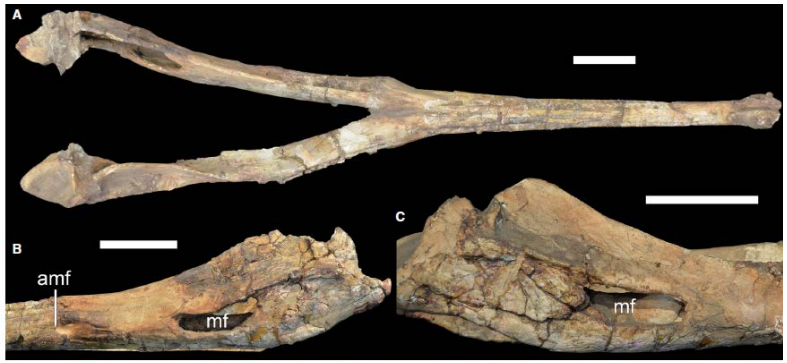


FIG. 9. Neotype mandible of *Parasuchus hislopi* Lydekker, 1885 (ISI R42). A, mandible in dorsal view. B, posterior end of left mandibular ramus in lateral view. C, detail of posterior end of right mandibular ramus in lateral view. *Abbreviations*: amf, anterior margin of mandibular fenestra; mf, mandibular fenestra. All scale bars represent 5 cm. Colour online.

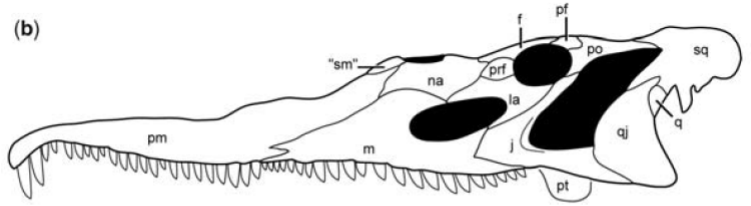


Fig. 3. Line drawings of phytosaur material for orientation. (**a**) Representative phytosaur skeleton based on *Angistorhinus*. (**b**) Representative phytosaur skull with elements labelled, based on *Pravusuchus hortus* (modified from Stocker 2010*a*, *b*). *Abbreviations:* f, frontal; j, jugal; la, lacrimal; m, maxilla; na, nasal; pm, premaxilla; pa, parietal; pf, postfrontal; po, postorbital; prf, prefrontal; q, quadrate; qj, quadratojugal; ‘sm’, ‘septomaxilla’; sq, squamosal.

Nundasuchus songeaensis

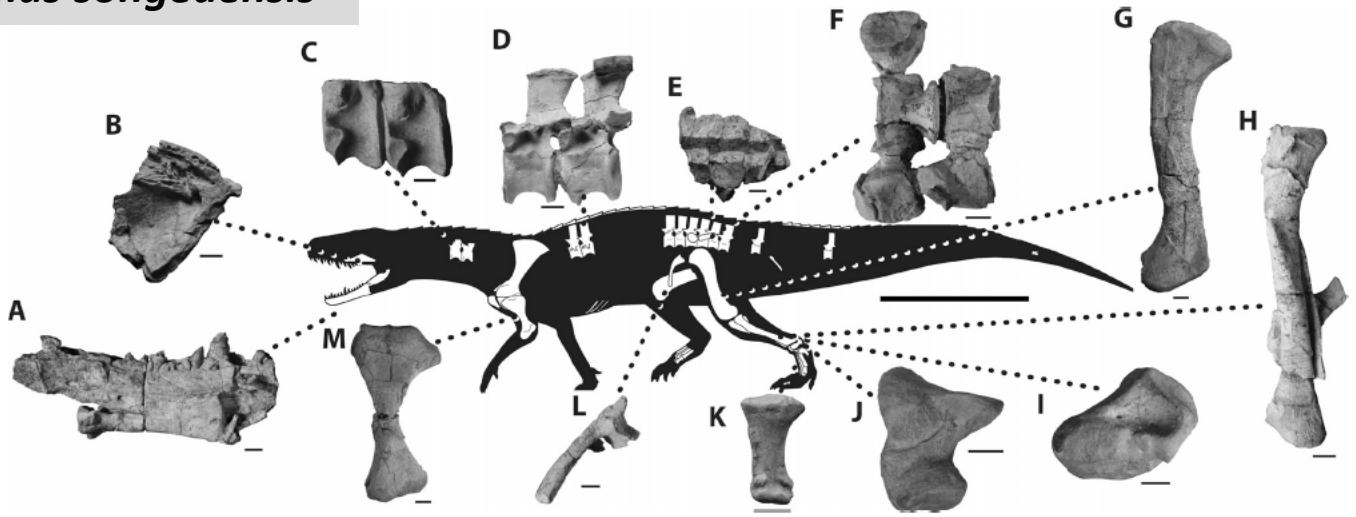


FIGURE 2. Skeleton of *Nundasuchus songeaensis*, gen. et sp. nov. (NMT RB48), illustrating the elements recovered. **A**, right dentary in medial view; **B**, right pterygoid in ventral view; **C**, mid-cervical vertebrae in lateral view; **D**, mid-dorsal vertebrae in lateral view; **E**, articulated paramedian osteoderms in dorsal view; **F**, sacrum in ventral view; **G**, right femur in anterolateral view; **H**, left fibula in lateral view; **I**, left astragalus in anterior view; **J**, left calcaneum in proximal view; **K**, left first metatarsal in dorsal view; **L**, left pubis in lateral view; **M**, left humerus in posterior view. Scale bars equal 1 cm for individual elements and 50 cm for entire skeleton.

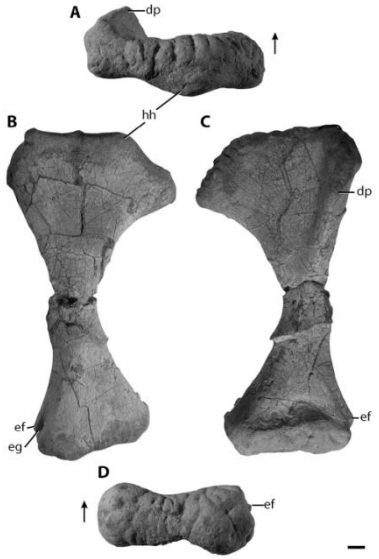


FIGURE 7. Left humerus of *Nundasuchus songeaensis*, gen. et sp. nov. (NMT RB48), in **A**, proximal, **B**, posterior, **C**, anterior, and **D**, distal views. Arrows indicate anterior direction. **Abbreviations**: **dp**, deltopectoral crest; **ef**, ectepicondylar flange; **eg**, ectepicondylar groove; **hh**, humeral head. Scale bar equals 1 cm.

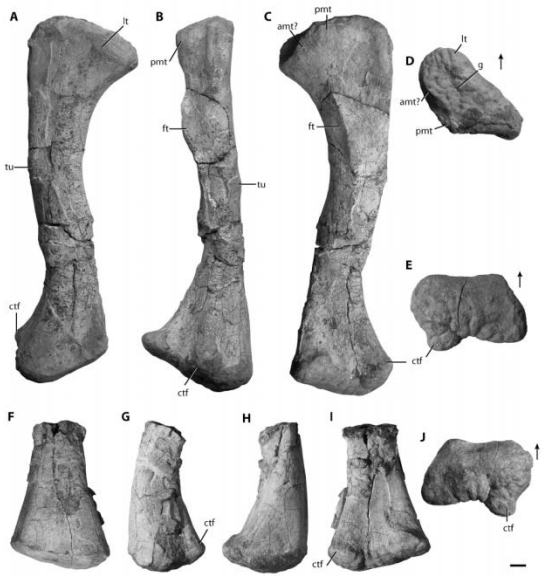
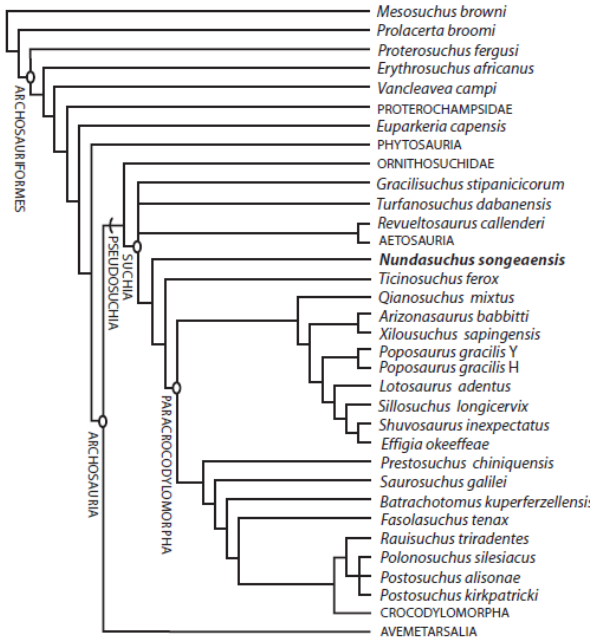


FIGURE 9. Femora of *Nundasuchus songeaensis*, gen. et sp. nov. (NMT RB48). Right femur in **A**, anterolateral, **B**, posterolateral, **C**, posteromedial, **D**, proximal, and **E**, distal views. Left femur in **F**, anterior, **G**, lateral, **H**, medial, **I**, posterior, and **J**, distal views. Arrows indicate anterior direction. **Abbreviations**: **amt**, anteromedial tuber; **ctf**, crista tibiofibularis; **ft**, fourth trochanter; **g**, groove; **lt**, lateral tuber; **pmt**, posteromedial tuber, **tu**, tuber. Scale bar equals 1 cm.



Erpetosuchidae

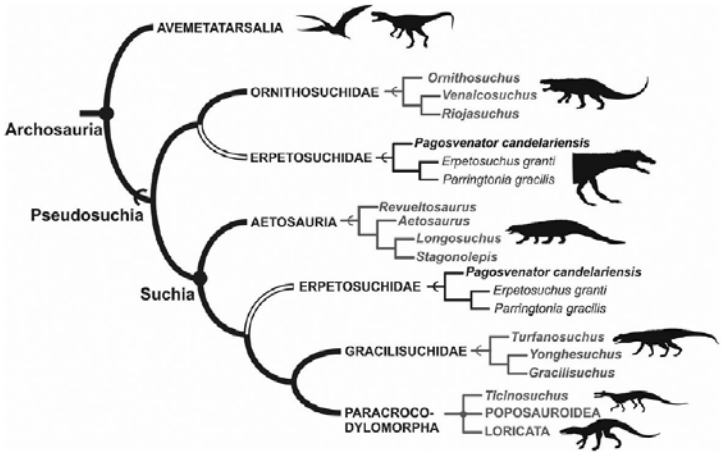


Figure 8. Alternative positions of Erpetosuchidae among the relationships of Pseudosuchia, indicating a simplified version of the strict consensus trees, 360 most parsimonious trees with 1358 steps, using a phylogenetic matrix composed of 84 terminal taxa and 417 (418 above) characters.

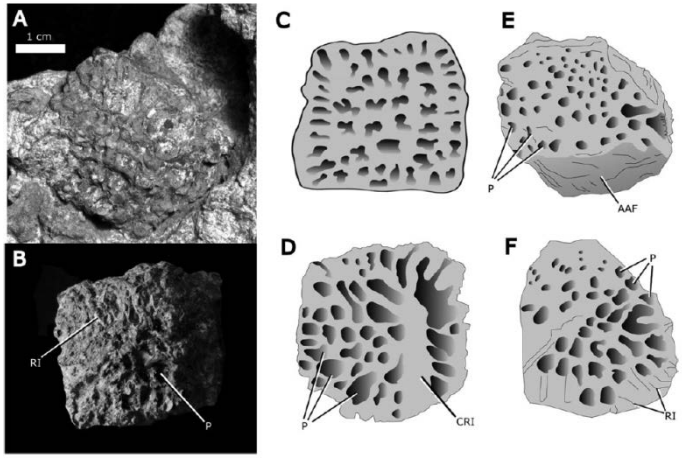


Figure 7. A, B, photographs of the best-preserved osteoderm in MMACR PV 036-T: A, in detail; and B, isolated and with heightened shadows to display the ornamentation cover better. C–F, interpretative illustrations of various ornamented osteoderms of archosauriforms for comparison: C, osteoderm of ***Pagosvenator candelariensis*** (MMACR PV 036-T); D, osteoderm of *Parringtonia gracilis* in dorsal view (NHMUK R3139, redrawn based on Nesbitt & Butler, 2012); E, osteoderm of *Archeopelta arborensis* (CPEZ-239a; redrawn based on Desojo *et al.*, 2012); and F, osteoderm of *Tarjadia ruthae* (PULR 063; redrawn based on Arcucci & Marsicano, 1998). Abbreviations: AAF, anterior articular facet; CRI, central ridge; P, pit; RI, ridge. Osteoderms are not to scale.

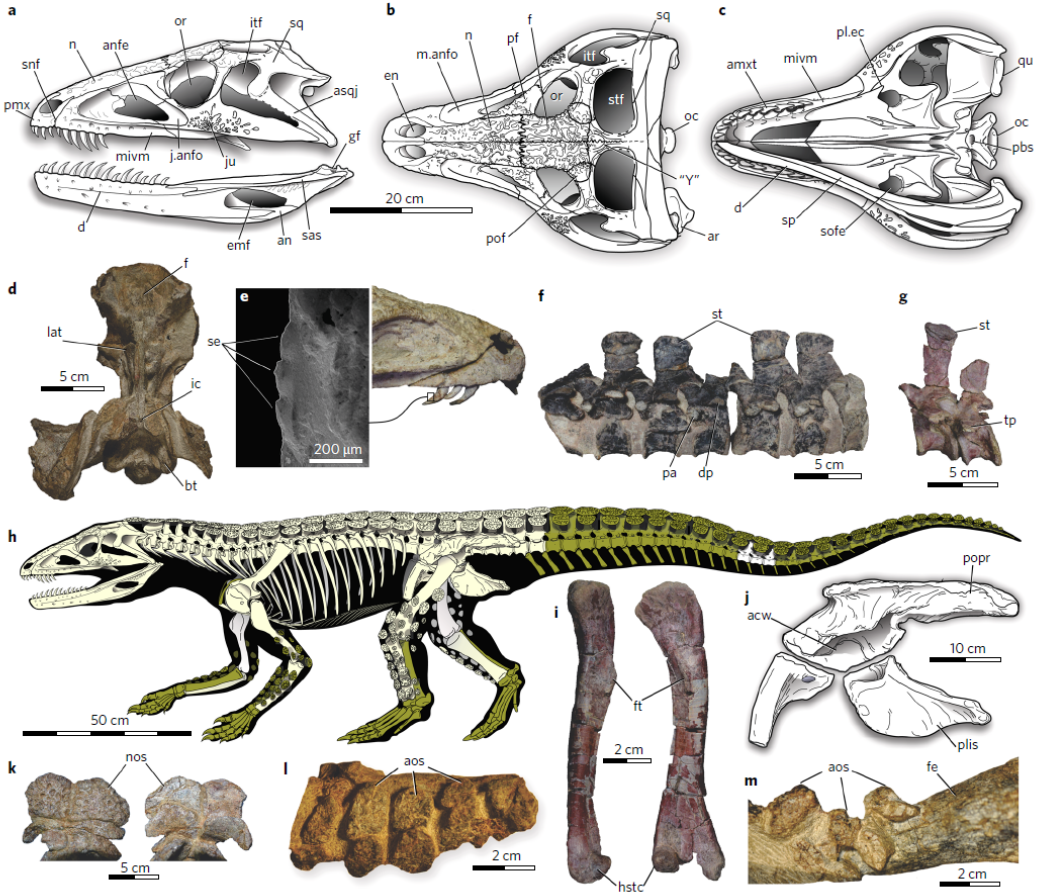


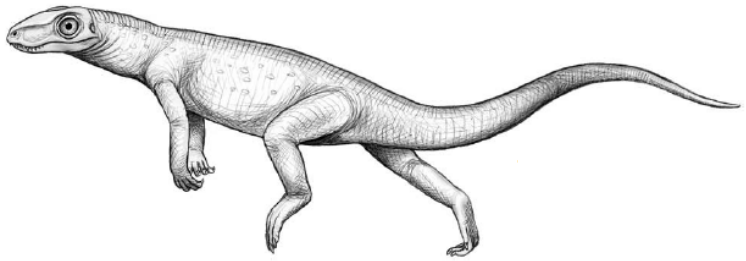
Fig. 2 | Skeletal anatomy of the erpetosuchid pseudosuchian *Tarjadia ruthae*. **a**–**c**, Reconstruction of skull in left lateral (**a**), dorsal (**b**) and ventral (**c**) views (based on CRILAR-Pv 478, 495, MCZ 9319). **d**, Braincase and skull roof in ventral view (CRILAR-Pv 478). **e**, Scanning electron microscope photograph of the distal serrations of a dentary tooth in labial view (CRILAR-Pv 478, the skull of CRILAR-Pv 495 on the right is only illustrative). **f**, Seven articulated middle and posterior dorsal vertebrae in left lateral view (CRILAR-Pv 479). **g**, Two articulated anterior caudal vertebrae in left lateral view (CRILAR-Pv 564). **h**, Skeletal reconstruction in left lateral view based on all available specimens (bones indicated in olive are unknown). **i**, Right femur in medial (left) and posterior (right) views (CRILAR-Pv 565). **j**, Reconstruction of the right hemipelvis in lateral view (based on CRILAR-Pv 478). **k**, Pair of paramedian nuchal osteoderms articulated to subsequent osteoderms in dorsal (left) and ventral (right) views (CRILAR-Pv 478). **l**, Appendicular osteoderms preserved on the surface of the tibia in external view (CRILAR-Pv 478). **m**, Appendicular osteoderms preserved on the surface of the distal half of the left femur in external view (CRILAR-Pv 478). "Y", Y-shaped tuberosity; acw, acetabular wall; amxt, anteriorly restricted maxillary teeth; an, angular; anfe, antorbital fenestra; aos, appendicular osteoderms; ar, articular; asqj, ascending process of the quadratojugal; bt, basal tuber; d, dentary; emf, external mandibular fenestra; en, external naris; f, frontal; fe, femur; ft, fourth trochanter; gf, glenoid fossa; hstc, hook-shaped tibial condyle; itf, infratemporal fenestra; j.anfo, jugal antorbital fossa; ju, jugal; ic, internal carotid artery passage; lat, laterosphenoid; m.anfo, maxillary antorbital fossa; mivn, medially inset ventral margin of the maxilla; n, nasal; nos, nuchal osteoderm; oc, occipital condyle; or, orbit; pbs, parabasisphenoid; pf, prefrontal; pl.ec, palatine–ectopterygoid contact; plis, plate-like ischium; pmx, premaxilla; pof, postfrontal; popr, postacetabular process; qu, quadrate; sas, surangular shelf; se, serrations; snf, subnarial foramen; sofe, suborbital fenestra; sp, splenial; sq, squamosal; st, spine table; stf, supratemporal fenestra; tp, transverse process. Institutional abbreviations: CRILAR-Pv, Centro Regional de Investigaciones Científicas y Transferencia Tecnológica, Anillaco, Argentina; MCZ, Museum of Comparative Zoology, Harvard, USA.

Gracilisuchidae

Definición: Clado más inclusivo que contiene a *Gracilisuchus stipanicicorum*, pero no a *Ornithosuchus longides*, *Aetosaurus ferratus*, *Poposaurus gracilis*, *Postosuchus kirkpatricki*, *Rutiodon carolinensis*, *Erpetosuchus granti*, *Revueltosaurus callenderi*, *Crocodylus niloticus* o *Passer domesticus* (Butler et al., 2014).

Sinapomorfías:

- Premaxilar con proceso posterodorsal que encaja en una muesca en la superficie lateral del nasal.
- Nasal forma parte del borde dorsal de fosa anteorbital.



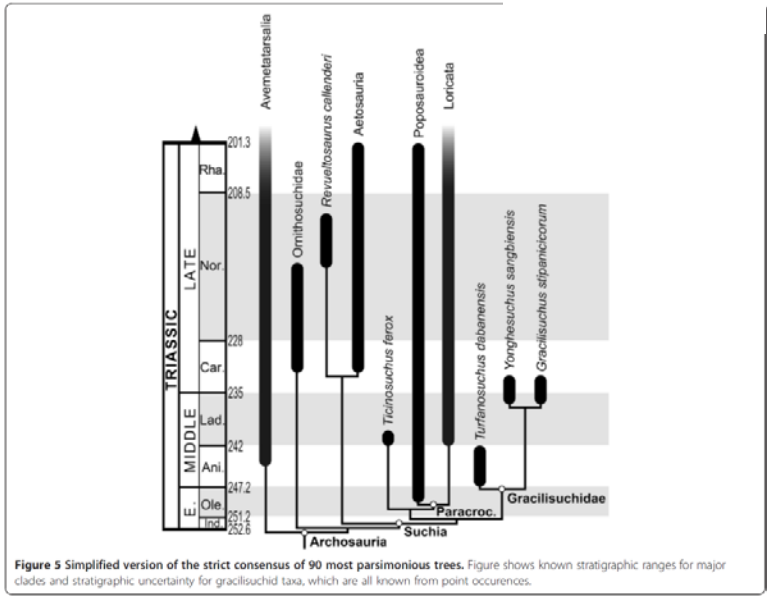


Figure 5 Simplified version of the strict consensus of 90 most parsimonious trees. Figure shows known stratigraphic ranges for major clades and stratigraphic uncertainty for gracilisuchid taxa, which are all known from point occurences.

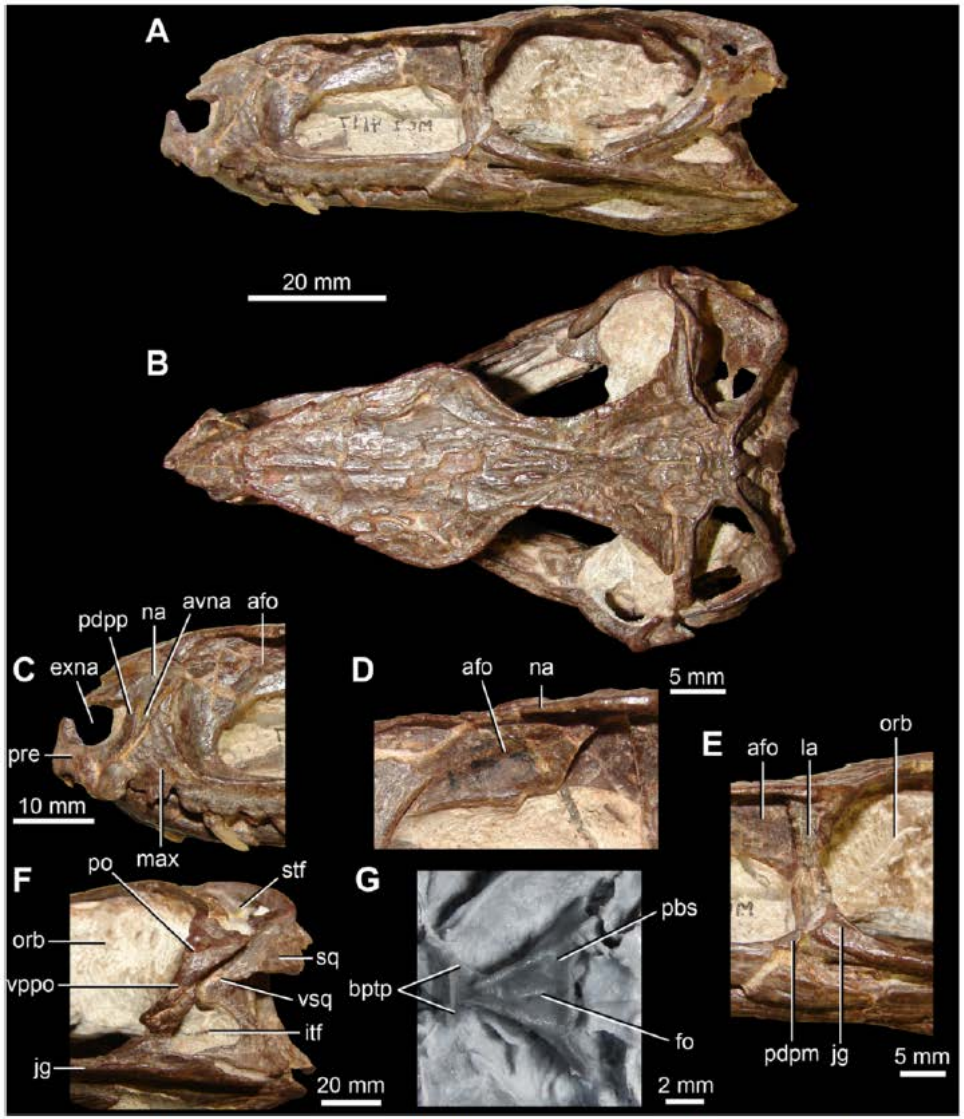


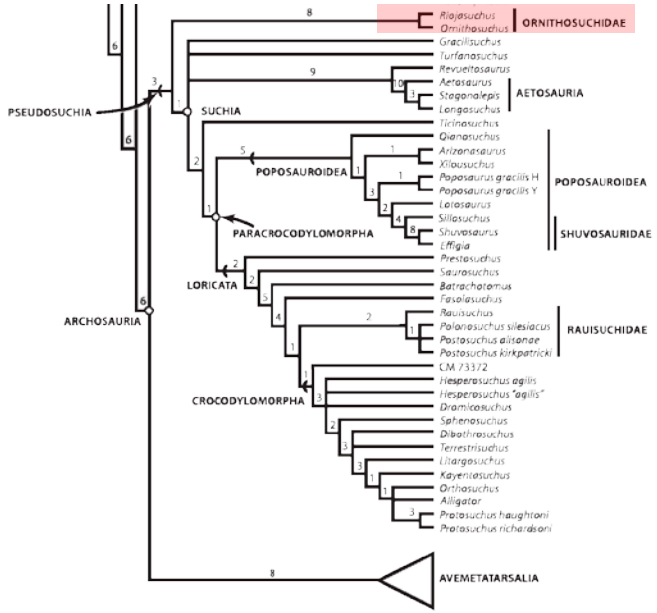
Figure 1 Anatomy of *Gracilisuchus stipanicicorum* Romer [8]. **A**. Skull in right lateral view (reversed). **B**. Skull in dorsal view. **C**. Close-up of the right premaxilla and anterior ends of right maxilla and nasal in lateral view (reversed). **D**. Close-up of the left antorbital fossa above the antorbital fenestra in lateral view. **E**. Posterodorsal process of the posterior end of the right maxilla in lateral view (reversed). **F**. Left infratemporal region in lateral view. **G**. Braincase and posterior end of the palate in ventral view. Abbreviations: afo, antorbital fossa; avna, anteroventral process of the nasal; bptp, basipterygoid process; exna, external naris; itf, infratemporal fenestra; jg, jugal; la, lacrimal; max, maxilla; na, nasal; orb, orbit; pbs, parabasisphenoid; pdpm, posterodorsal process of the posterior end of the maxilla; pdpp, posterodorsal process of the premaxilla; po, postorbital; pre, premaxilla; stf, supratemporal fenestra; sq, squamosal; vppo, ventral process of the postorbital; vsq, ventral process of the squamosal. **A-F**. MCZ 4117. **G**. cast of PULR 08.

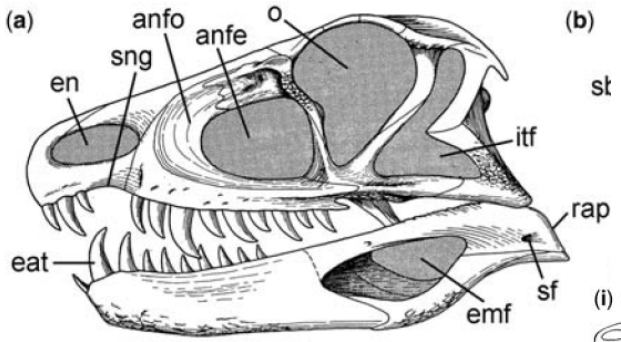
Ornithosuchidae

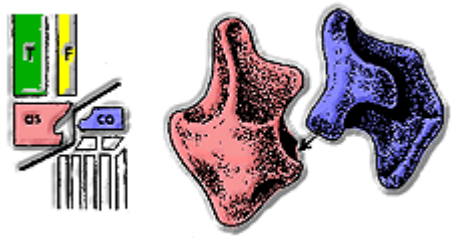
Definición: Clado más inclusivo que contiene a *Ornithosuchus longidens*, *Venaticosuchus rusconii*, *Riojasuchus tenuisceps* más todos los descendientes del ancestro común más reciente (Sereno, 1991).

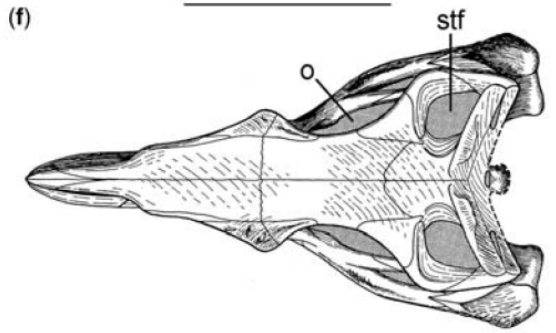
Sinapomorfías:

- Tres dientes premaxilares.
- Premaxila recurvada ventralmente.
- Diastema de dos dientes entre premaxila-maxila.
- Contacto Nasal-prefrontal ausente.
- Órbita con un borde ventral rodeado por un proceso del yugal en forma de V.
- En Astrágalo-calcaneo superficie articular ventral cóncavo-convexa con concavidad en astrágalo.









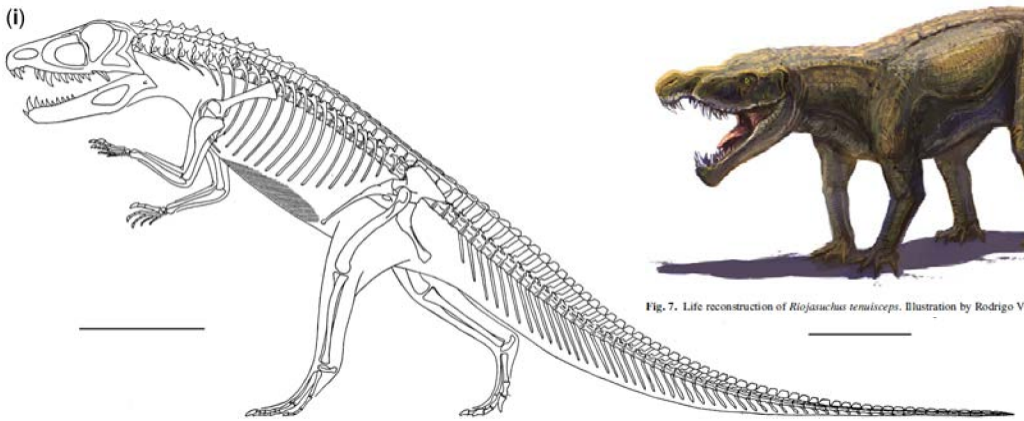


Fig. 7. Life reconstruction of *Riojasuchus tenuisceps*. Illustration by Rodrigo Vega.

Suchia

Definición: Clado menos inclusivo que contiene a *Aetosaurus ferratus* y *Rauisuchus tiradentes*, *Prestosuchus chiniquensis*, *Crocodylus niloticus* (Nesbitt, 2011).
Rango Temporal: Triásico tardío (Carniano?) – Presente.
Sinapomorfías:

- Reborde longitudinal redondeado y ancho sobre el yugal (75-2).
- Facetas articulares del calcáneo para fíbula y astrágalo separadas (372-1).
- Superficie articular del calcáneo para la fíbula convexa y hemicilíndrica (378-1).

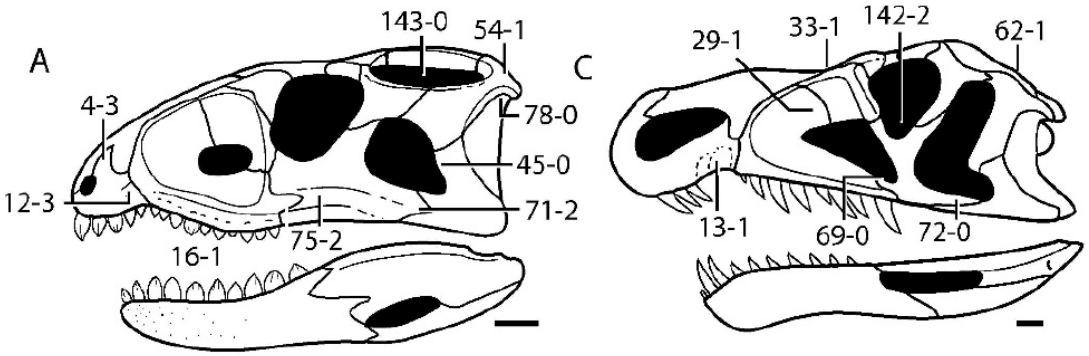


Fig. 17. Skulls of crocodylian-line archosaurs in lateral view: **A,** *Revueltosaurus callenderi* in lateral view; **B,** *Stagonolepis robertsoni* in lateral view; **C,** *Riojasuchus tenuisceps* in lateral view; **D,** *Effigia okeeffeae* in lateral view. Shaded area indicates incomplete preservation. Numbers refer to character states. Scale bars = 1 cm.

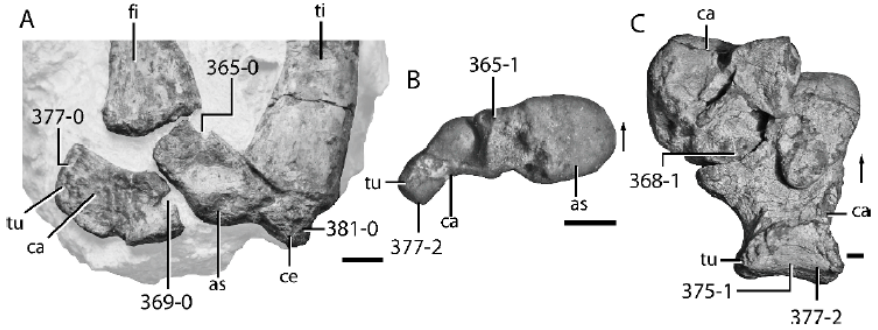
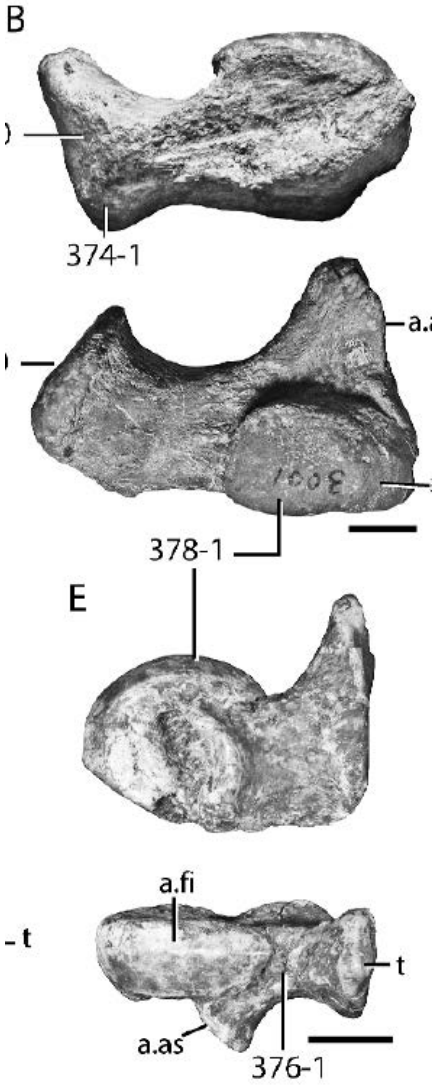


Fig. 44. Articulated ankles of archosauriforms: **A,** right ankle of *Proterosuchus* (AMNH FR 2237) in anterior view. The matrix has been lightened; **B,** left ankle of *Euparkeria capensis* (UMCZ T692) in proximal view; **C,** right ankle of *Fasolasuchus tenax* (PVL 3850) in proximal view. Arrow indicates anterior direction. Numbers refer to character states. See appendix for anatomical abbreviations. Scale bars = 1 cm.



B, right calcaneum of Phytosauria (AMNH FR 3001) in anterolateral (top) and proximal (bottom) views; E, right calcaneum of *Shuvosaurus inexpectatus* (TTU-P 9001) in medial (top) and proximal (bottom) views

Revueltosaurus spp.

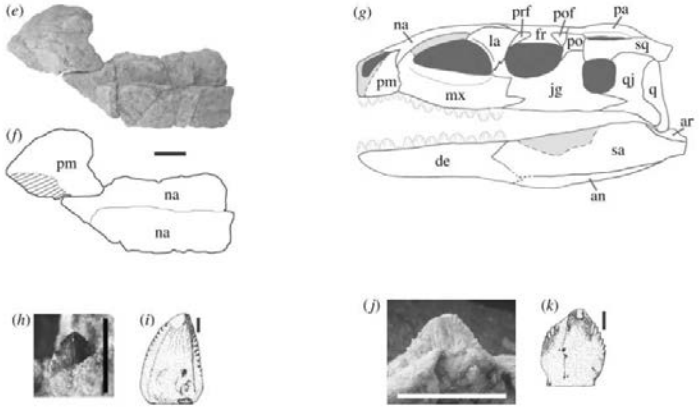
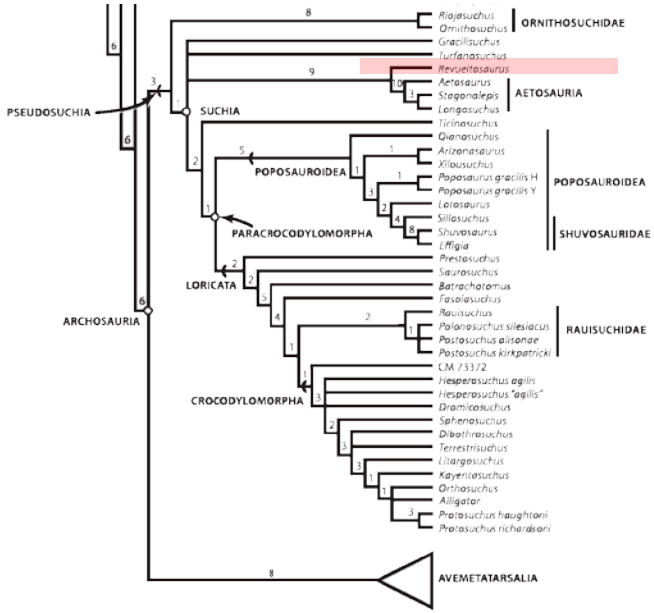


Figure 2. Cranial material of *Revueltosaurus callenderi*. (*a*) Posterior portion of the skull of PEFO 33787 in dorsal view; (*b*) drawing of PEFO 33787 in dorsal view; (*c*) posterior portion of the skull of PEFO 33787 in lateral view; (*d*) drawing of PEFO 33787 in lateral view; (*e*) nasals and right premaxilla of the skull of PEFO 33788 in dorsal view; (*f*) drawing of nasals and right premaxilla of the skull of PEFO 33788 in dorsal view; (*g*) reconstruction of the skull of *Revueltosaurus* in left lateral view; (*h*) *in situ* premaxilla tooth of PEFO 33787; (*i*) paratype premaxilla tooth (NMMNH P-4959) of *R. callenderi* (from Hunt & Lucas 1994); (*j*) *in situ* dentary tooth of PEFO 33787; and (*k*) paratype maxilla/dentary tooth (NMMNH P-4958) of *R. callenderi* (from Hunt & Lucas 1994). Abbreviations: an, angular; ar, articular; de, dentary; fr, frontal; jg, jugal; la, lacrimal; ltf, lateral temporal fenestra; mx, maxilla; na, nasal; pa, parietal; pm, premaxilla; po, postorbital; pof, postfrontal; prf, prefrontal; q, quadrate; qj, quadratojugal; sa, surangular; sq, squamosal; stf, supratemporal fenestra; ?, unidentified element crushed into orbit. Cross-hatching indicates broken surfaces and dashed lines indicate inferred sutures. Scale bars equal 1 cm for all except (*i*) and (*k*), where the scale bar equals 1 mm.

Parker et al., 2005



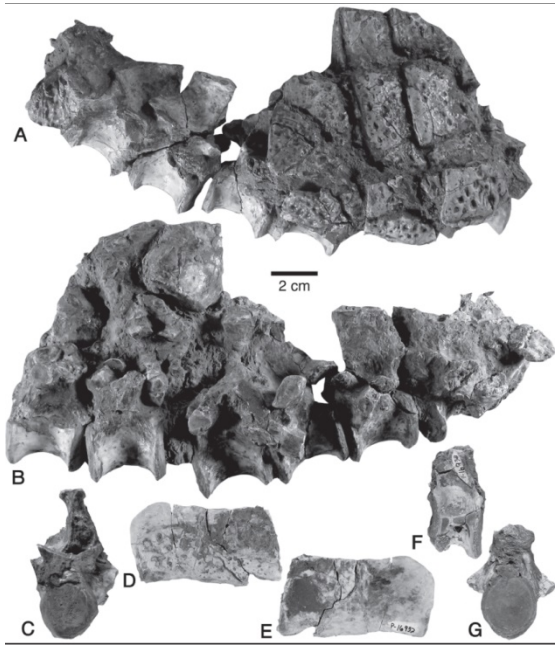


FIGURE 1. Skeleton of *Revueltosaurus callenderi* (NMMNH P-16932) from the Bull Canyon Formation of east-central New Mexico. A-B, Dorsal vertebral series with associated osteoderms in right (A) and left (B) lateral views. C, Dorsal centrum in cranial view. D-E, Paramedian osteoderm in dorsal (D) and ventral (E) views. F-G, Partial cervical vertebra in right lateral (F) and cranial (G) views. All scale bars = 2 cm.

Hunt et al., 2005

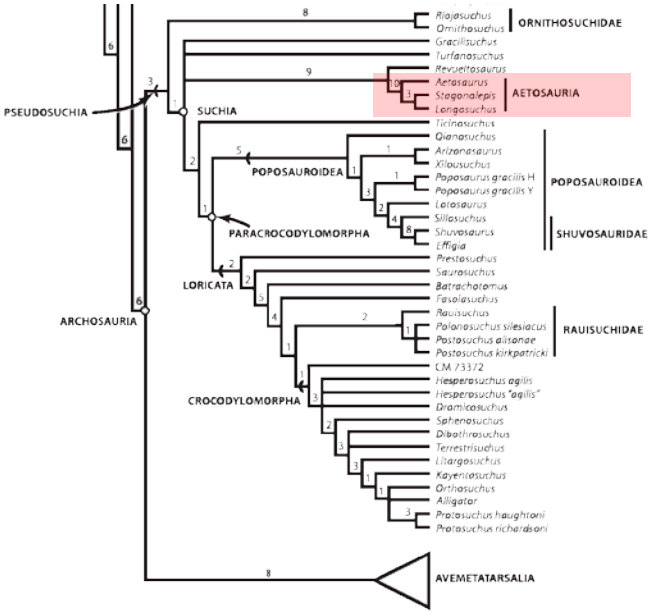
Aetosauria

Definición: Clado más inclusivo que contiene a *Aetosaurus ferratus* y *Desmatosuchus haplocerus* pero no a *Rutiodon carolinensis, Postosuchus kirkpatricki, Prestosuchus chiniquensis, Poposaurus gracilis, Crocodylus niloticus, Gracilisuchus stipanicicorum,* y *Revueltosaurus callenderi*, (Nesbitt, 2011; Parker, 2007).

Rango Temporal: Triásico tardío (Carniano?-Noriano) – Triásico tardío (Rhaetiano?).

Sinapomorfías:

- Dientes premaxilares ausentes en porción rostral de la premaxila.
- Cuadradoyugal forma más del 80% del borde posterior de la FTI.
- Glenoide mandibular localizado ventralmente respecto al margen dorsal del dentario.
- Dientes del dentario ausentes en porción más rostral.
- Corona dental mesio-distalmente expandida respecto a la raíz.
- Dos pares de osteodermos paramedianos.



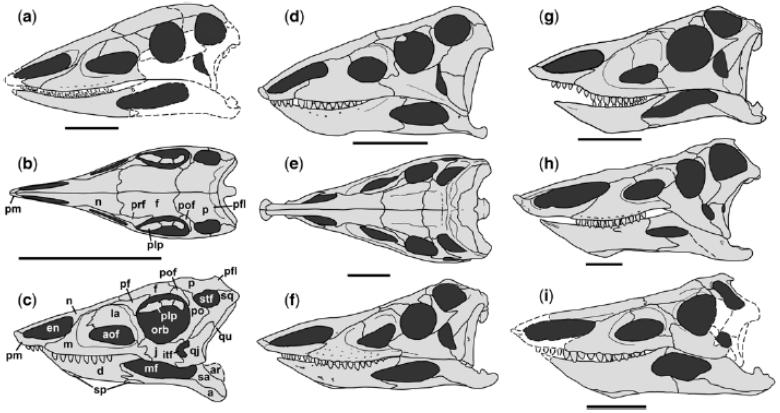
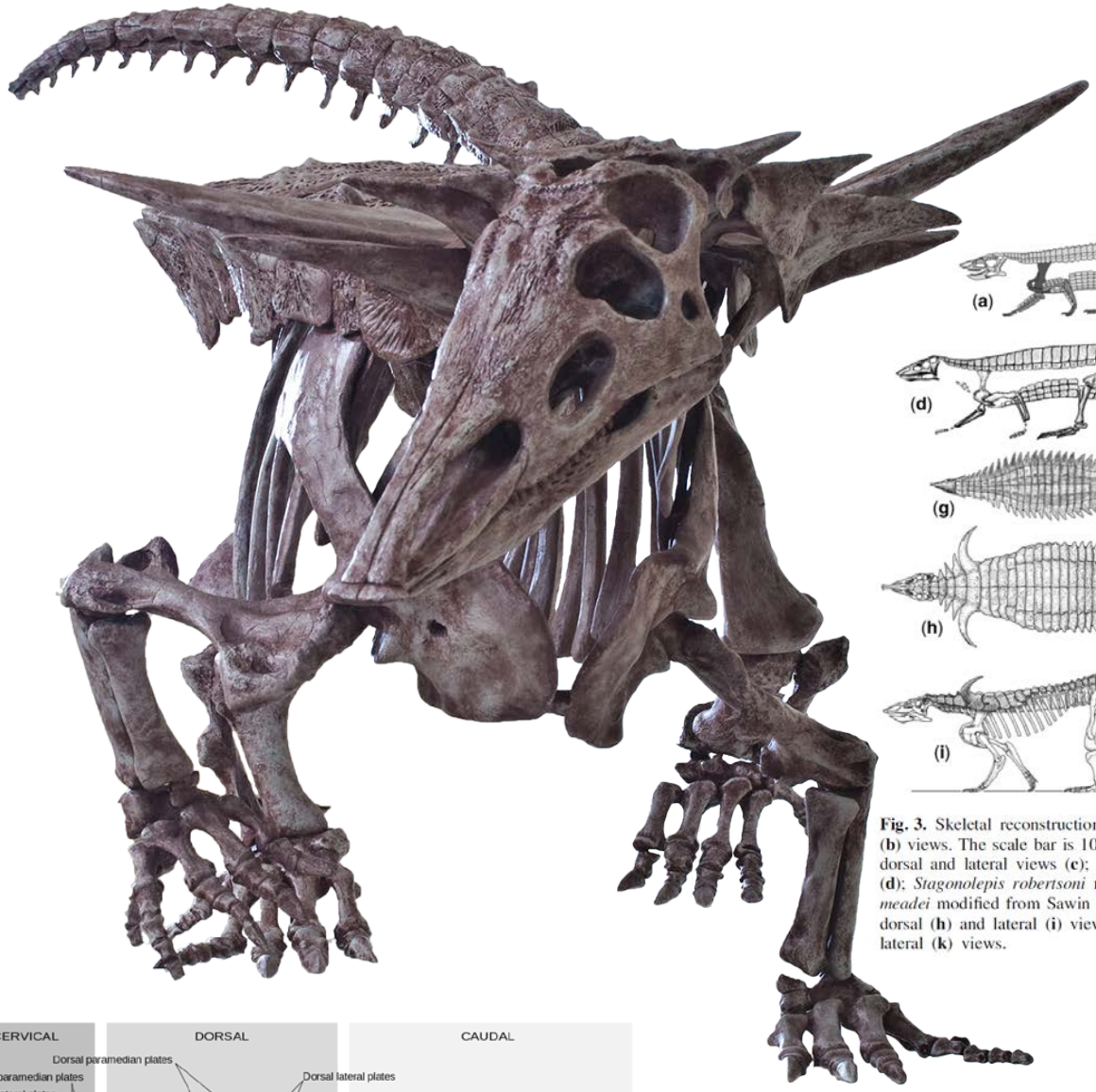


Fig. 4. Aetosaur skulls. *Aetosauroides scagliai* modified from Desojo & Ezcurra (2011) in lateral view (**a**); *Aetosaurus ferratus* modified from Schoch (2007) in dorsal (**b**) and lateral views (**c**); *Neoaetosauroides engaeus* modified from Desojo & Báez (2007) in lateral view (**d**); *Stagonolepis olenkae* modified from Sulej (2010) in dorsal (**e**) and lateral views (**f**); *Stagonolepis robertsoni* modified from Sulej (2010) in lateral view (**g**); *Desmatosuchus smalli* modified from Small (2002) in lateral view (**h**); *Longosuchus meadei* modified from Parrish (1994) in lateral view (**i**). All scale bars are 5 cm. See Appendix for anatomical abbreviations.



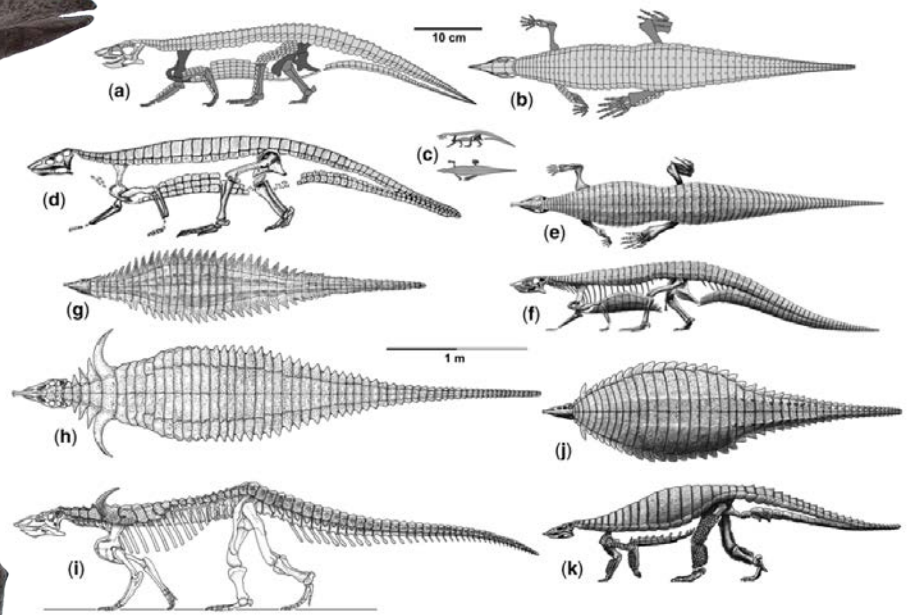
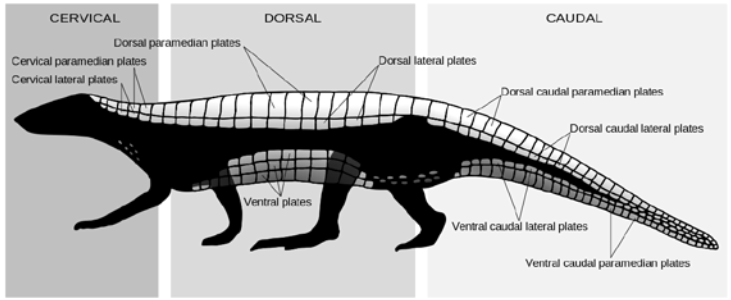


Fig. 3. Skeletal reconstructions of aetosaurs. *Aetosaurus ferratus* from Schoch (2007) in lateral (**a**) and dorsal (**b**) views. The scale bar is 10 cm. All other aetosaur skeletons are to the same scale (1 m). *Aetosaurus ferratus* in dorsal and lateral views (**c**); *Neoaetosauroides engaeus* modified from Desojo & Báez (2005) in lateral view (**d**); *Stagonolepis robertsoni* modified from Walker (1961) in dorsal (**e**) and lateral (**f**) views; *Longosuchus meadei* modified from Sawin (1947) in dorsal view (**g**); *Desmatosuchus spurensis* modified from Parker (2008) in dorsal (**h**) and lateral (**i**) views; *Typothorax coccinarum* modified from Heckert *et al* (2010) in dorsal (**j**) and lateral (**k**) views.



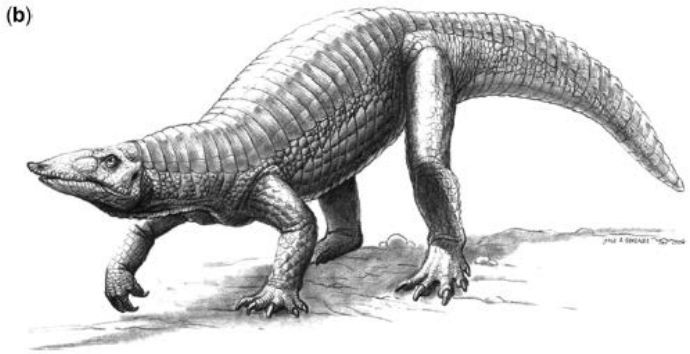


Fig. 9. Aetosaur palaeobiology. (**a**) Life reconstruction of *Desmatosuchus spurensis* as a herbivore, image © Victor Leshyk. (**b**) Life reconstruction of *Neoaetosauroides engaeus* showing the difference in posture between front and back limbs, image © Jorge A. Gonzalez (Palaeontology **50**: 269).

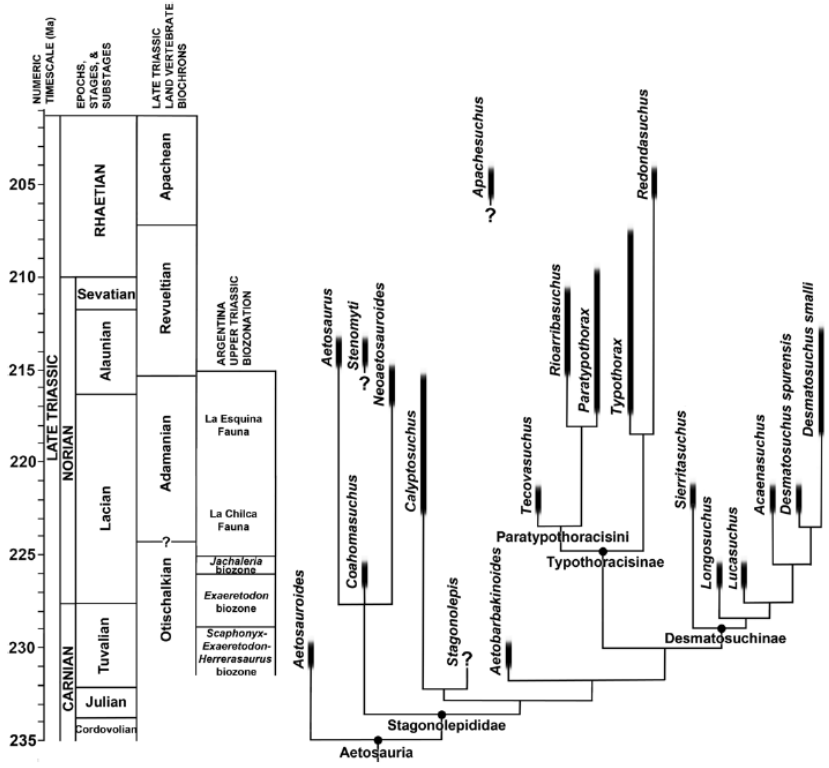


Fig. 2. Time-calibrated phylogenetic tree for Aetosauria. Geological timescale based on the calibrations of Muttoni *et al.* (2004, 2010), Furin *et al.* (2006), Schoene *et al.* (2010) and Hüsing *et al.* (2011). Calibration of the Late Triassic land vertebrate faunachrons and Upper Triassic biozones of Argentina based on data in Martinez *et al.* (2011), Ramezani *et al.* (2011), Irmis *et al.* (2011) and Santi Malnis *et al.* (2011). Phylogeny based on Desojo *et al*'s. (2012) modification of the dataset of Parker *et al.* (2008); the phylogenetic positions of *Stenomyti* and *Apachesuchus* have not been tested in a phylogenetic analysis.

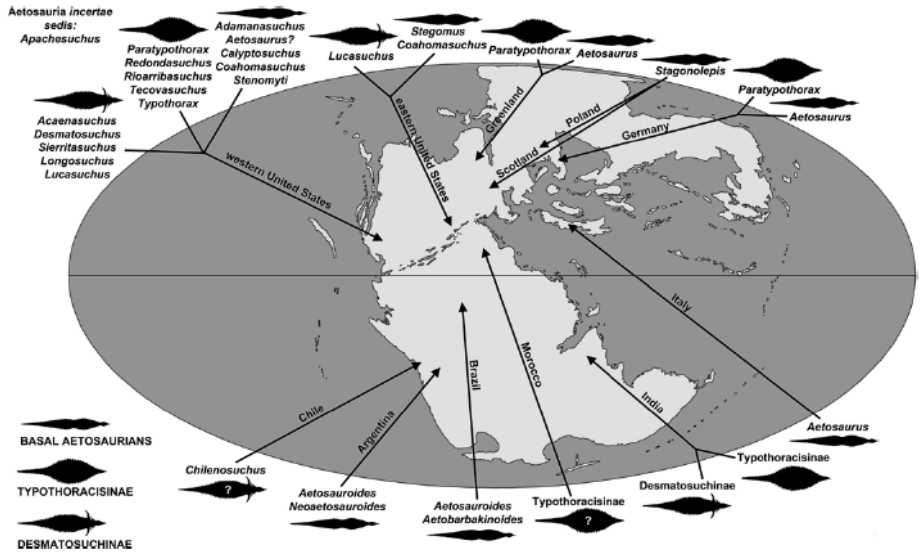
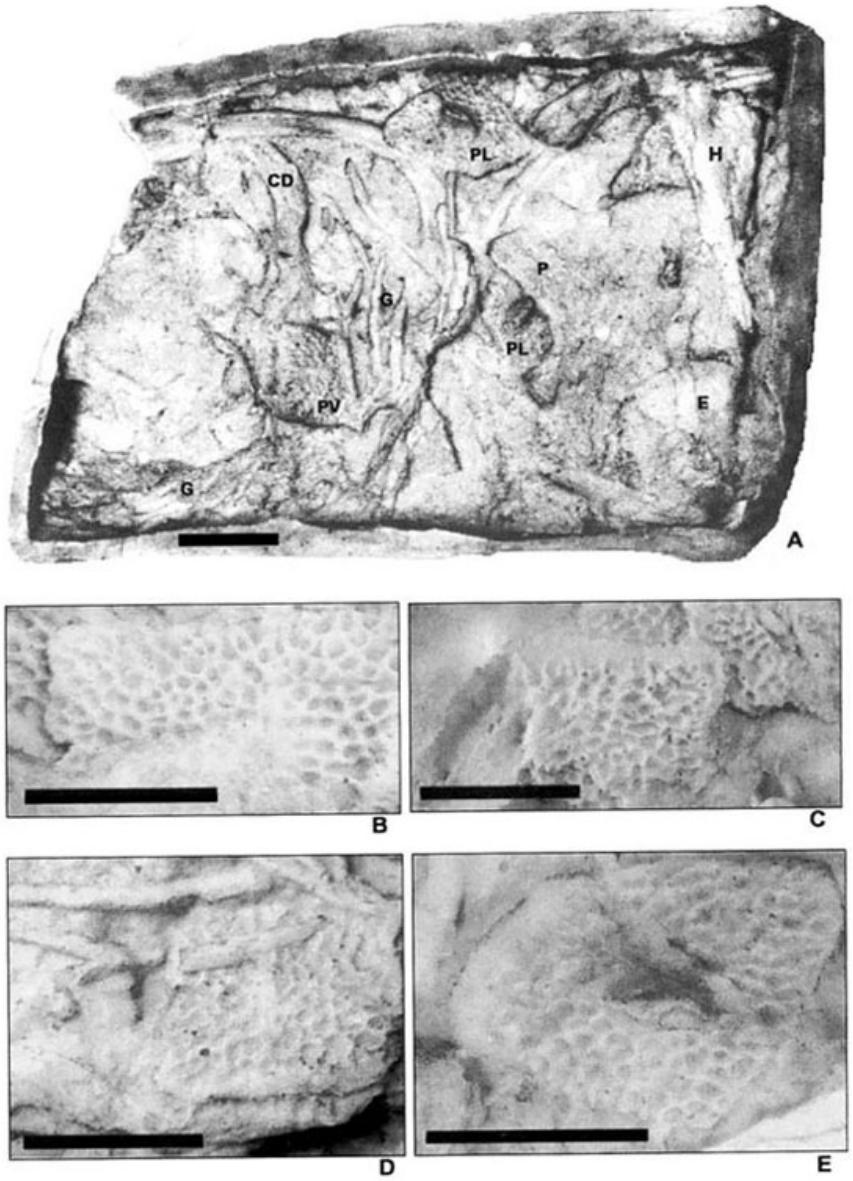


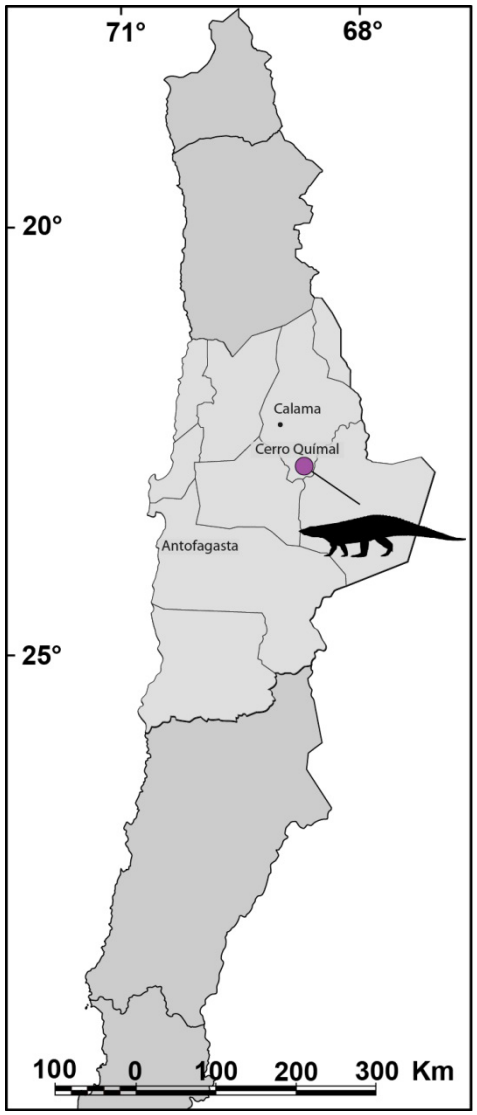
Fig. 1. Global geographical distribution of aetosaur taxa on a palaeogeographical map of Late Triassic Pangaea.

Chilenosuchus forttae Casamiquela 1980
Cerro Químal, Estratos El Bordo

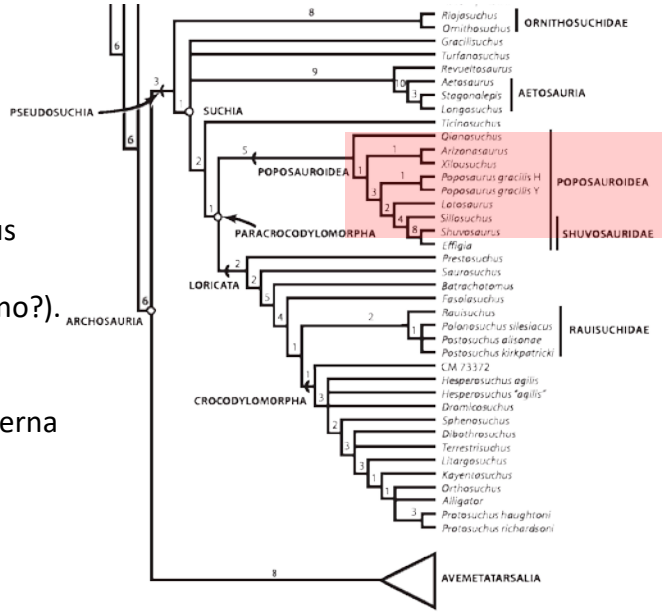
Casamiquela, 1980



Desojo, 2003



Poposauroidea



Definición: Clado más inclusivo que contiene a Poposaurus gracilis, pero no a Postosuchus kirkpatricki, Crocodylus niloticus, Ornithosuchus longidens o Aetosaurus ferratus.

Rango Temporal: Triásico temprano (Olenekiano) – Triásico tardío (Noriano-Rhaetiano?).

Sinapomorfías:

- Proceso anterodorsal del nasal mayor que la premaxila
- Proceso posterodorsal del premaxilar restringido al borde ventral de la narina externa
- Margen Anterodorsal del maxilar bordeando la narina externa

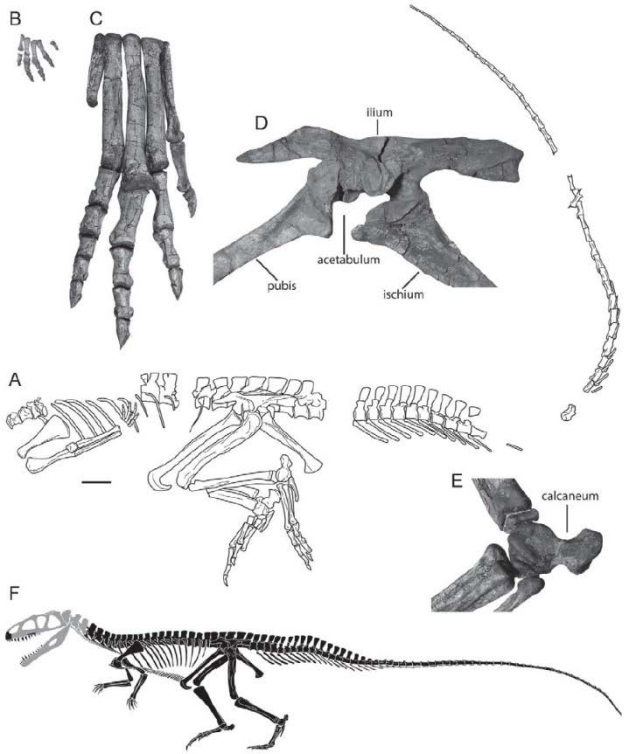
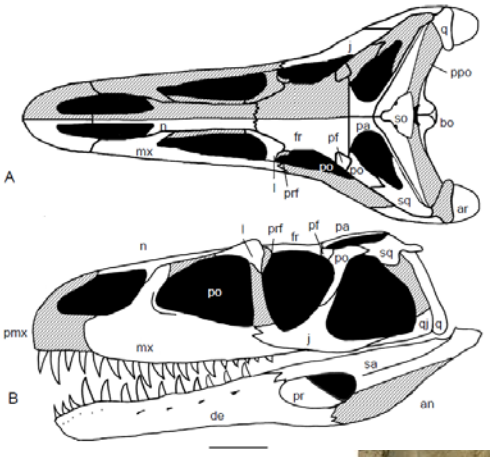


FIGURE 1. *Poposaurus gracilis*. **A,** Illustration of in situ *P. gracilis* (YPM VP 057100) from the base of the Chinle Formation, Circle Cliffs, Grand Staircase–Escalante National Monument, Utah, USA. Scale bar equals 10 cm. **B,** Dorsal view of left manus as found in situ. **C,** Dorsal view of left pes after extraction from the block. **D,** Left lateral view of acetabular portion of the pelvis. The femur has been removed to reveal the incompletely ossified acetabulum. **E,** Left lateral view of the left ankle in situ. **F,** Skeletal reconstruction of the bipedal stem crocodilian *P. gracilis* based on YPM VP 057100.



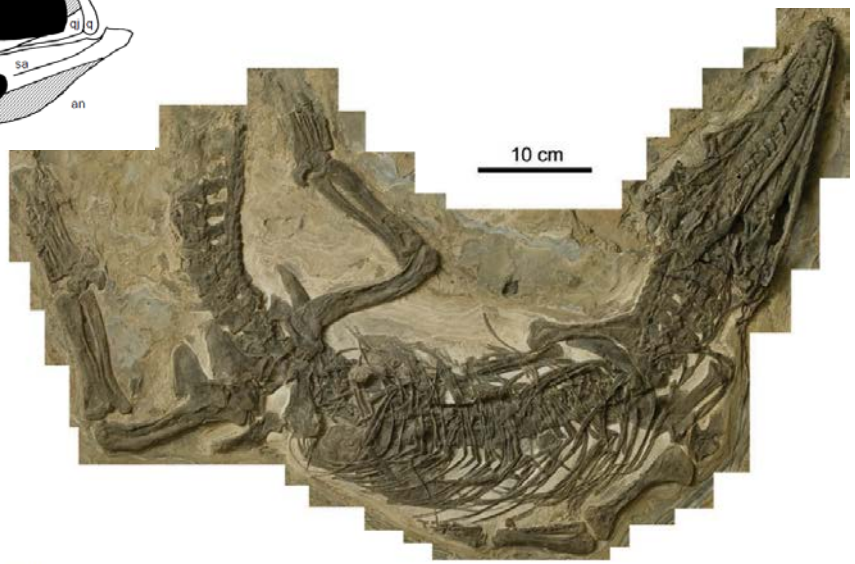
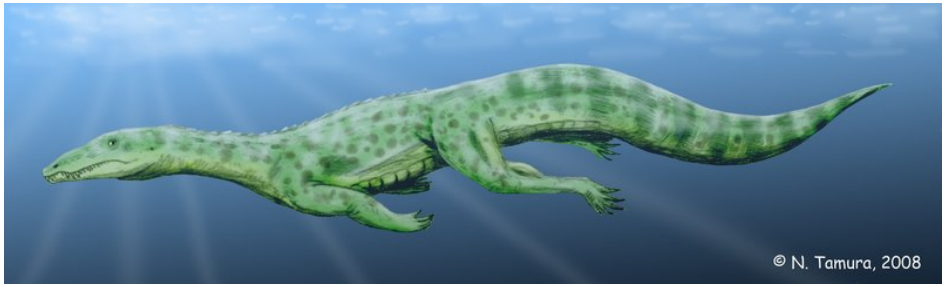


FIGURE 1. Skeleton of *Diandongosuchus fuyuanensis*, gen. et sp. nov. (ZMNH M8770).

Qianosuchus mixtus



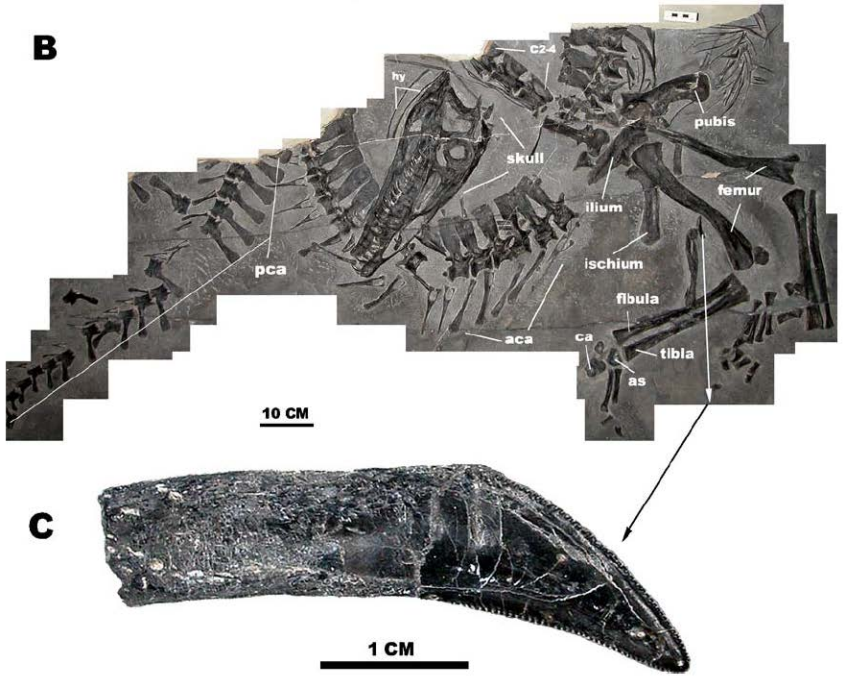
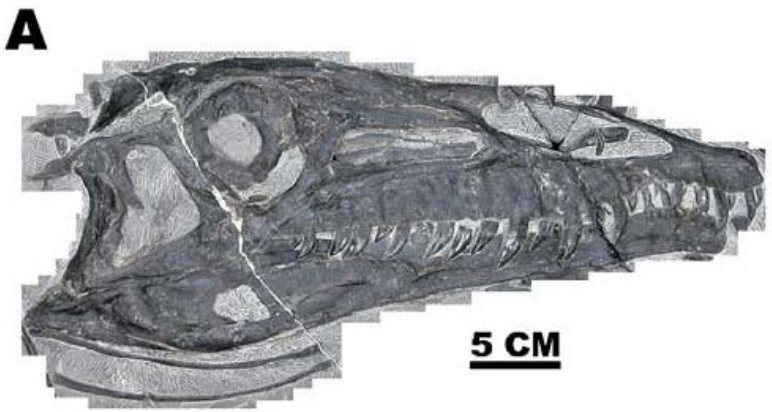
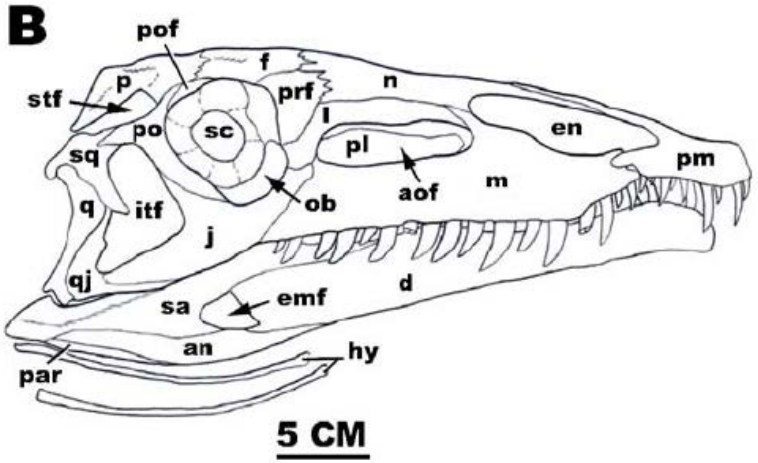
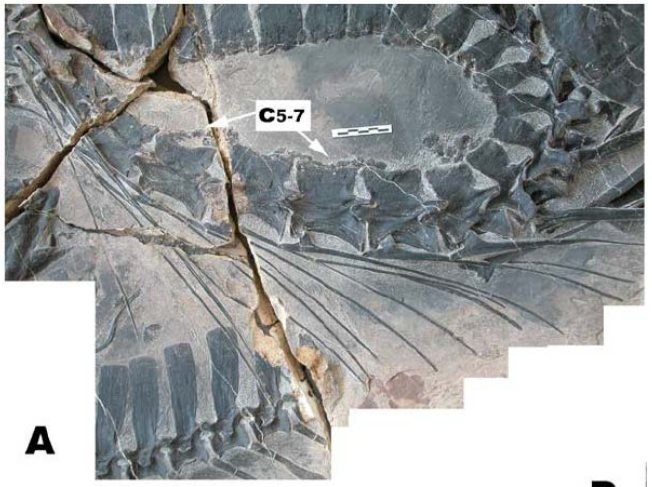


Fig. 1 *Qianosuchus mixtus* gen. et sp. nov. **a** Holotype (IVPP V13899). **b** Paratype (IVPP V14300). **c** An isolated tooth. *aca* anterior caudal vertebrae, *as* astragalus, *ca* calcaneum, *cl* clavicle, *co* coracoid, *c2-4* and *c4-9* cervical vertebrae 2 to 4 and 4 to 9, *h* humerus, *hy* hyoid, *icl* interclavicle, *lsc* left scapula, *rsc* right scapula, *mca* midcaudal vertebrae, *mtV* metatarsal V, *pca* posterior caudal vertebrae with no transverse process







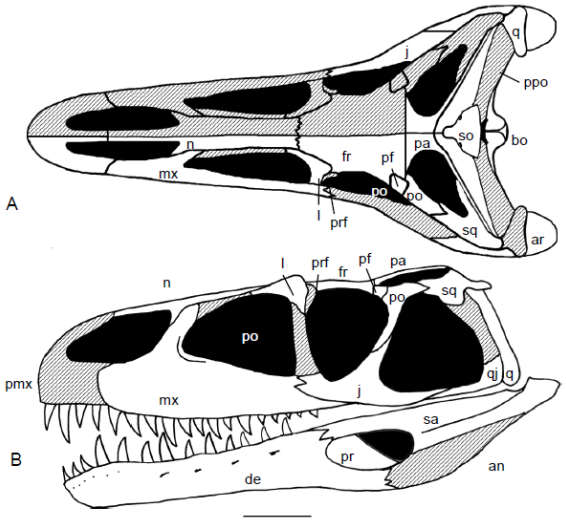
Li et al 2006

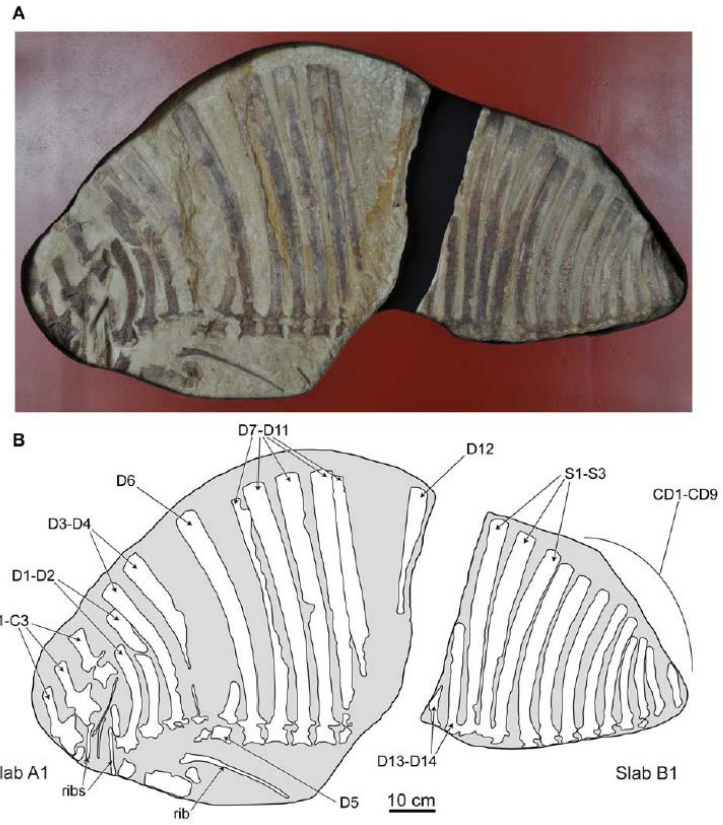
Ctenosauriscidae

Definición: Clado más inclusivo que contiene a *Ctenosauriscus koeneni* pero no a *Poposaurus gracilis*, *Effigia okeefeae*, *Postosuchus kirkpatricki*, *Crocodylus niloticus*, *Ornithosuchus longidens* o *Aetosaurus ferratus* (Butler et al., 2012).

Sinapomorfías:

- Espinas neurales de las vèrtebras dorsales elongadas (7 veces altura del centro, 4 veces más elongadas que la altura de las espinas cervicales).
- Espinas neurales dorsales fuertemente recurvadas en vista lateral.





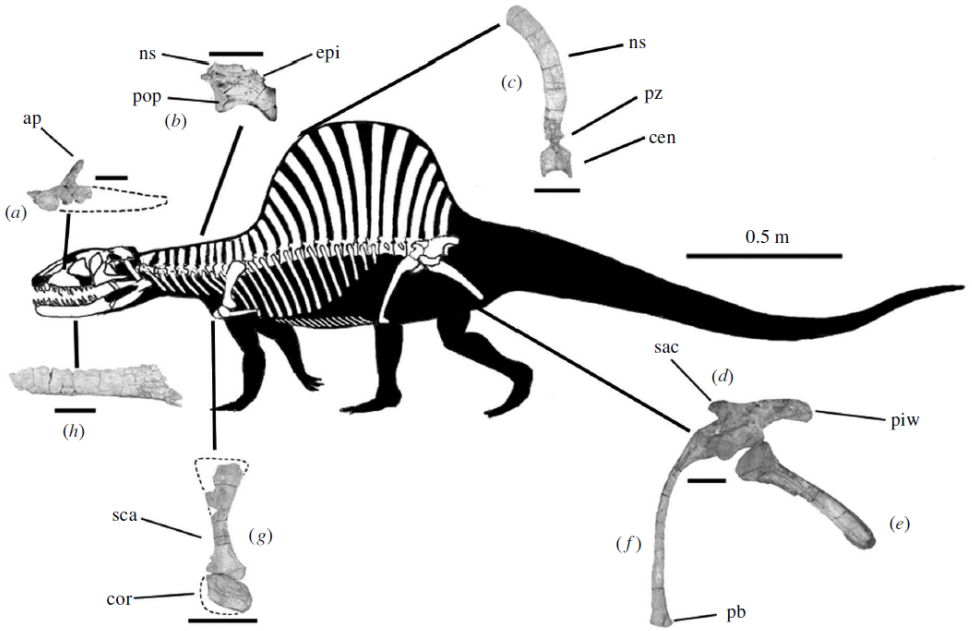
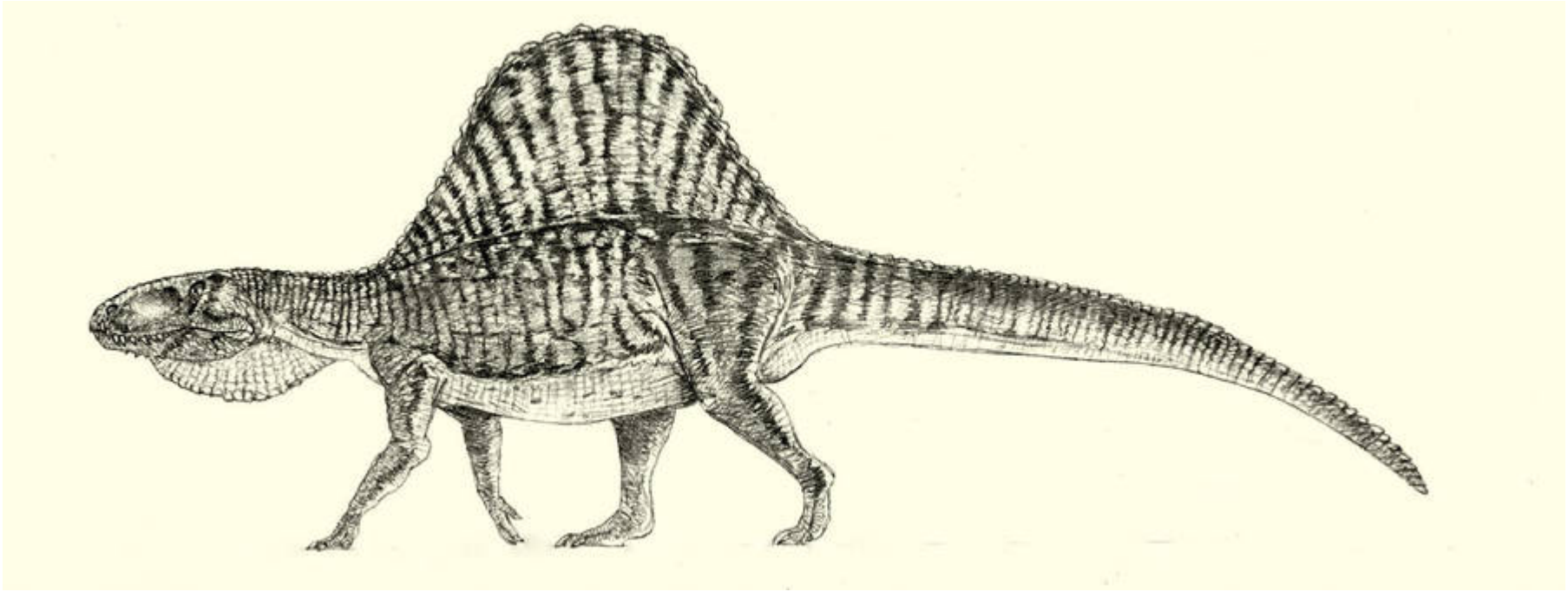


Figure 1. Skeletal anatomy of *Arizonasaurus babbitti*. Illustrated bones are based on MSM P4590 and the outline of the skeleton is based on *Postosuchus kirkpatricki*. (*a*) Partial maxilla in lateral view (dashed lines indicate reconstructed outline of the element); (*b*) third cervical vertebra with broken neural spine in lateral view; (*c*) anterior dorsal vertebra in lateral view; (*d*) left ilium in lateral view; (*e*) fused left and right ischia in lateral view; (*f*) left pubis in lateral view; (*g*) incomplete left scapula with articulated coracoid in lateral view; and (*h*) complete left dentary in lateral view. Scale bars of individual elements represent 5 cm. Skeletal scale bar represents 0.5 m. Abbreviations: ap, ascending process; epi, epipophysis; cen, centrum; cor, coracoid; ns, neural spine; pb, pubic boot; piw, posterior iliac wing; pop, parapophysis; pz, postzygopophysis; sac, supraacetabular crest; sca, scapula.

Arizonasaurus babbitti



Shuvosauridae

Definición: Clado menos inclusivo que contiene a *Shuvosaurus inexpectatus* y *Sillosuchus longicervix* (Alcober y Parrish,1997; Nesbitt, 2011).
Rango Temporal: Triásico tardío (Carniano?) – Triásico tardío (Noriano-Rhaetiano?)
Sinapomorfías:

- Pleurocelos en porción anterior de centros cervicales.
- Costillas sacrales compartidas entre dos vèrtebras sacrales.
- Margen anterior de la escápula recto/convexo o ligeramente cóncavo.
- Porción posteroventral del coracoides suave.
- Proción proxmal del húmero expandida menos de la mitad del ancho de la diáfisis humeral.

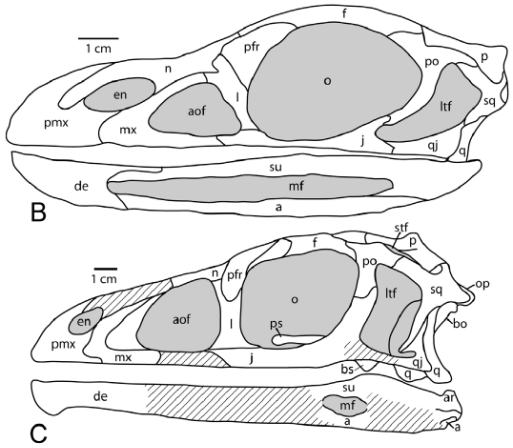


FIGURE 1. Comparison of the skulls of *Effigia* and *Shuvosaurus*. **A**, Drawing of left side of holotype skull of *Effigia okeeffeae*, AMNH FR 30587, as preserved (after Nesbitt, 2007, fig. 4). **B**, Reconstruction of skull of *Effigia okeefeae* in left lateral view (after Nesbitt and Norell, 2006, fig. 1). **C**, Reconstruction of skull of *Shuvosaurus inexpectatus* in left lateral view (after Lehane, 2005, fig. 5). Diagonal lines represent reconstructed portions. Abbreviations are: a = angular, aof = antorbital fenestra, ar = articular, bo = basioccipital, bs = basisphenoid, de = dentary, en = external nares, f = frontal, j = jugal, l = lacrimal, ltf = lateral temporal fenestra, mf = mandibular fenestra, mx = maxilla, n = nasal, o =orbit, op = opisthotic, p = parietal, pfr = prefrontal, pmx = premaxilla, po = postorbital, ps = parasphenoid, q = quadrate, qj = quadratojugal, sq = squamosal, stf = supratemporal fenestra, su = surangular.

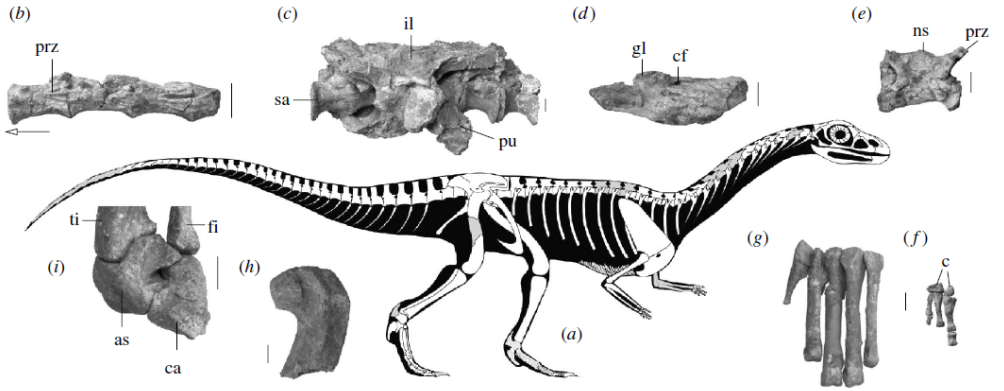


Figure 2. AMNH FR 30587. (*a*) Skeletal reconstruction of *Effigia okeeffeae*. The bones in grey are unknown. (*b*) Posterior caudal vertebrae (AMNH FR 30589) with overlapping prezygapophyses in lateral view. Arrow indicates anterior direction for the vertebrae only. (*c*) Articulated pelvis in lateral view. (*d*) Right coracoid in lateral view. (*e*) Anterior cervical vertebra in lateral view. (*f*) Incomplete right manus scaled to the right pes in dorsal view. (*g*) Right pes in dorsal view. (*h*) Right proximal part of the femur in medial view. (*i*) Articulation of the right ankle in posterior view. Abbreviations: as, astragalus; c, carpal; ca, calcaneum; cf, coracoid foramen; fi, fibula; gl, glenoid; il, ilium; ns, neural spine; prz, prezygapophysis; pu, pubis; sa, sacrum; ti, tibia. Scales = 1 cm.

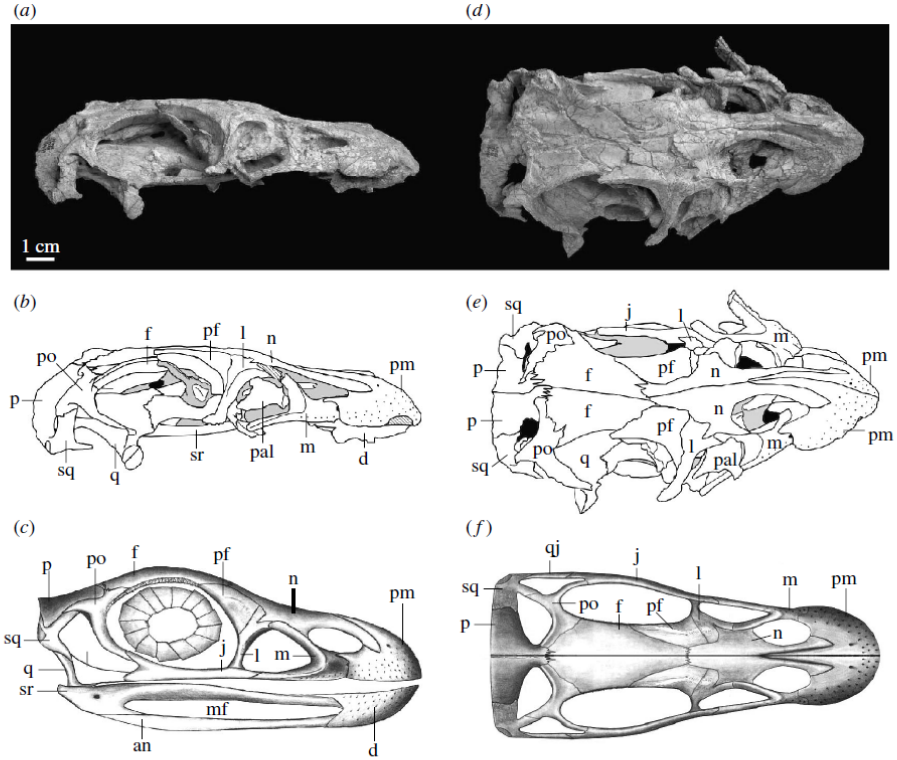


Figure 1. Skull reconstruction of *Effigia okeeffeae* (AMNH FR 30587). (*a*, *b*) Lateral view, (*c*) reconstruction, (*d*, *e*) dorsal view and (*f*) reconstruction. Abbreviations: an, angular; d, dentary; f, frontal; j, jugal; l, lacrimal; m, maxilla; mf, mandibular fenestra; n, nasal; p, parietal; pal, palatine; pf, prefrontal; pm, premaxilla; po, postorbital; q, quadrate; qj, quadratojugal; sq, squamosal; sr, surangular.

Effigia okeeffeae

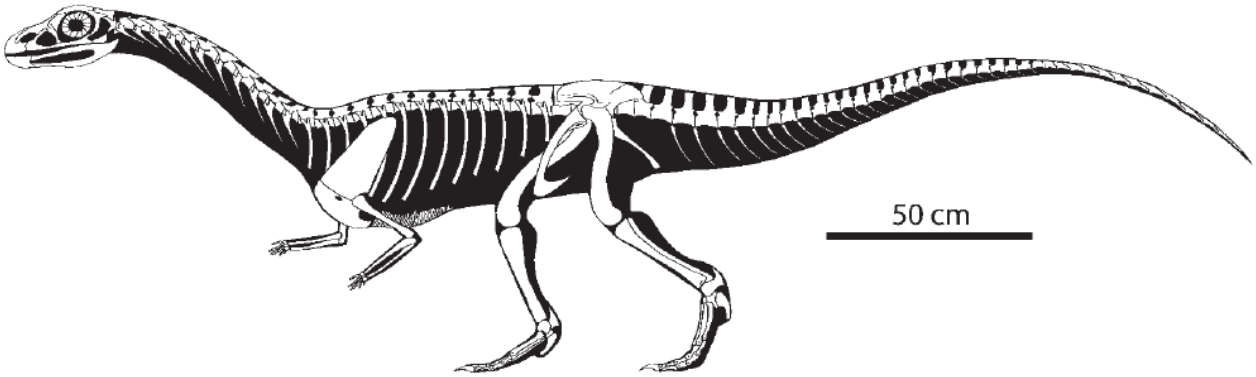


Fig. 52. Reconstruction of *Effigia okeeffeae* from all of the available specimens. Details of the distal tail, the number of vertebrae, and the proportions of the femur are uncertain (from Nesbitt and Norell, 2006).

Lotosaurus adentus

Loricata

Definición: Clado más inclusivo que contiene a Crocodylus niloticus, pero no a Poposaurus gracilis, Ornithosuchus longidens o Aetosaurus ferratus (Nesbitt, 2011).
Rango Temporal: Triásico medio (Ladiniano) – Presente.

Sinapomorfías:
- Cuatro dientes premaxilares.
- Reborde en lado lateral del proceso ventral del escamoso.
- Proceso anteroventral del escamoso que penetra la fosa temporal inferior.
- Órbita alta y angosta.

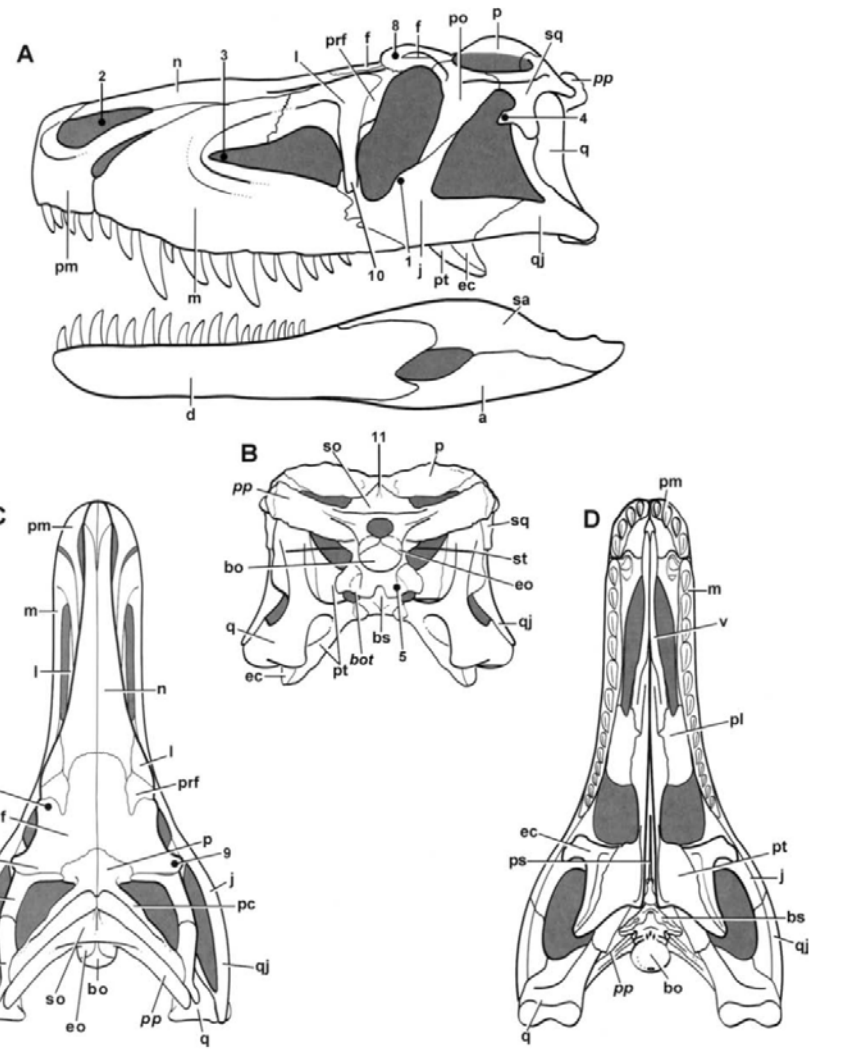


FIGURE 11. Reconstruction of the skull of *Saurosuchus galilei*, in lateral view (**A**), posterior view (**B**), dorsal view (**C**), and ventral view (**D**). Numbers indicate locations of cranial autapomorphies. **Abbreviations**: as in figures 1–5.

“Rauisuchia”

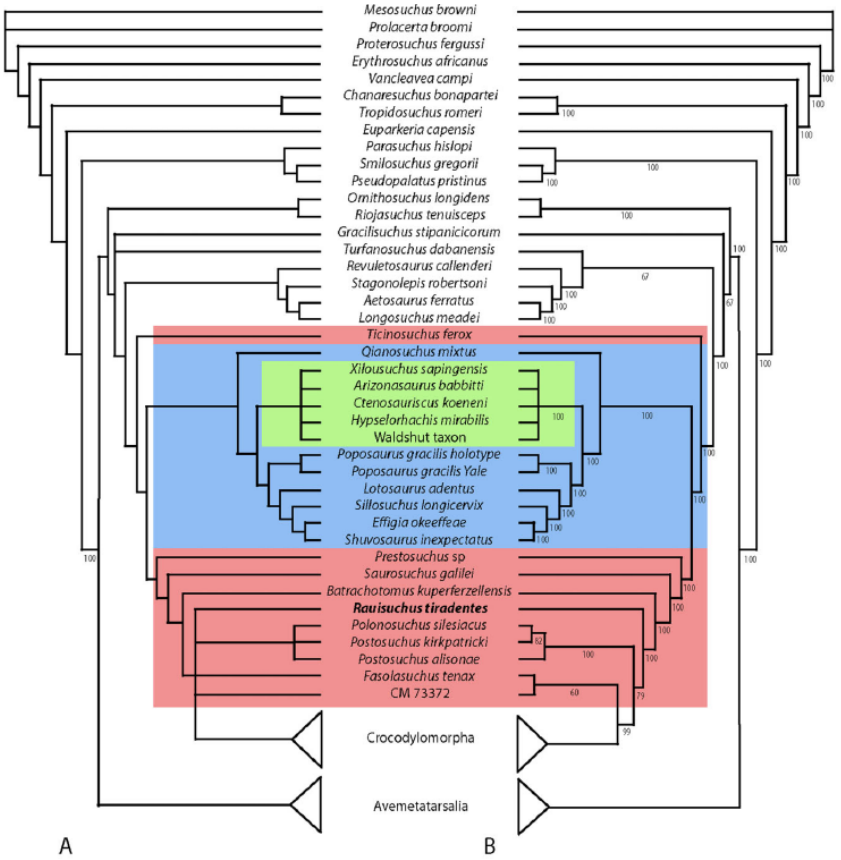


Figure 19. Phylogenetic analyses based on a reanalysis of Nesbitt's (2011) data set with 80 taxa and 415 characters. A, strict consensus tree of 1267 most-parsimonious trees (MPTs; tree length, TL = 1293 steps; retention index, RI = 0.77; consistency index, CI = 0.38). B, 50% majority rule consensus tree. Numbers denote percentage of most parsimonious trees, in which the respective clade is recovered. Colour-coding of phylogenetic units as in Figure 18. (Colour version of figure available online.)

Lautenschlager & Rauhut, 2014

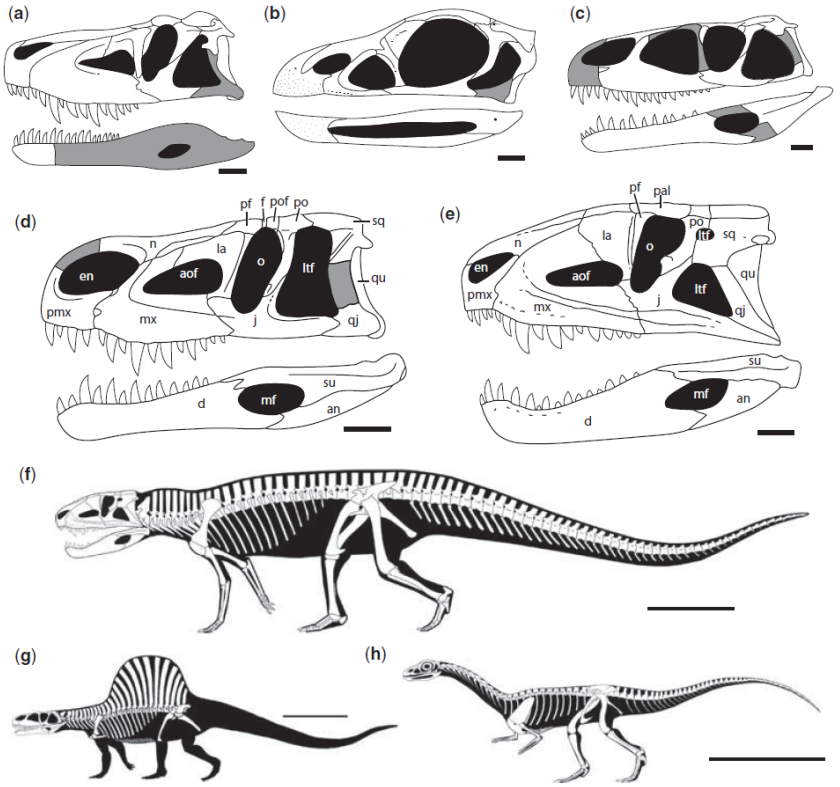


Fig. 1. Skulls and skeletons of rauisuchians: (**a**) skull of *Saurosuchus galilei*; (**b**) skull of *Effigia okeeffeae*; (**c**) skull of *Arizonasaurus babbitti*; (**d**) skull of *Batrachotomus kupferzellensis* (from Gower 1999); (**e**) skull of *Postosuchus kirkpatricki*; (**f**) skeleton of *Postosuchus kirkpatricki*; (**g**) skeleton of *Arizonasaurus babbitti* (from Nesbitt 2005*a*); (**h**) skeleton of *Effigia okeeffeae* (from Nesbitt 2007). Grey areas indicate unknown portions of skulls. (a–c, e) from Nesbitt (2011). Scale bars: 1 cm (b, c); 5 cm (a, d, e); 50 cm (f–h). *Abbreviations*: an, angular; aof, antorbital fenestra; d, dentary; en, external naris; f, frontal; j, jugal; la, lacrimal; ltf, lower temporal fenestra; max, maxilla; mf, mandibular fenestra; n, nasal; o, orbit; pf, prefrontal; po, postorbital; pof, postfrontal; pmx, premaxilla; qj, quadratojugal; qu, quadrate; sq, squamosal; su, surangular.

Nesbitt et al., 2013

“Prestosuchidae”

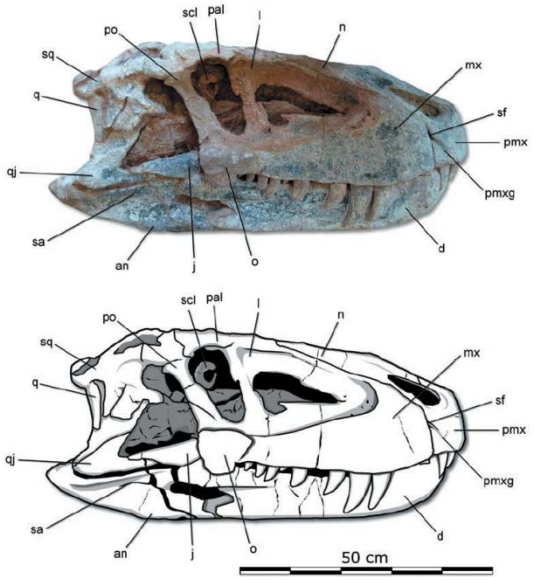


Figure 2. Skull of *Prestosuchus chiniquensis* (ULBRA-PVT-281) in right lateral view. Abbreviations: an, angular; d, dentary; j, jugal; l, lacrimal; mx, maxilla; n, nasal; o, osteoderm; pal, palpebral; pmx, premaxilla; pmxg, premaxillary groove; po, postorbital; q, quadrate; qj, quadratojugal; as, surangular; scl, sclerotic ring; sf, subnarial foramen; sq, squamosal.

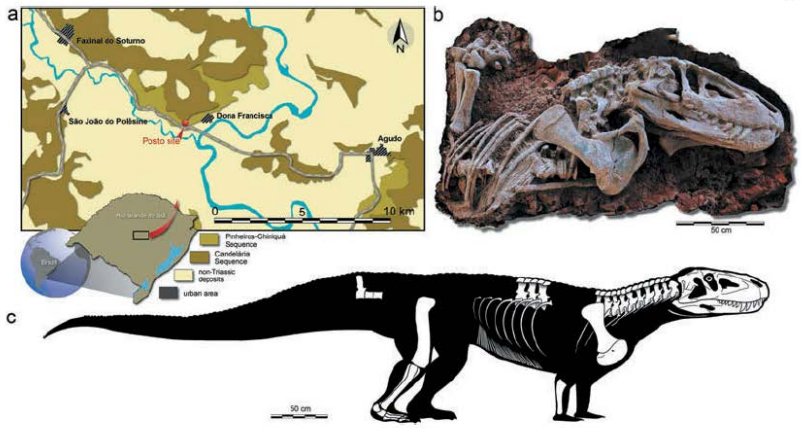


Figure 1. ULBRA-PVT-281 and the location of the study area. (a) map of the Dona Francisca area, Rio Grande do Sul, Brazil, showing the location of the Posto Site (modified from Müller et al. 2018). (b) ULBRA-PVT-2815 in the rock block. (c), reconstruction of the preserved portions of the skeleton of ULBRA-PVT-281.

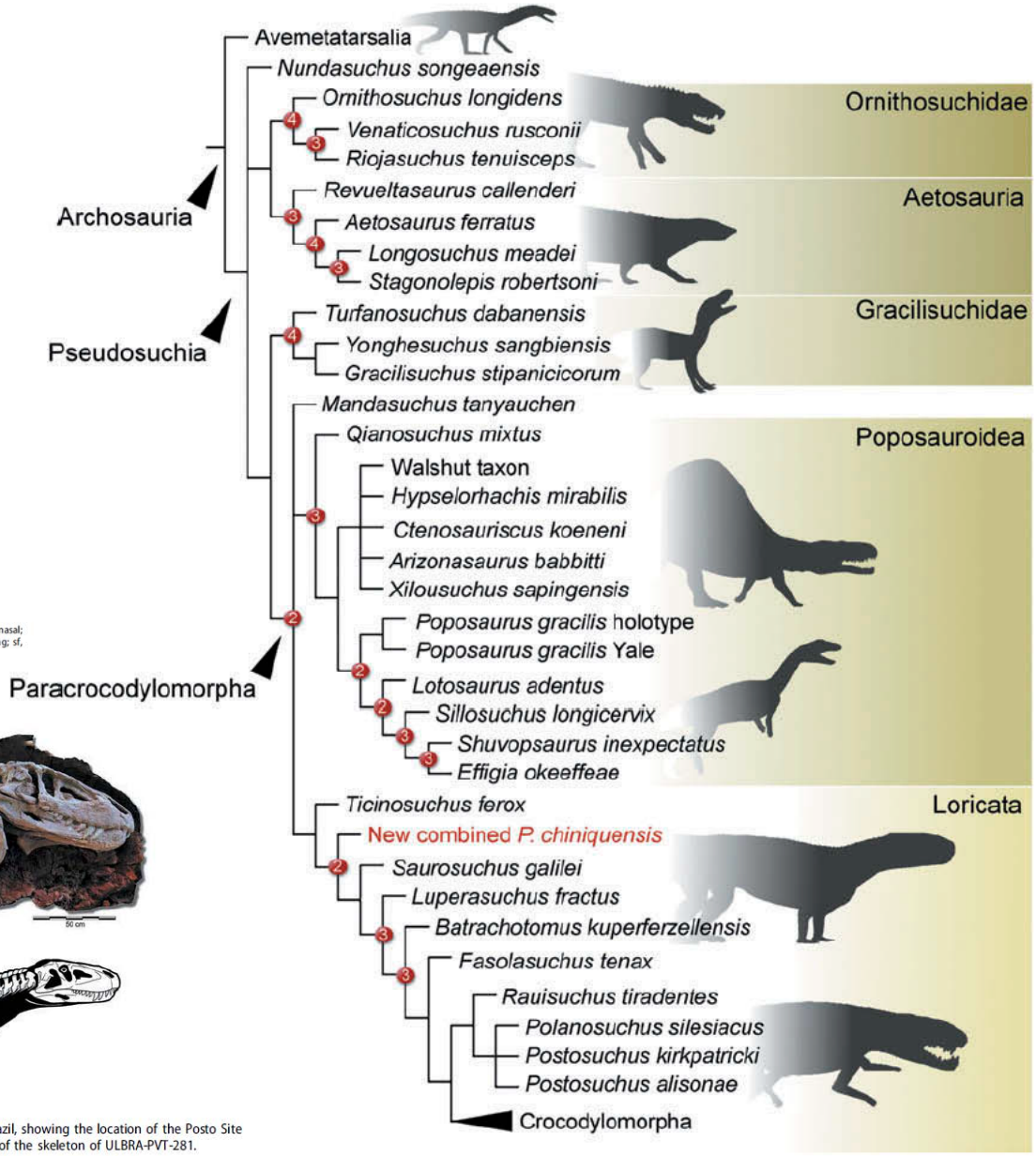


Figure 10. Reduced strict consensus tree of the phylogenetic analysis. Numbers represent Bremer support values higher than one.

Rauisuchidae

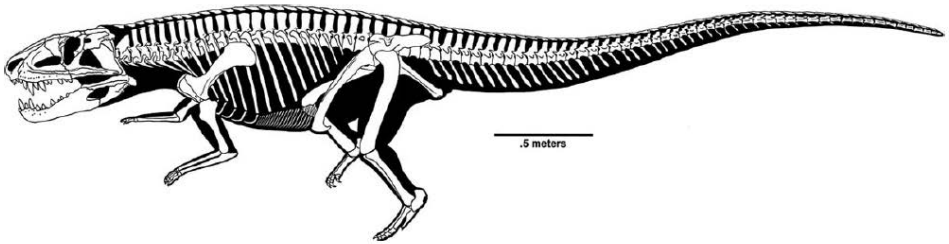


Fig. 26. Skeletal restoration of *Postosuchus kirkpatricki*.

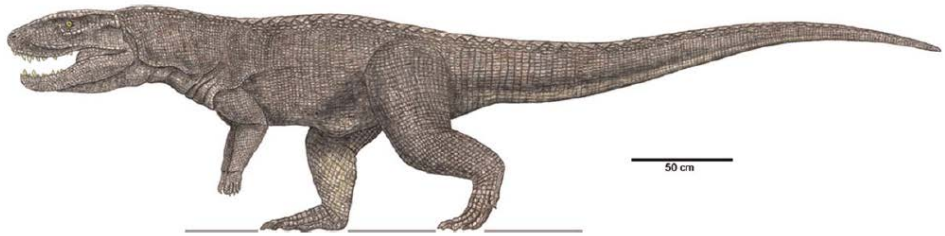


Fig. 27. Life restoration of *Postosuchus kirkpatricki* by Jeffrey Martz.

Weinbaum et al., 2013

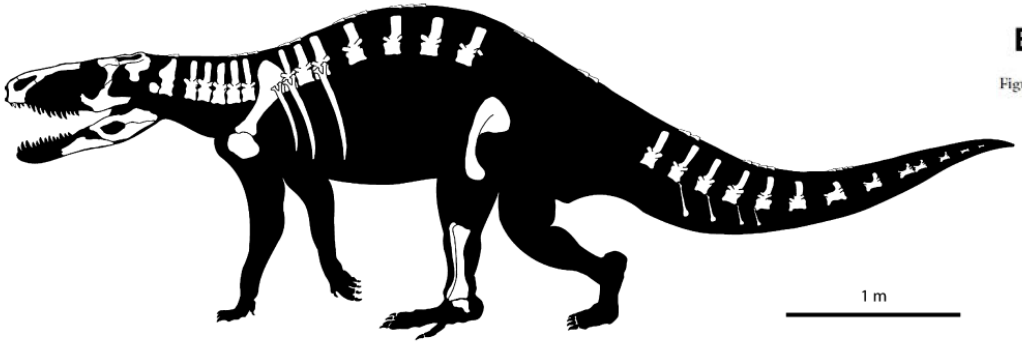
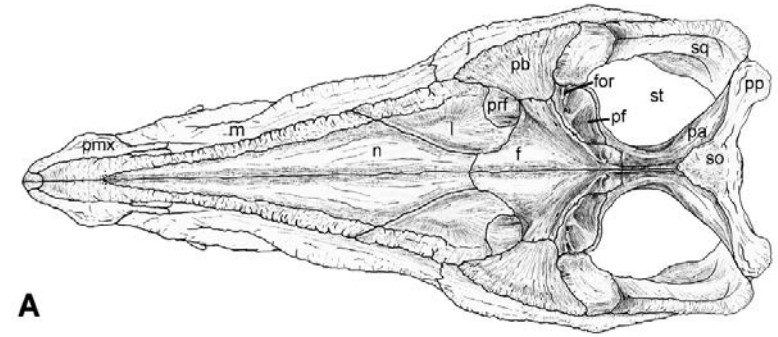


Figure 1. Preserved skeletal elements of *Rauisuchus tiradentes*.

Lautenschlager & Rauhut 2014



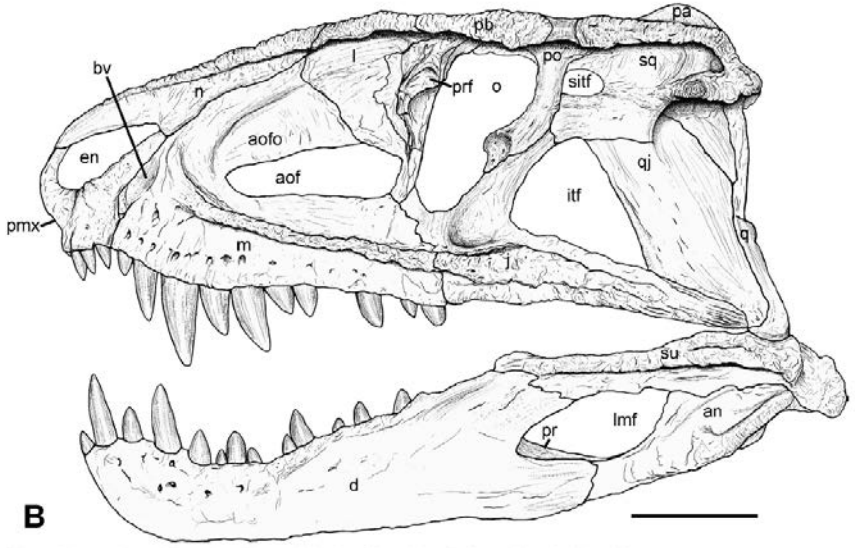


Figure 1. Restoration of *Postosuchus kirkpatricki* skull. A. Dorsal view B. Lateral view. Scale bar = 10 cm.

Weinbaum, 2011

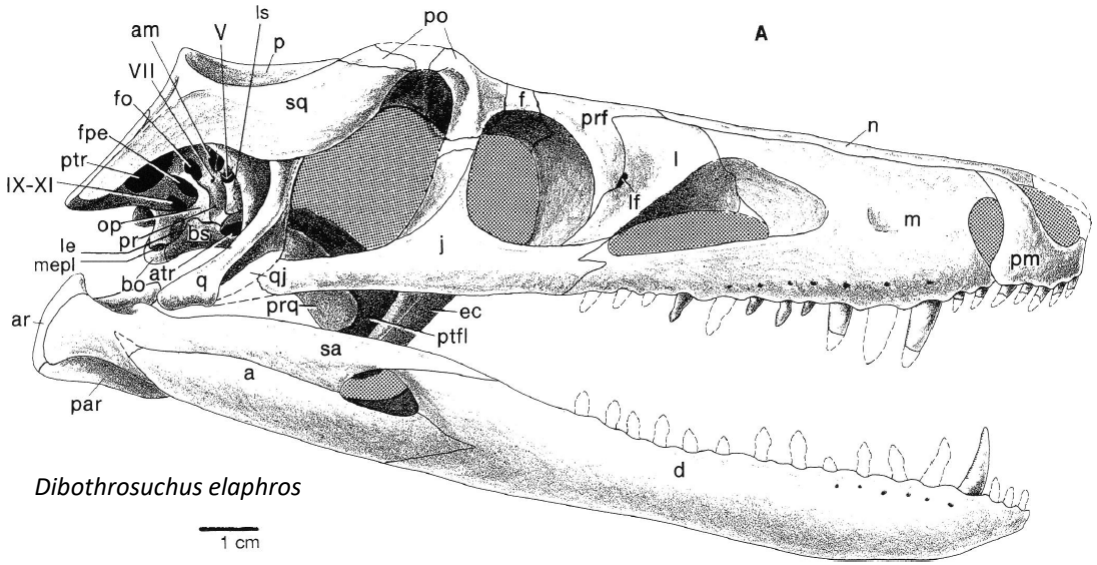
Crocodylomorpha

Definición: Clado más inclusivo que contiene a Crocodylus niloticus, pero no a Rauisuchus tiradentes, Poposaurus gracilis, Gracilisuchus stipanicicorum, Prestosuchus chiniquensis o Aetosaurus ferratus (Sereno, 2005).

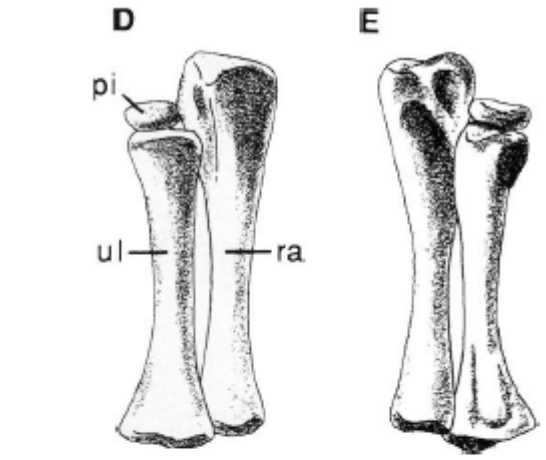
Rango Temporal: Triásico tardío (Carniano?-Noriano) – Presente.

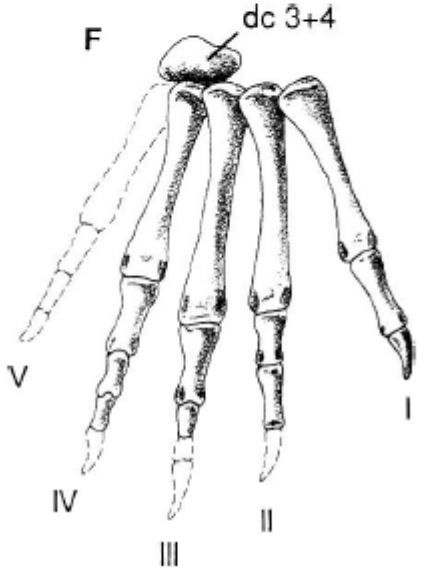
Sinapomorfías:

- Proceso posterodorsal de premaxilar menor o igual a longitud total del premaxilar.
- Proceso posterodorsal del premaxilar sobrelapa la superfcie anterodorsal del nasal.
- Cinco dientes premaxilares.
- Espacio subnarial entre premaxilar-maxilar.
- Nasal forma parte de borde dorsal de la fosa anteorbital.
- Lacrimal tan alto como la órbita, contactando el yugal en el margen ventral de la órbita.
- Postfrontal ausente.
- Proceso anteroventral del escamoso ausente.
- FTS sobre la porción posterodorsal del escamoso.
- Formaen Cuadradoyugal-Cuadrado ausente.
- Órbita circular o elíptica.
- Clavículas ausentes.
- Carpales proximales elongados.
- Carpal distal V ausente.



Dibothrosuchus elaphros





“Sphenosuchia”

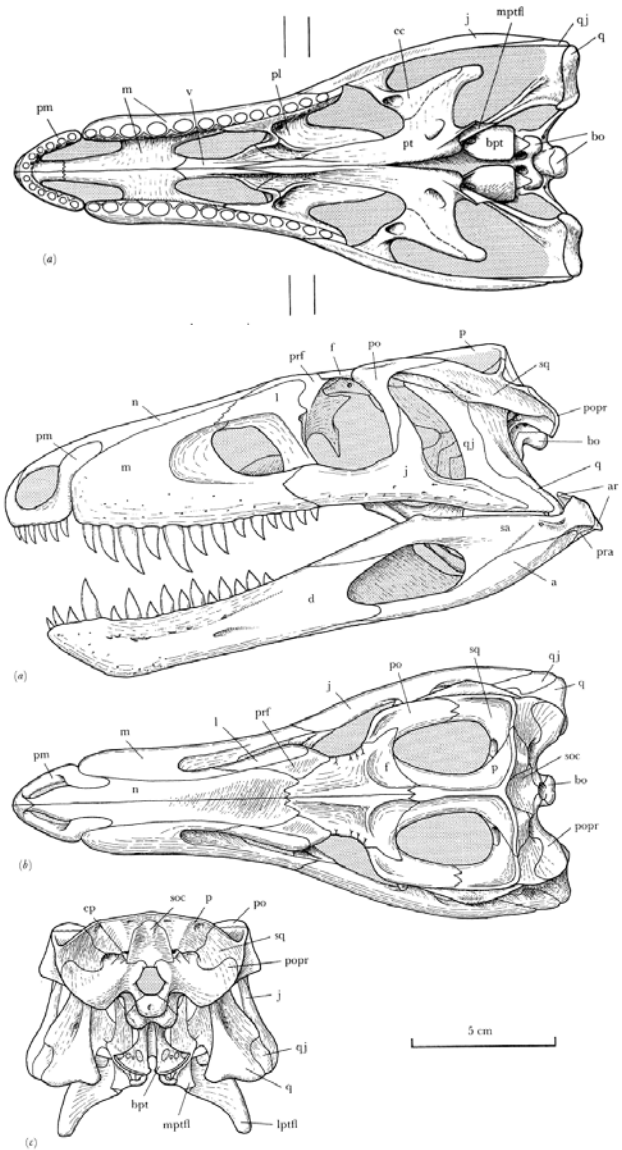
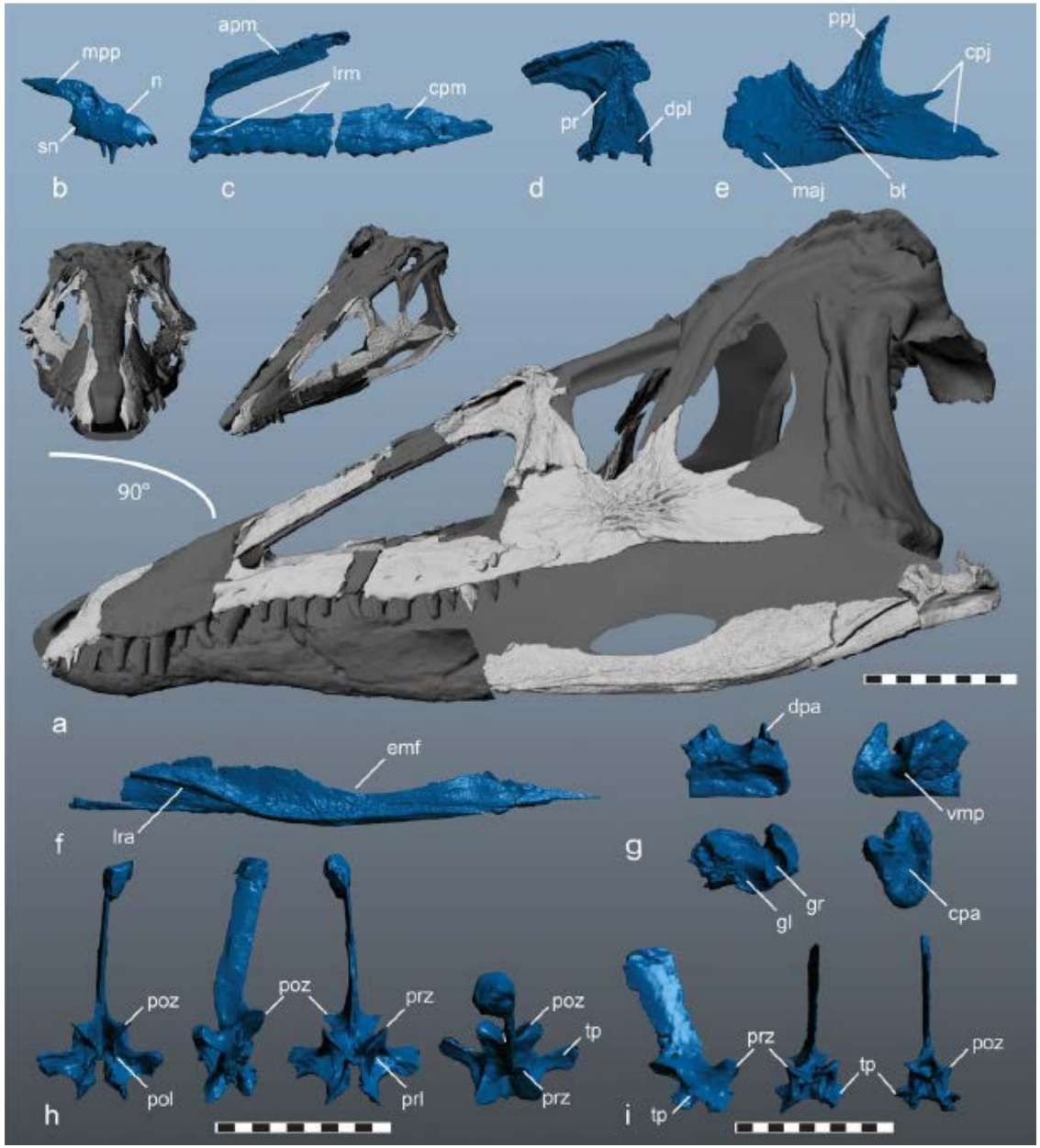
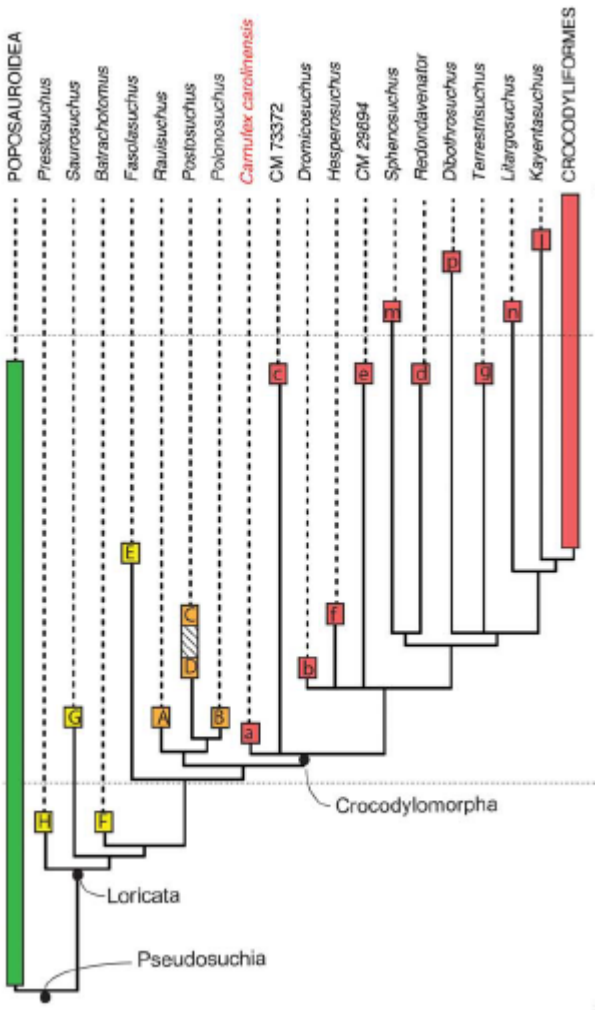


Figure 2. *Sphenosuchus acutus* Htn. Restoration of the skull and jaw in (*a*) lateral, (*b*) dorsal and (*c*) occipital views, magn. ×0.75. Tip of snout and central part of jaw restored.

Sphenosuchus acutus



Carnufex carolinensis



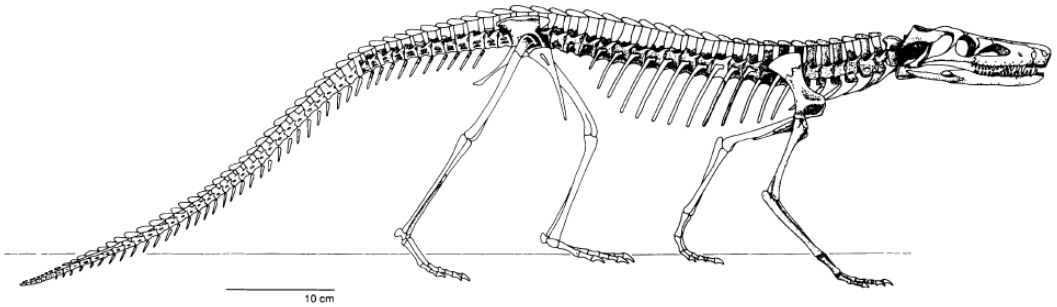


FIGURE 15. *Dibothrosuchus elaphros*, skeletal restoration.

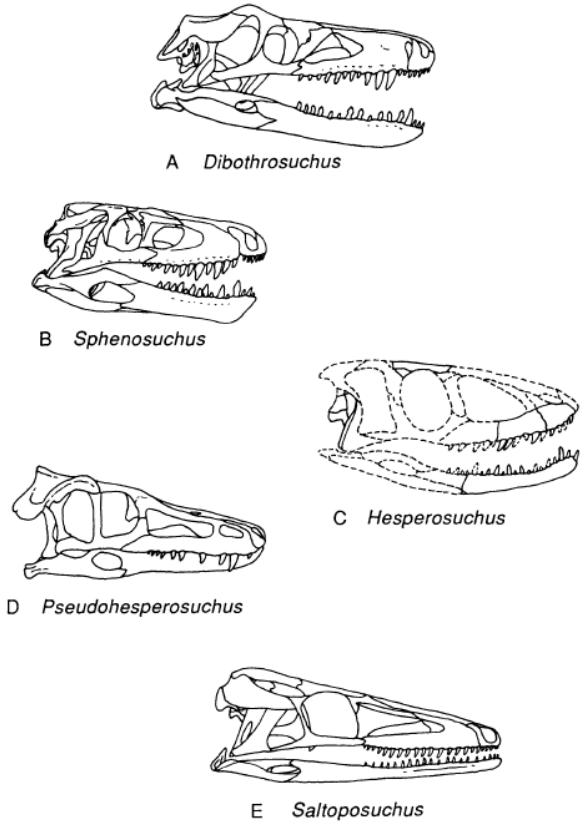


FIGURE 16. Skulls of different sphenosuchians for comparison, in right lateral view. **B**, after Walker (1990); **C**, after Colbert (1952); **D**, after Bonaparte (1972); **E**, after Crush (1984).

Crocodyliformes

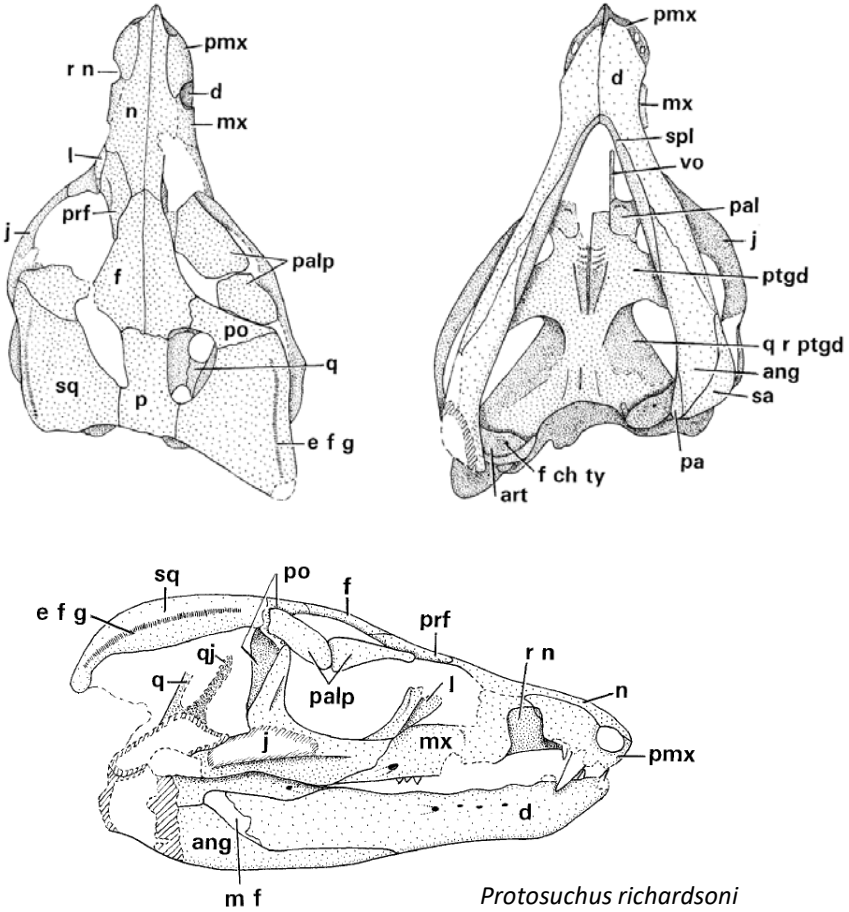
Definición: Clado menos inclusivo que contiene a *Protosuchus richardsoni* y *Crocodylus niloticus* (Sereno et al., 2001).
Rango Temporal: Triásico tardío (Noriano) – Presente.
Sinapomorfías:

- Proceso posterodorsa de premaxilar vertical, fuertemente suturado al maxilar.
- Osteodermos en extremidades.
- Corona dental mesiodistalmente expandida respecto a raíz.

Antiguamente Este clado era dividido en grandes grupos:

- **Protosuchia**
- **Mesosuchia**
- **Thalattosuchia**
- **Neosuchia (incluye Eusuchia)**

.



Protosuchus richardsoni

“Protosuchia”

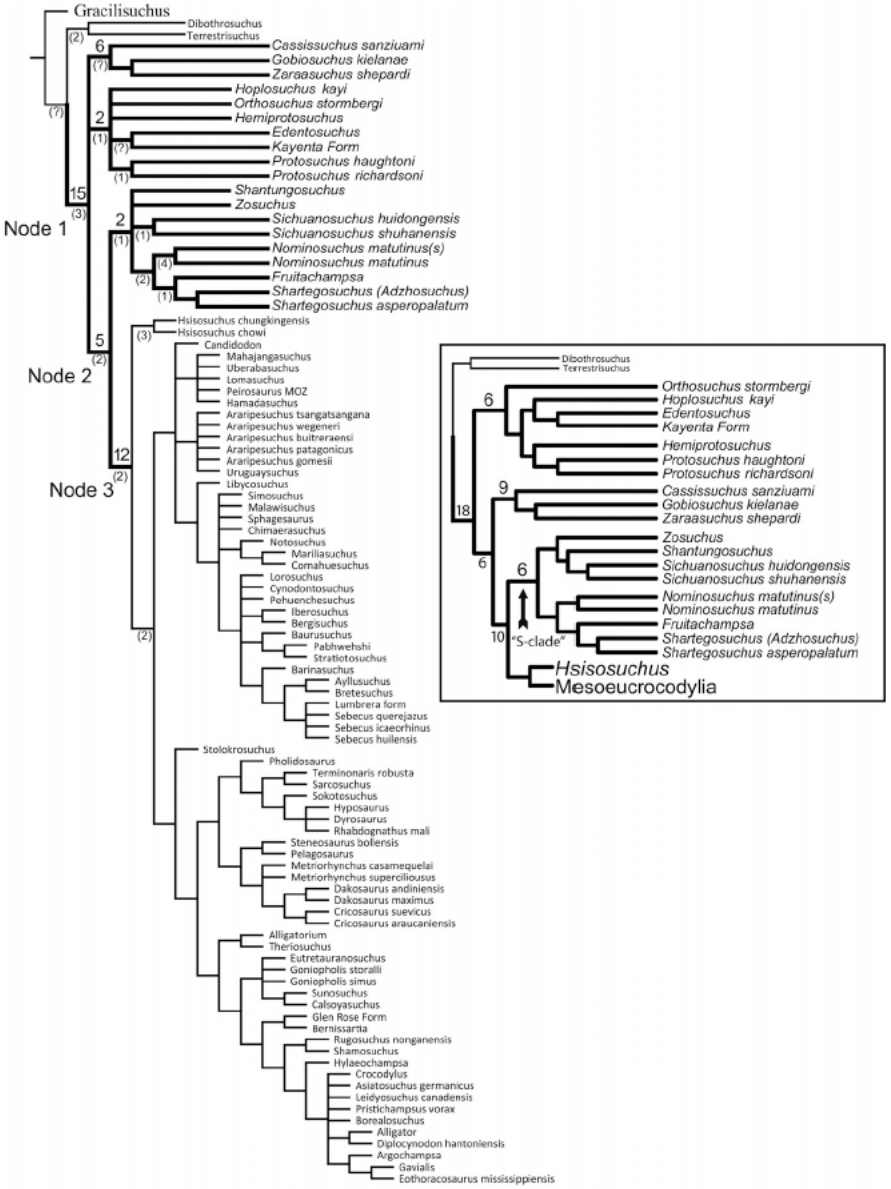
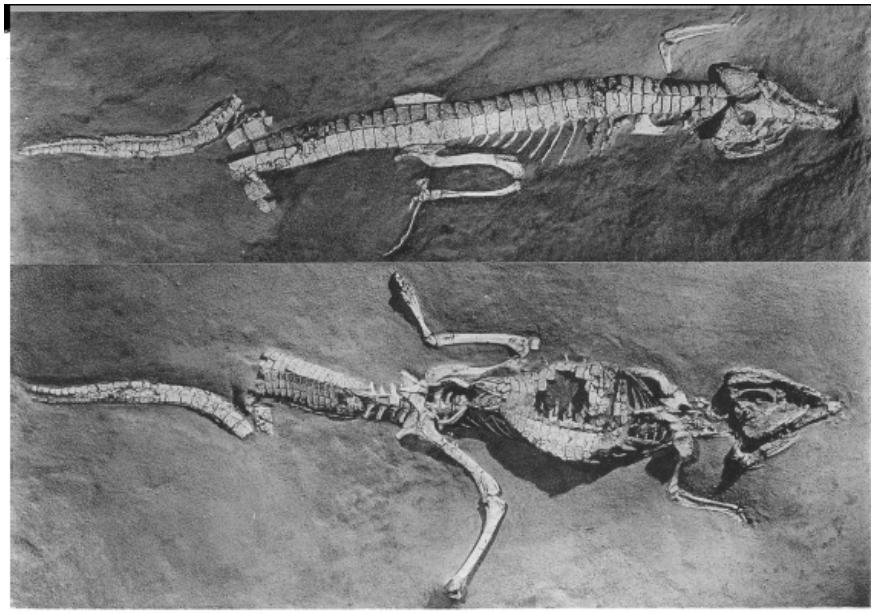


FIGURE 11. Phylogenetic relationships of *Cassissuchus sanziuami*. Strict consensus of 6500 trees obtained, with a tree length of 1390, CI = 0.320, and RI = 0.722. The nodes (1 to 3) reflect the sequence of clades diagnosed in Appendix 1. Bremer support of the consensus in parentheses; the branch length at the internal nodes corresponds to the common synapomorphies of all most parsimonious trees. Inset contains a resolved cladogram with Protosuchidae as the basal group, showing the branch length of each crocodyliform clade. The S-clade is denoted with an arrow.



Protosuchus richardsoni **(Brown). A.M.N.H. No. 3024, type. 1. Dorsal view of the skeleton as exposed in the matrix, one-fourth natural size. 2. Ventral view of the skeleton as exposed in the matrix, one-fourth natural size**

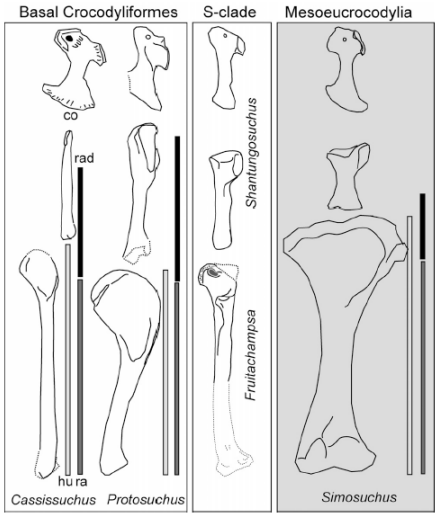


FIGURE 12. Morphological transformations of the pectoral girdle (**co**, coracoid) and forelimb from Crocodyliformes to Mesoeucrocodylia. The bars denote the proportion of humerus (**hu**), radius (**ra**), and radiale (**rad**), based on measurements of *Cassissuchus sanziuami* holotype and *Protosuchus richardsoni* (AMNH 3026). S-clade is a composite of *Shantungosuchus brachycephalus* (Lü and Wu, 1996) and *Fruitachampsa callisoni* (LACM 120494, holotype). Data on *Simosuchus clarki* from Sertich and Groenke (2010).

Mesoeucrocodylia

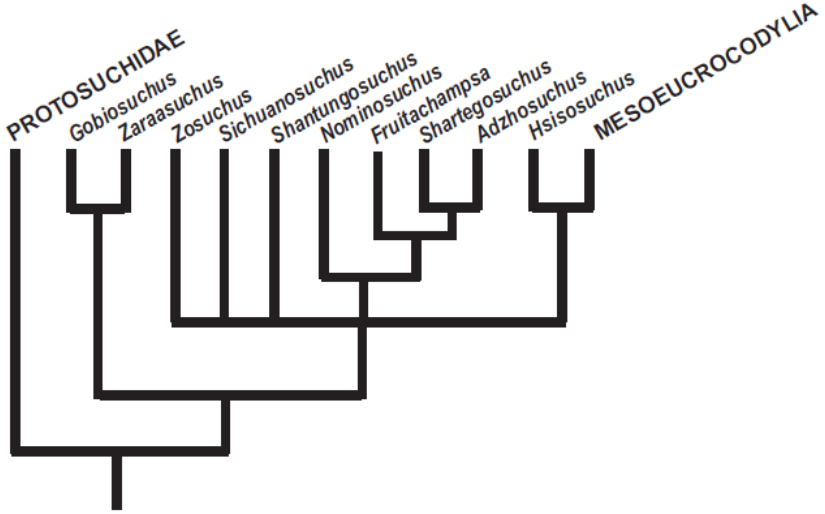
Definición: Es el clado menos inclusivo que incluye a Crocodylus niloticus y Notosuchus terrestris.

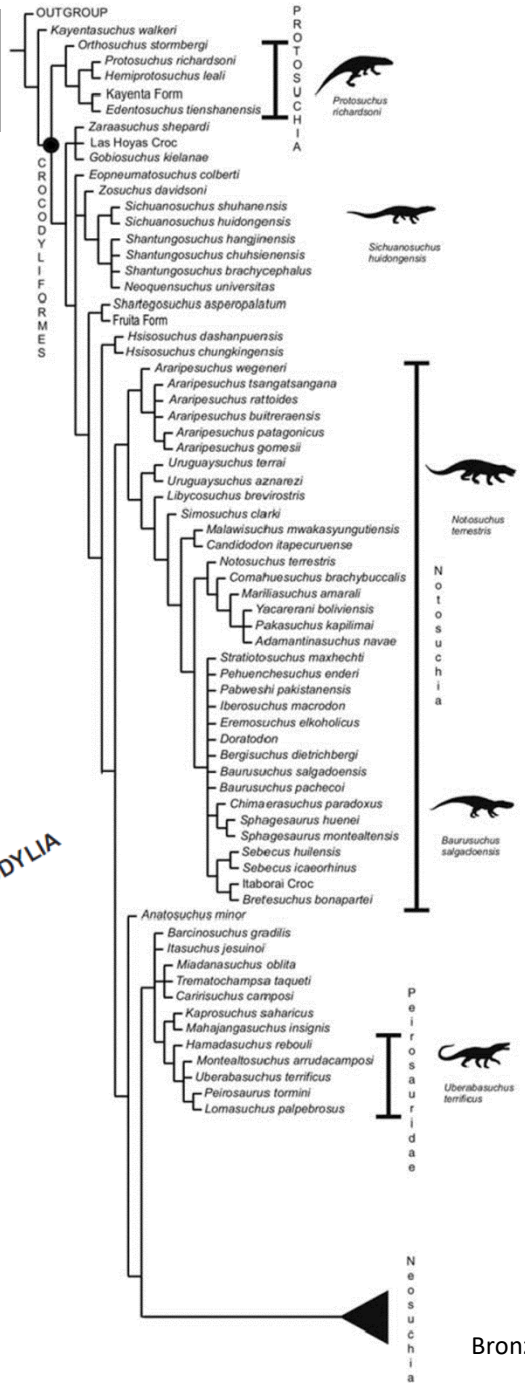
Incorpora a los parafiléticos “Mesosuchia” y excluye a “Protosuchia” y formas relacionadas (Shatergosuchidae, Hsisosuchus, etc).

La filogenia de este grupo es debatida entre distintos autores, particularmente por la posición de Thalattosuchia.

Sinapomorfías:

- Frontales fusionados en línea media sin evidencia de sutura.
- Presencia de paladar secundario, conformado por extensión posterior de palatinos stuturados.





Bronzati et al 2012

Mahajangasuchus y la evolución del paladar eusuquio

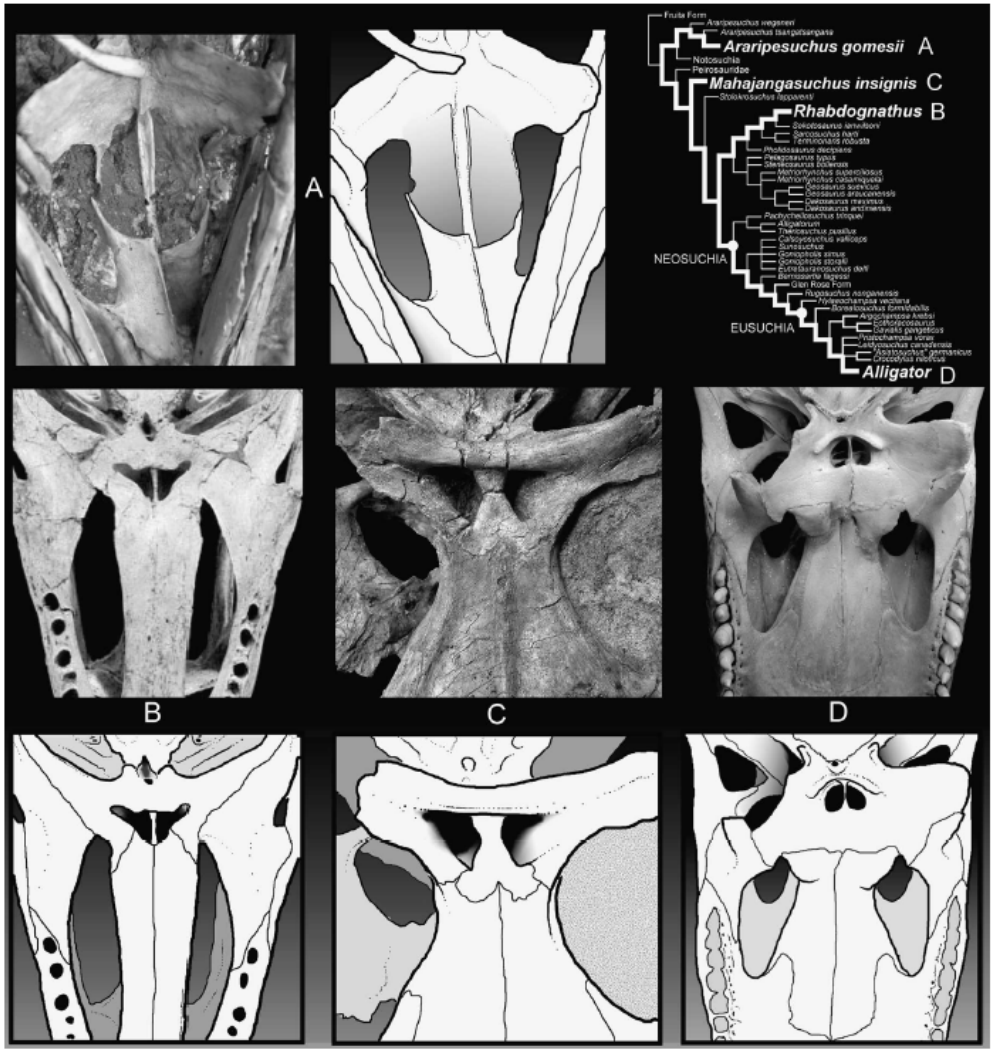


FIGURE 15. Phylogenetic variation in the mesoeucrocodylian bony palate. Top right cladogram shows phylogenetic distribution of examplar taxa. (**A**) *Araripesuchus gomesii* AMNH FR 24450, showing the primitive mesoeucrocodylian condition of a large ventrally opening choanal groove situated anteriorly, well between the suborbital fenestra. (**B**) *cf. Rhabdognathus* CNRST-SUNY 190, showing more derived condition of a smaller, posteriorly positioned choanal opening. Note that the ventral laminae of the pterygoids do not contact one another. (**C**) *Mahajangasuchus insignis* FMNH PR 2389, showing convergent "eusuchian" condition where the internal choana is entirely within the pterygoids. Robust pterygoid-formed choanal septum links the ventral pterygoid laminae. (**D**) *Alligator mississippiensis* AMNH uncatalogued, showed derived true eusuchian bony palate with internal choana entirely with the pterygoids and the anterior pterygoid laminae contacting on another. Images not to scale.

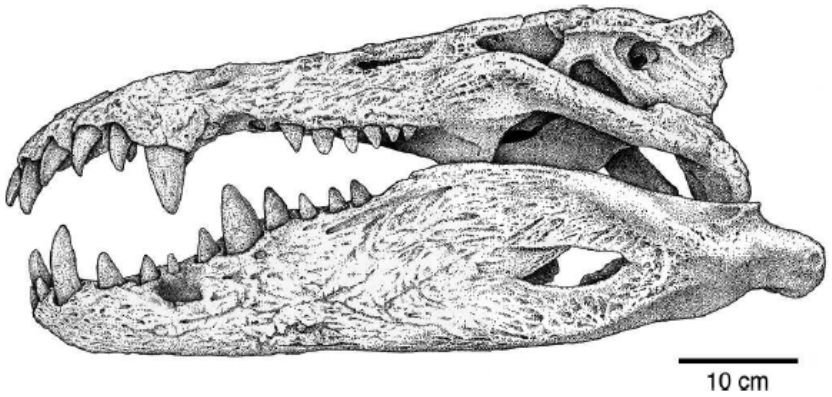


FIGURE 9. Reconstruction of the skull of *Mahajangasuchus insignis* in right lateral view. Original illustration by Luci Betti Nash.

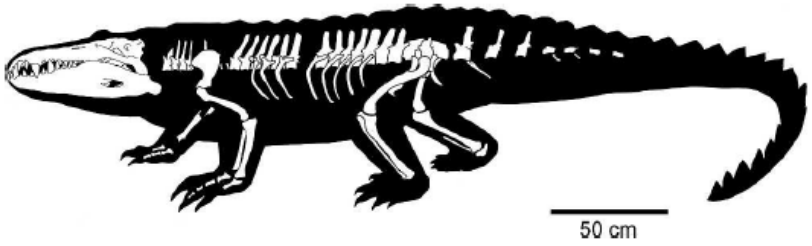
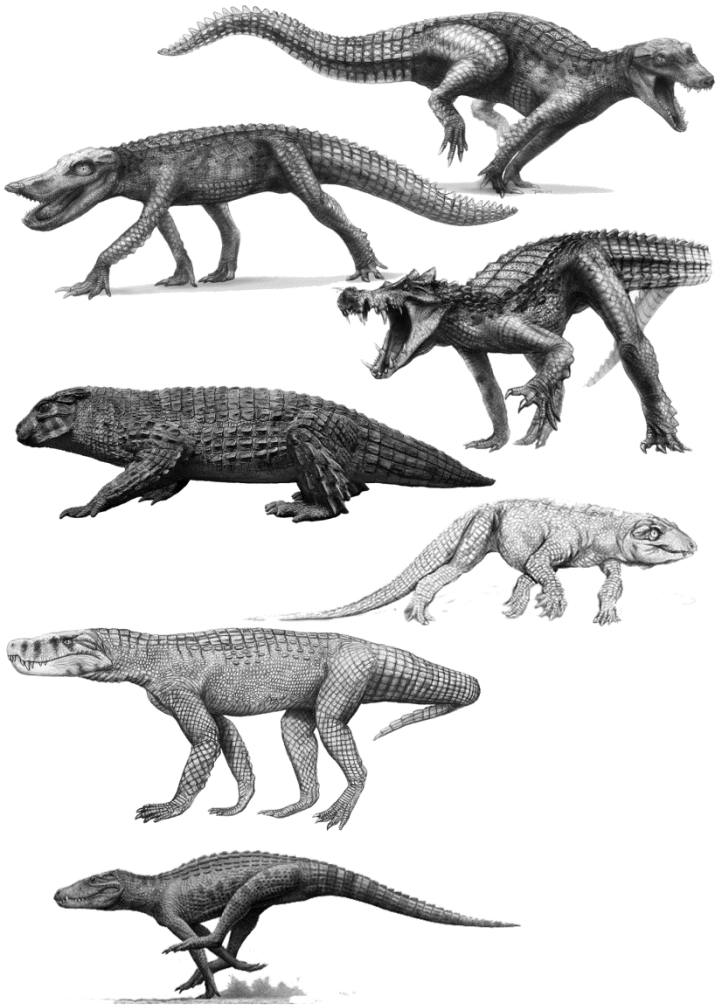
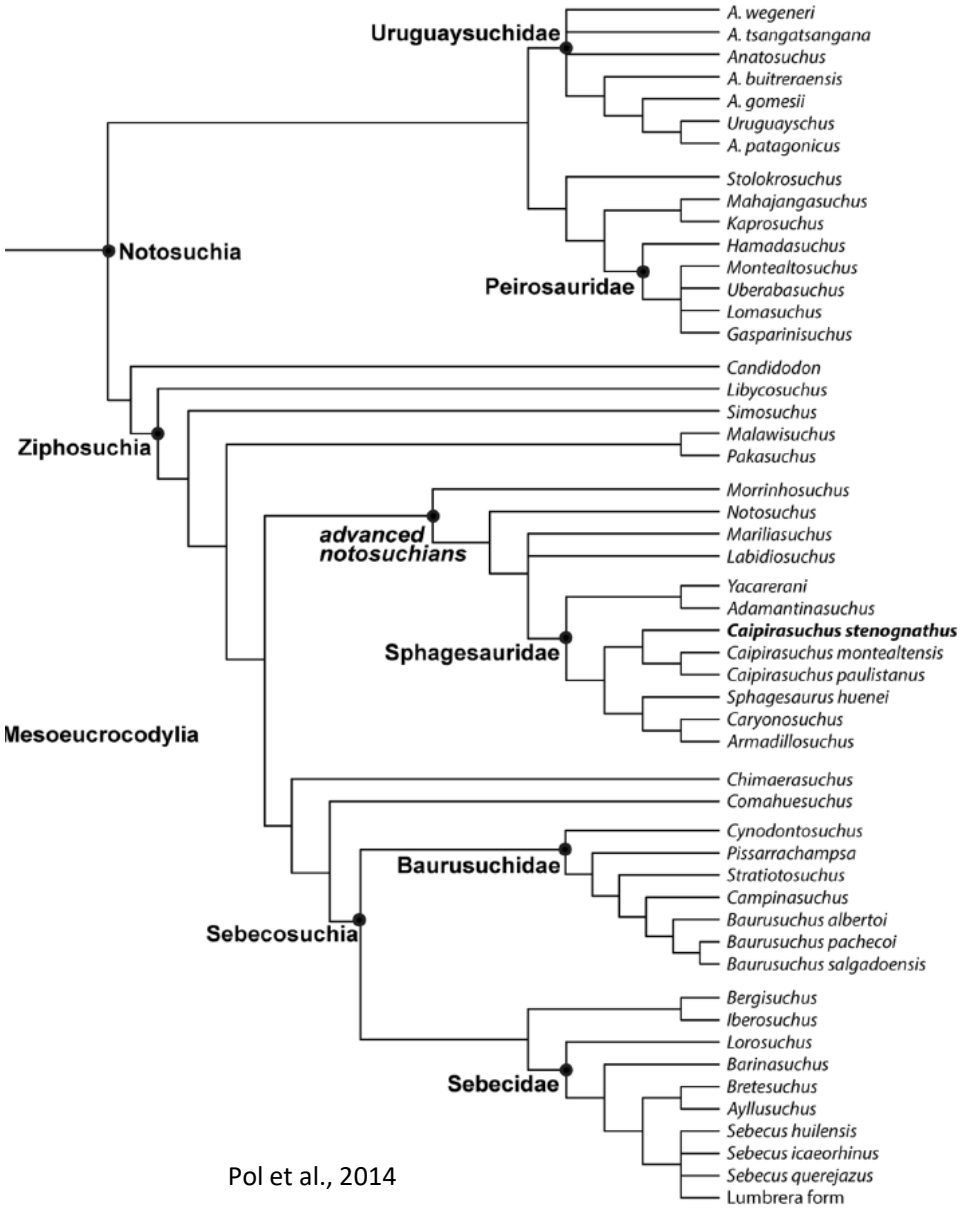


FIGURE 2. Reconstruction of *Mahajangasuchus insignis* and illustration of known skeletal material. Original illustration by Luci Betti Nash.

Notosuchia

Definición: Clado más inclusivo que contiene a *Notosuchus terrestris* pero no a *Crocodylus niloticus* (Sereno et al., 2001)
Rango Temporal: Cretácico inferior (Aptiano) – Mioceno.





Pol et al., 2014

Notosuchia

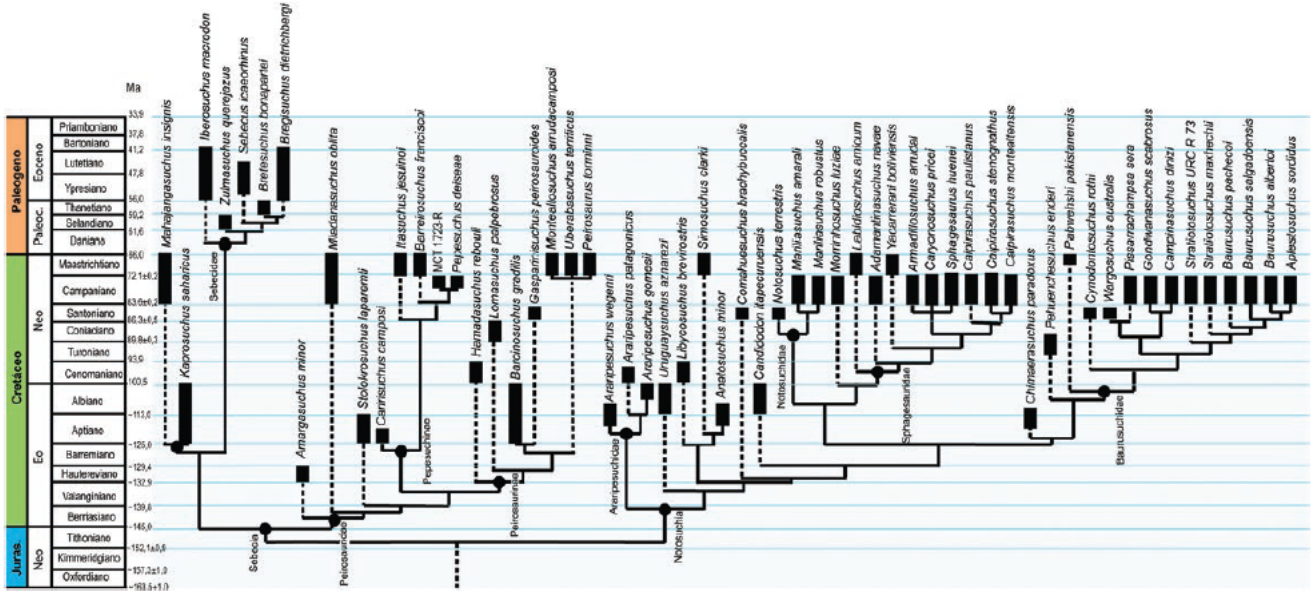


Figure 9. Calibrated cladogram for the *consensus strictus* for the three most parsimonious trees, depicting only Mesoeucrocodylia. For the complete cladogram, refer to Supplementary Information Data S3. Mesoeucrocodylia. For the complete cladogram, refer.

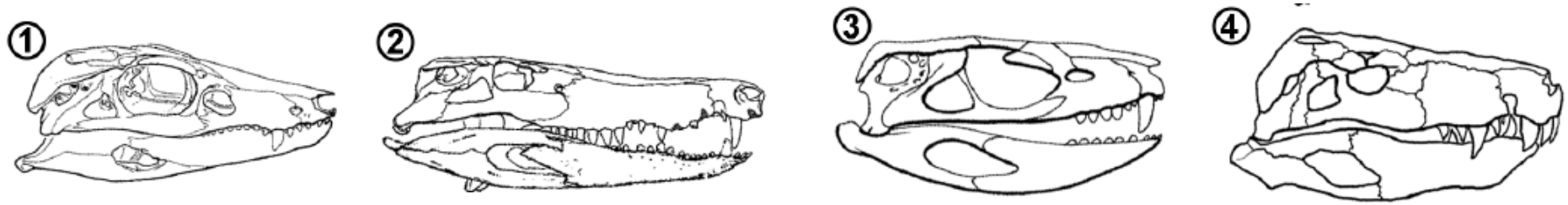


Figure 1. Skull reconstruction of four groups of Cretaceous notosuchians. **1,** Uruguaysuchidae (***Araripesuchus gomesii***); **2,** Peirosauridae (***Hamadasuchus reboulii***); **3,** Notosuchidae (***Notosuchus terrestris***); **4,** Baurusuchidae (***Baurusuchus salgadoensis***). Modified from Pol and Larsson (2011).

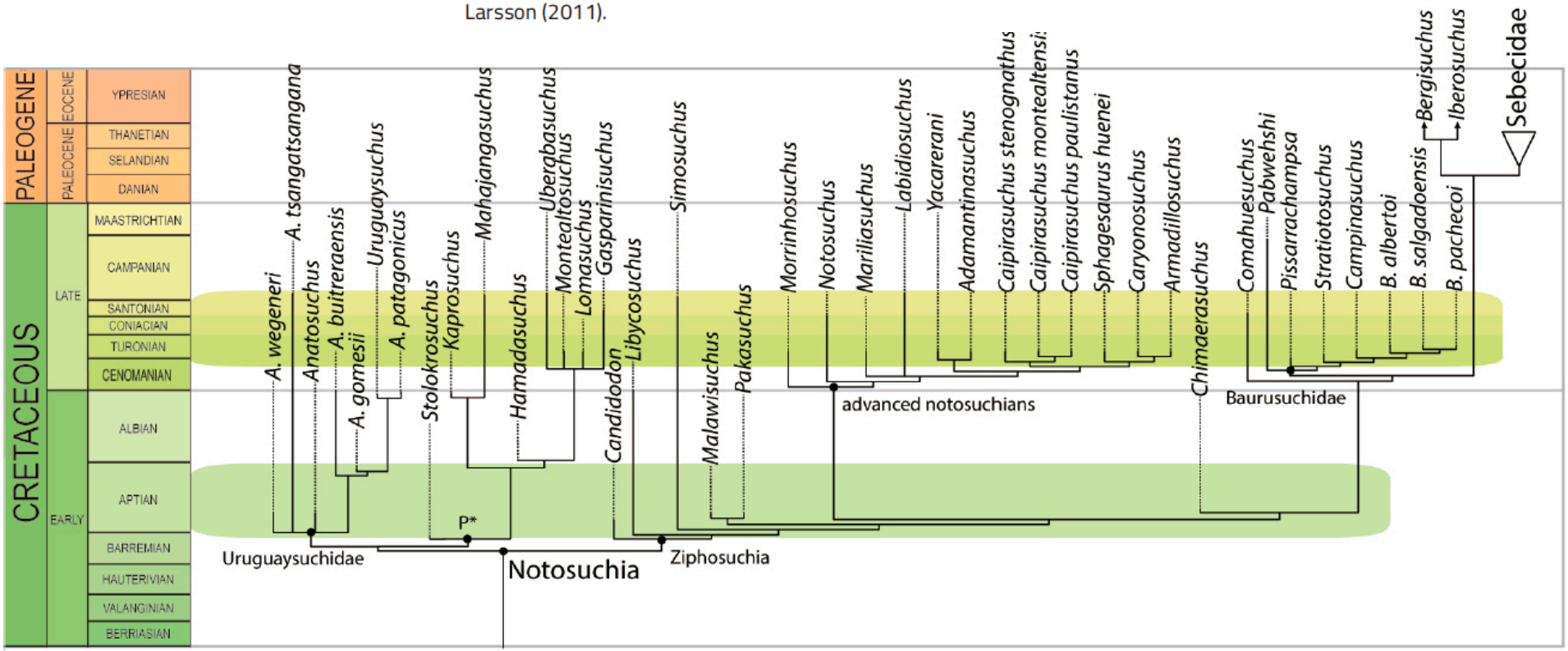


Figure 3. Calibrated phylogeny of Notosuchia based on Pol *et al.* (2014) and Leardi *et al.* (2015). P* indicates the clade formed by Peirosauridae and allies (*i.e.*, Mahajangasuchidae).

Pol et al., 2015

Uruguaysuchidae

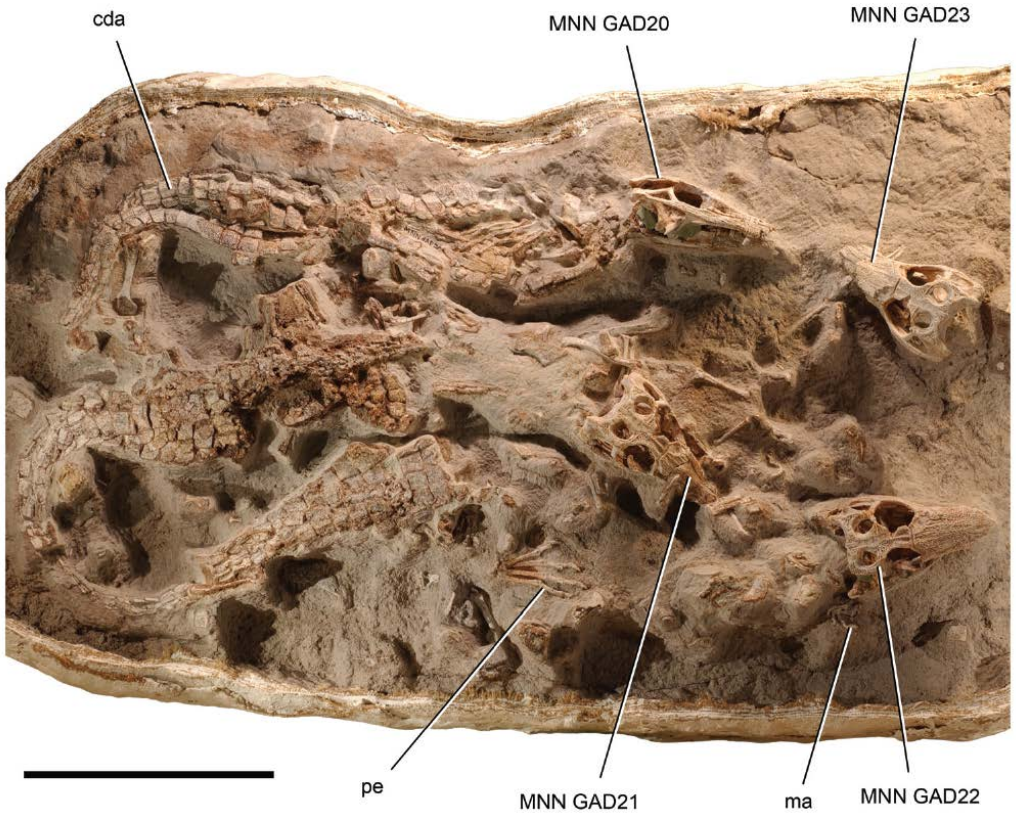
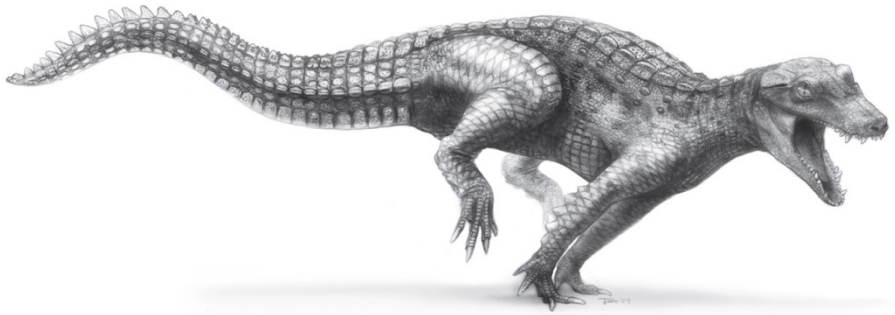


Figure 23. Block containing skeletons of the crocodyliform *Araripesuchus wegeneri*. Three aligned and partially articulated skeletons (MNN GAD20–22) and a partial skull (MNN GAD23) in dorsal view. Weathered portions of the crania were restored based on MNN GAD19. Scale bar equals 20 cm. Abbreviations: *cda*, caudal dermal armor; *ma*, manus; *pe*, pes.



Peirosauridae

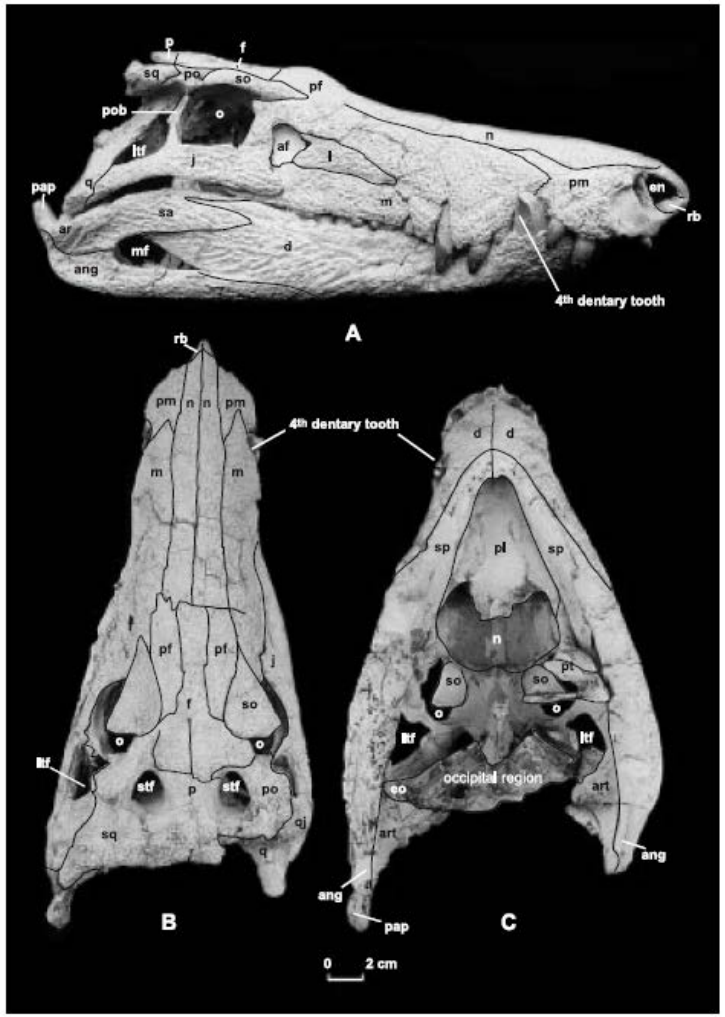


Fig. 3. *Uberabasuchus terrificus* sp. nov. specimen CPPLIP nº 630. (A) Right lateral view. (B) Dorsal view. (C) Ventral view of skull and mandible (Photographs by Mr. Carlos Alberto da Silva Silvestre).

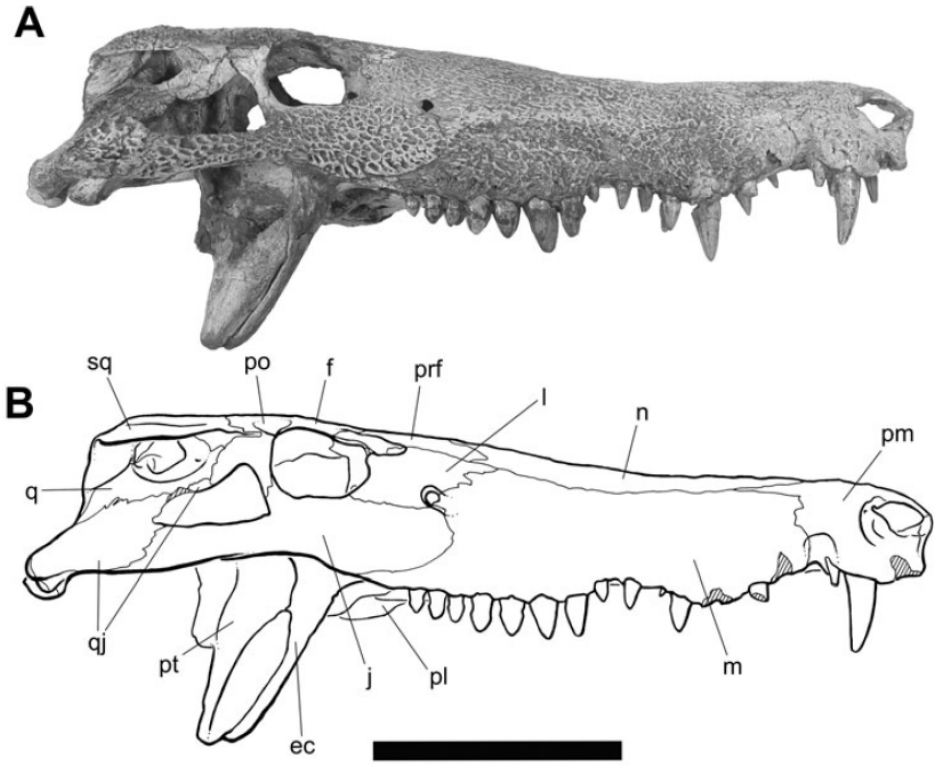


Figure 2. Cranium of *Hamadasuchus rebouli* (ROM 52620). A, right lateral and C, occipital view. B and D, outline drawings corresponding to each view. Scale bar = 10 cm. Anatomical abbreviations are defined in Appendix 1.

Notosuquios avanzados: Sphagesauridae

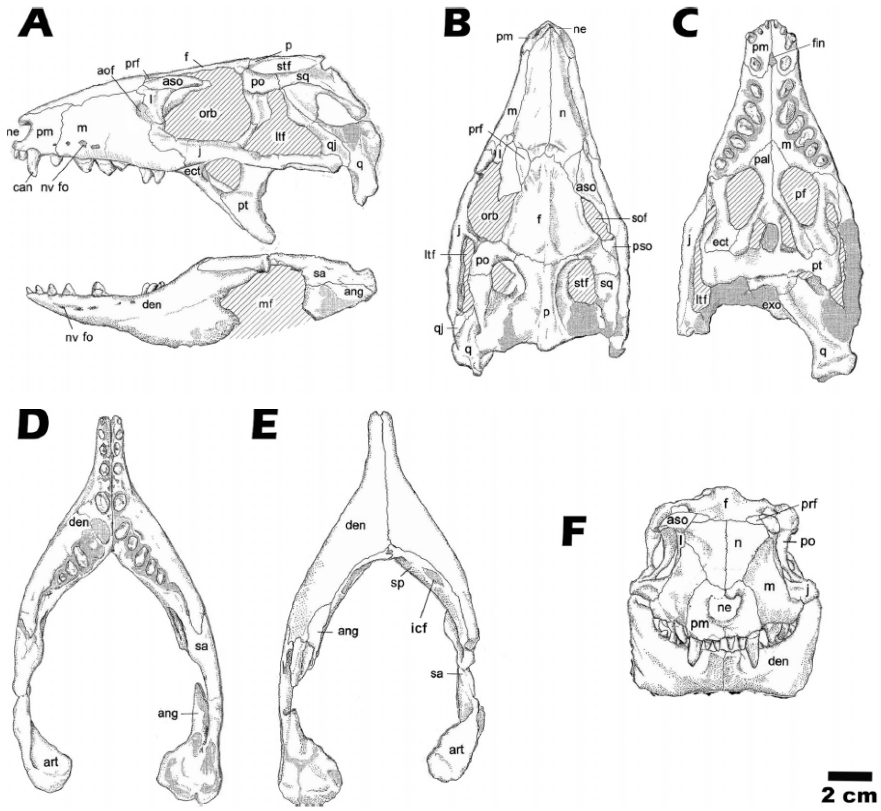


FIGURE 3. Schematic drawing of *Caipirasuchus paulistanus*. (**A**) Skull and mandible in lateral view; (**B**) skull in dorsal view; (**C**) skull in ventral view; (**D**) mandible in dorsal view; (**E**) mandible in ventral view; (**F**) skull and mandible in occlusion in frontal view. **Abbreviations**: **ang**, angular; **aof**, antorbital fenestra; **art**, articular; **aso**, anterior supraorbital; **can**, caniniform tooth; **den**, dentary; **ect**, ectopterygoid; **exo**, exoccipital; **f**, frontal; **fin**, incisive foramen; **icf**, intermandibular caudal foramen; **j**, jugal; **l**, lacrimal; **ltf**, laterotemporal fenestra; **m**, maxilla; **mf**, mandibular fenestra; **n**, nasal; **ne**, external naris; **nv fo**, neurovascular foramina; **orb**, orbit; **p**, parietal; **pal**, palatine; **pf**, palatal fenestra; **pm**, premaxilla; **prf**, prefrontal; **po**, postorbital; **pso**, posterior supraorbital; **pt**, pterygoid; **q**, quadrate; **qj**, quadratojugal; **sa**, surangular; **sof**, supraorbital fenestra; **sp**, splenial; **sq**, squamosal; **stf**, supratemporal fenestra.

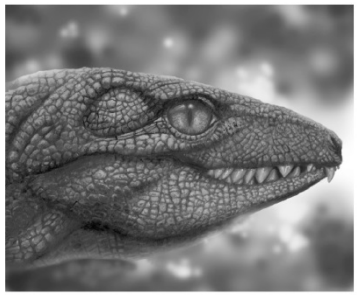


FIGURE 5. Restoration of the head of *Caipirasuchus paulistanus*.

Fig. 6. Life reconstruction of *Armadillosuchus arrudai* gen. et sp. nov.

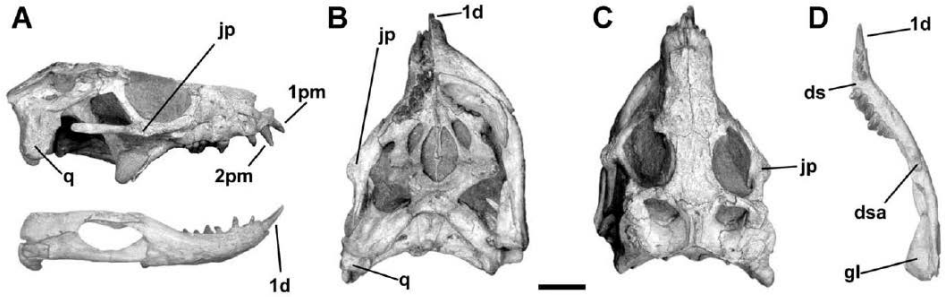
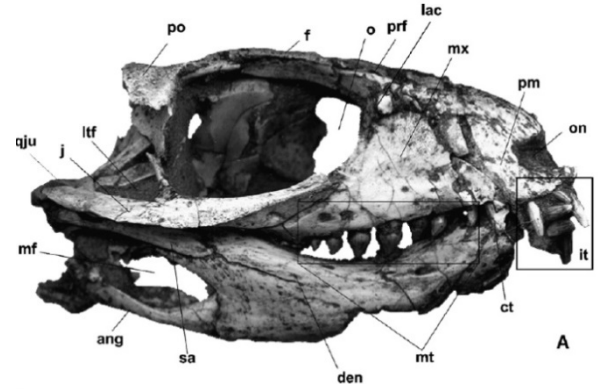


FIGURE 2. *Yacarerani boliviensis* gen. et sp. nov., MNK-PAL5063. Skull and lower jaw in **A**, right lateral, **B**, ventral, and **C**, dorsal views. **D**, right lower jaw in dorsal view. Scale bar equals 2 cm. **Abbreviations**: **1d**, first dentary tooth; **1pm**, **2pm**, first and second premaxillary teeth; **ds**, symphyseal region of dentary; **dsa**, flattened area in the dentary-surangular contact; **gl**, glenoid cavity; **jp**, laterally projected prong of jugal; **q**, quadrate.



Adamantinasuchus navae

Baurusuchidae

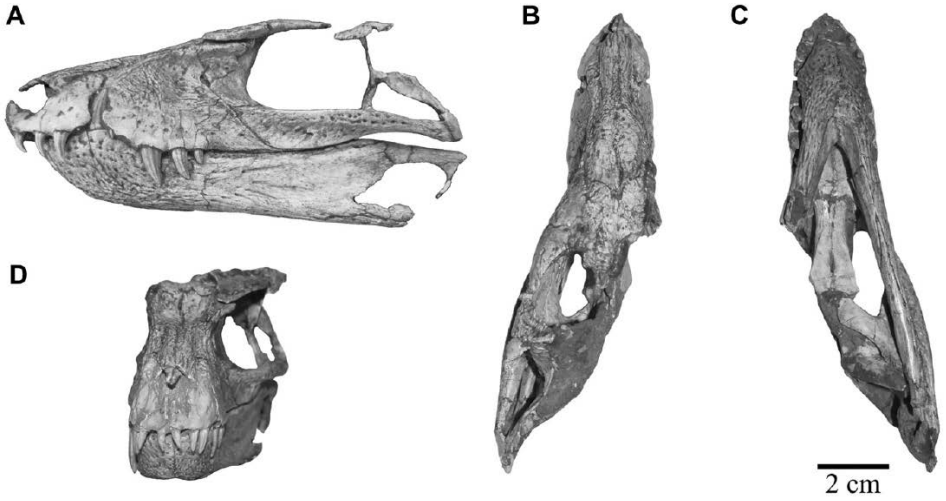


Fig. 2. Holotype of *Gondwanasuchus scabrosus* **gen. nov. et sp. nov.** (UFRJ DG 408-R) in lateral view (A), dorsal view (B), palatal view (C) and anterior view (D).

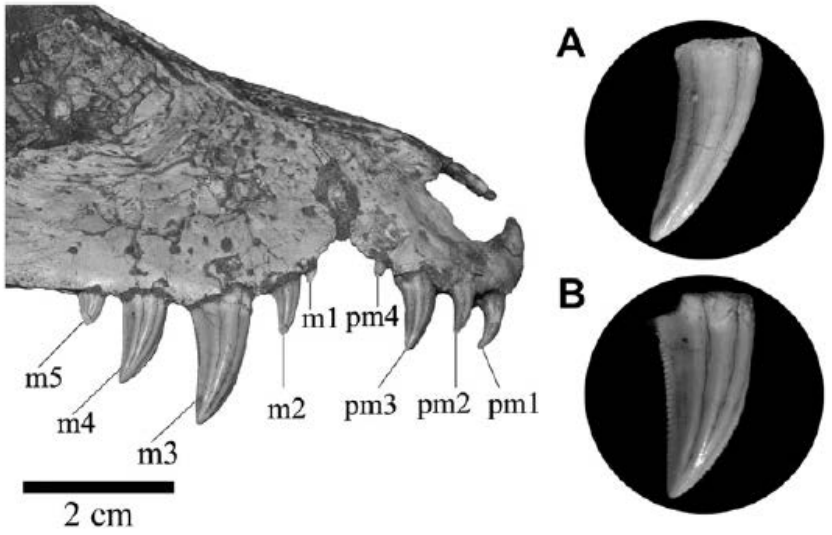


Fig. 4. The dentition of *Gondwanasuchus scabrosus* **gen. nov. et sp. nov.** (UFRJ DG 408-R); Second right premaxillary tooth (A) and fourth right maxillary tooth (B). **Abbreviations: m 1–5**: maxillary tooth and corresponding position 1–5; **pm 1–4**: premaxillary tooth and corresponding position 1–4.

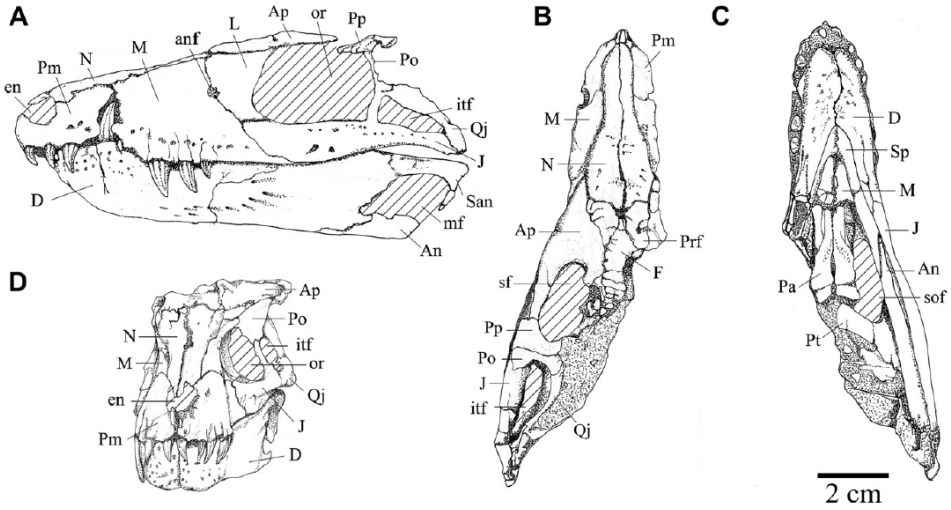


Fig. 3. Schematic drawings of holotype of *Gondwanasuchus scabrosus* **gen. nov. et sp. nov.** (UFRJ DG 408-R) in lateral view (A), dorsal view (B), palatal view (C) and anterior view (D). **Anatomical abbreviations: An**: Angular; **anf**: antorbital fenestra; **Ap**: Anterior palpebral; **D**: Dentary; **en**: external nares; **F**: Frontal; **itf**: infratemporal fenestra; **J**: Jugal; **L**: Lacrimal; **M**: Maxilla; **mf**: mandibular fenestra; **N**: Nasal; **or**: orbit; **Pa**: Palatine; **Pfr**: Prefrontal; **Pm**: Premaxilla; **Po**: Postobital; **Pp**: Posterior palpebral; **Pt** Pterygoid; **Qj**: Quadratojugal; **San**: Surangular; **sf**: supraorbital fenestra; **sof**: suborbital fenestra; **Sp**: Splenial.

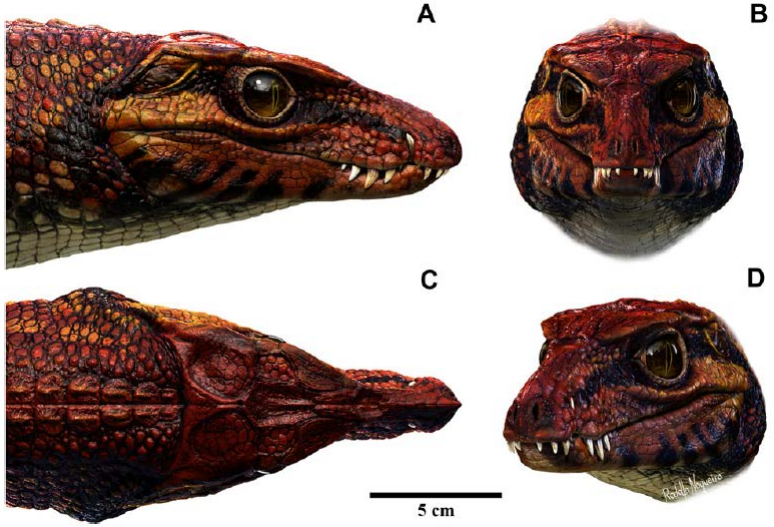


Fig. 5. Life reconstruction of *Gondwanasuchus scabrosus* gen. nov. et sp. nov. right lateral (A), anterior (B), dorsal (C) and oblique (D) views. Art by Rodolfo Nogueira.

Sebecidae

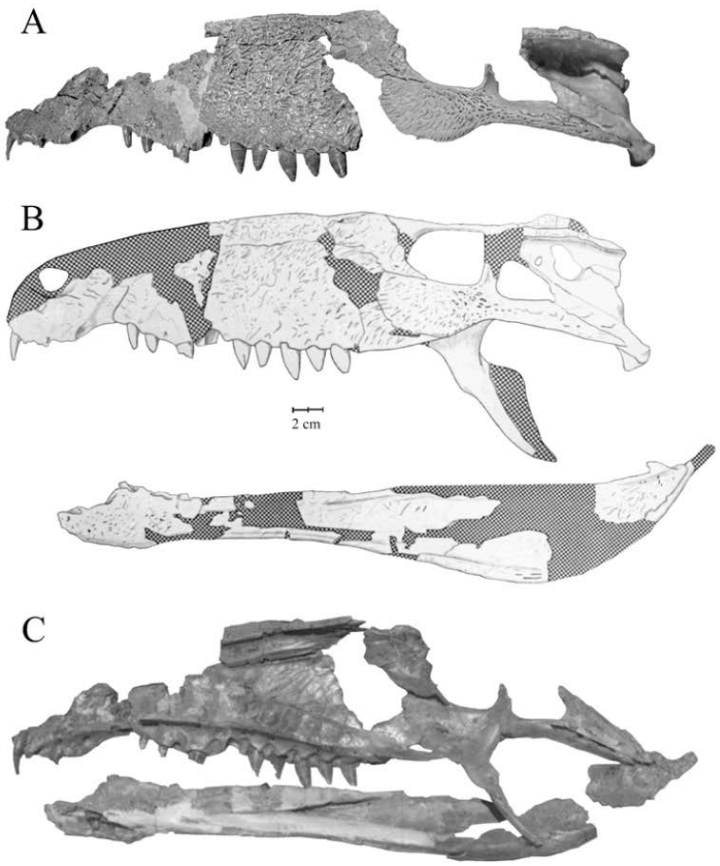


Figure 1. Reconstruction and elements of the skull and mandible of *Sebecus icaeorhinus* (based on AMNH 3160) in left lateral view. A. Preserved cranial bones of *S. icaeorhinus*, AMNH 3160, in left lateral view. B. Reconstruction of the skull and mandible, hatched areas represent missing material. C. Preserved left cranial bones of AMNH 3160 in medial view, reversed. Scale 2 cm.

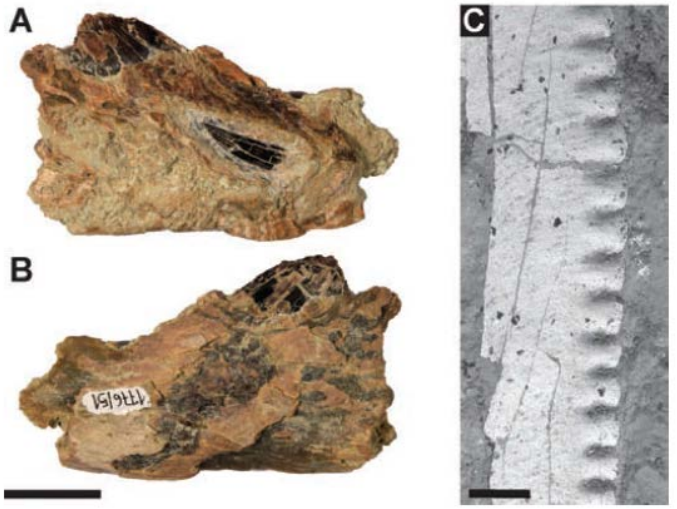
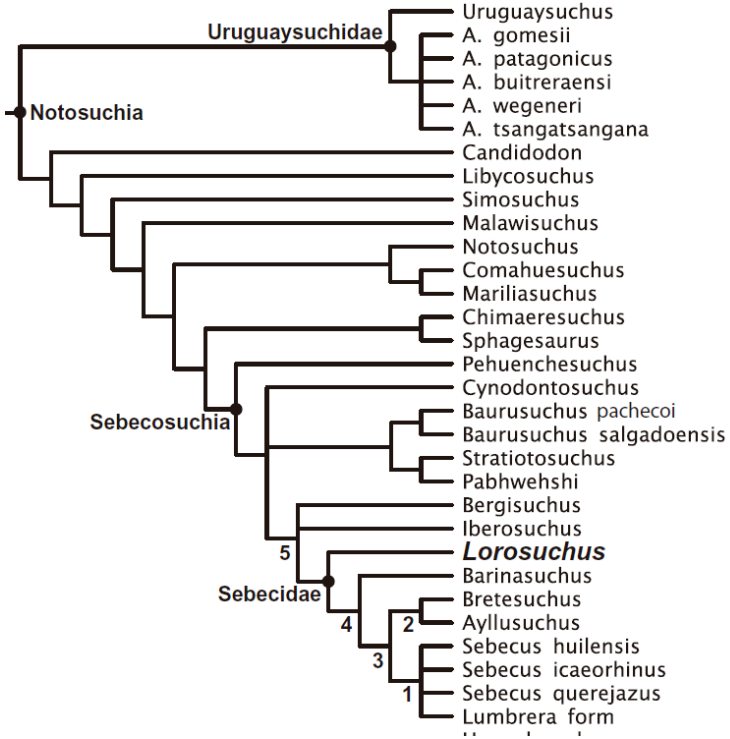
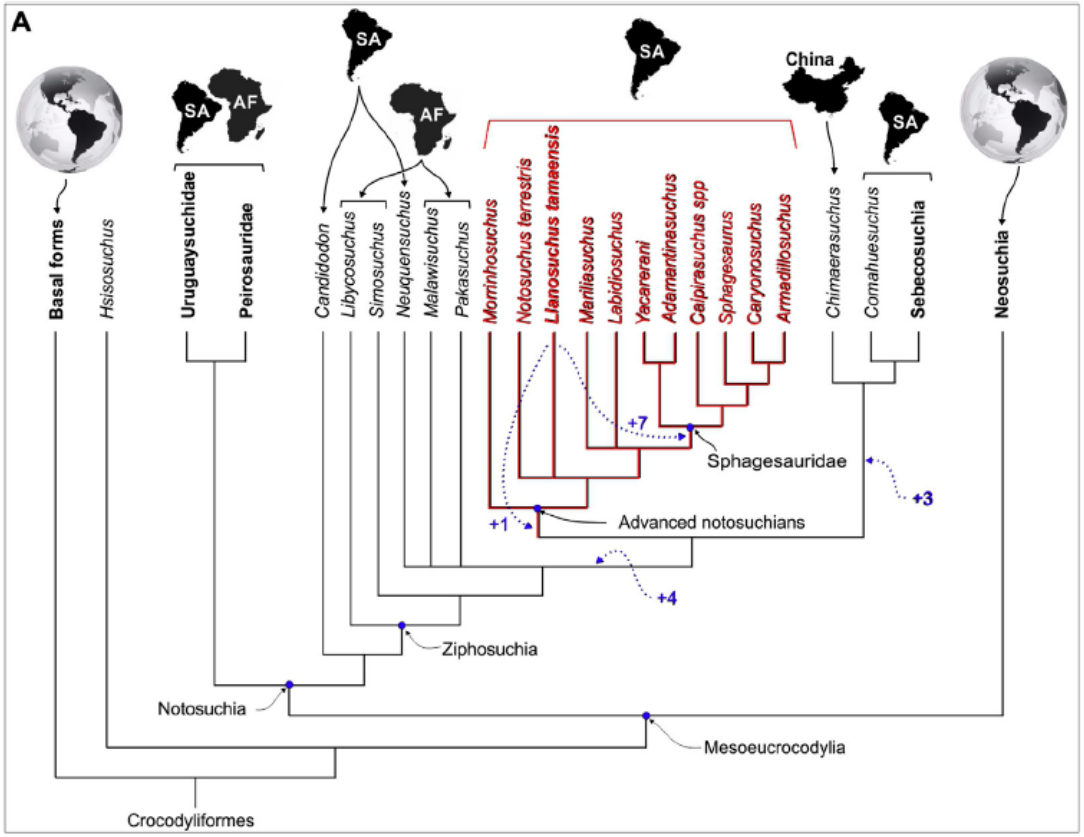


FIGURE 3. Mandibular remains of *S. icaeorhinus* (MPEF-PV 1776). **A**, right dentary in medial view showing replacement tooth; **B**, right dentary in lateral view; **C**, SEM image of distal margin of replacement tooth. Scale bars equal 1 cm (**A**, **B**), and 250 μm (**C**). (Color figure available online.)



Biogeografía de notosuquios



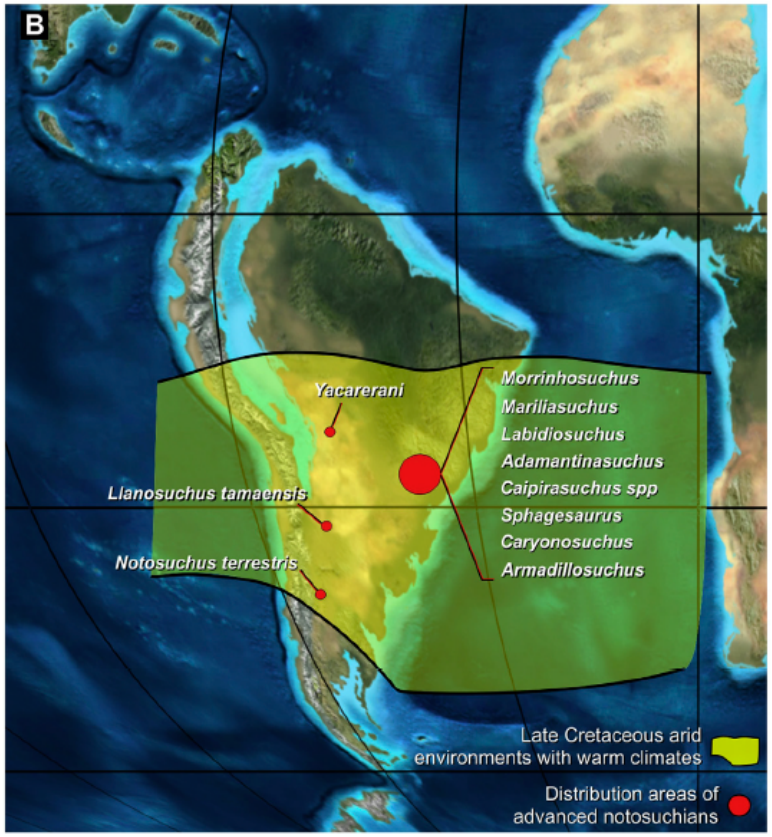


Fig 9. A, Phylogenetic relationships of Notosuchia and their land mass provenances showing the South American endemism of advanced notosuchians (in red). In addition, the blue dotted arrows indicate the extra steps when *Llanosuchus tamaensis* is forced as the sister group of Sphagesauridae (+7; which is highly suboptimal), as the basalmost advanced notusuchian (+1), as a derived ziphosuchian more derived than *Pakasuchus* + *Malawisuchus* (+4) or as the sister group of *Chimaerasuchus* + *Comahuesuchus* + Sebecosuchia (+3). **B**, Paleogeographic map of South America during the Late Cretaceous with the distribution of the advanced notosuchians; Late Cretaceous paleogeographic map provided by Dr. Ron Blakey and paleoclimatic reconstruction based on Scotese (2005). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Neosuchia

Definición: Clado más inclusivo que contiene a *Crocodylus niloticus* pero no a *Notosuchus terrestris*

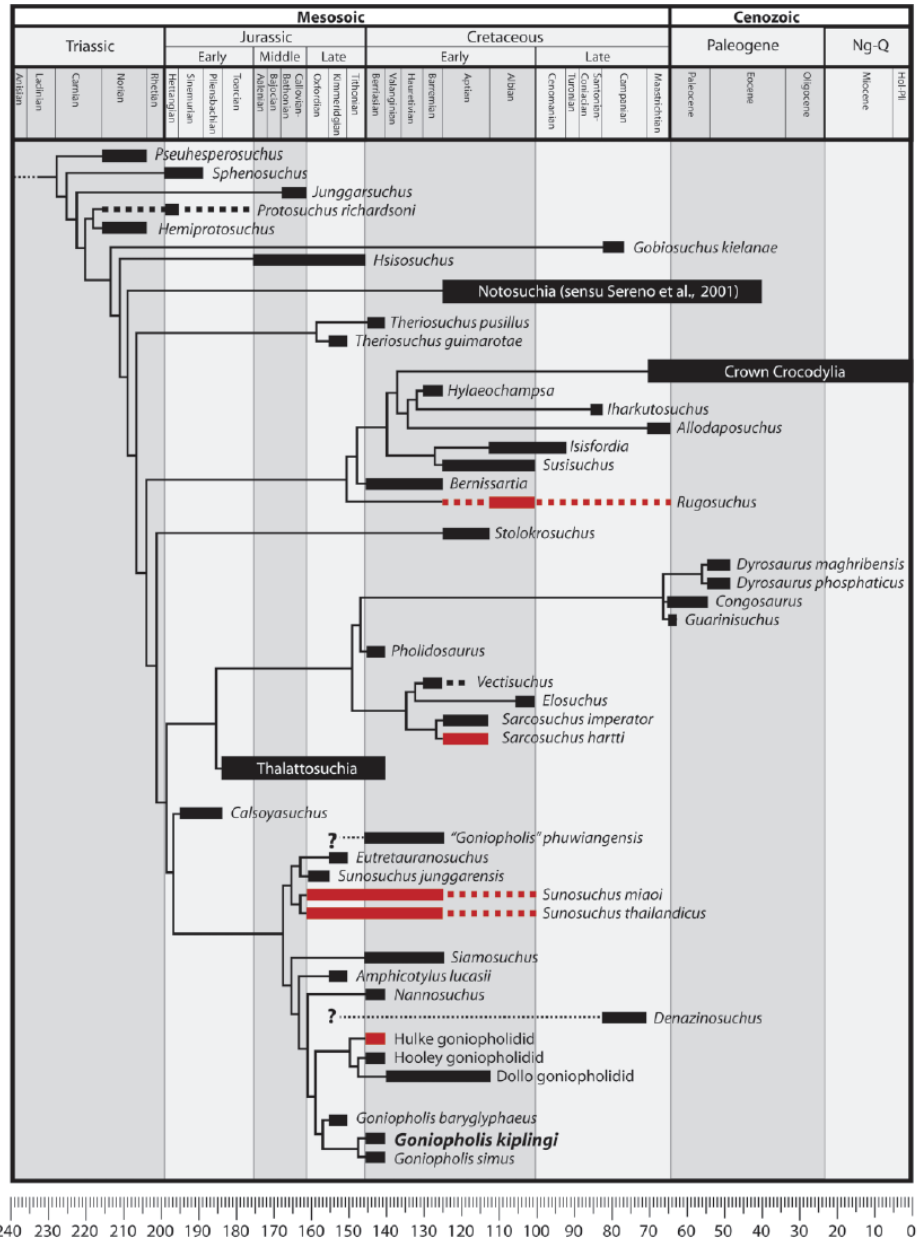
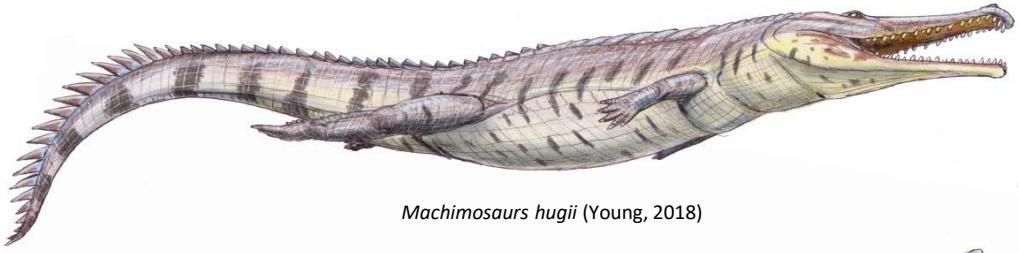


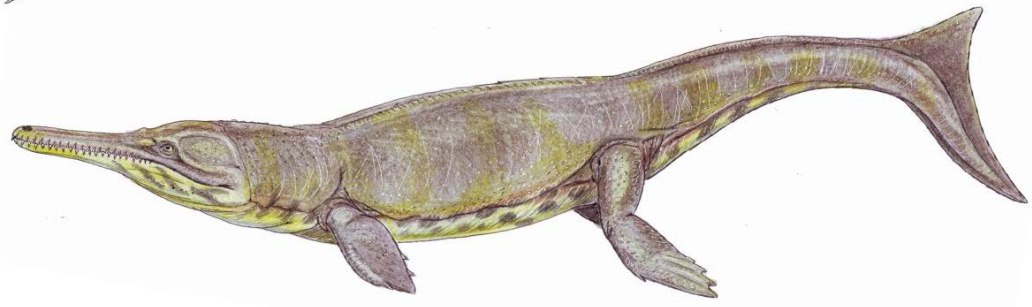
Figure 14. Phylogenetic relationships of Goniopholididae and other main groups of neosuchians, calibrated through time. The goniopholidid fossil record begins in the Early Jurassic, but most members of this group occur from the Late Jurassic to the Early Cretaceous (pre-Aptian). *Calsoyasuchus* is the oldest taxon, and appears as the basal-most goniopholidid. *Denazinosuchus* is the most recent record (Late Cretaceous), but its relationships are poorly understood. Dashed ranges represent variation in the age attributed to the material; grey/red ranges are uncertain records; dotted lines represent taxa of uncertain relationships. Abbreviations: Ng, Neogene; Q, Quaternary.

Thalattosuchia

"Metriorhynchus" casamiquelai (foto de Rodrigo Otero)



Machimosaurs hugii (Young, 2018)



Metriorhynchus superciliosus (tomado de Young., 2018)

Dakosaurus maximus y *Cricosaurus* sp. (tomado de Young., 2018)

Metriorhynchoidea

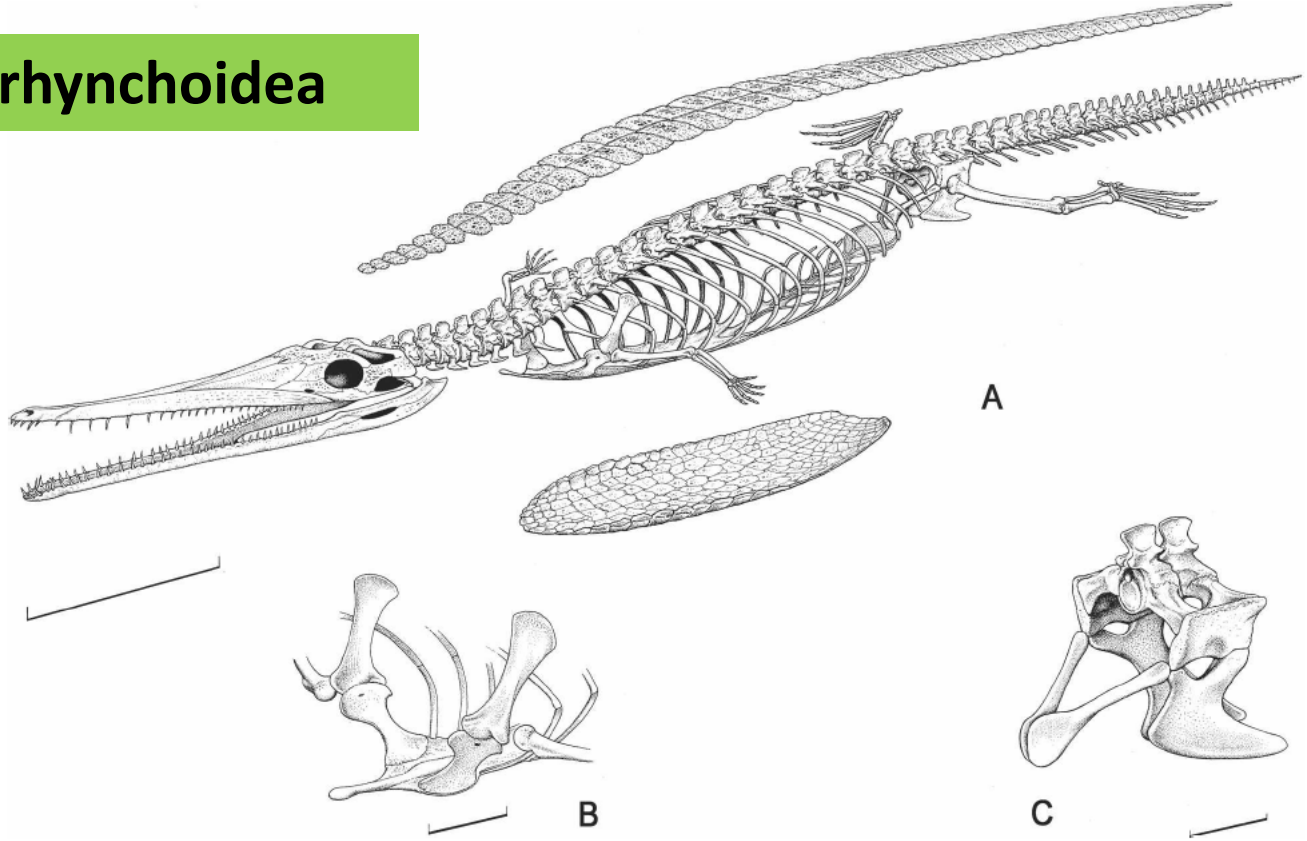


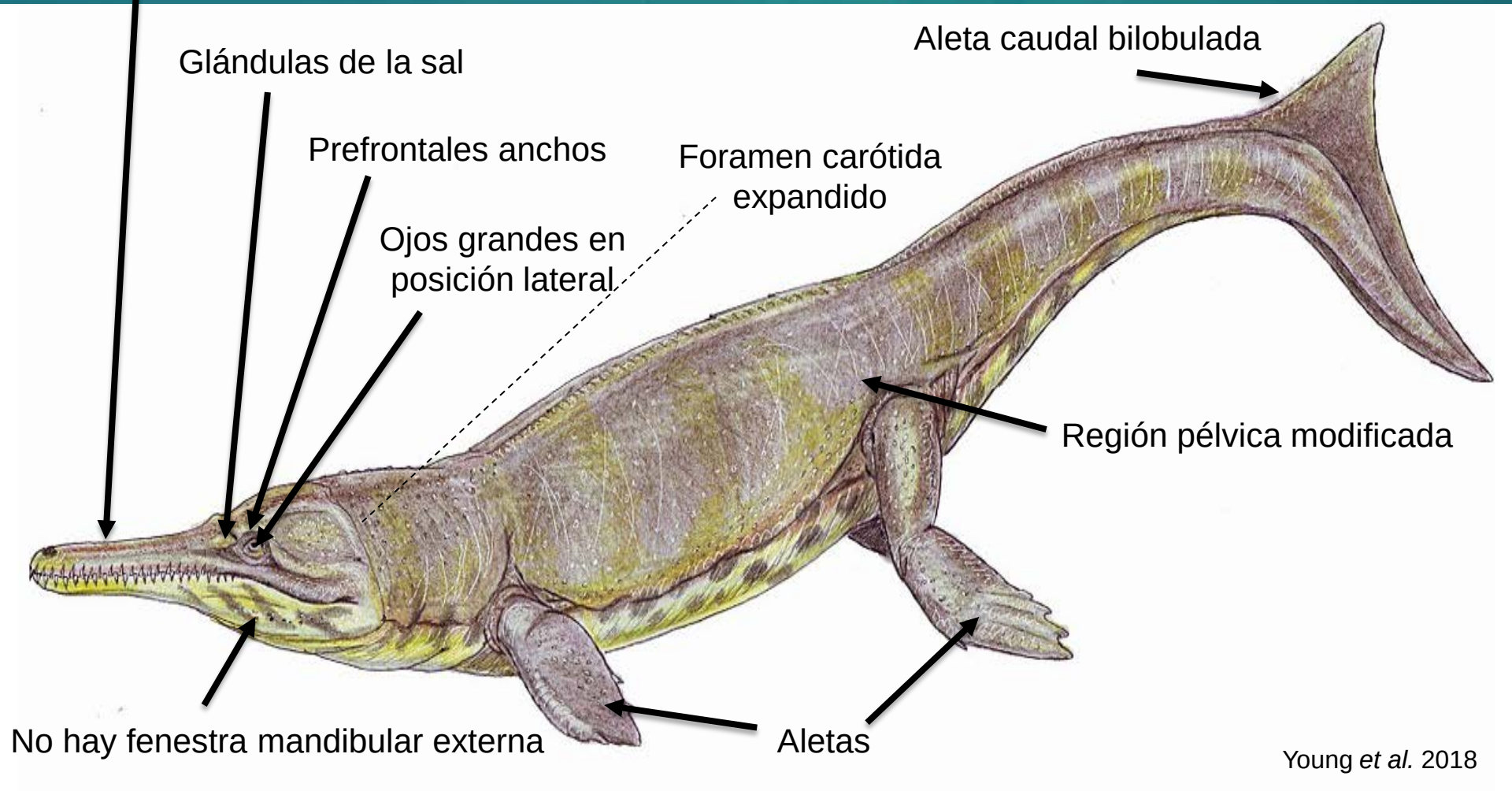
FIGURE 7. Reconstruction of the postcranial anatomy in *Pelagosaurus typus* from the Toarcian of Somerset, England, with special reference to the pectoral and pelvic girdles. **A**, articulated skull and postcranial skeleton (Scale bar equals 10 cm); **B**, pectoral girdle (Scale bar equals 3 cm); **C**, pelvic girdle (Scale bar equals 3 cm). (Drawing by ©John Sibbick).

Metriorhynchidae

Pérdida de osteodermos

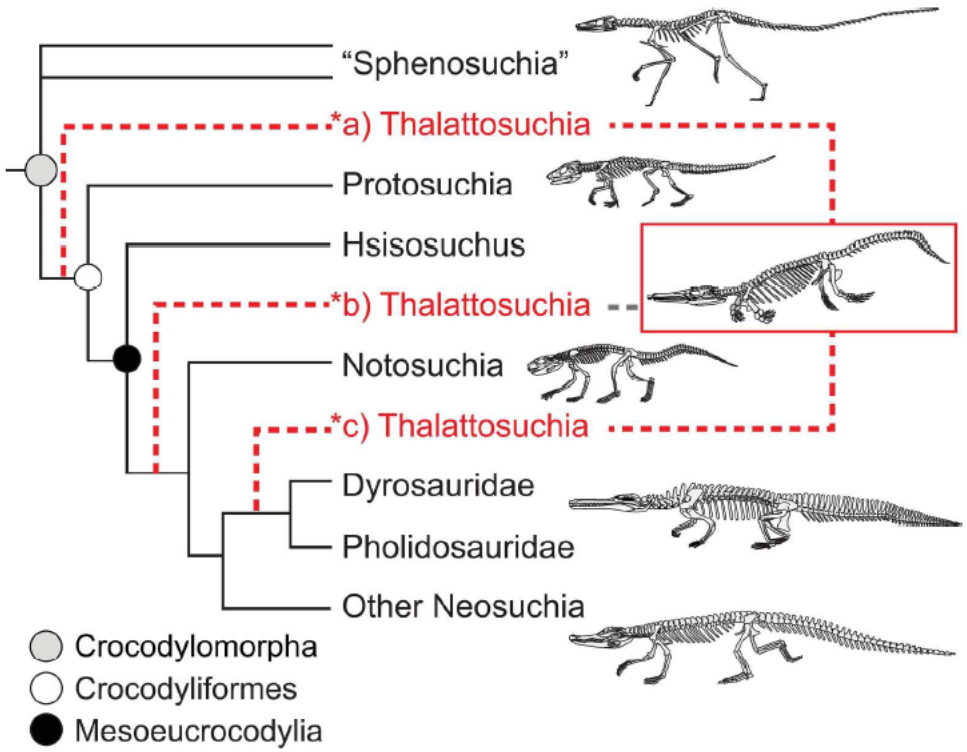
Osteoporosis

Cabeza y cuerpo hidrodinámicos



Young *et al.* 2018

Origen y Evolución de los Thalattosuchia



Generalized phylogeny of Crocodylomorpha showing the three potential positions of Thalattosuchia. a) Sister group to Crocodyliformes; b) basal mesoeucrocodyilans; c) Derived neosuchians, allied with pholidosaurs/dyrosaurids to form a "longirostrine clade".
196x152mm (300 x 300 DPI)

Wilberg, 2015

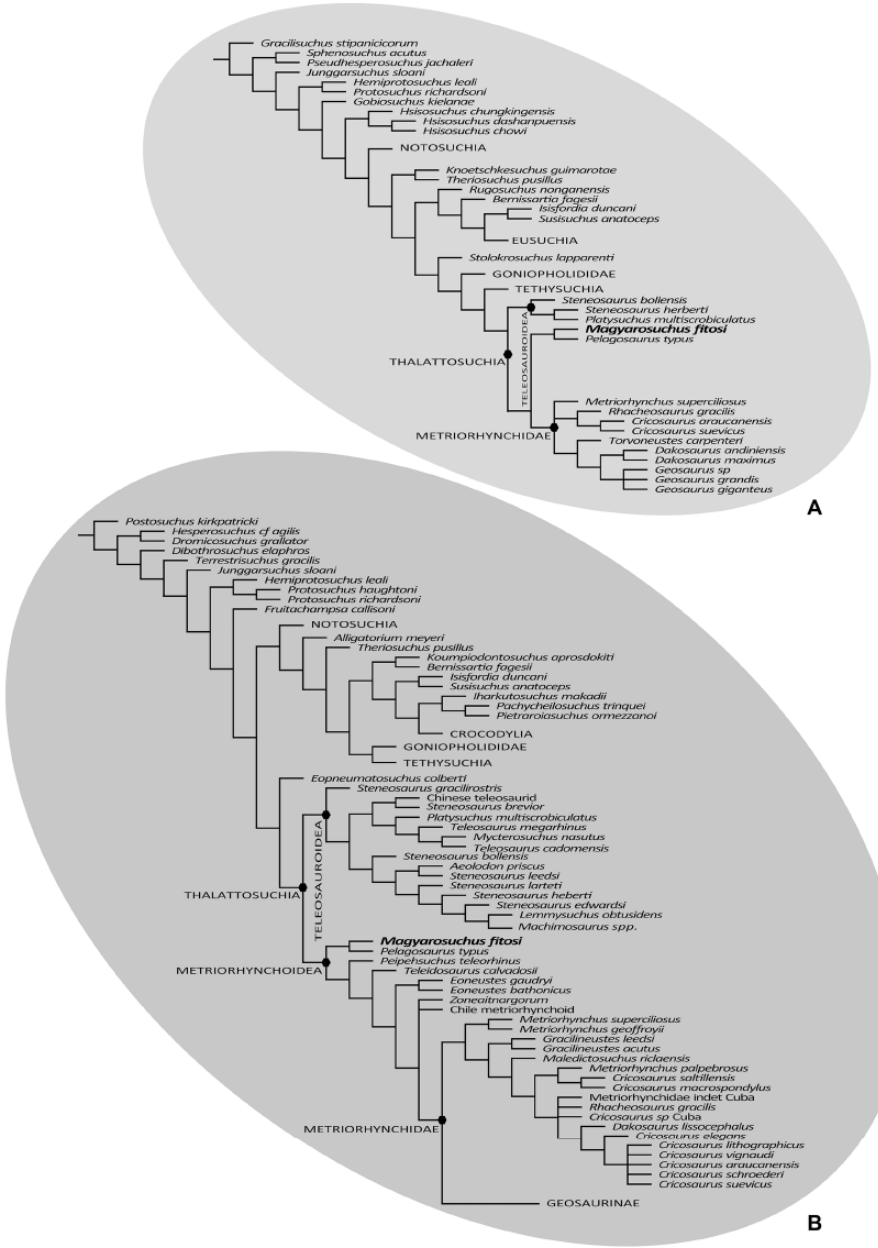


Figure 10 **Results of the phylogenetic analyses.** (A), Strict consensus of 16 most parsimonious cladograms based on the modified Andrade matrix (*Andrade et al., 2011*), showing the phylogenetic relationships of *Magyarosuchus fitosi* gen. et sp. nov. within Metriorhynchoidea. (B), Strict consensus of 84 most parsimonious cladograms based on the Hastings + Young matrix (*Young et al., 2016*), showing the phylogenetic relationships of *Magyarosuchus fitosi* gen. et sp. nov. within Metriorhynchoidea.
Full-size DOI: 10.7717/peerj.4668/fig-10

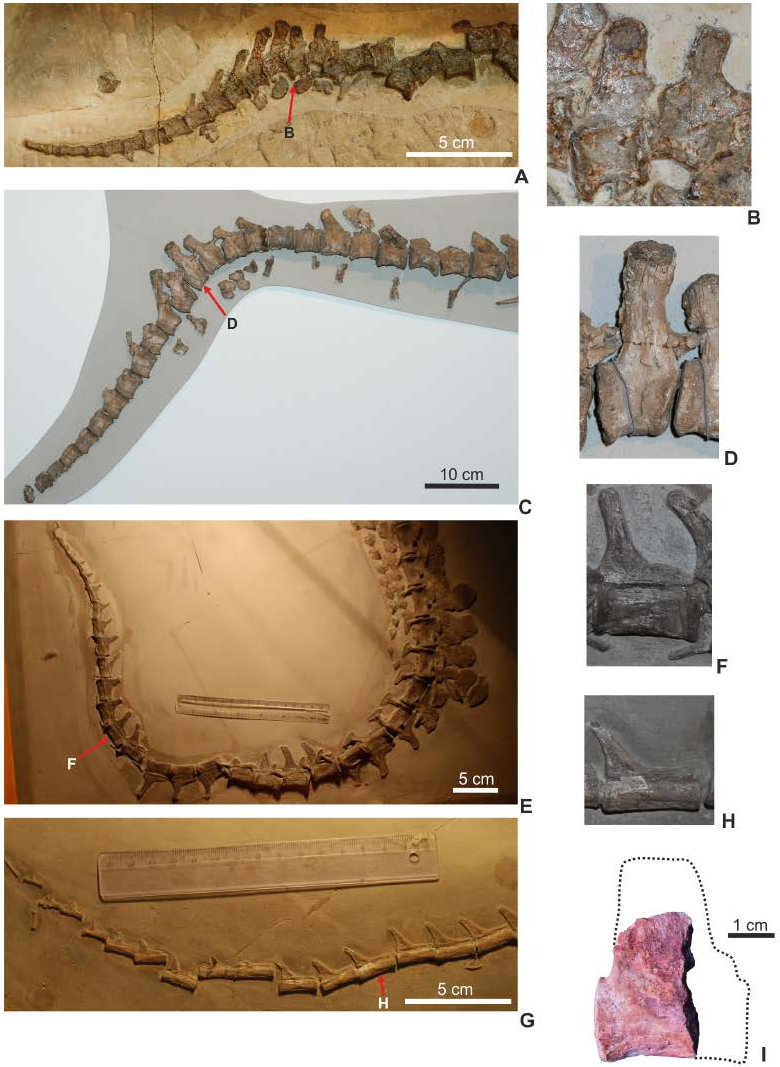
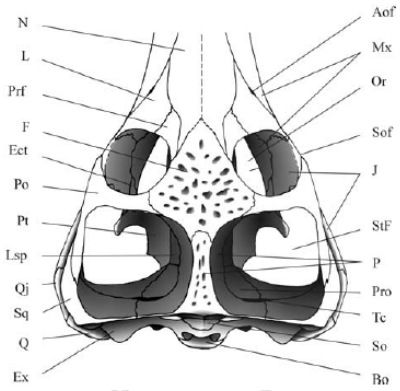


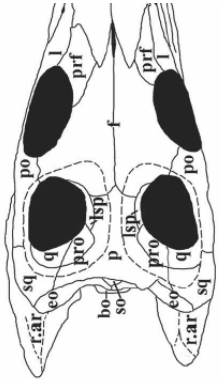
Figure 12 **Comparison of thalattosuchian bony tails and the distal caudal vertebrae within the bending zone.** (A and B), *Cricosaurus suevicus* from Nusplingen (GPIT RE 7322); (C and D), *Metriorhynchus superciliosus* (GPIT RE 9405); (E and F), *Steneosaurus bollensis* (MTM M 69242); (G and H), *Pelagosaurus typus* (MTM M 62 2516); (I), *Magyarosuchus fitosi* gen. et sp. nov. distal caudal (MTM V.97.19.) with the interpreted original outline of the vertebra.
Full-size DOI: 10.7717/peerj.4668/fig-12

Osi et al., 2018

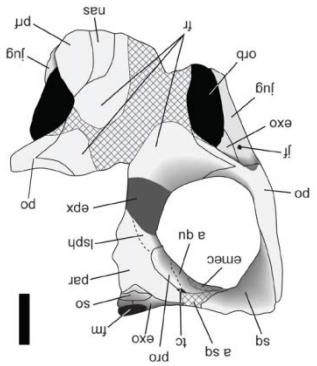
Evolución del cráneo en Thalattosuchia



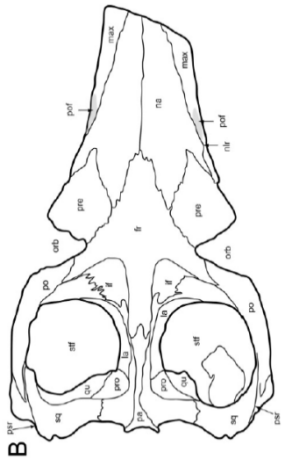
Teleosaurus cadomirus



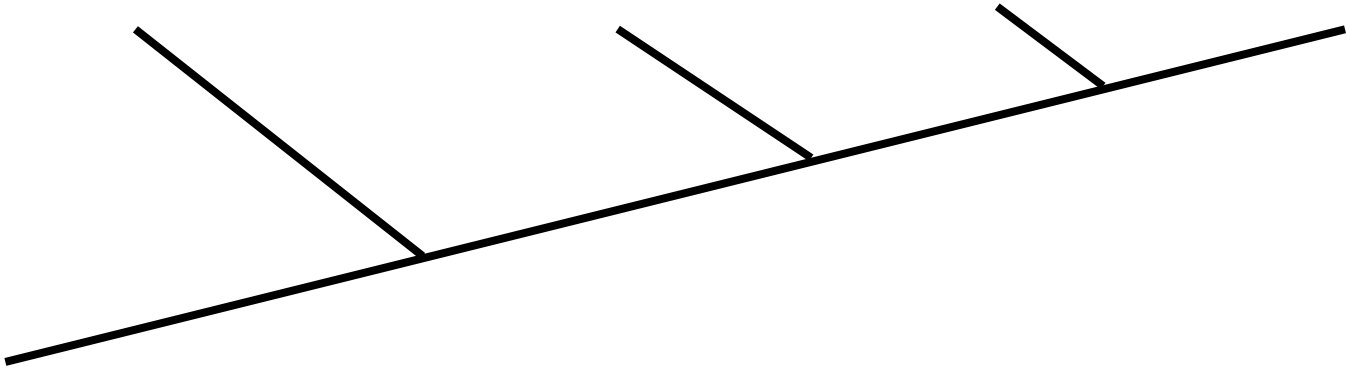
Pelagosaurus typus



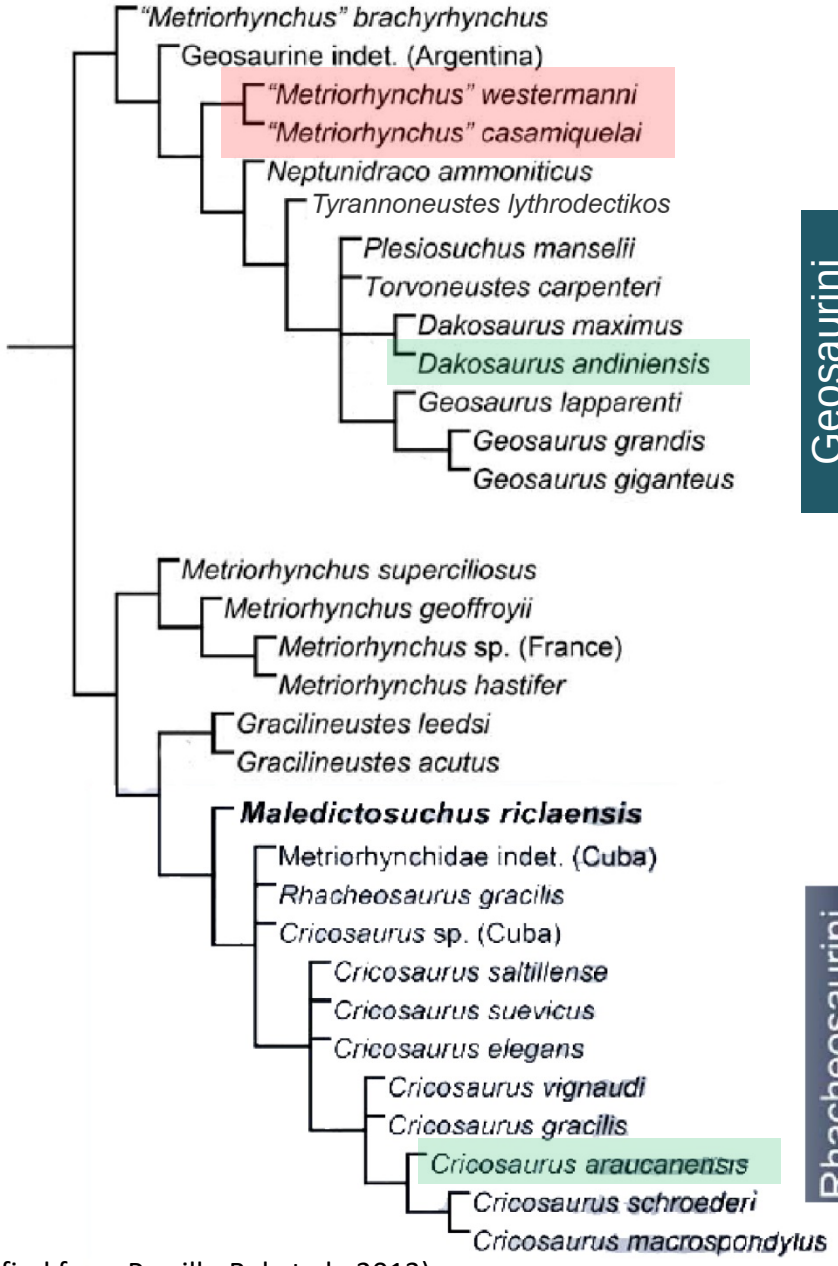
Zoneait nargorum

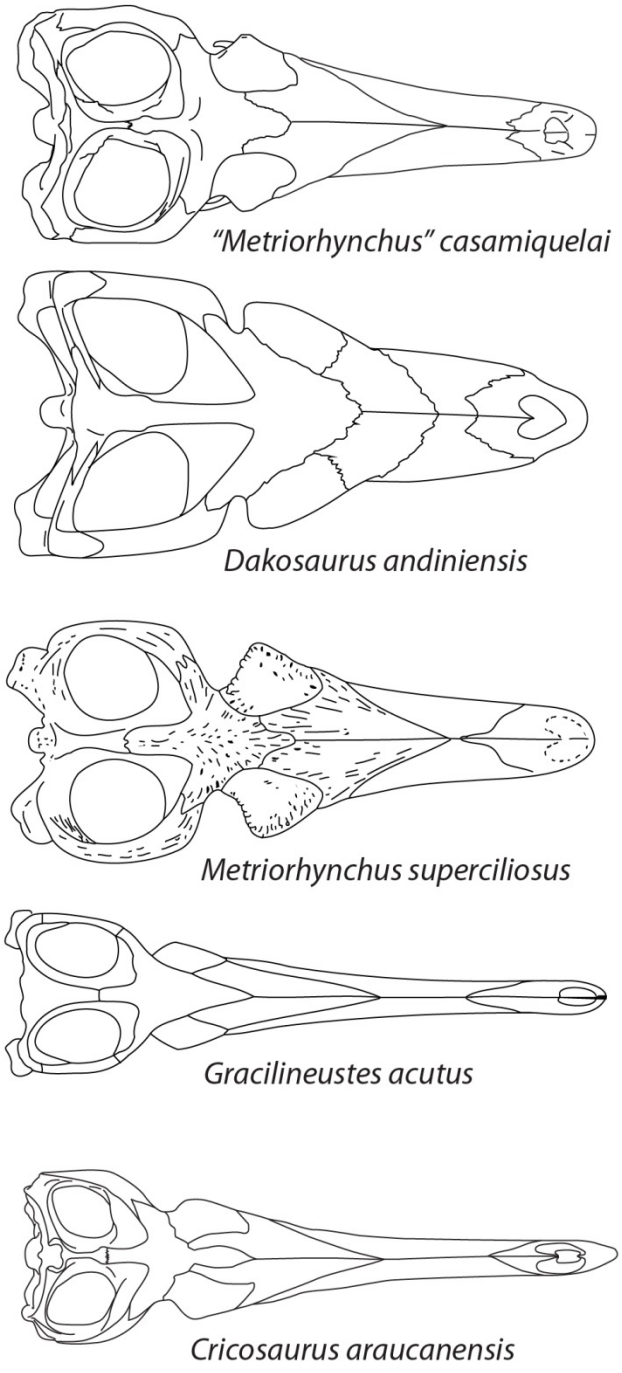


Torvoneustes coryphaeus



Metriorhynchidae





(modified from Parrilla-Bel et al., 2013)

Evolución del miembro anterior en Thalattosuchia

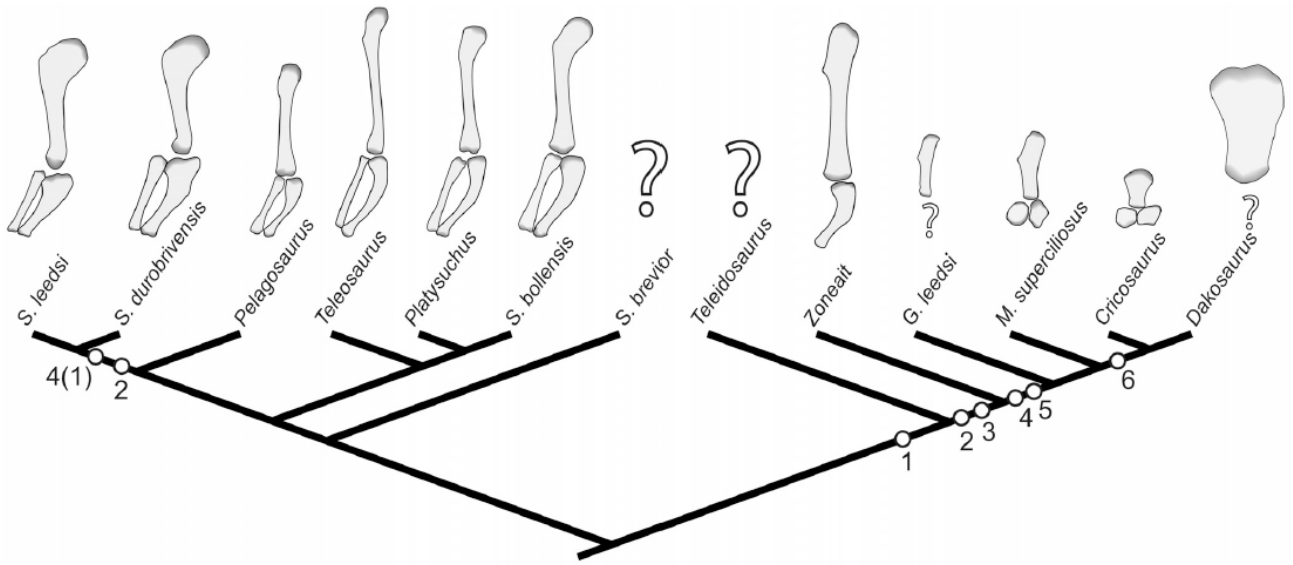
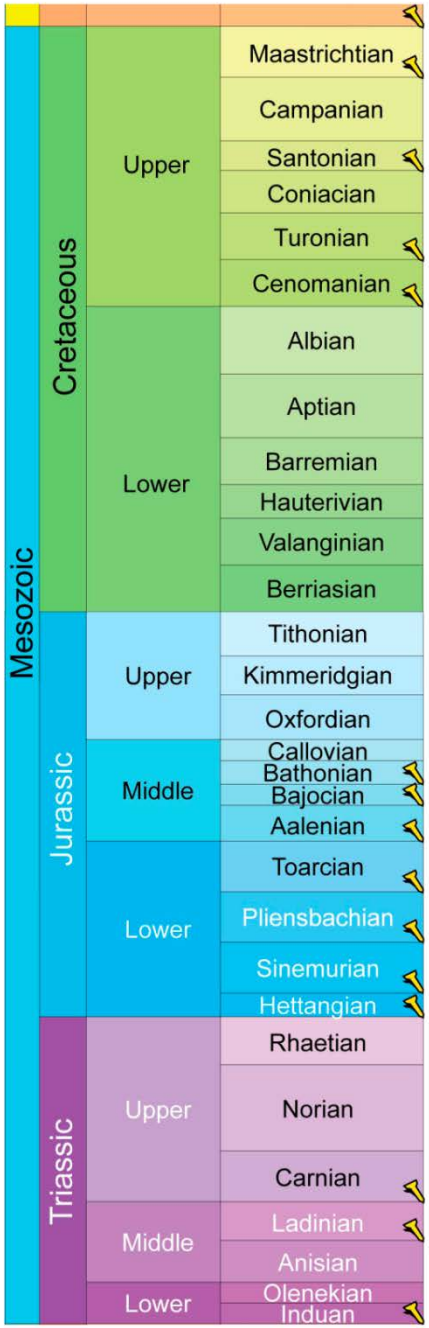
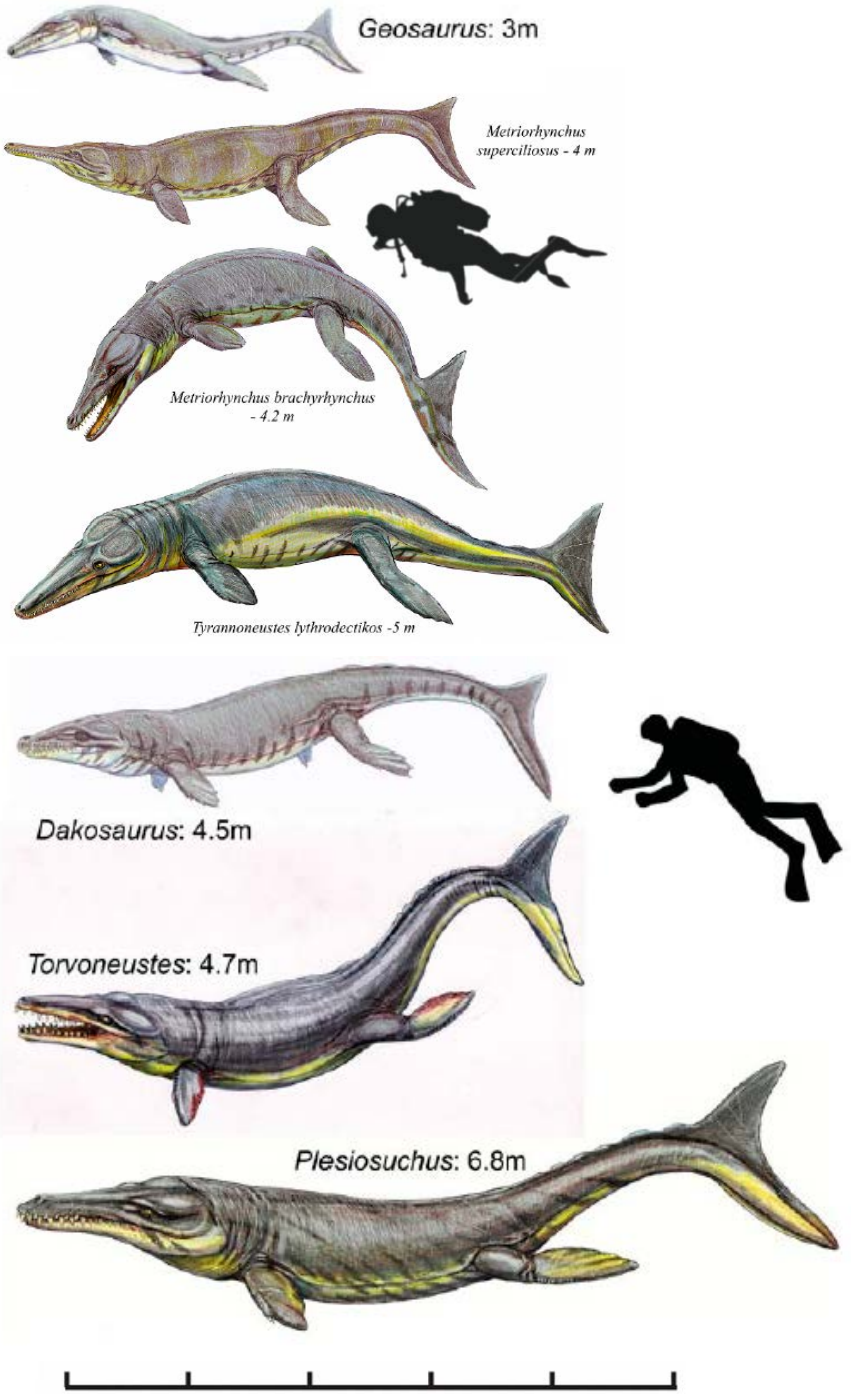


FIGURE 16. Reduced cladogram of thalattosuchian taxa demonstrating the evolution of marine adaptations. 1, lateral orientation of orbits; 2, ulna slightly reduced and proximal portion anteroposteriorly expanded; 3, indirect evidence of hypertrophied salt glands; 4, humerus reduced in size [4.1, different mode of reduction in *Steneosaurus*]; 5, radius and ulna reduced to plate-like elements; 6, further reduction of humerus; deltopectoral crest becomes continuous with proximal articulation surface. *Dakosaurus* and *Cricosaurus* limb elements adapted from Fraas (1902).

Top: The forelimb (left) and hindlimb (right) of the teleosauroid *Platysuchus multiscrobiculatus*, Lower Jurassic (early Tithonian, Posidonienschiefer Formation) of Holzmaden (Germany). Middle: The forelimb (left) and hindlimb (right) of the metriorhynchid *Dakosaurus maximus*, Upper Jurassic (late Kimmeridgian, Torleite Formation) of Painten (Germany)

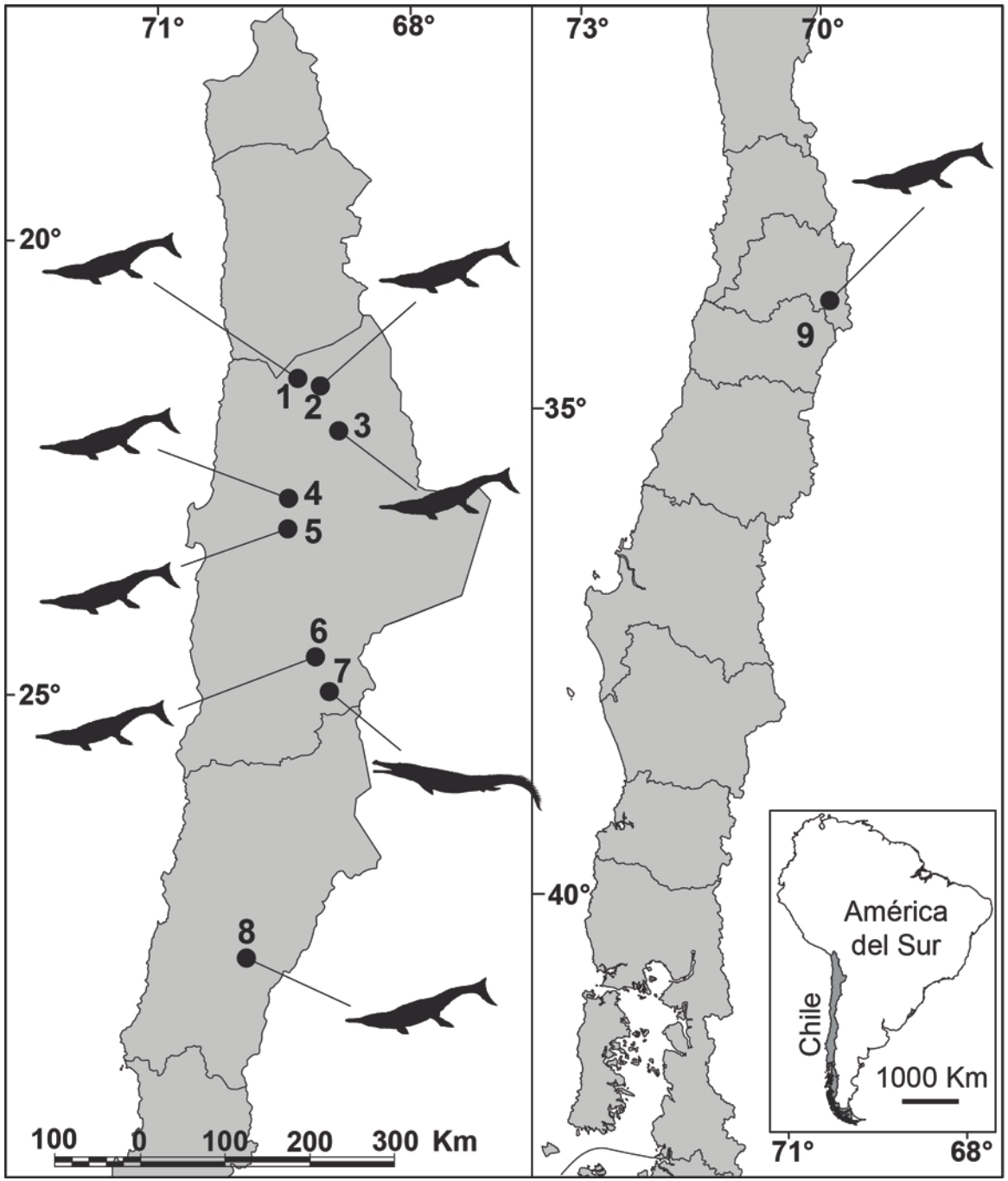
Rango Cronoestratigráfico





Modificado de Cohen et al (2013)

Thalattosuchia en Chile



1) Quebrada Sajasa, Sierra Moreno, Región de Antofagasta. Formación Quinchamale, **Caloviano medio**.

2) Quebrada Cherejara, Región de Antofagasta. Formación Quehuita, Miembro Quehuita, **Caloviano inferior**.

3) Cerritos Bayos, Calama, Región de Antofagasta. Formación Cerritos Bayos, **Oxfordiano**.

4) Placilla de Caracoles, Cordillera de Domeyko, Región de Antofagasta. Grupo Caracoles, Formación Mina Chica **Caloviano**.

5) Cerro Laberinto, Cordillera de Domeyko, Región de Antofagasta. Formación Sierra El Cobre, Miembro Cerro Amarillo, **Oxfordiano**.

6) Alto de Varas, Región de Antofagasta. **Sinemuriano**.

7) Sierra de Candeleros, Región de Antofagasta. **Caloviano**.

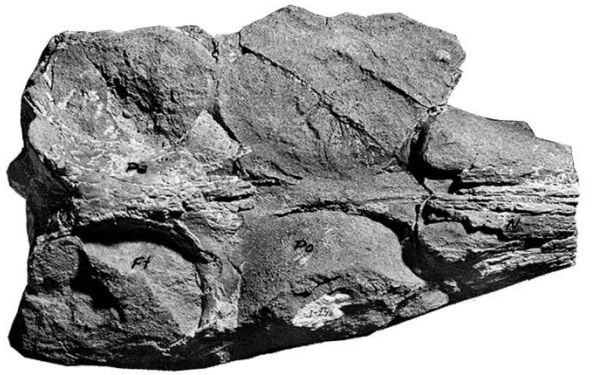
8) Quebrada La Iglesia, Región de Atacama. Formación Lautaro, **Bajociano**.

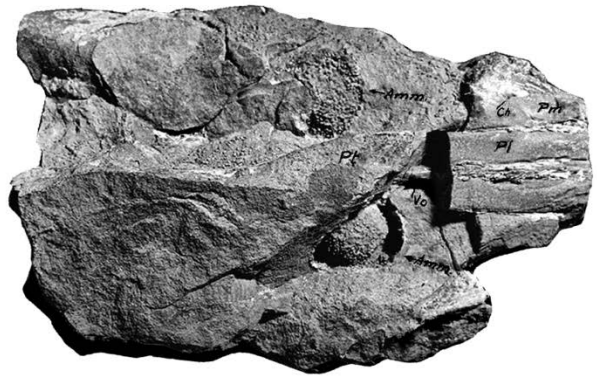
9) Lo Valdés, Región Metropolitana. Formación Lo Valdés, **Titoniano-Hauteriviano**.

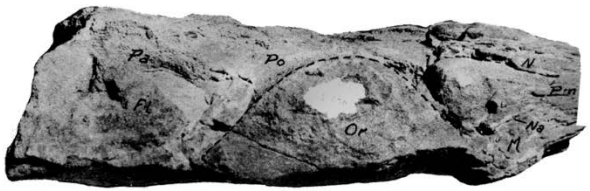
METRIORHYNCHOIDEA Fitzinger, 1843

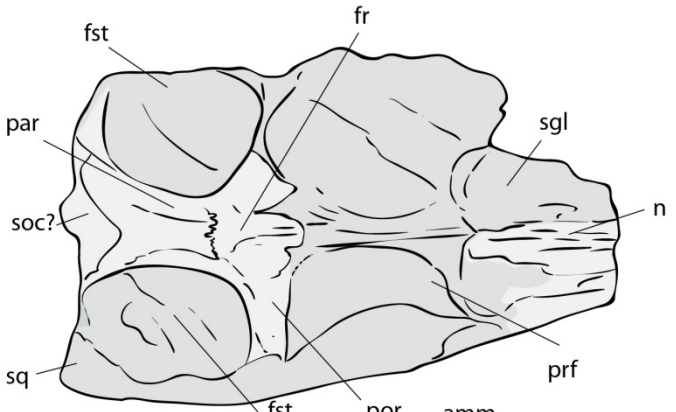
Metriorhynchoidea indet.

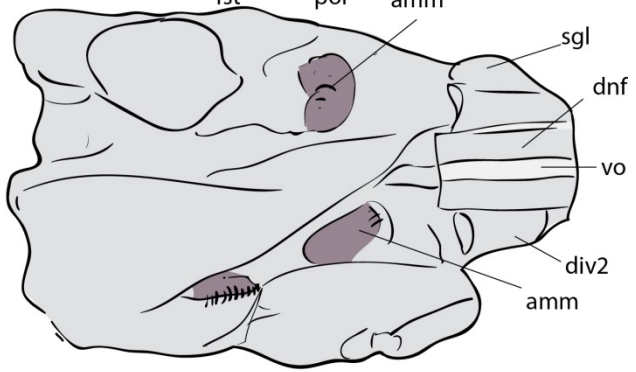
'*Ichthyosaurus acutirostris*' Owen: Tavera, 1981
Metryorhynchus sp.: Gasparini et al., 2000.
Material: T 330, Skull lacking of rostrum (unknown repository).
Procedence: Quebrada de la Iglesia, Atacama Region. Lautaro Formation (Early Bajocian)

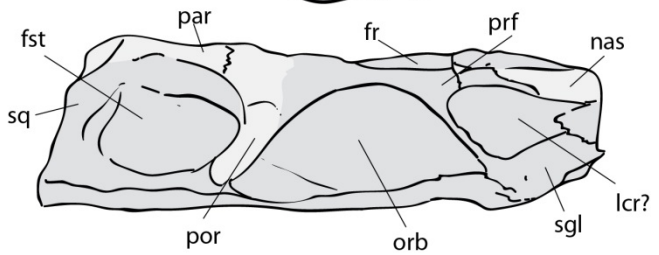












GEOSAURINAE Lydekker, 1889

Metriorhynchus von Meyer, 1830

Metriorhynchus sp.: Chong-Díaz and Gasparini, 1976 (MGHF 1-08573).
Metriorhynchus casamiquelai: Gasparini and Chong, 1977 (MGHF 1-08573).
Thalattosuchia indet.: Chong-Díaz and Gasparini, 1976 (SGO.PV.249).
Thalattosuchia indet.: Gasparini and Chong, 1977 (SGO.PV.249).
Metriorhynchus casamiquelai: Gasparini et al., 2000 (MGHF 1-181097)
Metriorhynchus casamiquelai: Soto-Acuña et al., 2012 (SGO.PV.249).

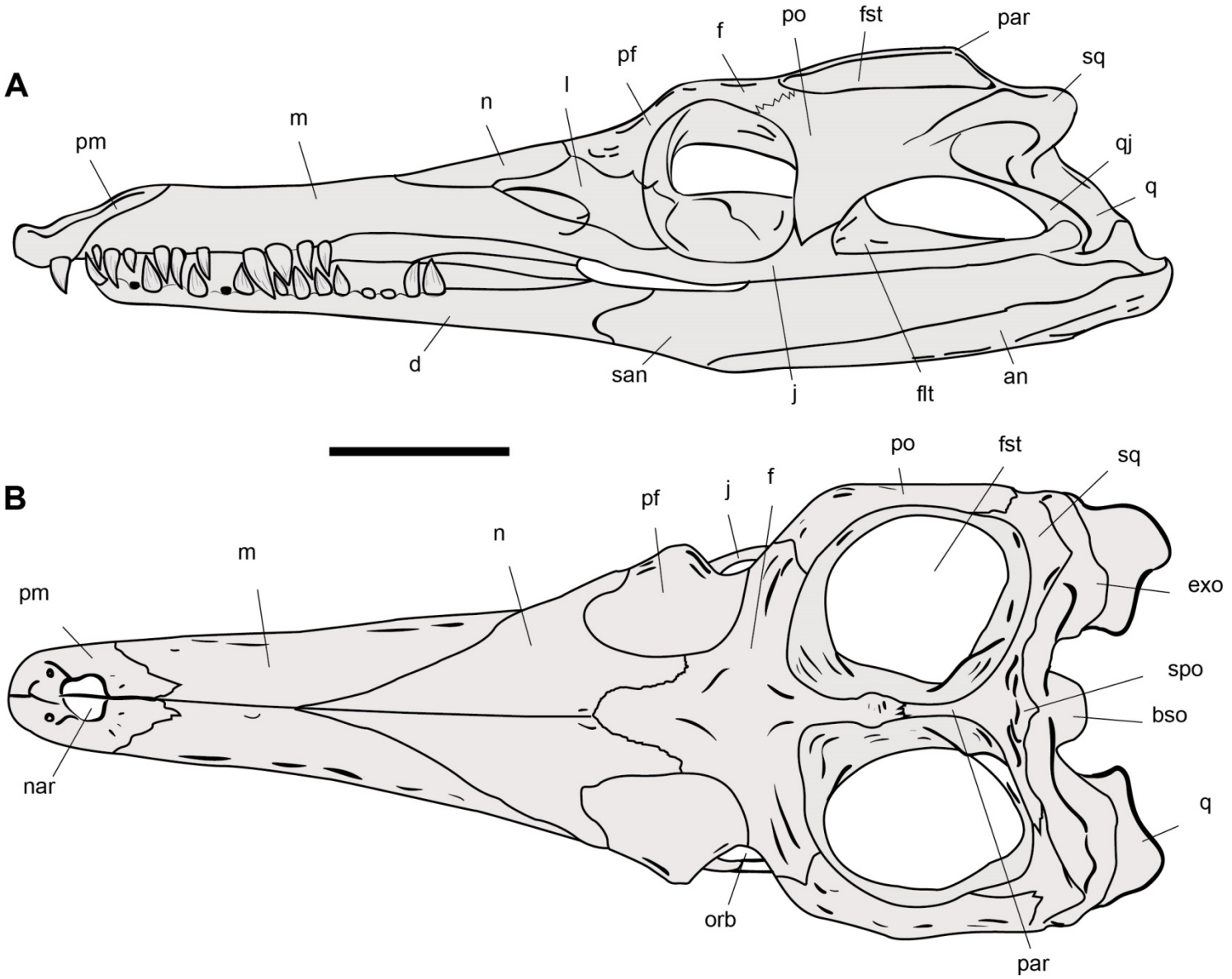
"Metriorhynchus" casamiquelai Gasparini y Chong 1977

Type Material: MGHF 1-08573, skull.
Procedence: Quebrada Sajasa, Sierra Moreno, Antofagasta Region. Quinchamale Formation, (Middle Callovian)

GEOSAURINAE Lydekker, 1889

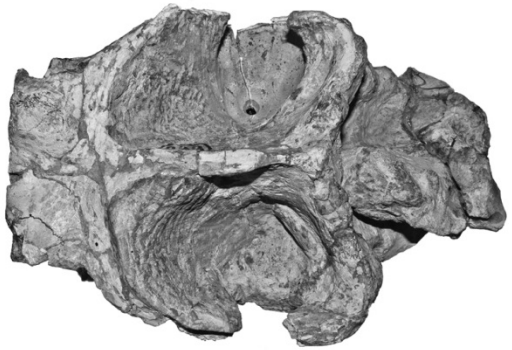
Metriorhynchus von Meyer, 1830

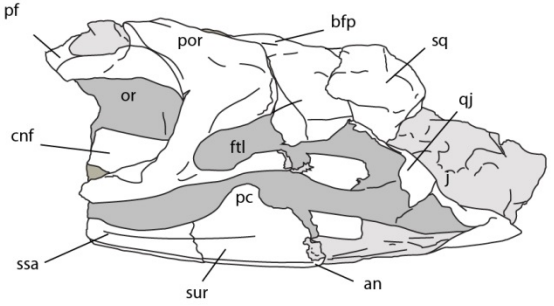
"Metriorhynchus" casamiquelai Gasparini y Chong 1977

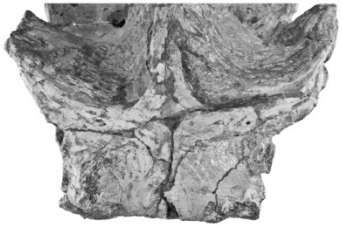


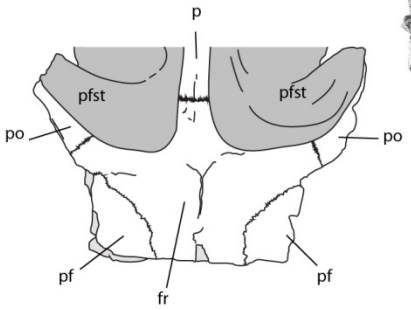
"Metriorhynchus" sp. Gasparini y Chong 1977

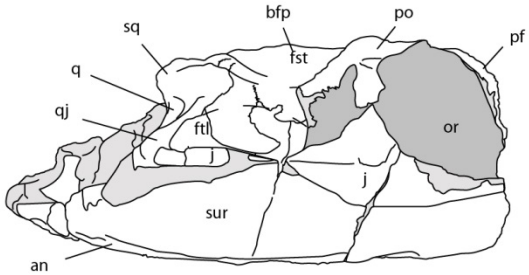
Referred material: SGO.PV.249, skull without rostrum. Sierra Moreno, Región de Antofagasta. Quinchamale Formation (Middle Callovian).

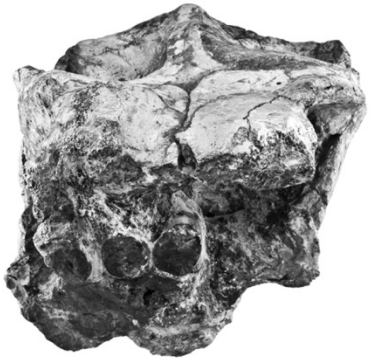


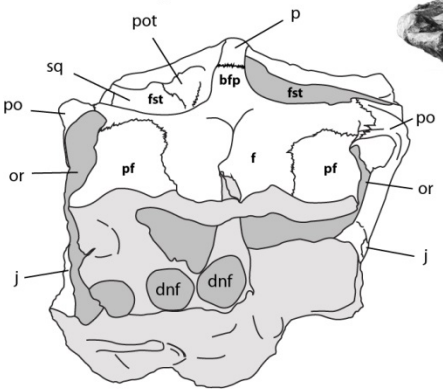


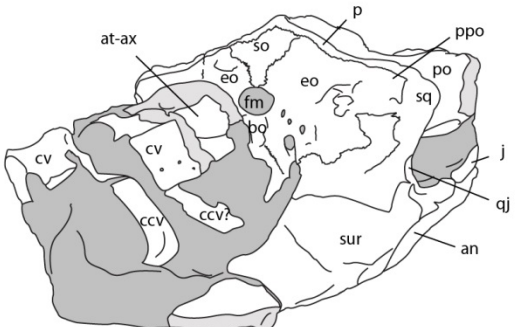


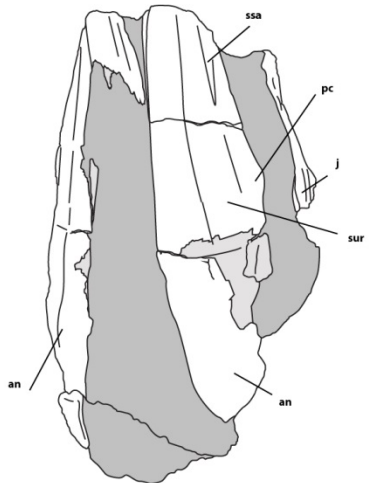












"Metriorhynchus" westermanni Gasparini, 1980

Metriorhynchidae: Gasparini, 1979.
Metriorhynchus westermanni: Gasparini, 1980.
Type Material: MGHF 1-010199, skull laking of rostrum.
Procedence: Placilla de Caracoles, Antofagasta Region. Mina Chica Formation (Lower-Middle Callovian)
Referred material: MDA1, fragmentary skull. Quebrada Cherejara, Sierra del Medio, Antofagasta Region. Quehuita Formation, Quehuita Member (Lower Callovian).

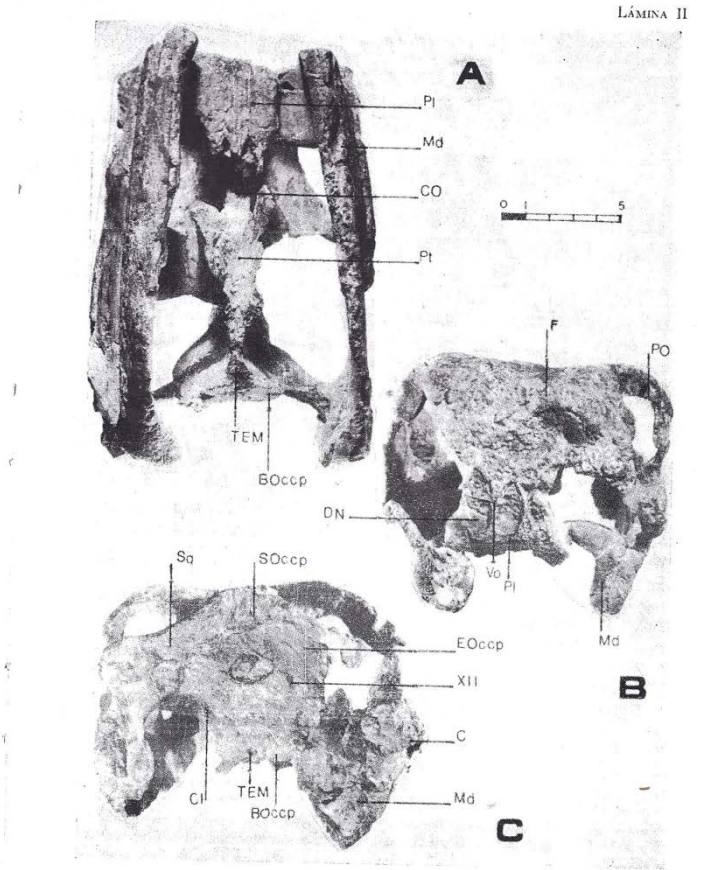


Lámina II. — **Metriorhynchus westermanni** nov. sp. McM J1151r, Caloviano temprano-Caloviano medio, Antofagasta, Chile. **A:** Vista ventral; **B:** Corte natural transversal por delante de las órbitas; **C:** Vista occipital (aprox. x 1/2). Boccp, basioccipital; C, cuadrado; Cl, foramen carótida interna; CO, coanas; DN, ducto nasal; Eoccp, exoccipital; F, frontal; Md, mandíbula; Pl, palatino; PO, postorbital; Pt, pterogoides; Soccp, supraoccipital; Sq, escamoso; TEM, foramen tubo de Eustaquio medio; Vo, vomer; XII, foramen nervio XII. (Escala en cm).

Gasparini (1980)

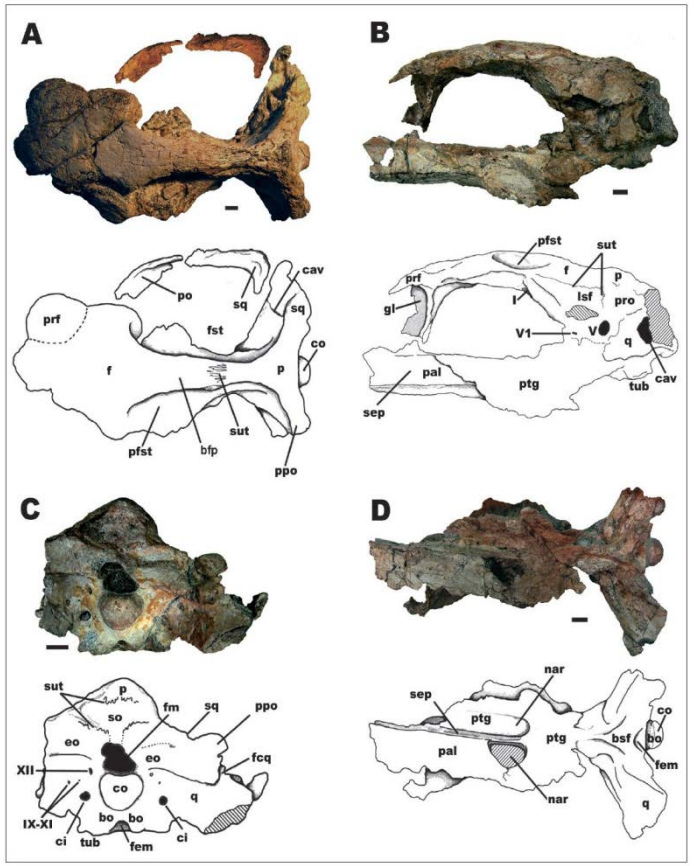
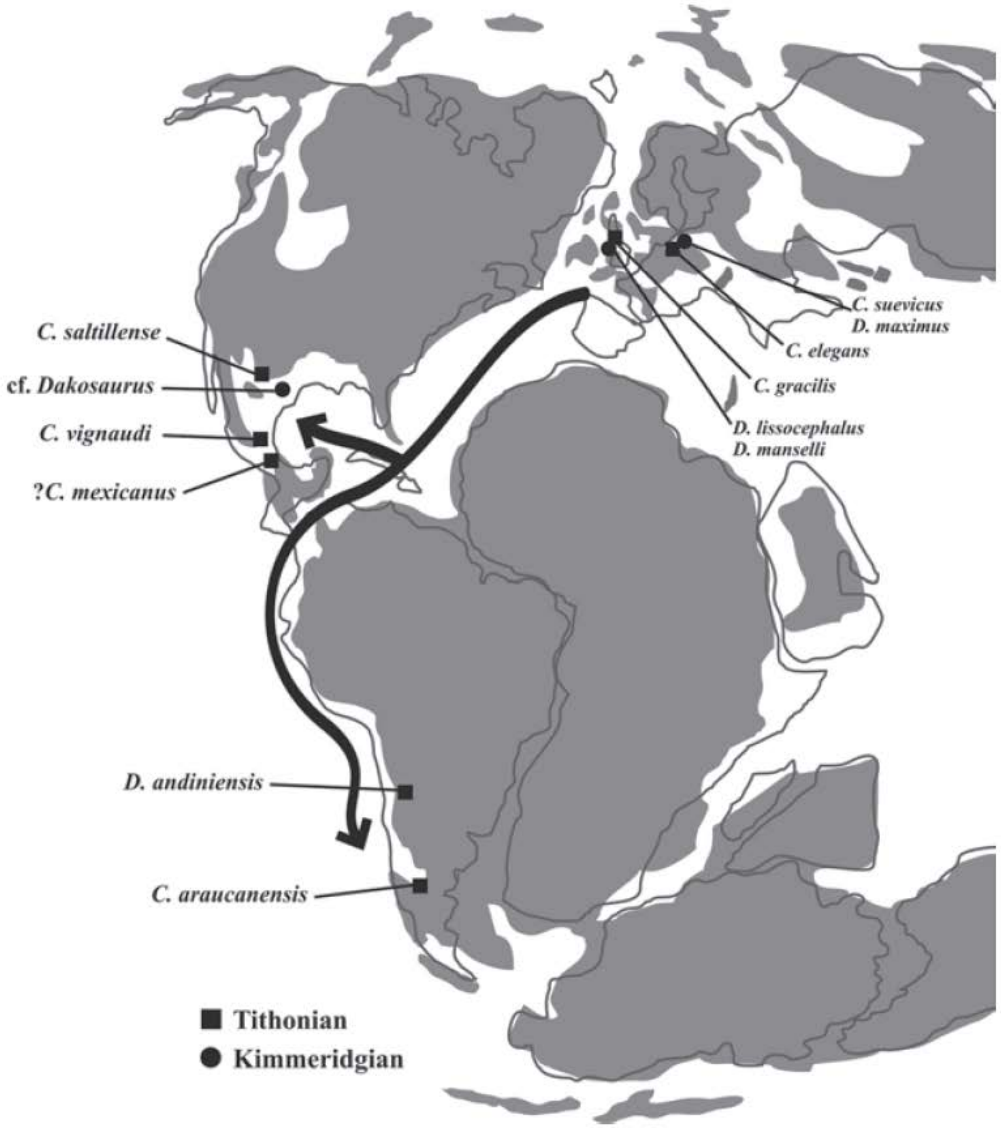


FIG. 2. *Metriorhynchus westermanni* (MDA1) neurocráneo (foto y contorno en líneas) en vistas dorsal **(A)**, lateral izquierda **(B)**, posterior **(C)** y ventral **(D)**. Escala: 1 cm. **bo.** basioccipital; **bsf.** basiesfenoides; **cav.** cavidad del cuadrado; **ci.** carótida interna; **co.** cóndilo occipital; **eo.** exoccipital; **gl.** cavidad de la glándula de la sal; **bfp.** barra frontoparietal; **f.** frontal; **fem.** foramen de eustaquio medio; **fcq.** foramen craneocuadrado; **fm.** foramen magno; **fst.** fosa supratemporal; **nar.** narinas internas; **p.** parietal; **pal.** palatino; **pfst.** piso de la fosa supratemporal; **po.** postorbital; **ppo.** proceso paroccipital; **prf.** prefrontal; **pro.** proótoco; **ptg.** pterigoides; **q.** cuadrado; **sep.** septo medial; **so.** supraoccipital; **sq.** escamoso; **sut.** sutura; **tub.** tubera; **V, V1, IX-XII.** nervios craneanos.

Gasparini et al (2008)

Biogeografía de Herpetofauna Jurásica: Corredor Hispánico



7.6. Map showing the distribution of *Cricosaurus* and *Dakosaurus* in the Thitonian and Kimmeridgian and their paleobiogeographic relationships. The arrows show the possible dispersion of this genus from Europe to North and South America.

Goniopholididae

Definición: Clado que contiene a *Goniopholis crassidens*, pero no a *Pholidosaurus geoffroyi*, *Alligatorellus beaumonti*, *Peirosaurus torminni*, *Araripesuchus gomesii*, *Notosuchus terrestris* ni *Crocodylus niloticus*

Rango temporal: Sinemuriano-Campaniano

Sinapomofías: presencia de fosas maxilares laterales cerca al margen alveolar. Depresiones maxilares cerca de la sutura maxilar-jugal.

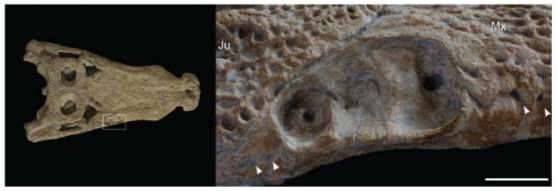
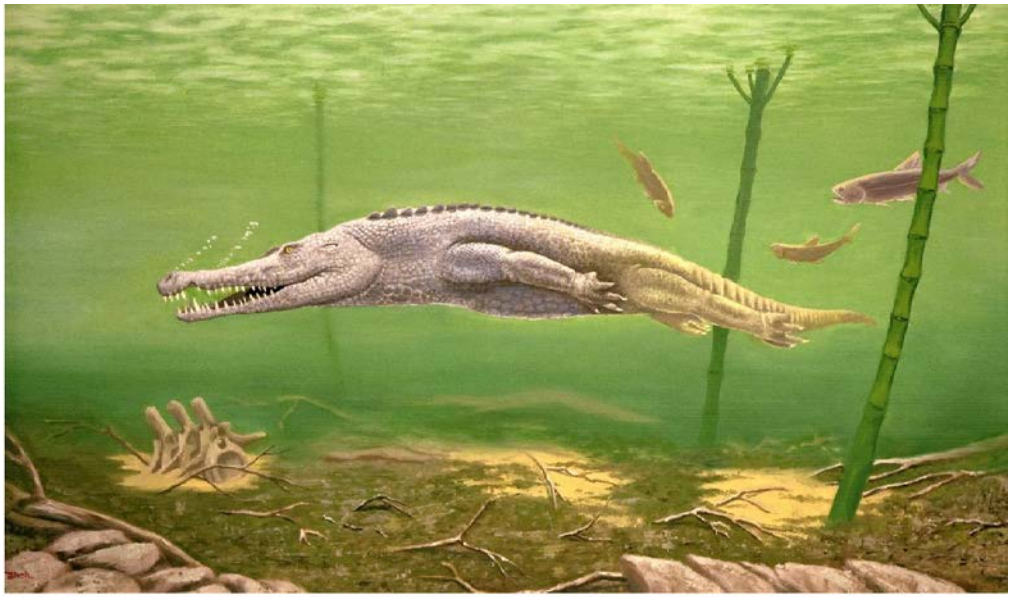


Figure 9. Maxillary depressions of ***Goniopholis kiplingi* sp. nov.** DORCM 12154, with detail of the right structure in lateral view, showing its internal structure. Note that the area around the fossa is smooth, unornamented; and the interior is complex (see Andrade, 2009). The dorsal exposure of the right fossa is taphonomic; the structure faces laterally in other goniopholidids, and also on the left side of DORCM 12154. Common neurovascular foramina are indicated by white pointers. Scale bar = 20 mm. Abbreviations: Ju, jugal; Mx, maxilla.

Erickson, 2018

FIGURE 13. Photograph of mounted cast of *Goniopholis* P 2003.20.1 illustrating osteodermal groups in perspective view.



Frontispiece: Flesh restoration of *Goniopholis*.

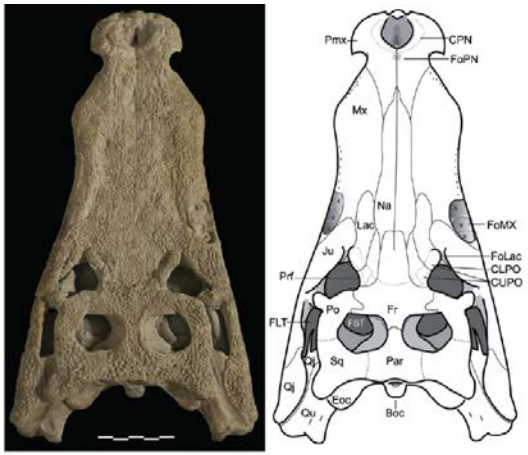


Figure 6. ***Goniopholis kiplingi* sp. nov.** DORCM 12154 after extraction from its original slab (left), and reconstruction of the specimen (right), with interpretation of sutures and main structures of the skull. Note the evident ornamentation, almost completely composed of pits, and the elongated lachrymals. Scale bar = 20 mm. Abbreviations: Boc, basioccipital; CPN, perinarial crest; CLPO, lower periorbital crest; CUPO, upper periorbital crest; Eoc, exoccipital; FLT, laterotemporal fenestra; FoLac, lachrymal fossa; FoMX, maxillar fossa; FoPN, postnasal fossa; Fr, frontal; FST, supratemporal fenestra; Ju, jugal; Lac, lachrymal; Mx, maxilla; Na, nasal; Par, parietal; Prf, prefrontal; Pmx, premaxilla; Po, postorbital; Qj, quadrate-jugal; Qu, quadrate; Sq, squamosal.

Andrade et al 2011

Tethysuchia

Clado propuesto para el nodo Pholidosauridae+Dyrosauridae (Buffetaut, 1982; Andrade et al 2011). De acuerdo a algunos análisis filogenéticos sería grupo hermano a Thalattosuchia.

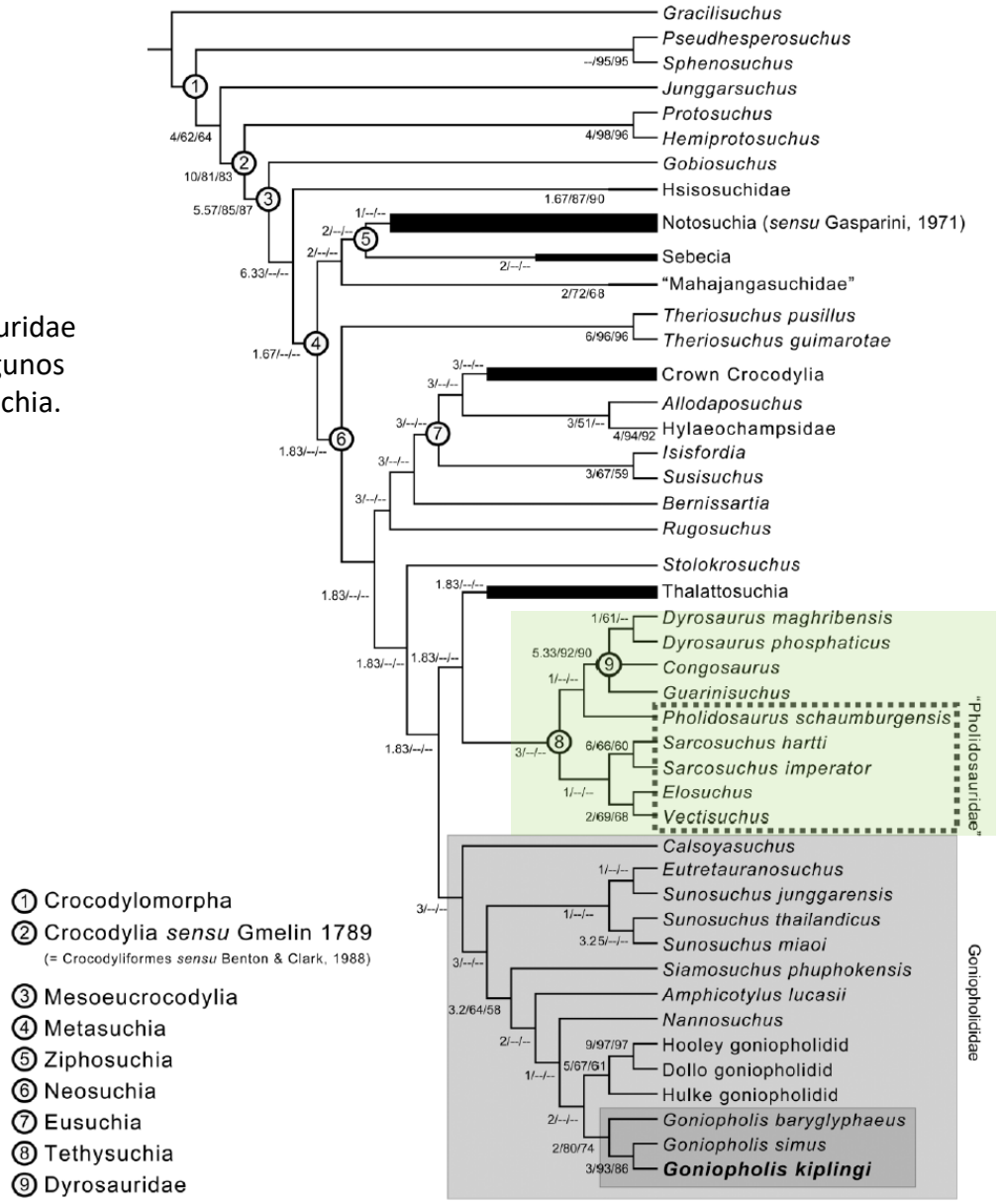


Figure 12. Phylogenetic analysis of Mesoeucrocodylia, with emphasis on Goniopholididae. The topology is the strict consensus of two trees, and major clades are summarized by thick lines (proportional to the number of specimens included in the analysis). The family Goniopholididae is indicated by the light grey box, whereas the genus *Goniopholis* is indicated by a dark grey box. Note that 'pholidosaurids' in their traditional sense are paraphyletic (dotted box), but *Sarcosuchus*, *Elosuchus*, and *Vectisuchus* constitute a monophyletic group (i.e. Elosuchidae). Nodal support is given for each node (Bremer decay/bootstrap/jackknife), but bootstrap and jackknife are only shown for values above 50%.

Andrade et al 2011

“Pholidosauridae”

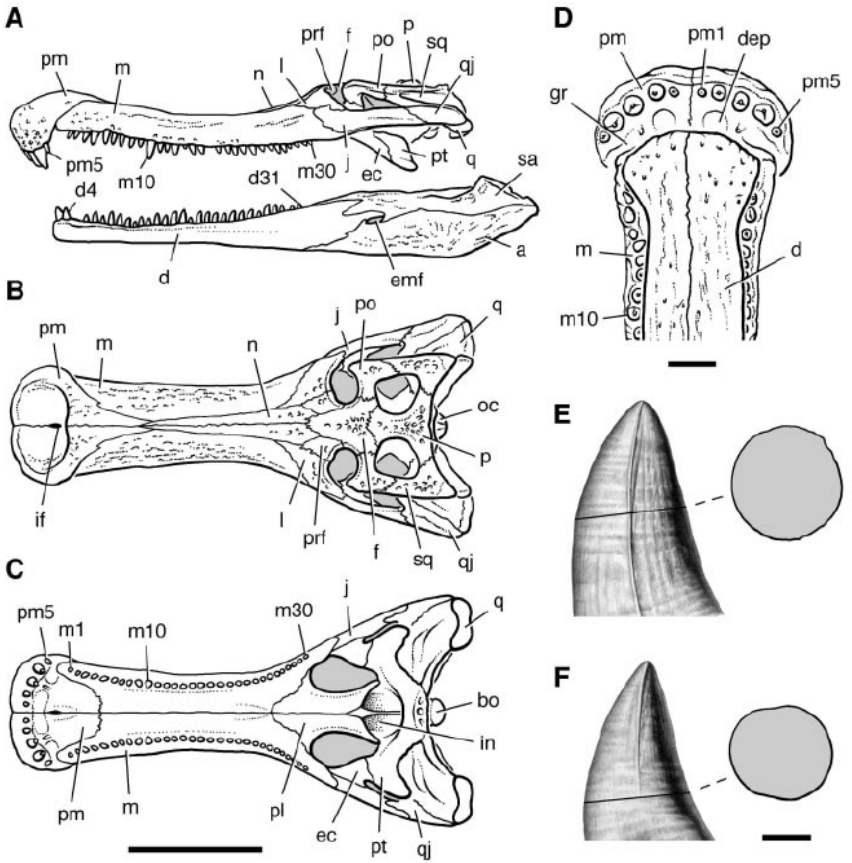
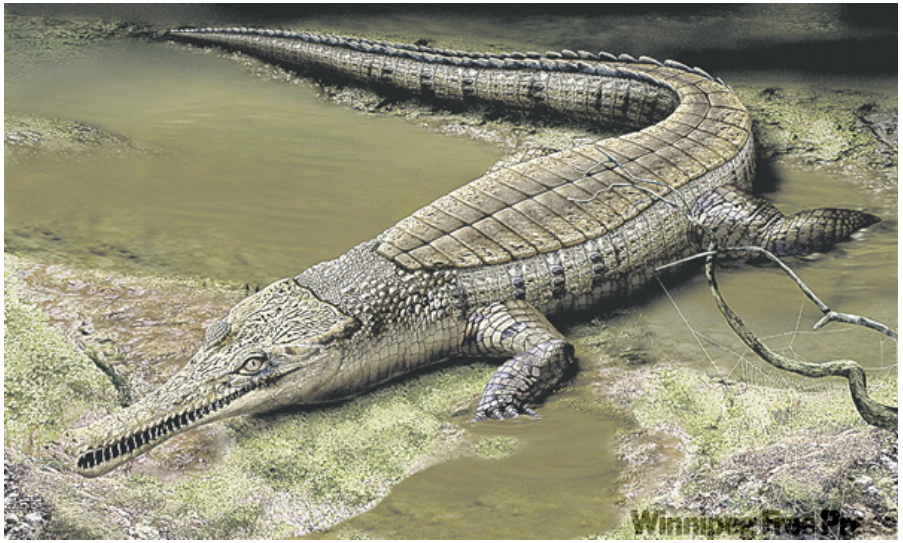


Fig. 2. Skull of *S. imperator* (MNN 604). (A) Skull and lower jaws in left lateral view. Cranium in (B) dorsal and (C) ventral views. (D) Anterior end of the jaws in ventral view. Right dentary tooth 4 (E) and 17 (F) in anterior and cross-sectional views. Scale bars: (A) to (C) 50 cm; (D), 10 cm; and (E) and (F), 1 cm. Abbreviations: 1-31, tooth number; a, angular; bo, basioccipital; d, dentary; dep, depression; ec, ectopterygoid; emf, external mandibular fenestra; f, frontal; gr, groove; if, incisive foramen; in, internal nares; j, jugal; l, lacrimal; m, maxilla; n, nasal; oc, occipital condyle; p, parietal; pl, palatine; pm, premaxilla; po, postorbital; prf, prefrontal; pt, pterygoid; q, quadrate; qj, quadratojugal; sa, surangular; sq, squamosal.

Sereno et al., 2001



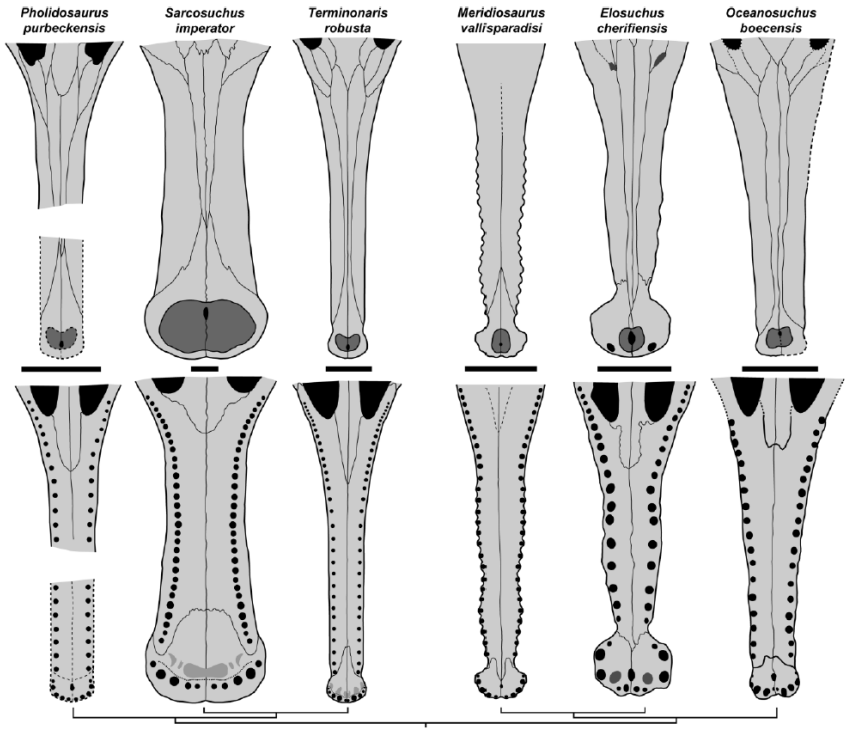


Figure 3. Pholidosaurids included in the phylogenetic analysis, and their relationships. Scale bars: 10 cm, except for *Meridiosaurus* (5 cm).

Fortier et al., 2011

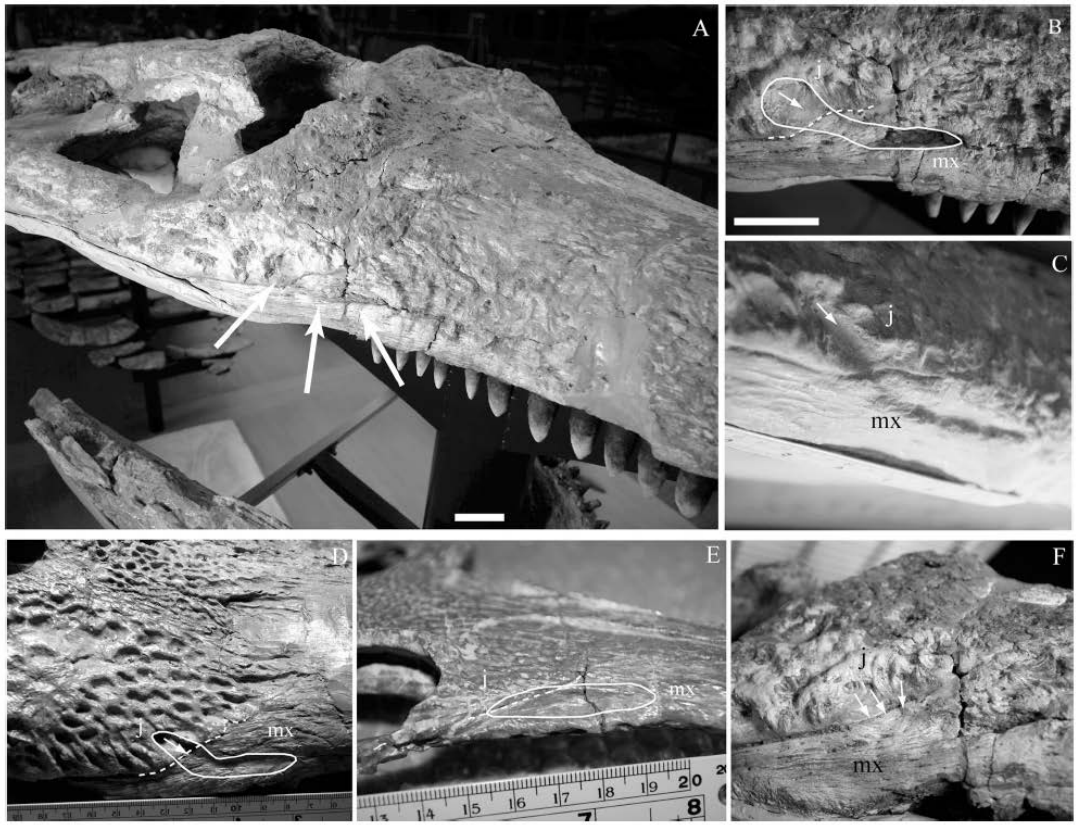
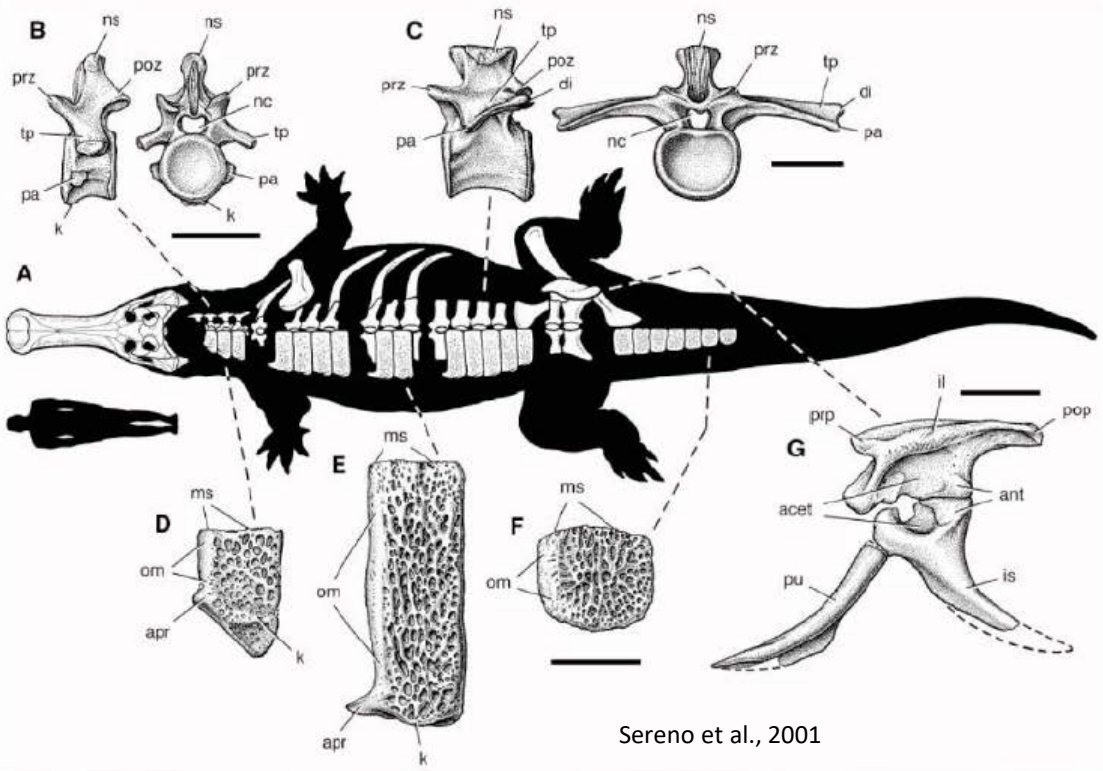


FIGURE 1. Comparative morphology of the maxillojugal depression among selected pholidosaurid specimens. **A**, right antorbital region of *Sarcosuchus imperator* (MNHN.F.GDF 662), scale bar equals 5 cm; **B**, detail of the maxillojugal area in the same specimen, scale bar equals 5 cm; **C**, left maxillojugal area of a MNHN cast (no number) of the holotype specimen of *Sarcosuchus imperator*; **D**, left maxillojugal area of *Elosuchus cherifiensis* (MNHN SAM129); **E**, right maxillojugal area of *Pholidosaurus* sp. from Cherves de Cognac (CHE03.100, Université Claude Bernard Lyon 1); **F**, right maxillojugal area of *Sarcosuchus imperator* (MNHN.F.GDF 662) from below. For ease of comparison, photographs in **C** and **D** have been reversed. When present, small arrows indicate the direction of exit of the jugal canal. **Abbreviations**: **j**, jugal; **mx**, maxilla.

Familia Pholidosauridae

Génereo ***Sarcosuchus***

-Desaparece la fenestra anterorbital



Sereno et al., 2001

Dyrosauridae

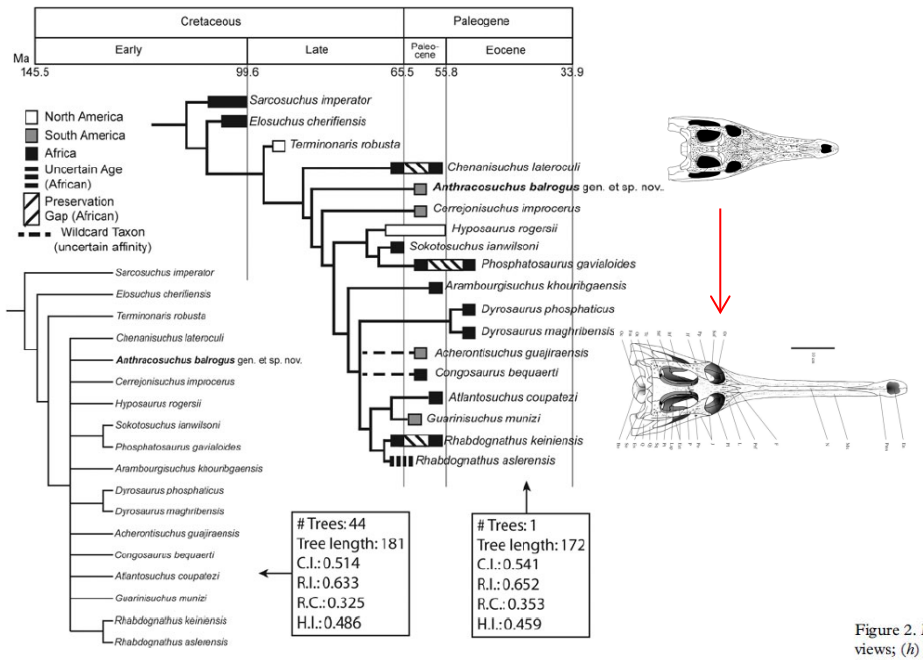


Figure 11. Cladograms resulting from a phylogenetic analysis of Dyrosauridae. Left cladogram is a strict consensus with all named species known from more than dentary fragments. Right cladogram represents a single cladogram resulting from analysis with the two wildcard taxa removed (*Acherontisuchus guajiraensis* and *Congosaurus bequaerti*). In the right cladogram, dotted lines for the wildcard taxa represent approximate placement based on cladistic analysis of Hastings et al. (2011). The right cladogram is placed in stratigraphic and geographic context. Dates were obtained from Gradstein et al. (2004). CI, consistency index; RI, retention index; RC, rescaled consistency index; HI, homplasy index.

Hastings et al., 2014

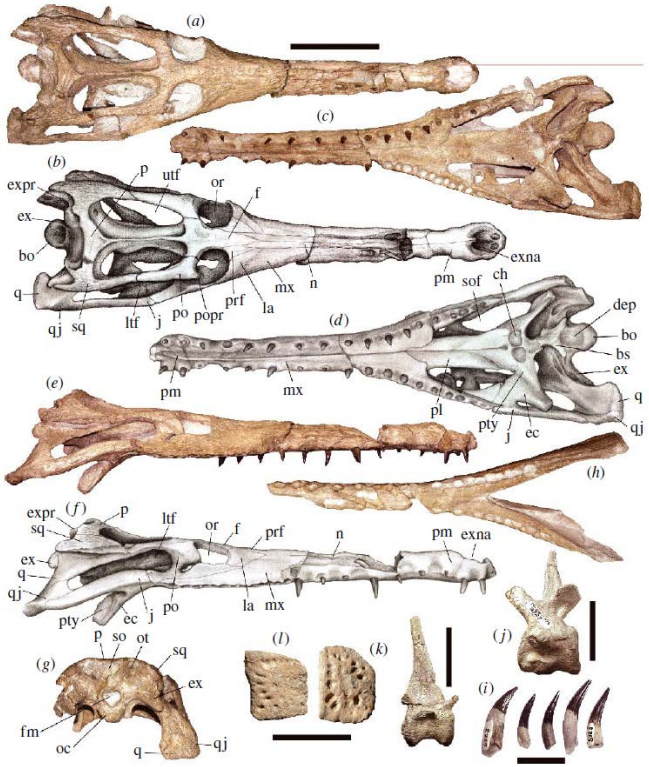


Figure 2. Material of *G. munizi* (DG-CTG-UFPE 5723). Skull in (*a*,*b*) dorsal, (*c*,*d*) ventral, (*e*,*f*) right lateral and (*g*) occipital views; (*h*) lower jaw in dorsal view; (*i*) isolated teeth in labial view; (*j*) cervical vertebra in right lateral view; (*k*) posterior caudal vertebra in right lateral view and (*l*) dermal scutes in dorsal view. Scale bars: (*a*)–(*h*) 10 cm, (*i*) 2 cm, (*j*,*k*) 5 cm, (*l*) 5 cm. bo, basioccipital; bs, basisphenoid; dep, depression; ch, choanae; ec, ectopterygoid; ex, exoccipital; exna, external narina; expr, exoccipital processes; f, frontal; fm, foramen magnum; j, jugal; la, lacrymal; ltf, lower temporal fenestra; mx, maxilla; n, nasal; oc, occipital condyle; or, orbit; ot, occipital tuberosity; p, parietal; pl, palatine; pm, premaxilla; po, postorbital; popr, postorbital process; prf, prefrontal; pty, pterygoid; q, quadrate; qj, quadratojugal; so, supraoccipital; sof, suborbital fenestra; sq, squamosal; utf, upper temporal fenestra.

Barbosa et al., 2008

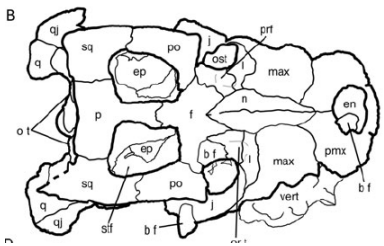


Figure 2. (Colour online) Holotype (UF/IGM 67) of *Anthracosuchus balrogus* gen. et **sp. nov.** from Cerrejón locality in northeastern Colombia, middle-late Palaeocene: (A, B) in dorsal view, (C, D) in ventral view and (C) insert displays an *in situ* tooth in lingual and anterior views; scale bar: 1 cm. bf, bone fragment; bo, basioccipital; bsp, basisphenoid; en, external nares; eo, exoccipital; ep, ectopterygoid; f, frontal; j, jugal; l, lacrimal; max, maxilla; m1, 4, 5 and 8, maxillary teeth/alveoli; n, nasal; or t, orbital tuberosity; ost, osteoderm (displaced); o t, occipital tuberosities; p, parietal; pal, palatine; pm2–4, premaxillary teeth/alveoli; pmx, premaxilla; po, postorbital; prf, prefrontal; pt, pterygoid; q, quadrate; qj, quadratojugal; sq, squamosal; stf, supratemporal fenestra; vert, vertebra (displaced). Scale bar: 10 cm.

Hastings et al 2014

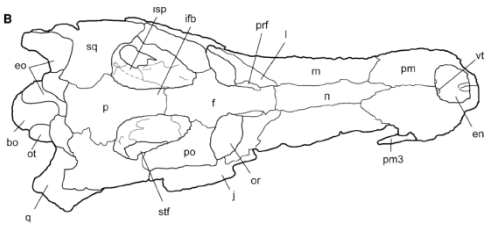


FIGURE 3. Skull of *Cerrejinosuchus improcerus*, UF/IGM 29, from the Cerrejón coal mine of northeastern Colombia, middle–late Paleocene, in dorsal view. **A**, photograph; **B**, sketch. **Abbreviations**: **bo**, basioccipital; **en**, external nares; **eo**, exoccipital; **f**, frontal; **ifb**, interfenestral bar; **j**, jugal; **l**, lacrimal; **lsp**, laterosphenoid; **m**, maxilla; **n**, nasal; **or**, orbit; **ot**, occipital tuberosity; **p**, parietal; **pm3**, third premaxillary tooth; **pm**, premaxilla; **po**, postorbital; **prf**, prefrontal; **q**, quadrate; **sq**, squamosal; **stf**, supratemporal fenestra; **vt**, ventral tubercle. Dotted line represents a suture which was not clear. Scale bar equals 10 cm.

Hastings et al 2010

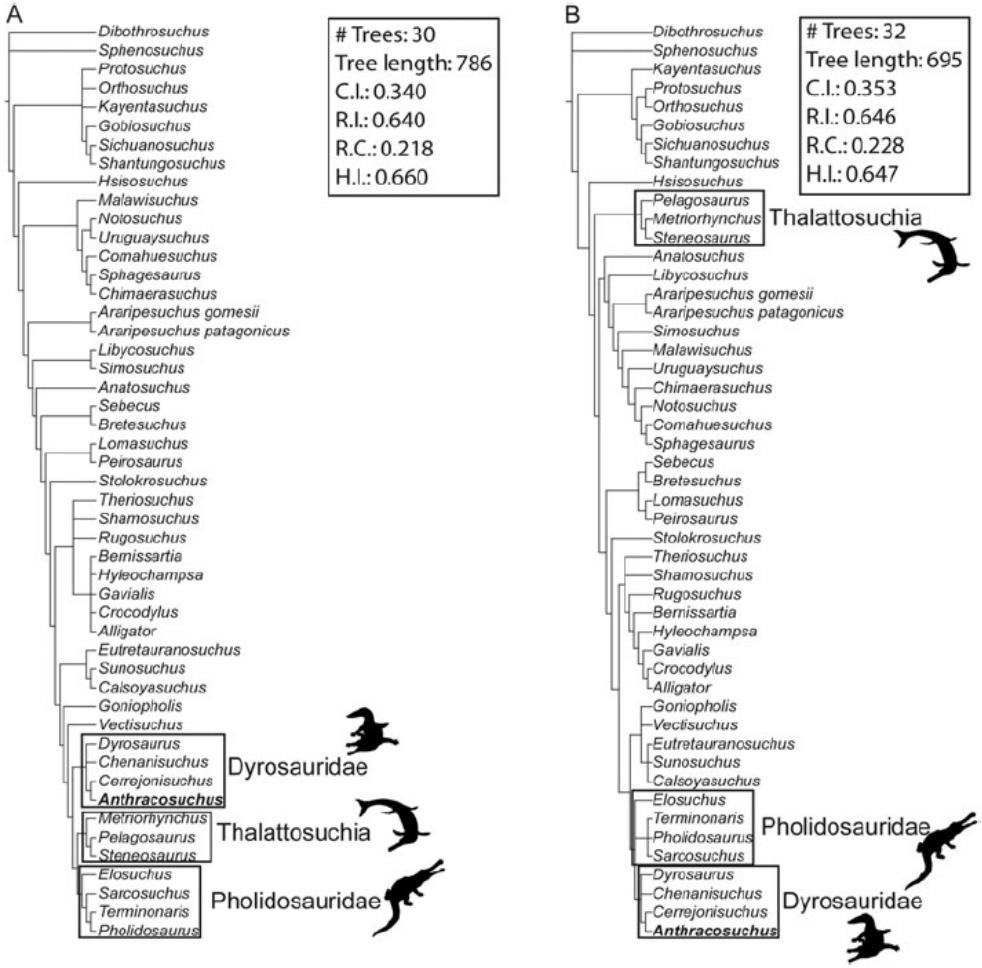


Figure 12. Two cladograms from analyses utilising a matrix with representatives across Crocodylomorpha. (A) Strict consensus cladogram resulting from analysis using all 234 characters of Jouve et al. (2006). (B) Strict consensus cladogram resulting from analysis that omitted the 15 characters associated with longirostry. Note the very different placement of Thalattosuchia with respect to Dyrosauridae in the two analyses. CI, consistency index; RI, retention index; RC, rescaled consistency index; HI, homplasy index.

Paralligatoridae

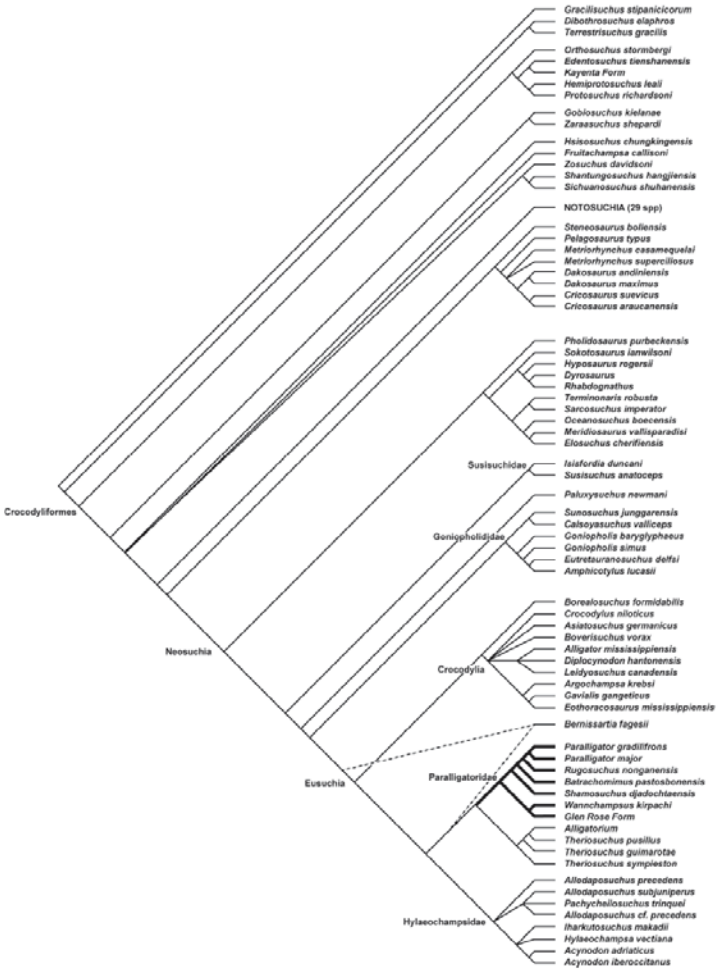


Fig 14. Reduced strict consensus of 108 equally optimal trees recovered from maximum parsimony analysis of 101 ingroup taxa and 318 phenotypic characters. Trees rooted on *Gracilisuchus stipanicicorum*. Two equally optimal positions of *Bernissartia fagesii* shown with dotted line (length = 1662, CI = 0.239, RI = 0.700).

doi:10.1371/journal.pone.0118116.g014

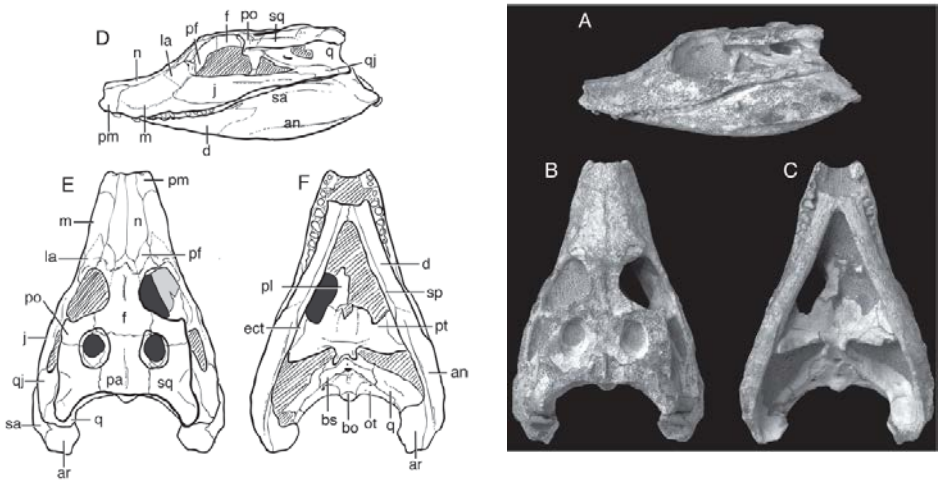


Fig 3. IGM 100/1195, *Shamosuchus djadochtaensis*, Djadokhta Fm., Campanian, Mongolia. Photographs in **A**, lateral, **B**, dorsal, **C**, ventral views. Line drawings in **D**, lateral, **E**, dorsal, **F**, ventral views. Abbreviations: an, angular; ar, articular; bo, basioccipital; bs, basisphenoid; d, dentary; ect, ectopterygoid; f, frontal; j, jugal; la, lacrimal; m, maxilla; n, nasal; ot, otoccipital; pa, parietal; pf, prefrontal; pl, palatine; pm, premaxilla; po, postorbital; pt, pterygoid; q, quadrate; qj, quadratojugal; sa, surangular; sp, splenial; sq, squamosal.

doi:10.1371/journal.pone.0118116.g003

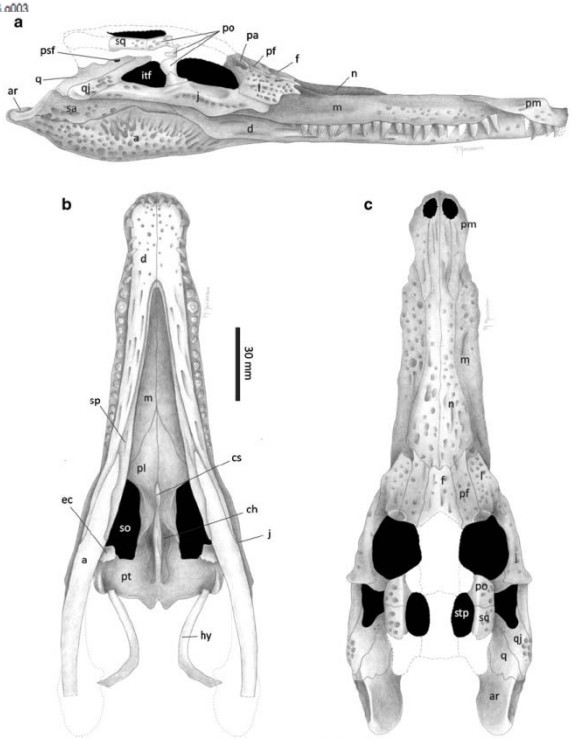


Fig. 2 *B. pastosbonensis* (LPRP/USP-0617). Reconstruction of the holotypic skull (mirrored from the preserved parts on both sides) in a right lateral, **b** ventral, and **c** dorsal views. *a* angular, *ar* articular, *ch* choanal aperture, *cs* choanal septum, *d* dentary, *ec* ectopterygoid, *f* frontal, *j* jugal, *hy* hyoid, *itf* infratemporal fenestra, *l* lacrimal, *m* maxilla, *n* nasal, *pa* palpebral articulation, *pf* prefrontal, *pl* palatine, *pm* premaxilla, *po* postorbital, *psf* preotic siphoneal foramen, *pt* pterygoid, *q* quadrate, *qj* quadrate-jugal, *sa* surangular, *so* suborbital fenestra, *sp* splenial, *sq* squamosal, *stf* supratemporal fenestra

Atoposauridae

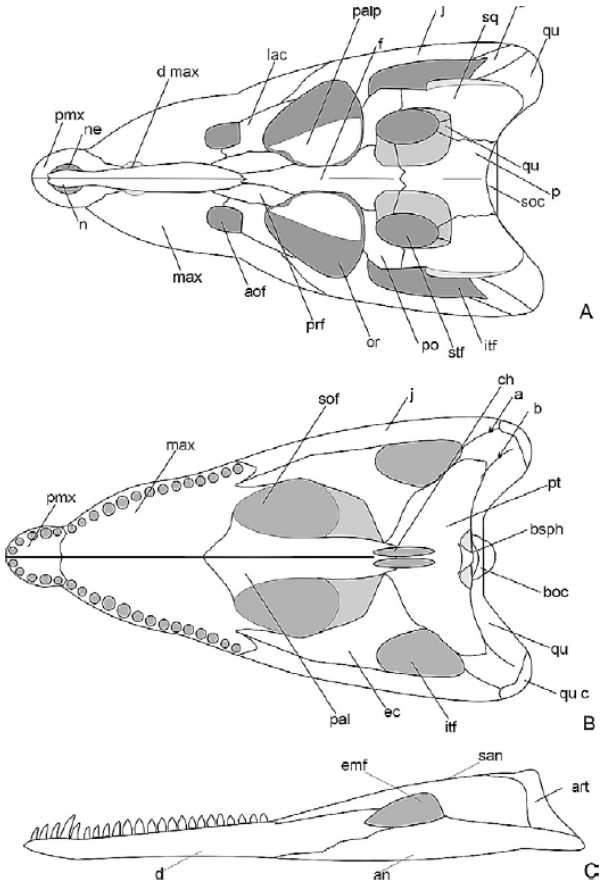
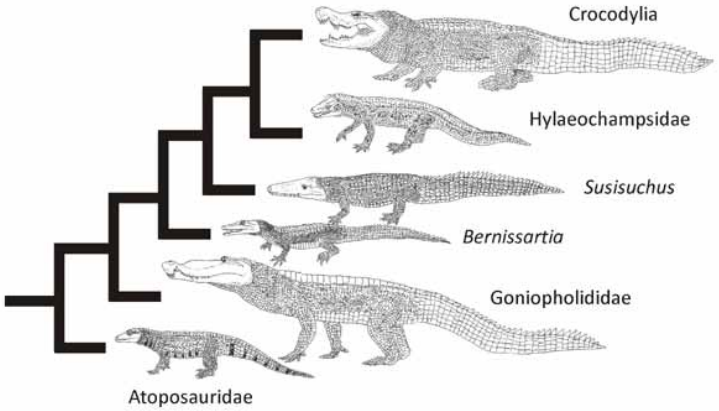


Fig. 5. Schematic reconstruction of the skull of *T. guimarotae* **A**) in dorsal view, **B**) in ventral view, **C**) schematic reconstruction of the left mandibular ramus of *T. guimarotae* in left lateral view. Abbreviations additional to those listed in Figs. 3 and 4: a, crest a of the quadrate; art, articular; b, crest b of the quadrate; boc, basioccipital; bsph, basisphenoid; pal, palatine; qu c mandibular condyle of the quadrate; sof, suborbital fenestra.



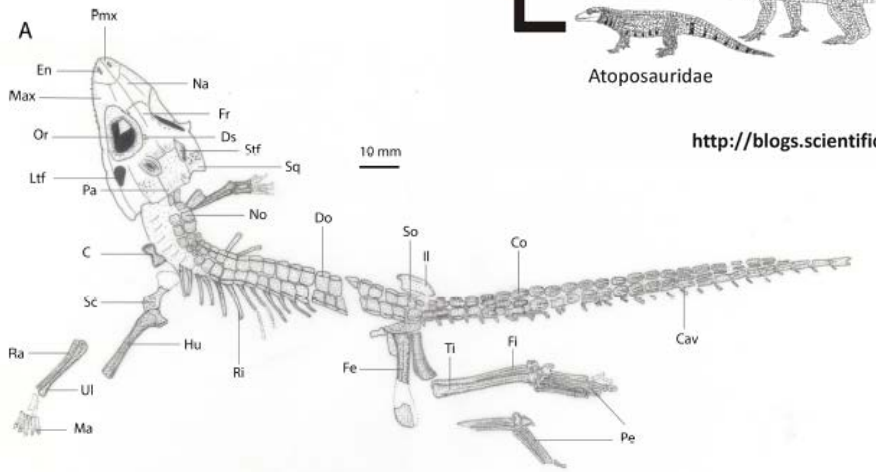
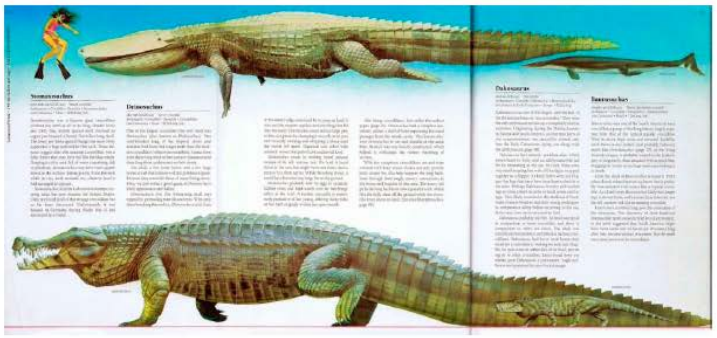


Figure 3 (A) Line drawing of holotype specimen of *Alligatorellus beaumonti* (MNHN 15639) in dorsolateral view; (B) photograph of holotype specimen.

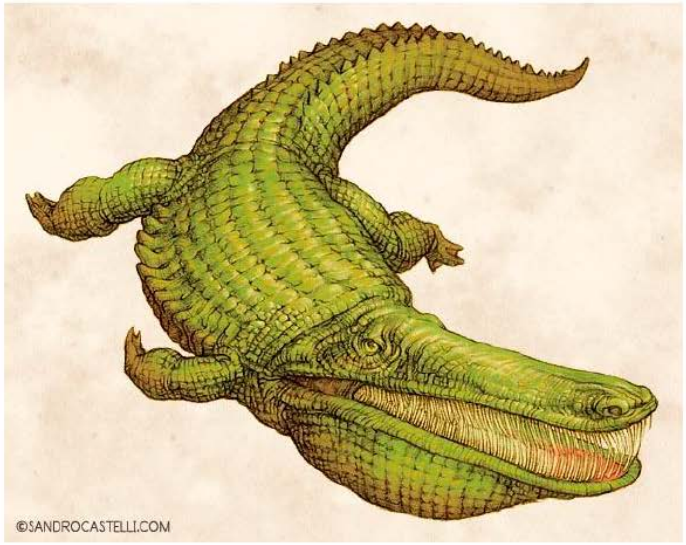
Eusuchia

Definición: Clado conformado por *Isisfordia duncani* y *Crocodyus niloticus*, su ancestro común más reciente y todos sus descendientes (aunque en términos prácticos aún es considerado un nodo basado en apomorfía).
Rango Temporal: Cretácico inferior– Presente.



Sinapomorfías:

- Vértebras cervicales, torácicas y lumbares procélicas.
- Vértebra caudall con cóndilo sbre extremo terminal del cuerpo vertebral y resto de vértebras caudales con procelia decreciente.
- Coana interna completamente rodeada por pterigoides.
- Osteodermos paravertebrales segmentados.



Stomatosuchus

Deinosuchus

Isisfordia duncani y la transición hacia los cocodrilos modernos

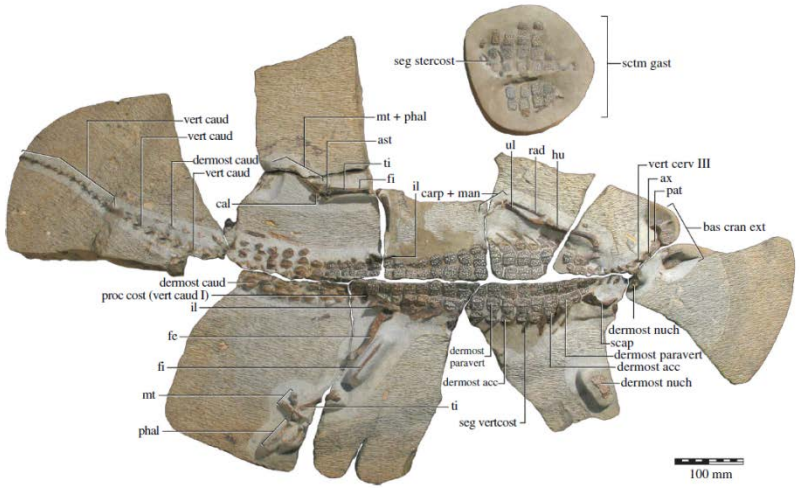
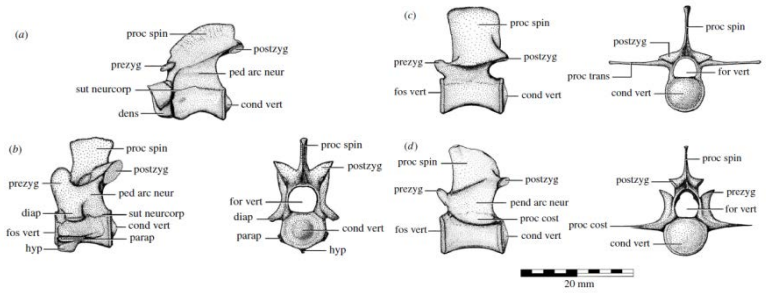
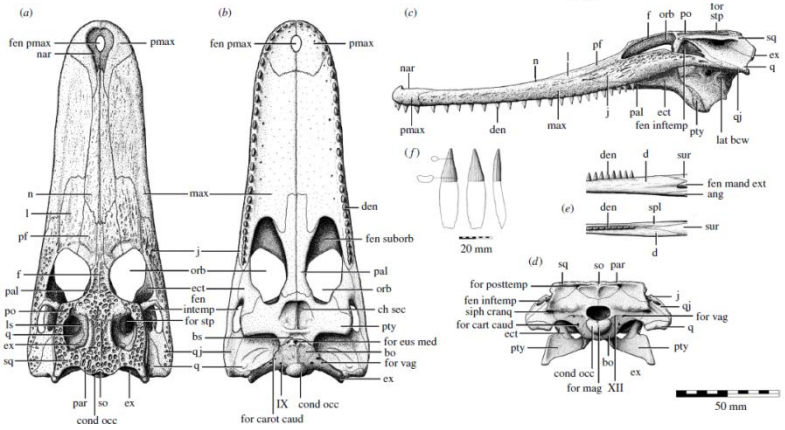
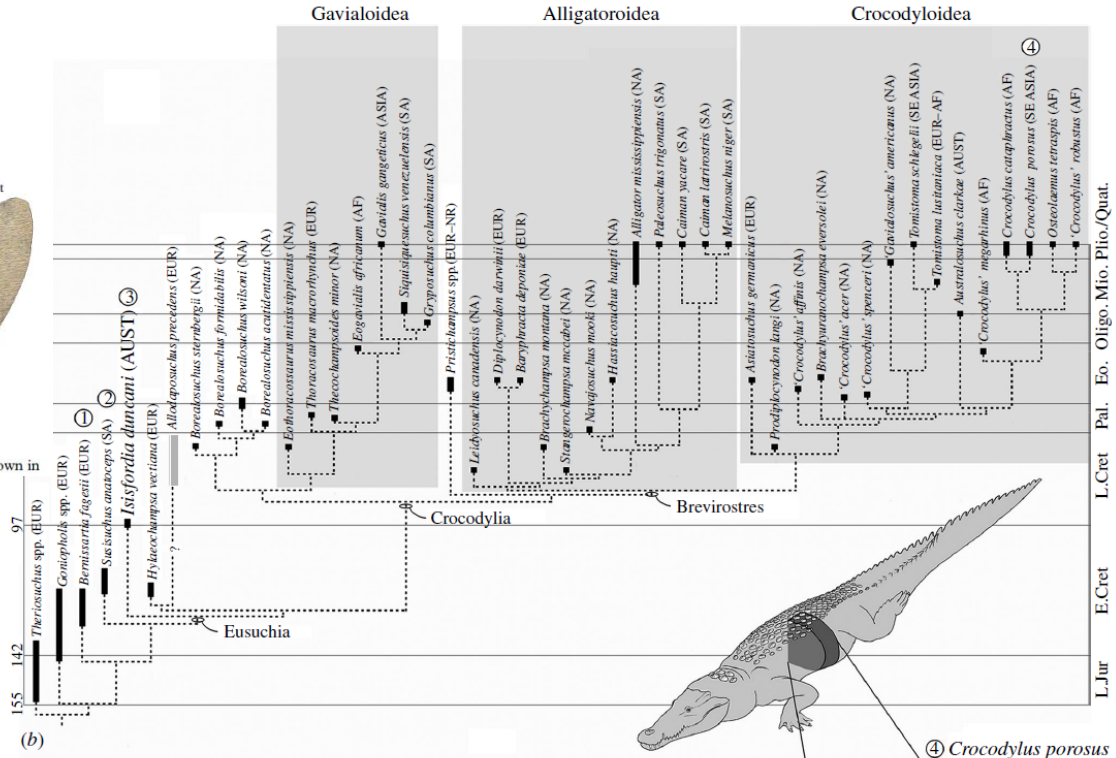


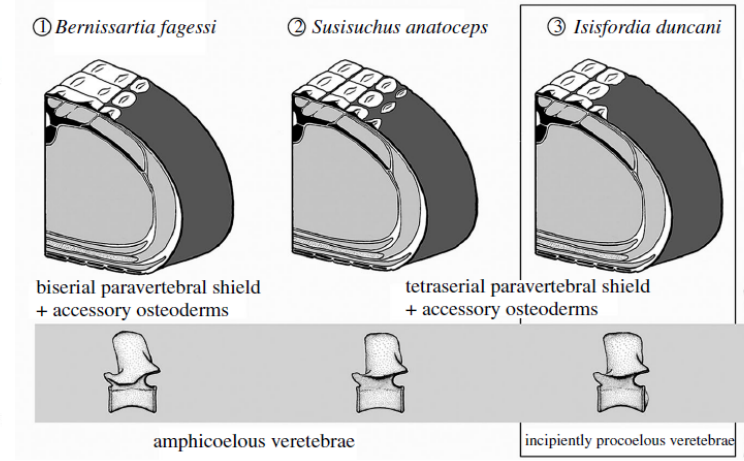
Figure 2. Skeleton of *Isisfordia duncani* gen. et sp. nov. (QM F36211, holotype) in dorsal aspect. The gastral shield is shown in

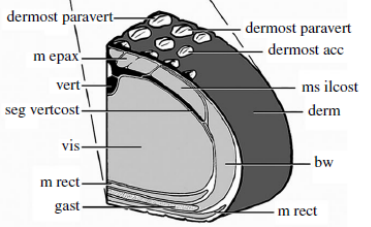






④ *Crocodylus porosus*





Susisuchus anatocepts y el paladar eusuquio

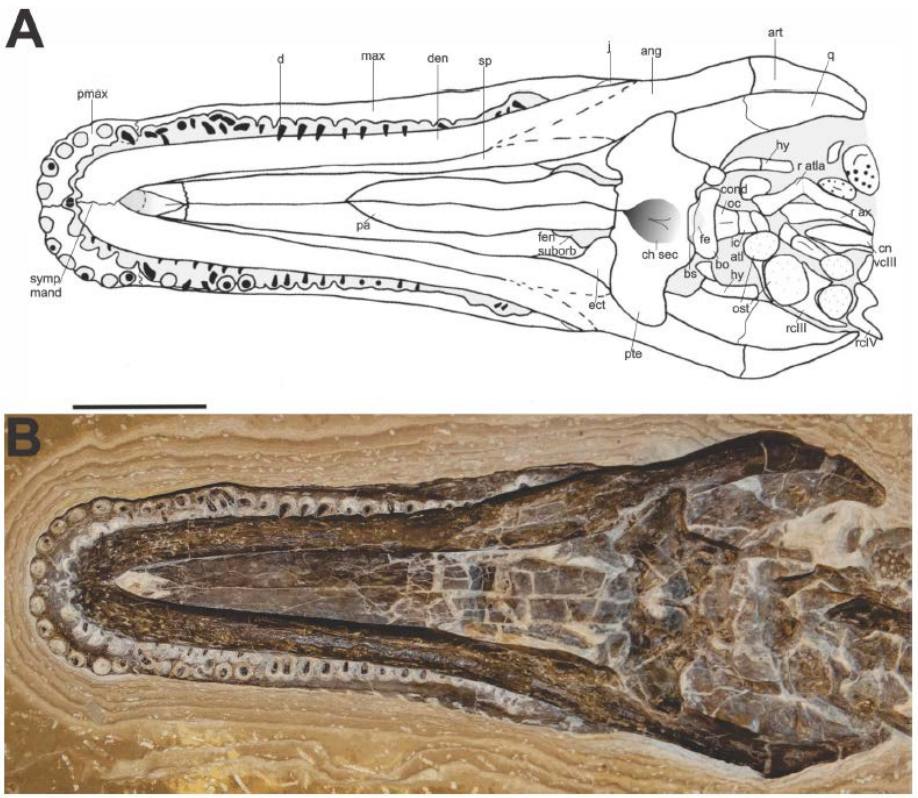


Figure 2 **Specimen skull *Susisuchus anatoceps* (FPH-243-V) ventral view exhibit the secondary palate.** Schematic diagram (A) and photograph (B). Abbreviations: ang, angular; art, articular; bo, basioccipital; bs, basisphenoid; ch sec, secondary choanae; cn vcIII, centrum cervical vertebrae III; cond oc, occipital condyle; d, dentary; den, tooth; ect, ectopterygoid; fen suborb, suborbital fenestra; fe, eustachian foramen; hy, hyoid; ic atl, atlas intercentrum; j, jugal; max, maxila; ost, osteoderm; pa, palatine; pmax, premaxilla; pte, pterygoid; q, quadrate; r atl, ribs atlas; r ax, ribs axis; r cIII, ribs cervical III; r cIV, ribs cervical IV; sp, splenial; symp mand, mandibular symphysis. Scale 2 cm. Photograph and schematic diagram credit Karla J. Leite.

Full-size DOI: 10.7717/peerj.5372/fig-2

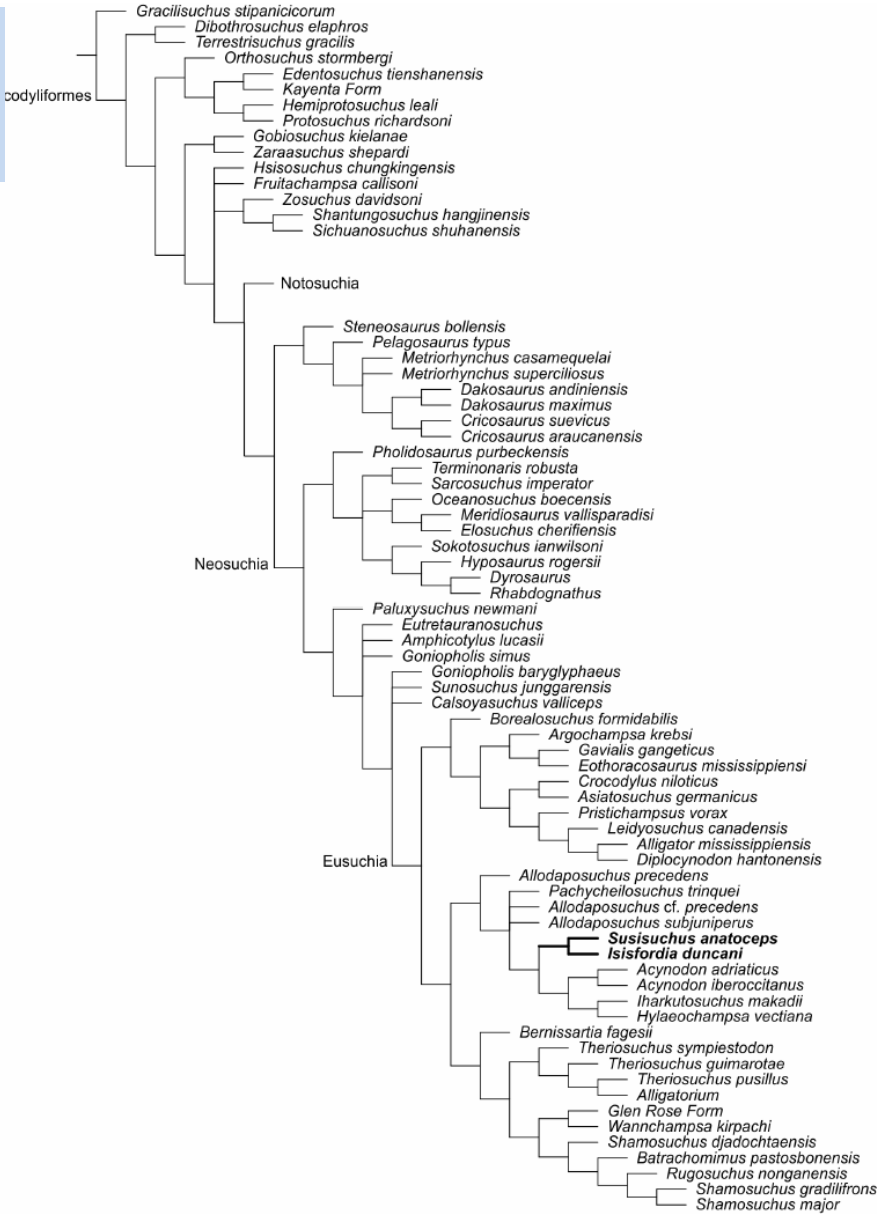


Figure 4 **Strict consensus of the second analysis in the matrix of *Turner & Pritchard (2015)* adding FPH-243-V and encoded characters for the holotype.** The new position of the susisuchids between Eusuchia (Bold).

Full-size DOI: 10.7717/peerj.5372/fig-4

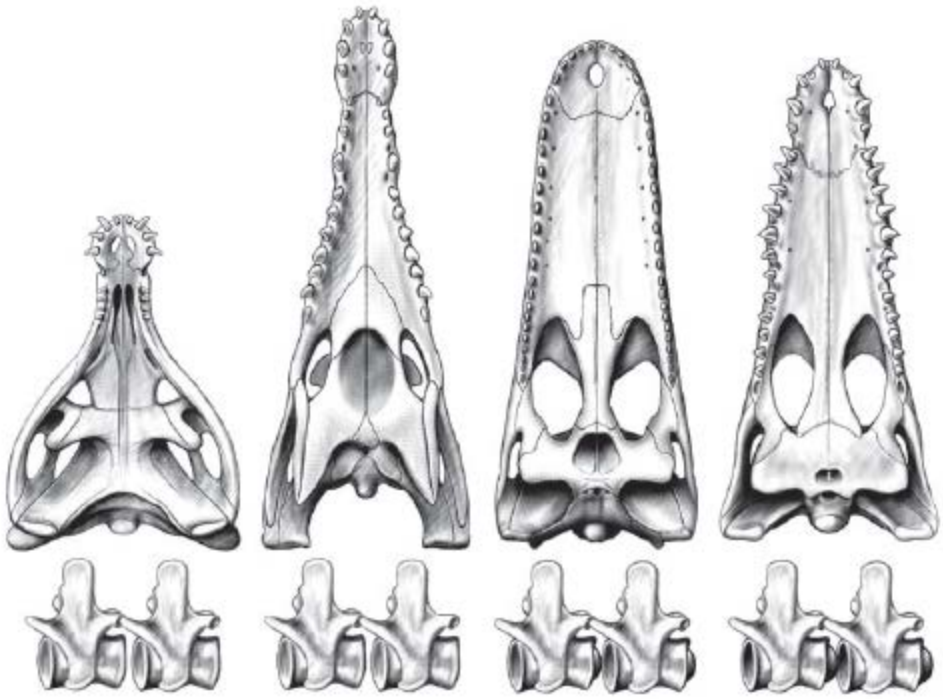


Fig. 2.29. *Rearward movement of the internal nares and evolution of procoelus vertebrae. Eusuchians have 'ball and socket' joints between the vertebrae, conferring more spinal flexibility. Earlier crocodile-like reptiles had vertebrae with flatter ends (the anterior of vertebrae is on the left).*

Crocodylia

Definición: Clado menos inclusivo que contiene a *Crocodylus niloticus, Gavialis gangeticus* y *Alligator mississippiensis*.

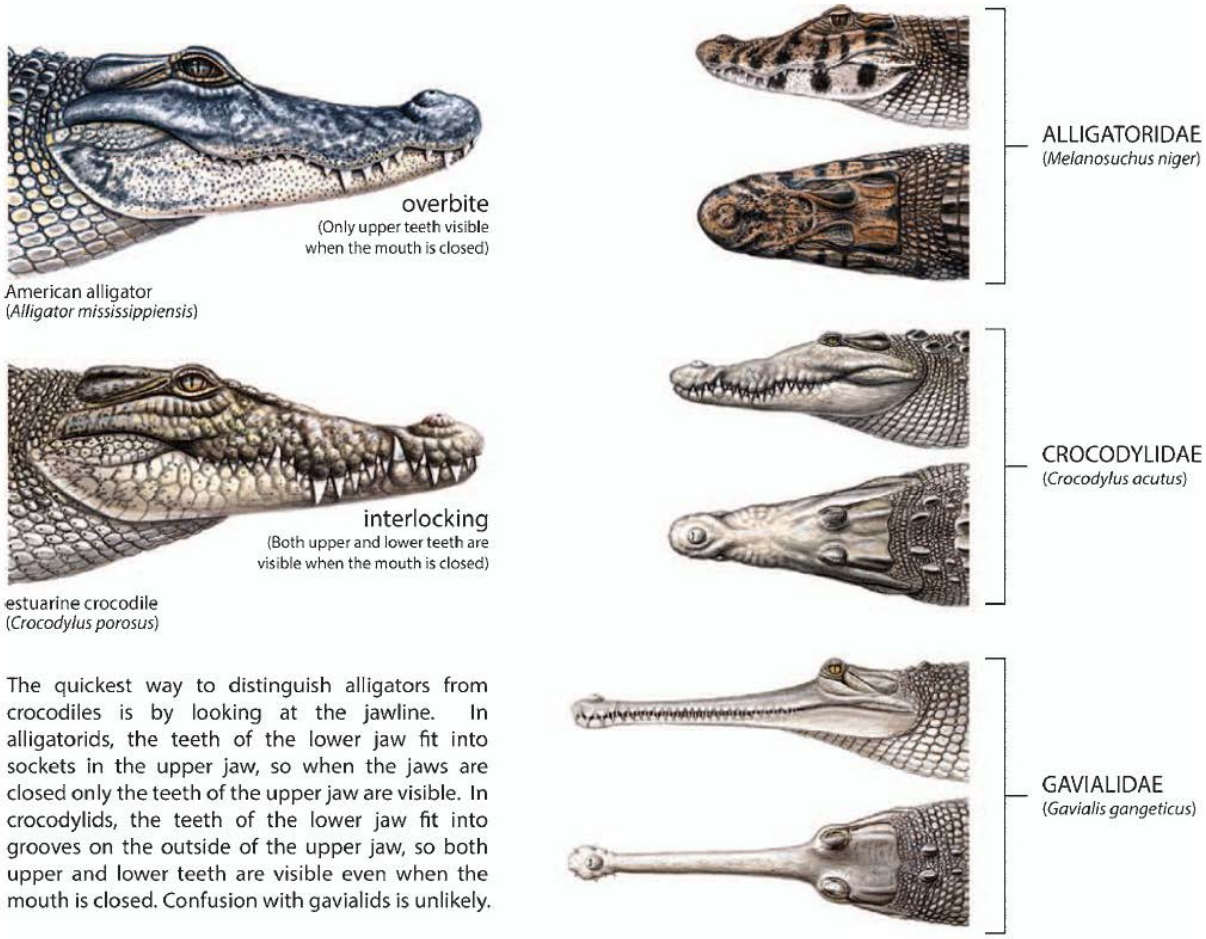


Fig. 1.3. *Head shapes and dentition in 'typical' examples of the three families of living Crocodylia (dorsal and side views). (Top to bottom)* Melanosuchus niger *(Alligatoridae),* Crocodylus acutus *(Crocodylidae) and* Gavialis gangeticus *(Gavialidae).* (Illustrations DSK, courtesy Weldon Owen Publishing)

Posición filogenética de Gavialidae y *Tomistoma*

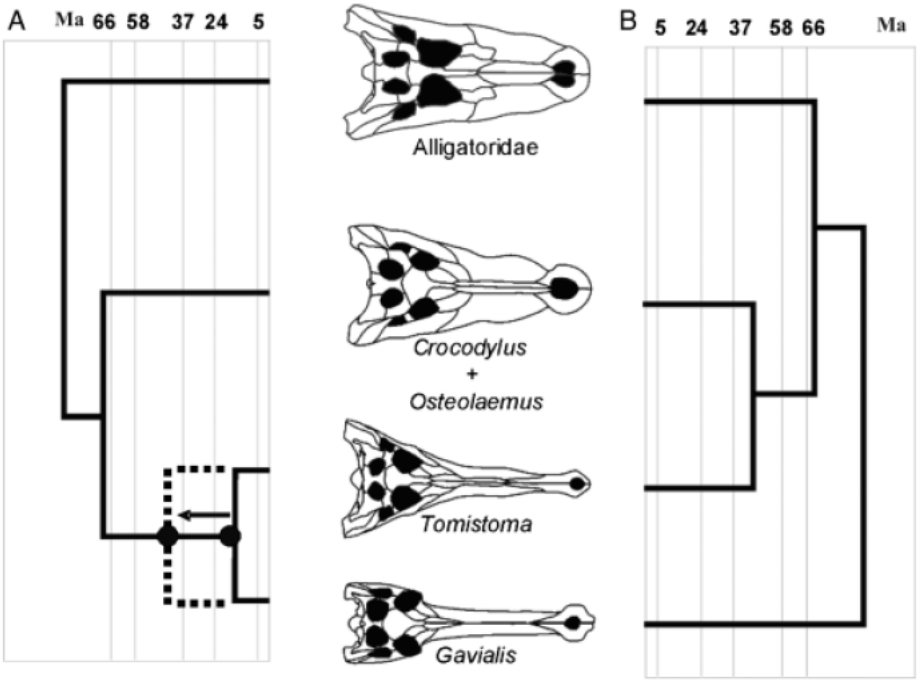
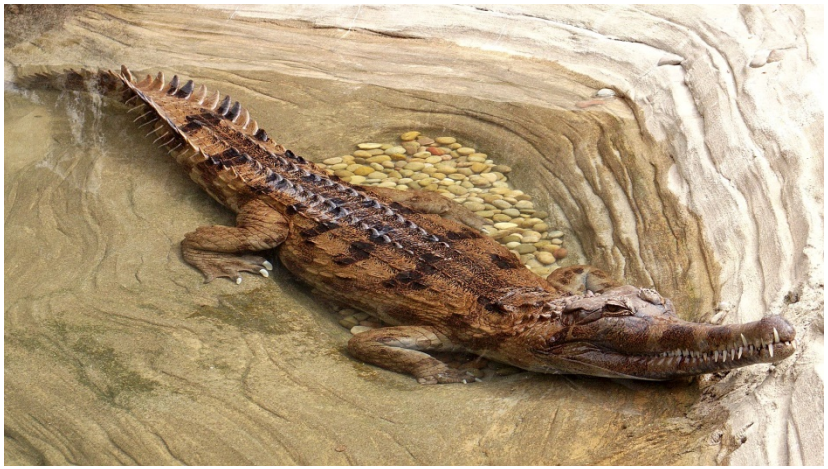


Fig. 1. Competing hypotheses about phylogenetic relationships for *Gavialis* and *Tomistoma*. (A) Molecular topology; dashed line indicates the oldest split proposed by a molecular study (Janke et al. 2006); (B) morphological/paleontological topology. From Brochu (2003), redrawn.



Posición filogenética de Gavialidae y *Tomistoma*

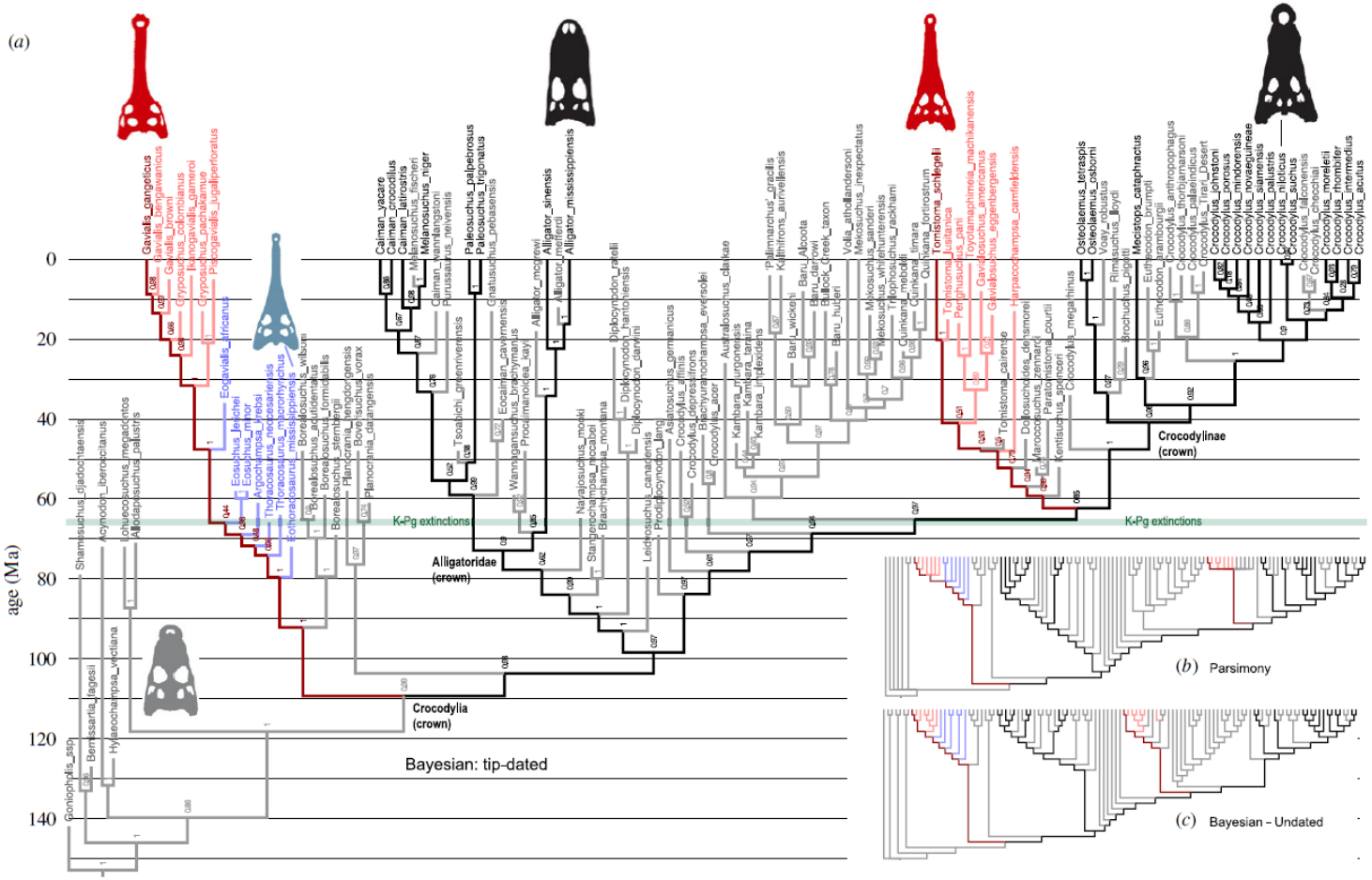


Figure 1. Morphology-only phylogeny of crocodilians based on (*a*) tip-dated Bayesian, (*b*) parsimony and (*c*) undated Bayesian approaches. All methods yield similar trees, in which *Gavialis* is sister to all other living crocodilians, which is strongly contradicted by molecular and combined analyses. The long-snounted, ancient thoracosaurs are always robustly placed on the lineage leading to *Gavialis*. Dark fonts and branches denote living taxa; lighter fonts and branches denote extinct taxa. Living gharials (*Gavialis* and *Tomistoma*) are dark red, fossil crown gharials (figure 2) are light pink; thoracosaurs are light blue. Numbers in (*a*) refer to clade posterior probabilities; see [8, figures S1–S3] for detailed versions.

Posición filogenética de Gavialidae y *Tomistoma*

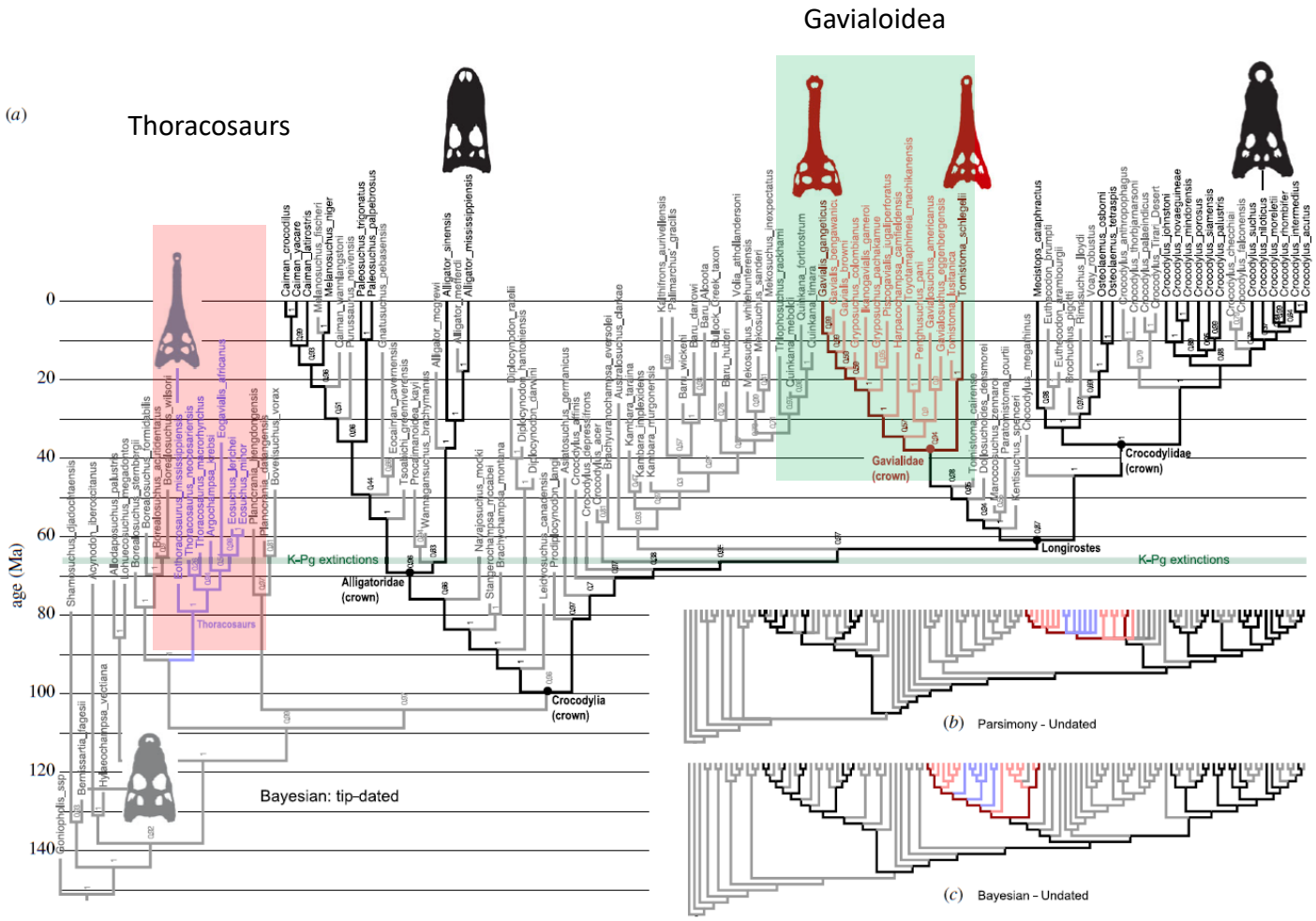


Figure 2. DNA + morphology phylogeny of crocodilians based on (*a*) tip-dated Bayesian, (*b*) parsimony and (*c*) undated Bayesian approaches. All methods unite living gharials (*Gavialis* + *Tomistoma*); however, tip-dating robustly places the long-snounted, ancient thoracosaurs as basal forms outside all living taxa, while parsimony and undated Bayesian analyses place them robustly within the gharial clade. Dark fonts and branches denote living taxa; lighter fonts and branches denote extinct taxa. Living gharials (*Gavialis* and *Tomistoma*) are dark red, fossil crown gharials (as identified in Fig. 2a) are light pink; thoracosaurs are light blue. Numbers in (*a*) refer to clade posterior probabilities; see [8, figures S4–S6] for detailed versions.

Gavialoidea

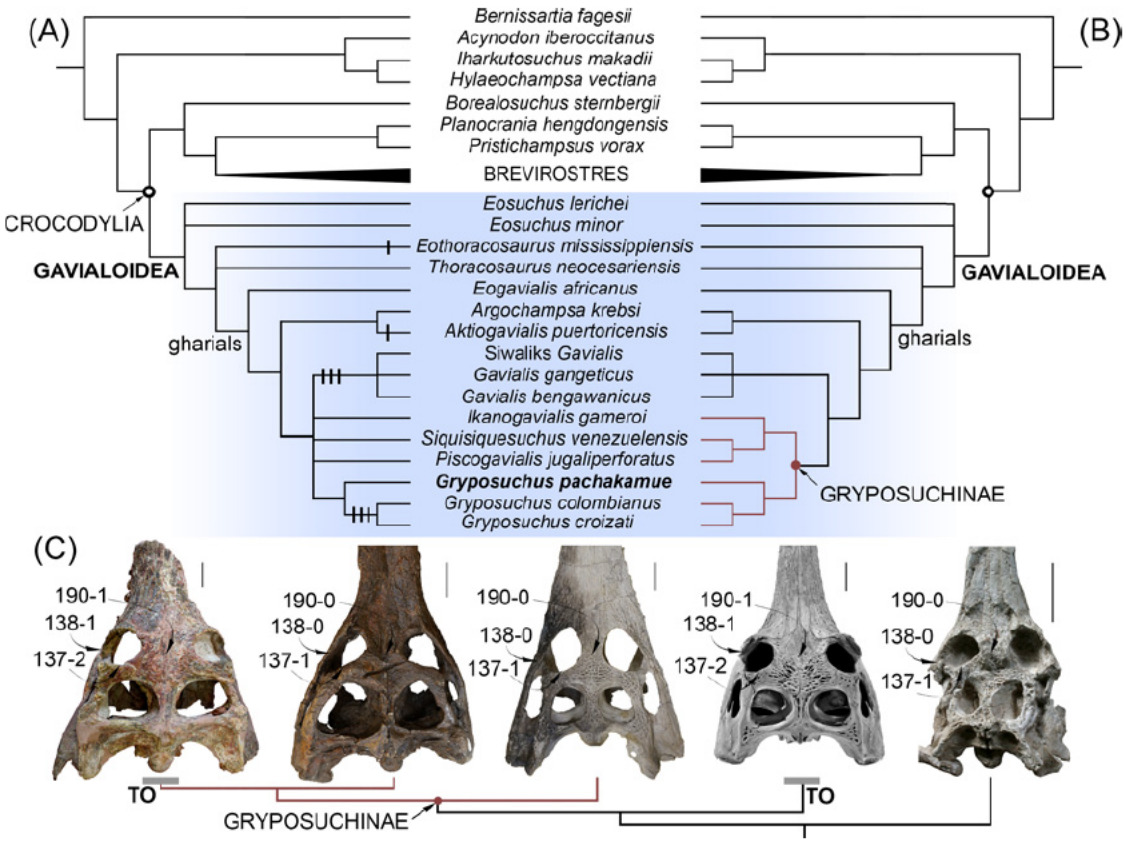


Fig 7. Phylogenetic position of *Gryposuchus pachakamue* within crocodylians. (A) Strict consensus cladogram of 45 most parsimonious trees based on parsimony analysis of the complete data matrix (S1 Appendix). Apomorphic character states associated with a "telescoped" orbit condition are plotted on the cladogram as black lines (i.e., 137–2, 138–1, and 190–1). (B) Strict consensus cladogram of 24 optimal trees in a second parsimony analysis performed after removing character state 137–2 and character 138 from the data matrix (S2 Fig). (C) Parallel acquisition of a fully "telescoped" orbit condition (TO) in advanced South American *Gryposuchus* and Indian *Gavialis*. Selected character states of the circumorbital region are indicated with arrows. From left to right: *Gryposuchus colombianus* (IGM 184696), *Gryposuchus pachakamue* (MUSM 900), *Piscogavialis jugaliperforatus* (SMNK 1282 PAL), *Gavialis gangeticus* (MNHN A5321), and *Argochampsa krebsi* (OCP DEK-GE 333). Scale bars, 5 cm.

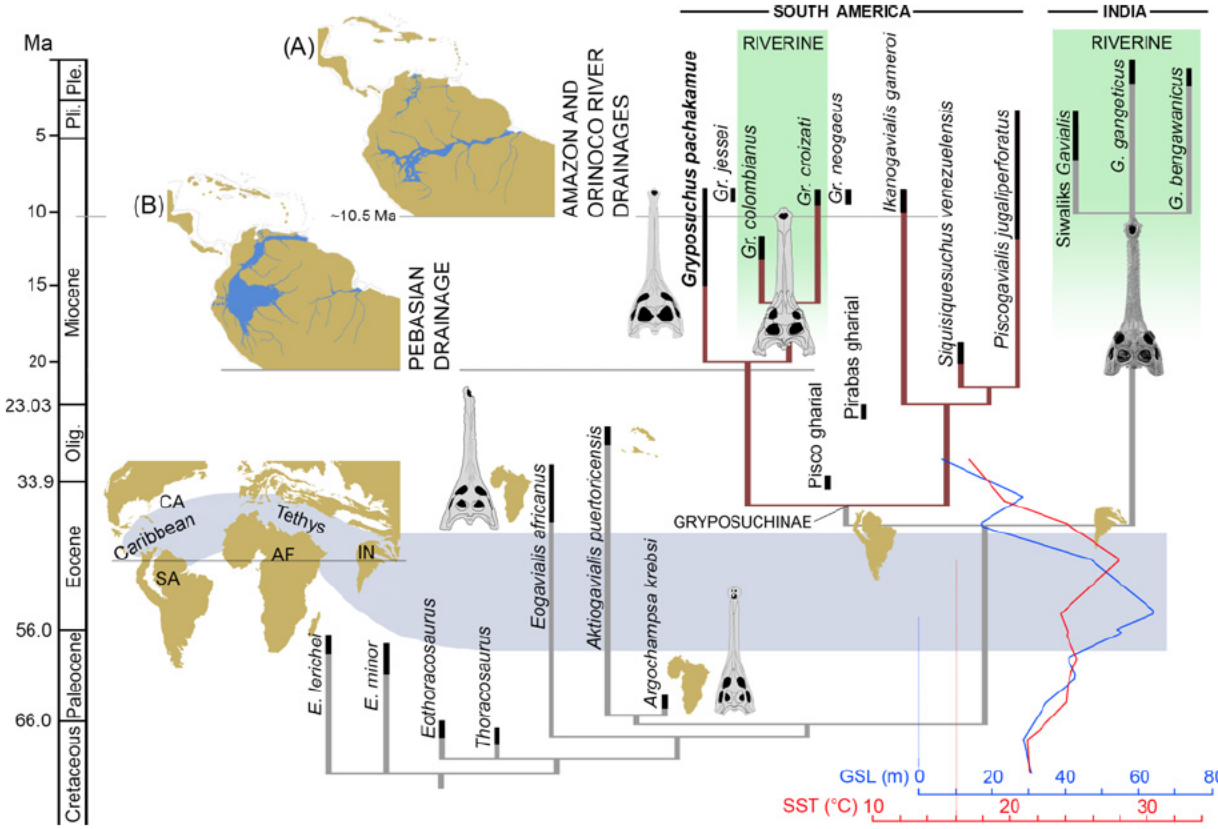


Fig 9. Time calibrated phylogenetic tree of the Gavialoidea and relevant paleogeographic distributions associated with the evolution and diversification of gavialoids in marine and freshwater settings. During the Late Paleocene-Early Eocene interval, peaks of sea surface temperature (SST) and global sea surface level (GSL) occurred together with tropical marine connections through the Tethys Ocean and Caribbean Sea [59,60]. During the Neogene, distinct biomes dominated tropical South America: (A) Acre Phase, after the onset of the eastern-draining Amazon and northward-draining Orinoco river systems; and (B) Pebas Mega-Wetland System, with its drainage northward to the Caribbean Sea. Abbreviations: Olig., Oligocene; Ple., Pleistocene; Pli., Pliocene. Global and South American schematic paleogeography adapted from Blakey [60] and Hoorn et al. [61], respectively.

Crocodyliformes en Chile: Caldera, Formación Bahía Inglesa (Mioceno medio – Plioceno)

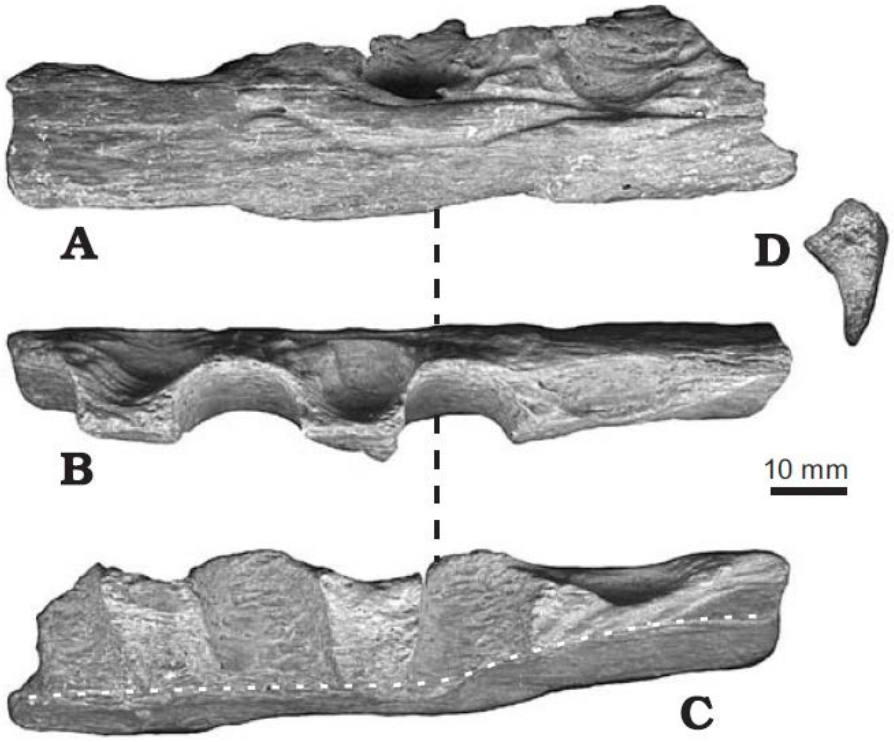


Fig. 2. Indeterminate crocodilian right dentary fragment (SGO-PV 834, Bahía Inglesa, Chile, late Miocene) in lateral (**A**), occlusal (**B**), medial (**C**), and caudal (**D**) aspects. Dashed line in white (in C) indicates position of Meckel's groove.

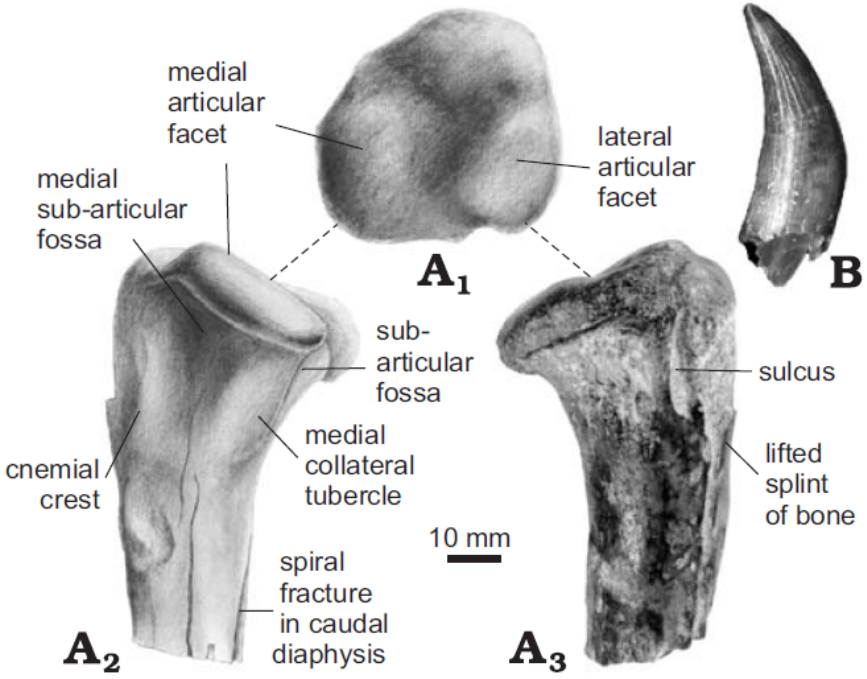


Fig. 3. **A**. Indeterminate crocodilian right tibia (SGO-PV-833, Bahía Inglesa, Chile, late Miocene) in proximal (A_1), medial (A_2), and lateral (A_3) aspects. Note the spiral fractures in A_2 and A_3. Such fractures involve torsional stress and indicate that the bone was fresh when the fracture occurred (see Lyman 1994 for a review of spiral fracture aetiology). Since impact during wave action or burial compaction seem unlikely to have caused the fracture, it may be direct evidence for predation or scavenging by other crocodyliforms. **B**. Indeterminate crocodilian tooth (SGO-PV-836, Bahía Inglesa, Chile, late Miocene). A_1 and A_2 are pencil drawings, A_3 and B are photographs.

Crocodyliformes en Chile: Caldera, Formación Bahía Inglesa (Mioceno medio – Plioceno)

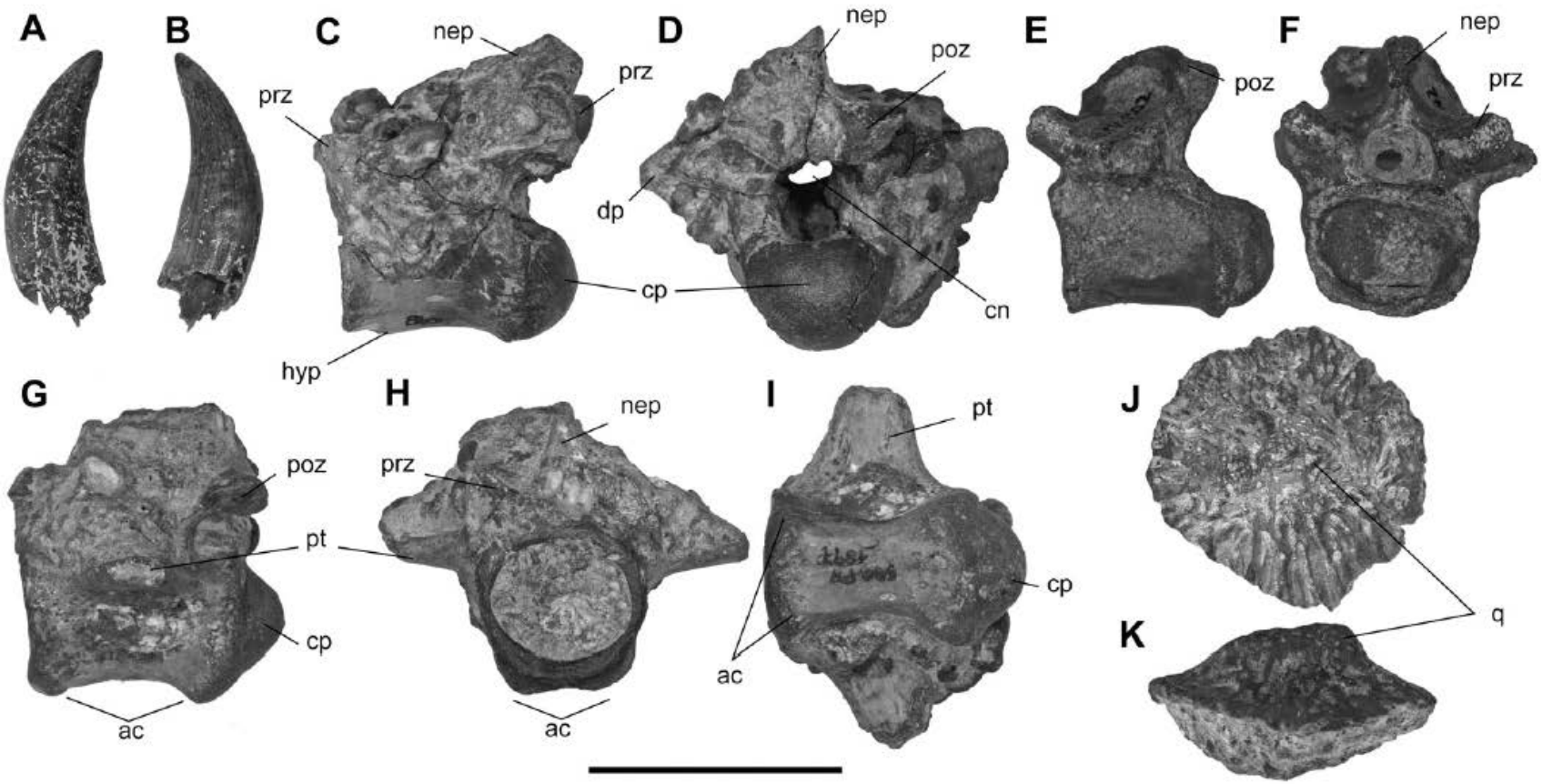


FIGURA 7. Crocodylia indet. A) diente en vista labial, B) vista lingual. C) SGO.PV.1098, vértebra dorsal en vista lateral izquierda, D) vista caudal. E) SGO.PV.1102, vértebra presacral indeterminada en vista lateral izquierda, F) vista rostral. G) SGO.PV.1097, vértebra caudal anterior en vista lateral izquierda, H) vista rostral, I) vista ventral. J) SGO.PV.1099, osteodermo en vista dorsal, K) vista lateral. Abreviaciones anatómicas: ac, articulación para los chevrones; cn, canal neural; cp, cóndilo posterior; diap, diapófisis; hyp, hipapófisis; nep,neurapófisis; poz, poszigapófisis; prz, prezigapófisis; pt, proceso transverso; q, quilla. Barra de escala = 5 cm.

Gavialidae en Chile?: Caldera, Formación Bahía Inglesa (Mioceno medio – Plioceno)

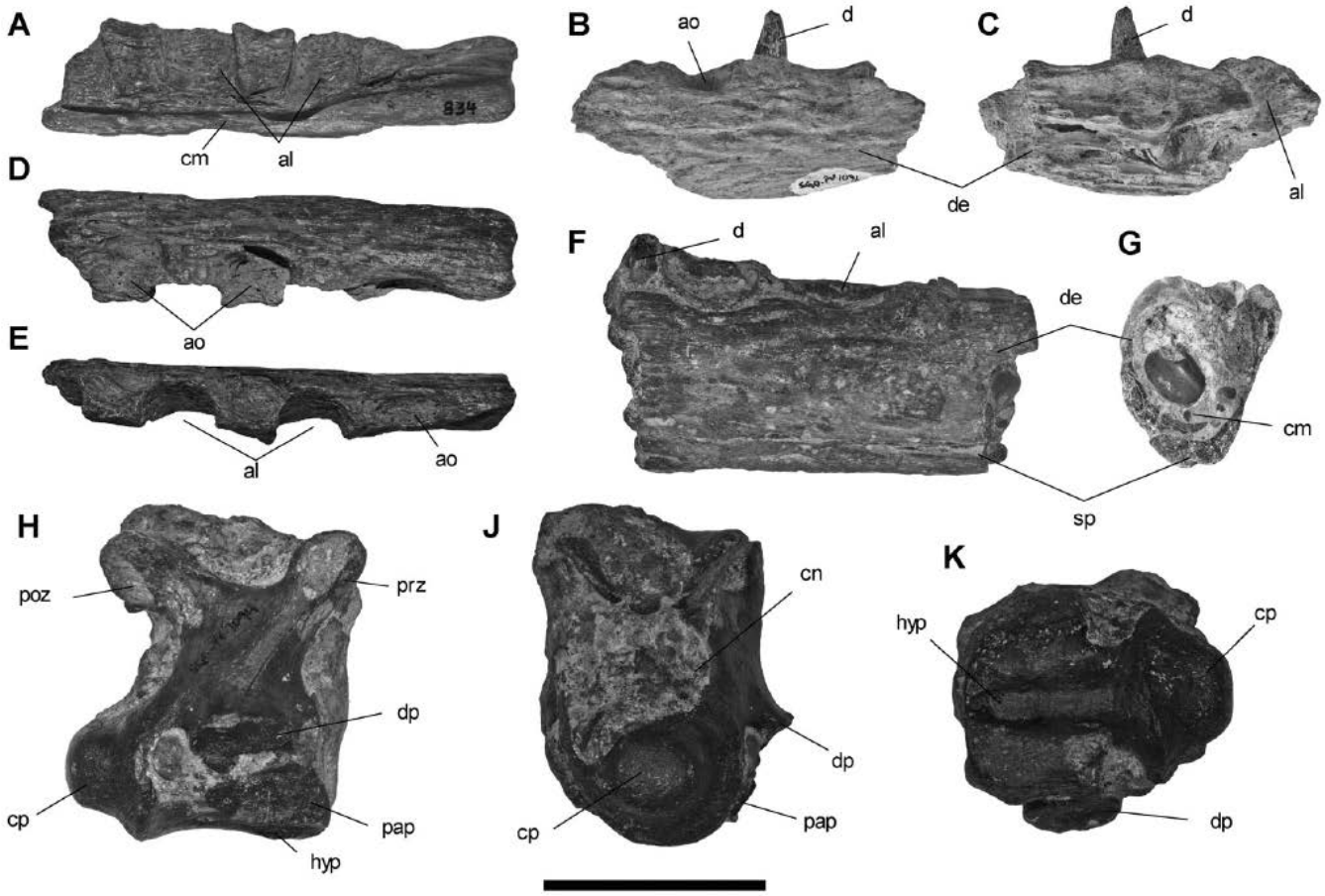
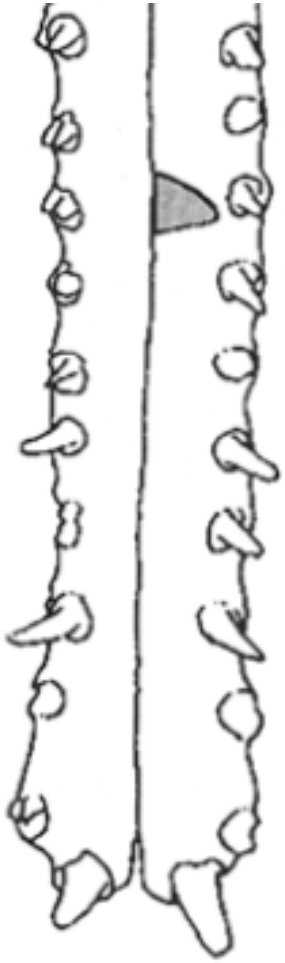


FIGURA 8. Gavialoidea indet. A) SGO.PV.834. Fragmento de dentario en vista medial, B) vista lateral, C) vista oclusal. D) SGO.PV.1096 fragmento de dentario con diente en posición anatómica en vista lateral, E) vista medial. F) SGO.PV.1095, fragmento de rama mandibular con dentario y esplenial preservados en vista lateral, G) sección transversal. H) SGO.PV.1094, vértebra cervical en vista lateral derecha, J) vista caudal y K) vista ventral. Abreviaciones anatómicas: ao, agujero de oclusión; al, alvéolo; cm, canal meckeliano; cn, canal neural; cp, cóndilo posterior; d, diente; de, dentario; dp, diapófisis; hyp, hipapófisis; sp, esplenial; poz, postzigapófisis; prez, prezigapófisis; pap, parapófisis. Barra de escala = 5 cm.

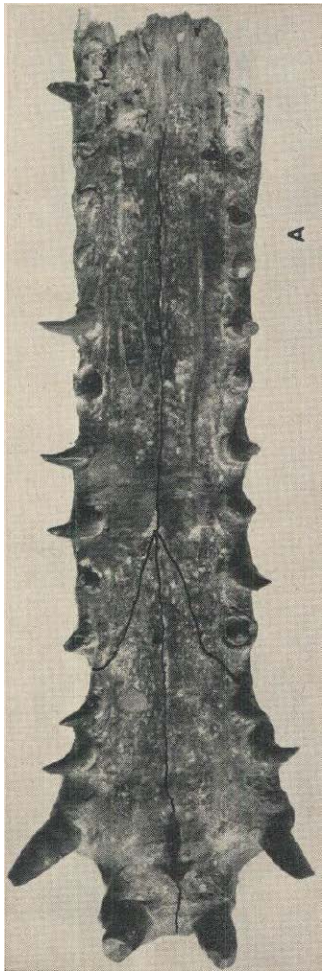
Sìnfisis Mandibular

Bahía Inglesa form

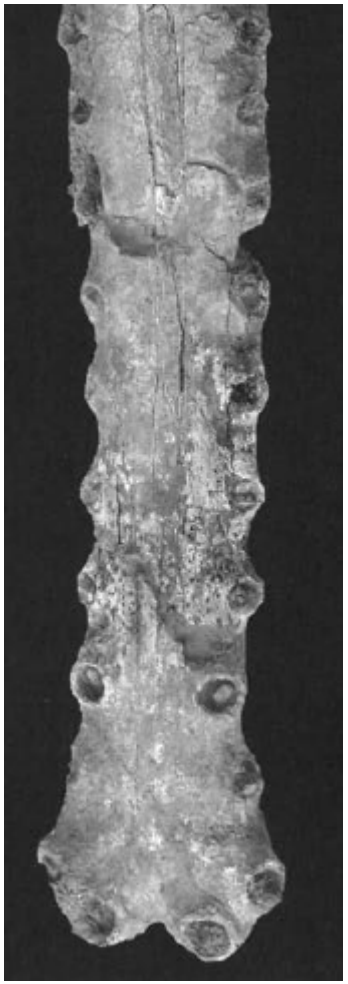


Piscogavialis jugaliperforatus
(Kraus, 1998)

Siquisiquesuchus venezuelensis
(Brochu and Rincón, 2004)



Ramphostomopsis neogaeus
(Gasparini, 1968)



Gryposuchus croizati
(Riff et al., 2008)

Crocodyliformes en Chile: Sierras Dorotea y Baguales, Formación Man Aike (Eoceno medio – superior)

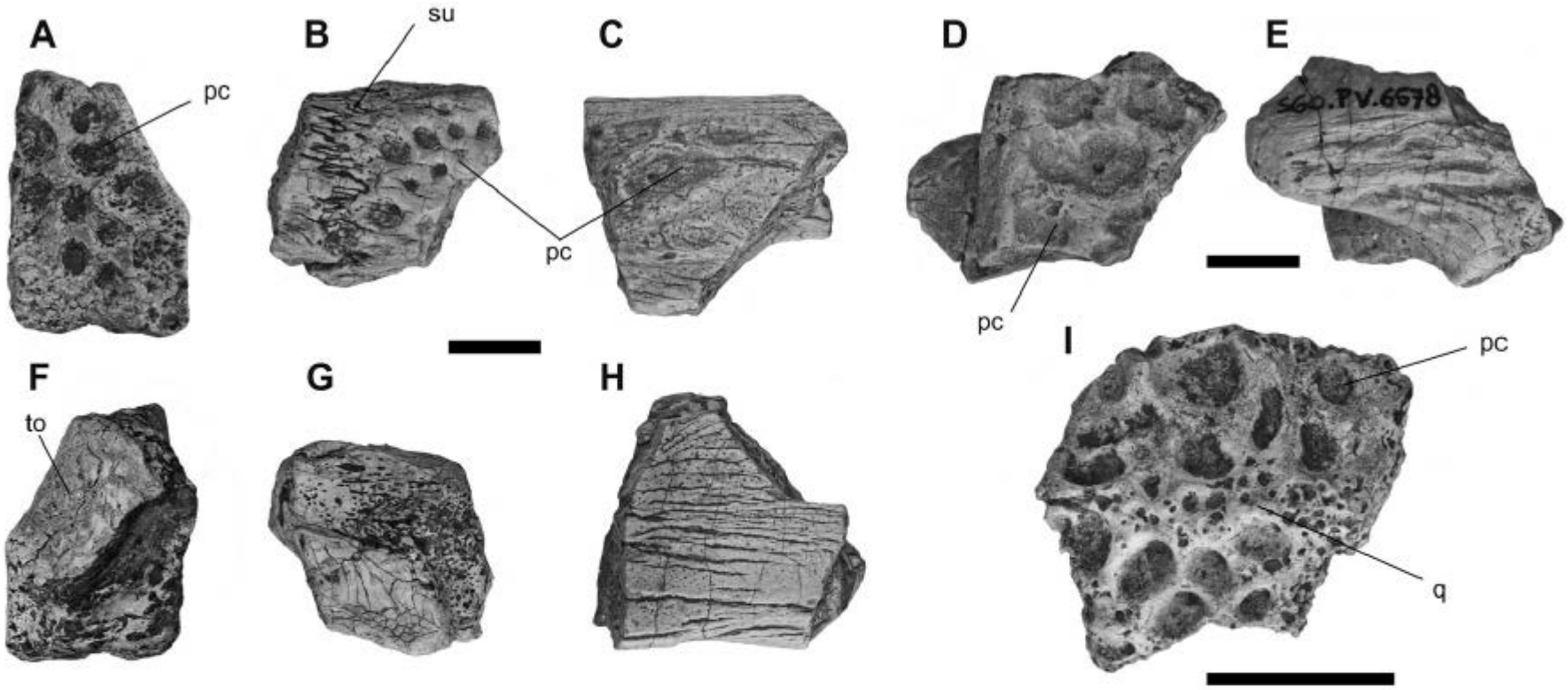
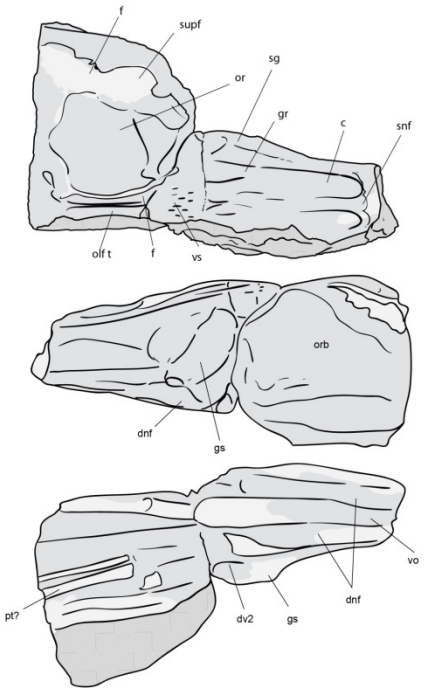
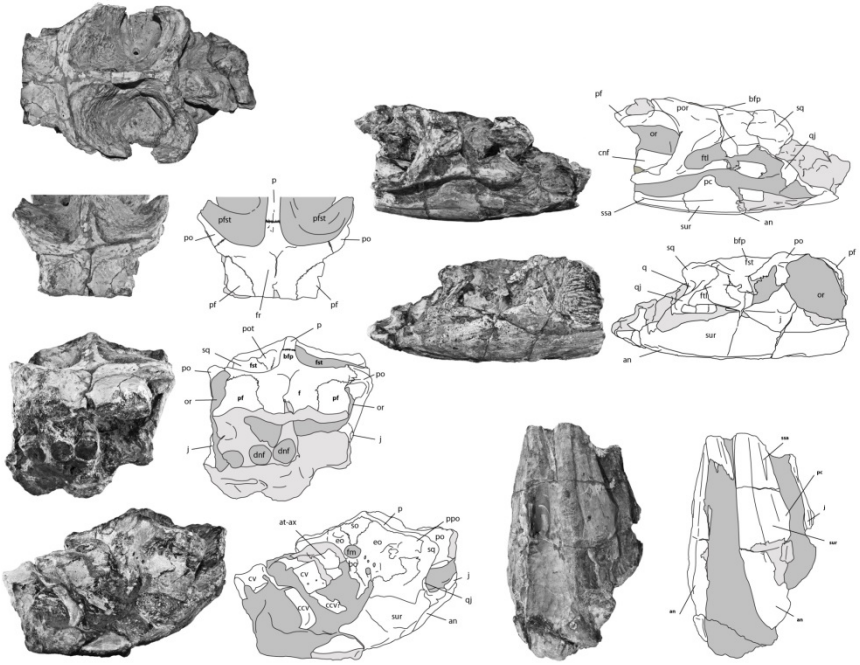
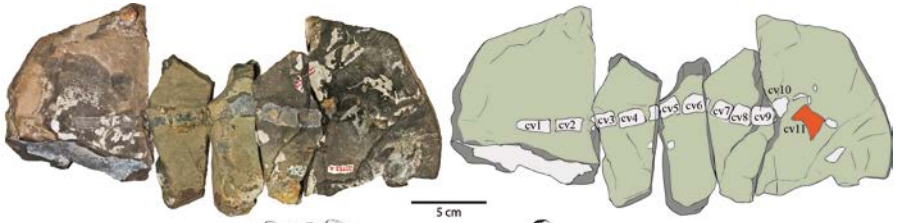


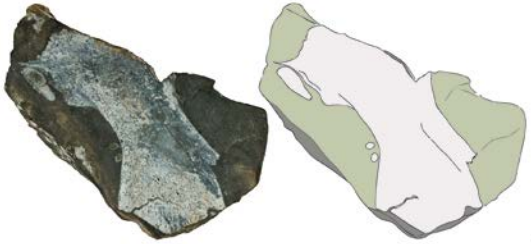
FIGURA 4. Mesoeucrocodylia indet., provenientes de niveles de edad Eoceno medio-superior de la Región de Magallanes. SGO.PV.6654, fragmento de posible frontal en A) vista dorsal, F) vista ventral. Fragmento de techo craneal, probablemente frontal y postorbital en B) vista dorsal, G) vista ventral. Fragmento craneal indeterminado en C) vista externa?, H) vista interna. Fragmento de osteodermo dorsal en I) vista dorsal. SGO.PV.6578, fragmento craneal indeterminado en D) vista externa, E) vista interna. Abreviaciones anatómicas: pc, perforaciones circulares; q, quilla; su, sutura; to?, techo de la órbita.

Novedades en el registro fósil chileno

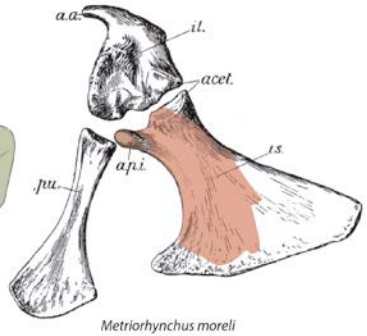






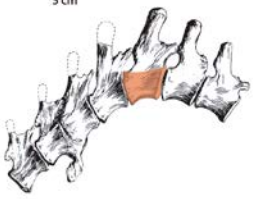


Metriorhynchidae indet.
MUNHCAL.20152



Metriorhynchus moreli
(Andrews, 1913)

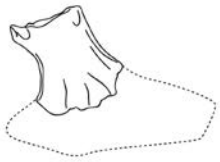
Cricosaurus suevicus
(Fraas, 1902)



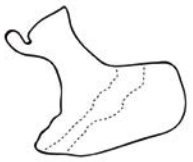
Gracilineustes leedsi (=*Metriorhynchus laeve*)
(Andrews, 1913)

Suchodus brachyrrhinchus
(=*Metriorhynchus cultridens*)
(Andrews, 1913)

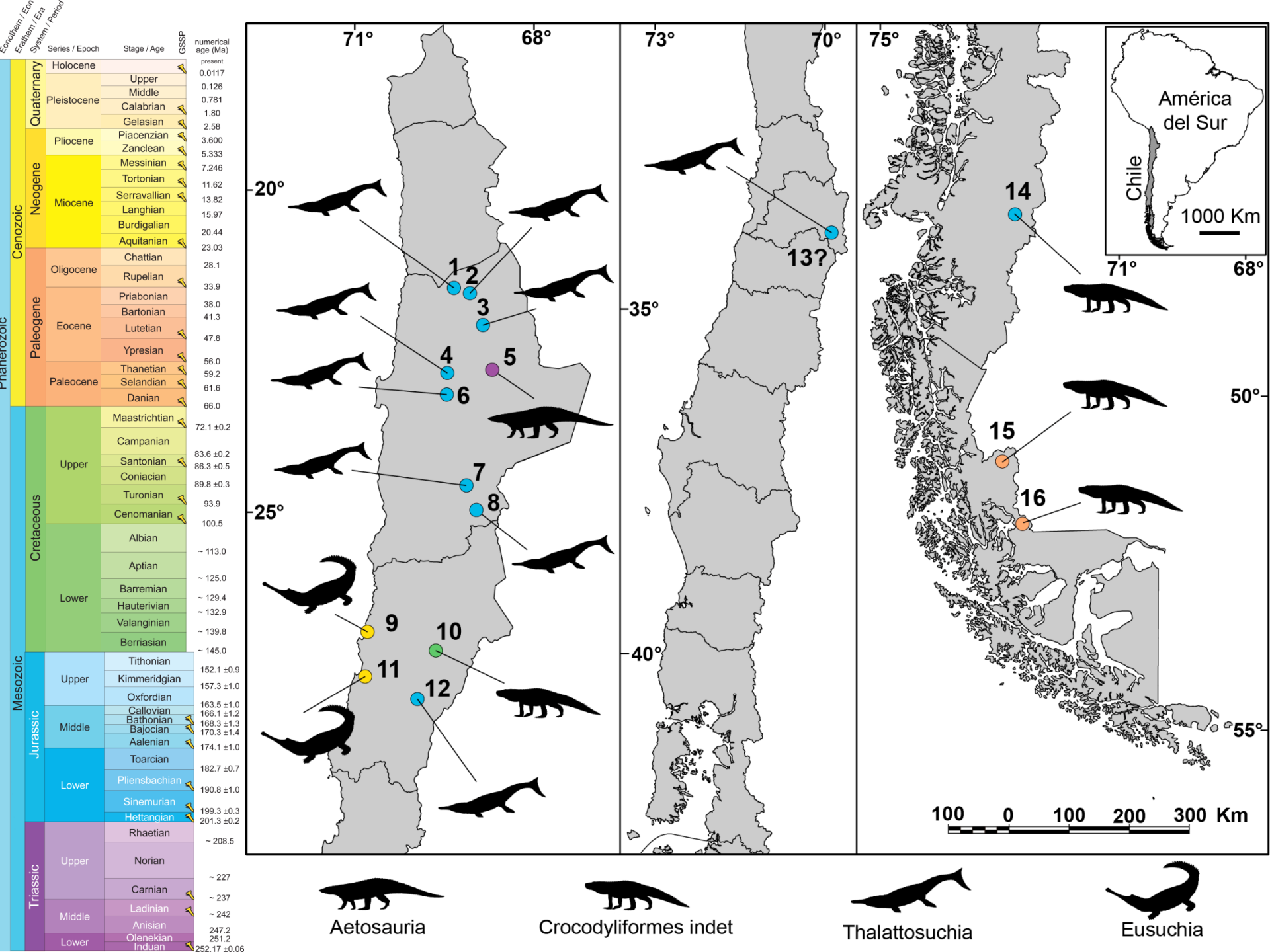
Steneosaurus obtusidens
(Andrews, 1913)



Tyrannoneustes lythrodectikos
(Young et al 2013)



Cricosaurus araucanus
(Andrews, 1913)


Eonothem / Eon
Erathem / Era
System / Period
Series / Epoch
Stage / Age
GSSP
numerical age (Ma)
present
Phanerozoic
Cenozoic
Quaternary
Holocene
Pleistocene
Upper
Middle
Calabrian
Gelasian
0.0117
0.126
0.781
1.80
2.58
Neogene
Pliocene
Piacenzian
Zanclean
3.600
5.333
Miocene
Messinian
Tortonian
Serravallian
Langhian
Burdigalian
Aquitanian
7.246
11.62
13.82
15.97
20.44
23.03
Paleogene
Oligocene
Chattian
Rupelian
28.1
33.9
Eocene
Priabonian
Bartonian
Lutetian
Ypresian
38.0
41.3
47.8
56.0
Paleocene
Thanetian
Selandian
Danian
59.2
61.6
66.0
Mesozoic
Cretaceous
Upper
Maastrichtian
Campanian
Santonian
Coniacian
Turonian
Cenomanian
72.1 ±0.2
83.6 ±0.2
86.3 ±0.5
89.8 ±0.3
93.9
100.5
Lower
Albian
Aptian
Barremian
Hauterivian
Valanginian
Berriasian
~ 113.0
~ 125.0
~ 129.4
~ 132.9
~ 139.8
~ 145.0
Jurassic
Upper
Tithonian
Kimmeridgian
Oxfordian
152.1 ±0.9
157.3 ±1.0
163.5 ±1.0
Middle
Callovian
Bathonian
Bajocian
166.1 ±1.2
168.3 ±1.3
170.3 ±1.4
Lower
Aalenian
Toarcian
Pliensbachian
Sinemurian
Hettangian
174.1 ±1.0
182.7 ±0.7
190.8 ±1.0
199.3 ±0.3
201.3 ±0.2
Triassic
Upper
Rhaetian
Norian
Carnian
~ 208.5
~ 227
Middle
Ladinian
Anisian
~ 237
~ 242
Lower
Olenekian
Induan
247.2
251.2
252.17 ±0.06
71°
68°
73°
70°
75°
20°
25°
35°
40°
50°
55°
1
2
3
4
5
6
7
8
9
10
11
12
13?
14
15
16
América del Sur
Chile
1000 Km
100 0 100 200 300 Km
Aetosauria
Crocodyliformes indet
Thalattosuchia
Eusuchia

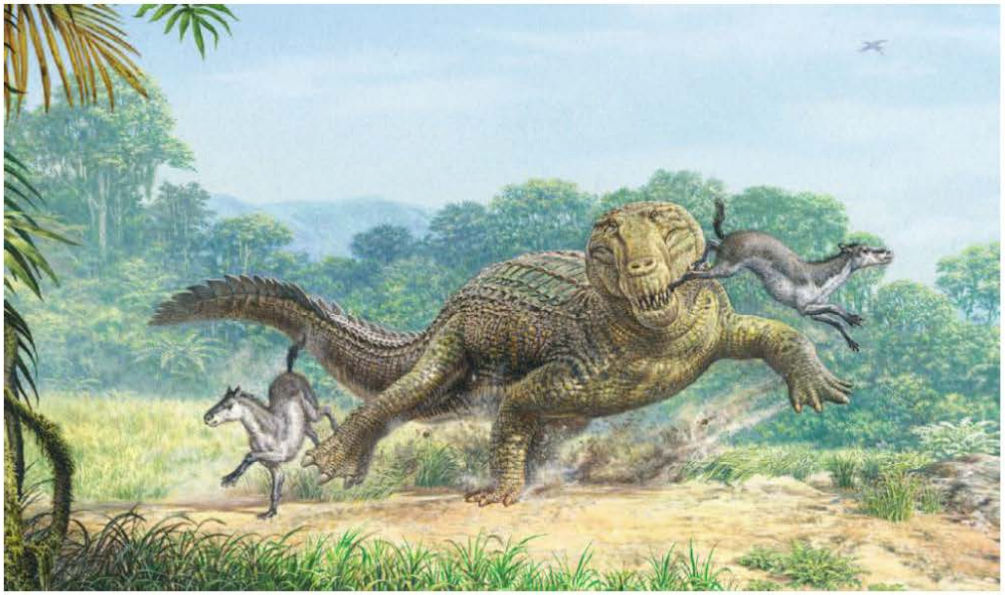


Fig. 2.36. *Unlike typical Palaeocene and Eocene eusuchians, species of* Pristichampsus *grew to 2–3 m and are thought to have been mostly terrestrial. They were also unusual in body form. They had extensive body armour, which may have compromised their lateral flexibility. The muzzle was laterally compressed, housing blade-like teeth, some with serrations. In this reconstruction by John Sibbick, made with input from Dino Frey and Steve Salisbury, a pristichampsid preys on small Eocene horses. It is easy for me to imagine these large, terrestrial predators being endothermic (see Chapter 10). (Image John Sibbick)*

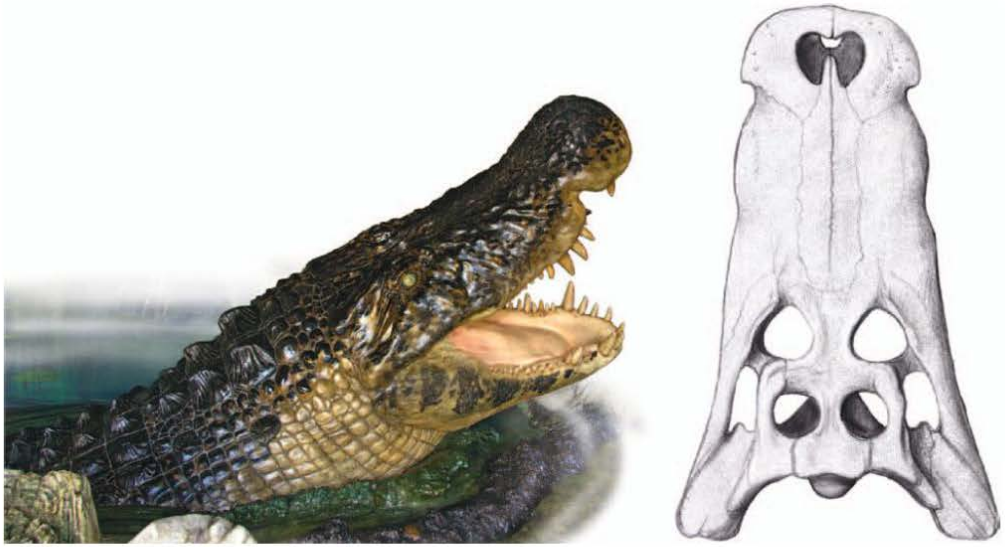


Fig. 2.37. Deinosuchus *(= terrible crocodile) from the North American late Cretaceous, one of the largest known eusuchians, is thought to have grown to 10–12 m which, extrapolating from* Alligator *data (Fig. 1.36), implies a body weight up to 11 tonnes. (Reconstruction photographed at WILD LIFE Sydney Zoo)*

Avemetatarsalia

Definición: El clado más inclusivo que contiene a Passser domesticus pero no a Crocodylus niloticus (Benton, 1999)

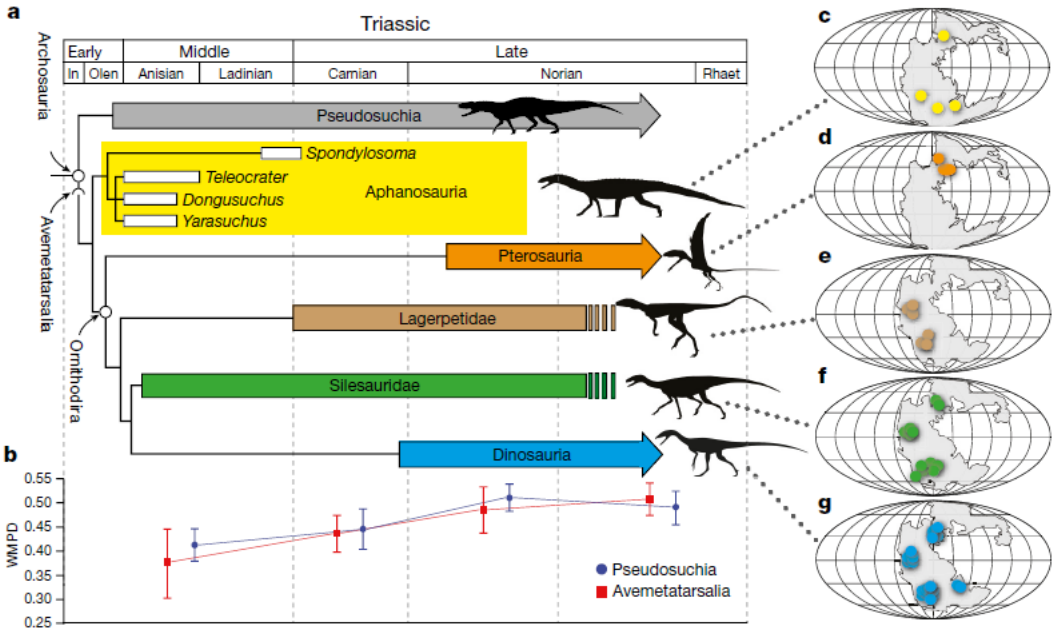


Figure 3 | Early evolution of avemetatarsalians. a, Interrelationships of Avemetatarsalia derived from two datasets[19,20] (Supplementary Information). All clades except Aphanosauria have been collapsed for clarity. The lengths of the white bars indicate stratigraphic imprecision. In, Induan; Olen, Olenekian; Rhaet, Rhaetian. **b**, Plot of morphological disparity for Pseudosuchia (including Phytosauria) and Avemetatarsalia for the duration of the Triassic period. Plots show weighted mean pairwise dissimilarity (WMPD, see Methods). **c**–**g**, Geographical distributions of major subclades of avemetatarsalians during the Triassic. **c**, Aphanosauria. **d**, Pterosauria. **e**, Lagerpetidae. **f**, Silesauridae. **g**, Dinosauria. See Supplementary Table 5 for occurrences. Palaeogeographic maps were modified from https://www2.nau.edu/rcb7/globaltext2.html. Source map from Ron Blakey, copyright 2012 Colorado Plateau Geosystems Inc.

Nesbitt et al., 2017

Aphanosauria

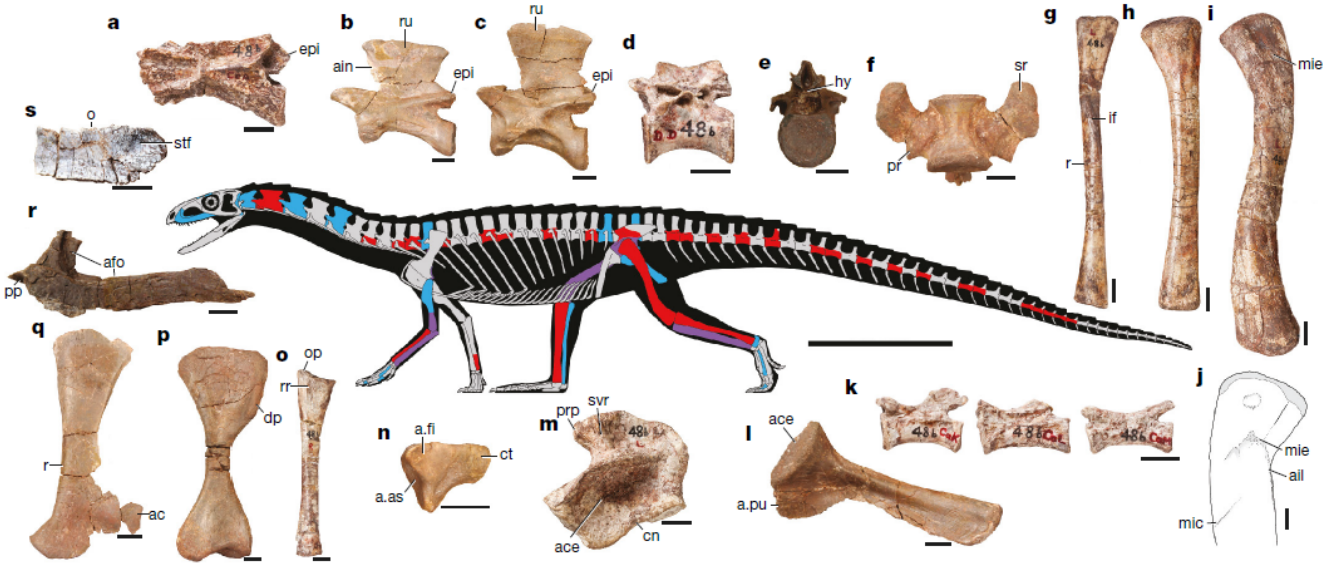


Figure 2 | Skeletal anatomy of *Teleocrater rhadinus* gen. et sp. nov. **a–c**, Anterior and mid-cervical vertebrae (Natural History Museum, London, UK (NHMUK) PV R6795, National Museum of Tanzania, Dar es Salaam, Tanzania (NMT) RB505, NMT RB511). **d–e**, Middle and posterior trunk vertebrae (NHMUK PV R6795). **f**, Second sacral vertebra (NMT RB519). **g**, Left fibula (NHMUK PV R6795). **h**, Right tibia (NHMUK PV R6795). **i**, Left femur (NHMUK PV R6795). **j**, Muscle scars of right femur (NHMUK PV R6795). **k**, Posterior caudal vertebrae (NHMUK PV R6795). **l**, Left ischium (NMT RB479). **m**, Partial left ilium (NHMUK PV R6795). **n**, Right calcaneum (NMT RB490). **o**, Left ulna (NHMUK PV R6795). **p**, Left humerus (NMT RB476). **q**, Right scapula (NMT RB480). **r**, Left maxilla (NMT RB495). **s**, Right frontal (NMT RB496). Orientations: **a–d**, **k**, left lateral; **e**, posterior; **f**, ventral; **g**, **h**, **l**, **m**, **o**, **q**, **r**, lateral; **i**, **j**, anterolateral; **n**, proximal; **p**, anterior; **s**, dorsal. Scale bars, **a–s**, 1 cm; skeleton, 25 cm. Red, holotype; blue, referred; purple, in holotype and referred; grey, unknown. a., articulates with; ac, acromion; ace, acetabulum; afo, antorbital fossa; ain, anteriorly inclined anterior margin of the neural spine; as, astragalus; cn, concave notch; ct, calcaneal tuber; dp, deltopectoral crest; epi, epipophyses; fi, fibula; hy, hyposphene; if, M. iliofemoralis scar; lic, linea intermuscularis cranialis; mic, M. iliotrochantericus caudalis scar; mie, M. iliofemoralis externus scar; o, orbital margin; op, olecranon process; pp, palatal process; pr, posterolateral process; prp, preacetabular process; pu, pubis; r, ridge; rr, radius ridge; ru, rugosity; sr, sacral rib; stf, supratemporal fossa; svr, subvertical ridge.

Nesbitt et al., 2017

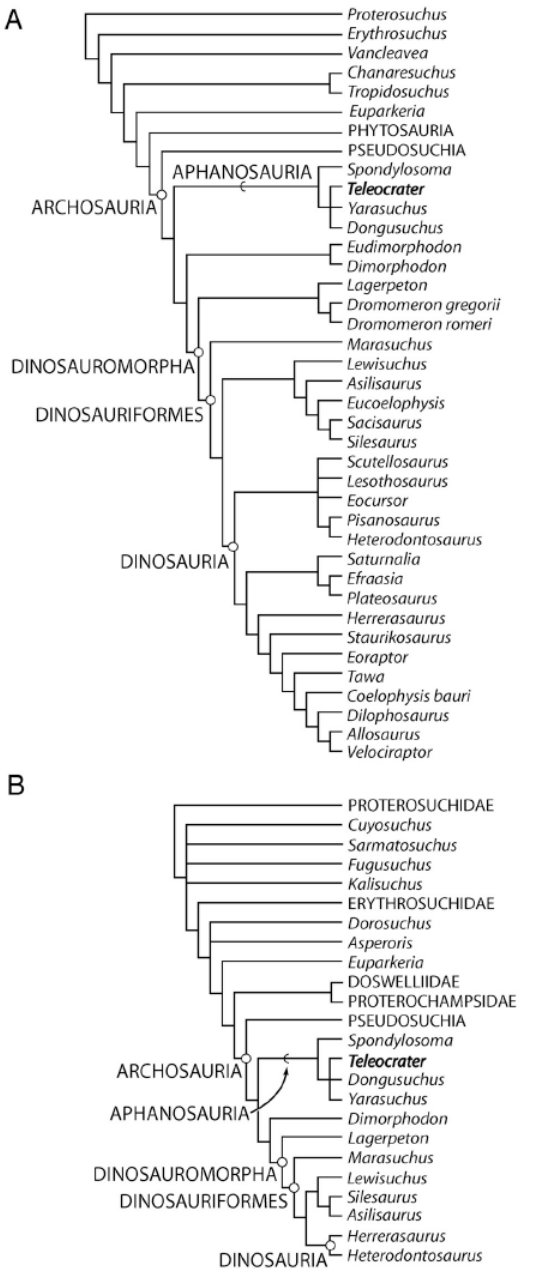


FIGURE 28. Phylogenetic relationships of *Teleocrater rhadinus* among archosauriform reptiles. Strict consensus trees (some taxa collapsed into larger clades) based on the analyses of **A**, Nesbitt (2011) and **B**, the data set of Ezcurra (2016). Full tree in Nesbitt et al. (2017).

Nesbitt et al., 2018

FIGURE 29. Life reconstruction of *Teleocrater rhadinus* feasting on *Cynognathus*. The large dicynodont *Dolichuranus* is seen in the background. ©Mark Witton/Natural History Museum, London.

Nesbitt et al., 2018

Ornithodira

Definición Original: Pterosauria, *Schleromochlus*, Dinosauromorpha y todos sus descendientes del ancestro común más reciente (Sereno, 1991).

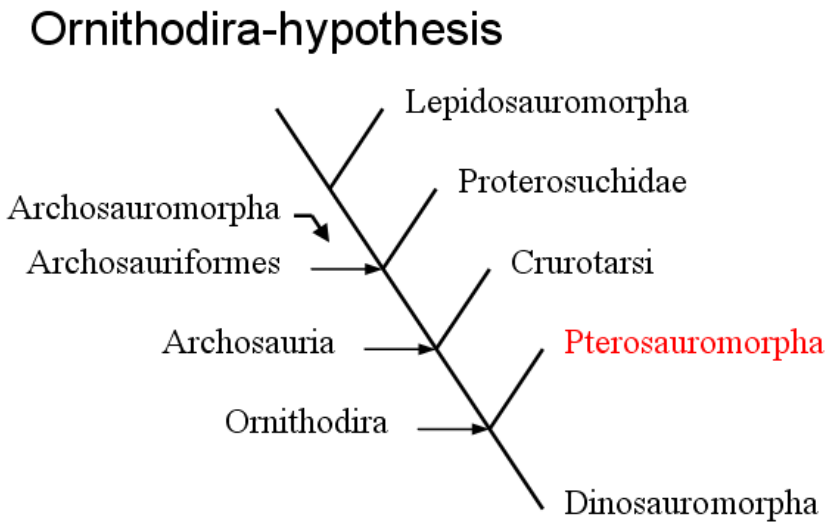
Definición actual: Clado menos inclusivo que contiene a *Pterodactylus antiquus* y *Passer domesticus*.

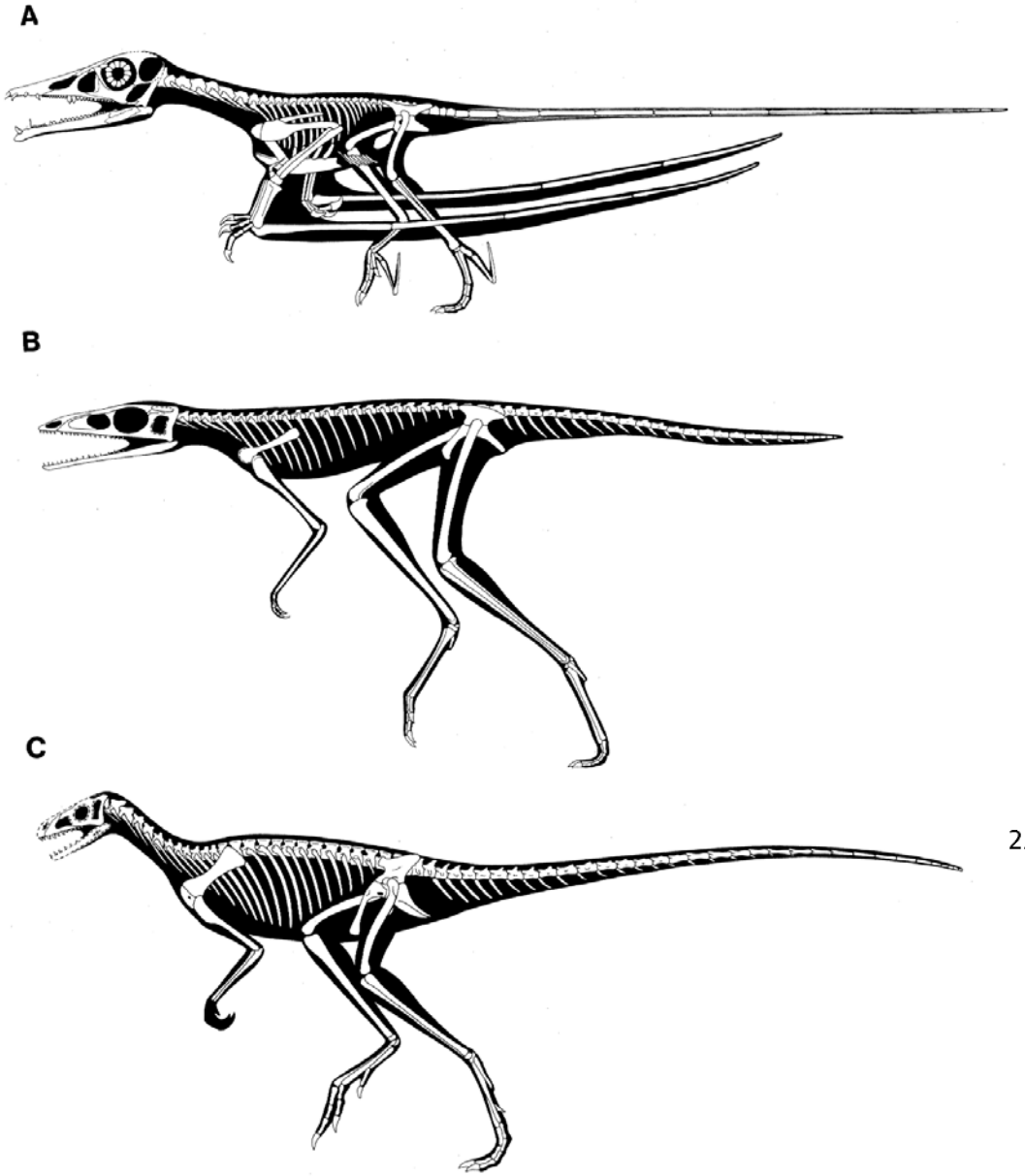
~~Potencialmente sinónonimo del término **AVEMETATARSALIA** Benton 1991, Clado que incluye a todos los arcosaurios más cercanos a las aves que a los cocodrilos.~~

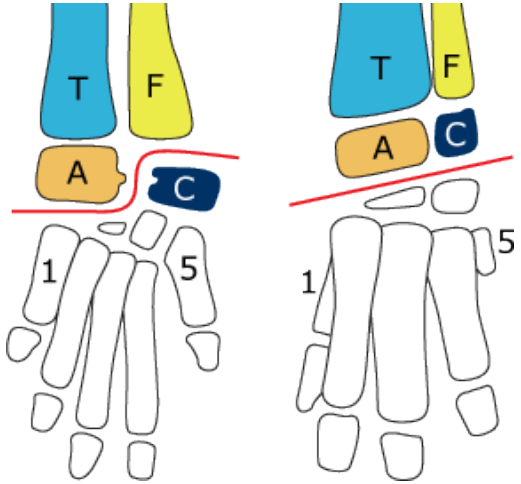
Rango Temporal: Anisiano (Triásico medio) hasta el presente.

Sinapomorfías:

- Ausencia de postfrontal
- Ausencia de interclavícula
- Ausencia de osteodermos parasagitales
- Reducción de coracoides
- Reducción de dígitos manuales IV y V
- Tibia – Fíbula > Fémur







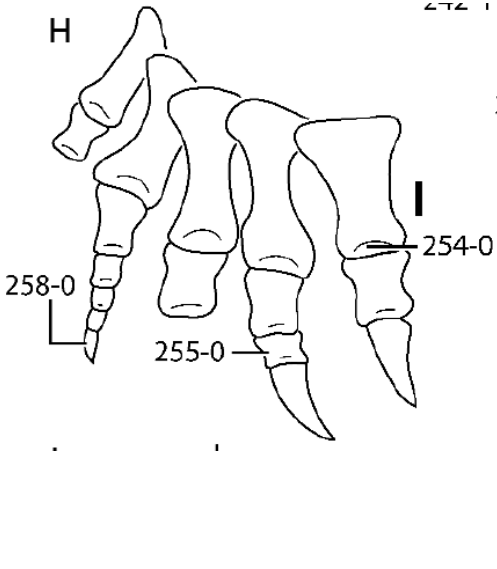


FIGURE 18. Skeletal reconstructions of basal ornithodirans. **A**, *Eudimorphodon ranzii* (based on MCSNB 2888 and exemplar Milano; Wild, 1978). **B**, *Scleromochlus taylori* (based on BMNH R3556, R3557). **C**, *Lagosuchus talampayensis* (based on PVL 3870, 3871).

Dinosauromorpha

Definición Original: *Lagerpeton chanarensis, Lagosuchus talampayensis, Pseudolagosuchus major*, Dinosauria (incl. Aves), y todos los descendientes de su ancestro común más reciente (Sereno, 1991)

Definición Actual: El clado más inclusivo que contiene a *Passer domesticus,* pero no *Pterodactylus antiquus*, *Ornithosuchus longidens* o *Crocodylus niloticus* (Nesbitt, 2011).

Rango Estratigráfico: Anisiano (Triásico tardío) – Presente.

Lagerpetidae

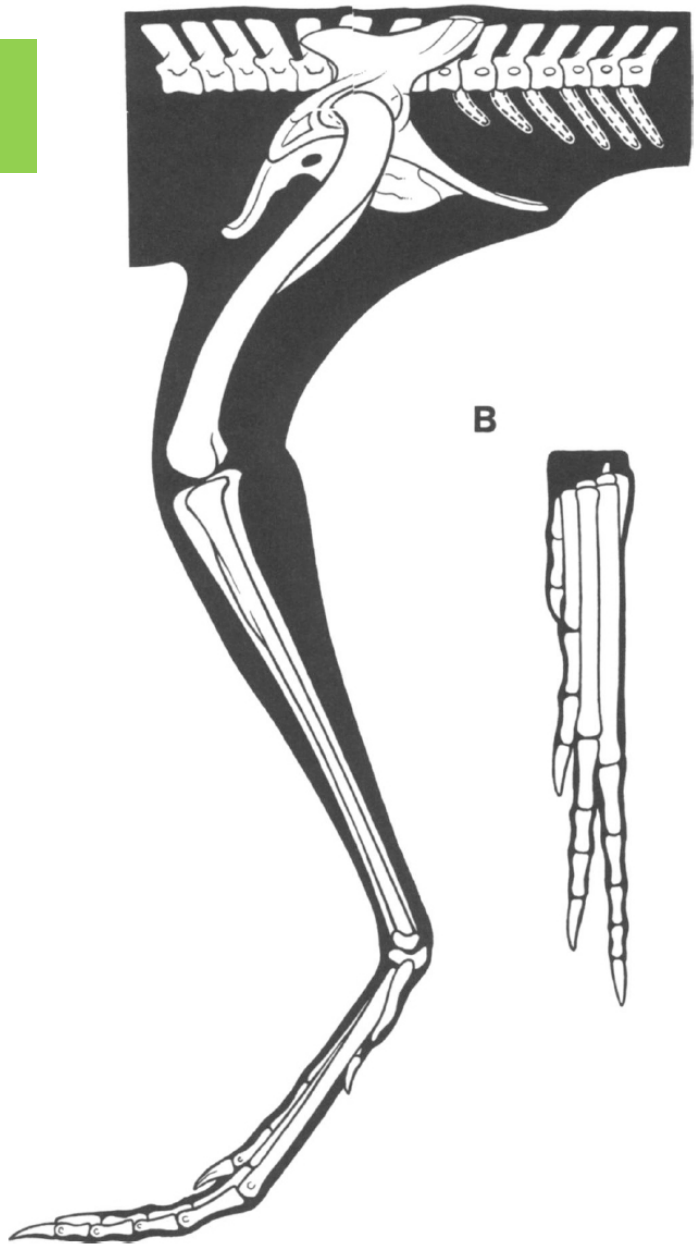


FIGURE 5. Reconstruction of the pelvic girdle and hind-limb of *Lagerpeton chanarensis* (based on UPLR 06, PVL 4619, and PVL 4625). **A**, pelvic girdle and left hind-limb in lateral view. **B**, left distal tarsals and pes in dorsal view.

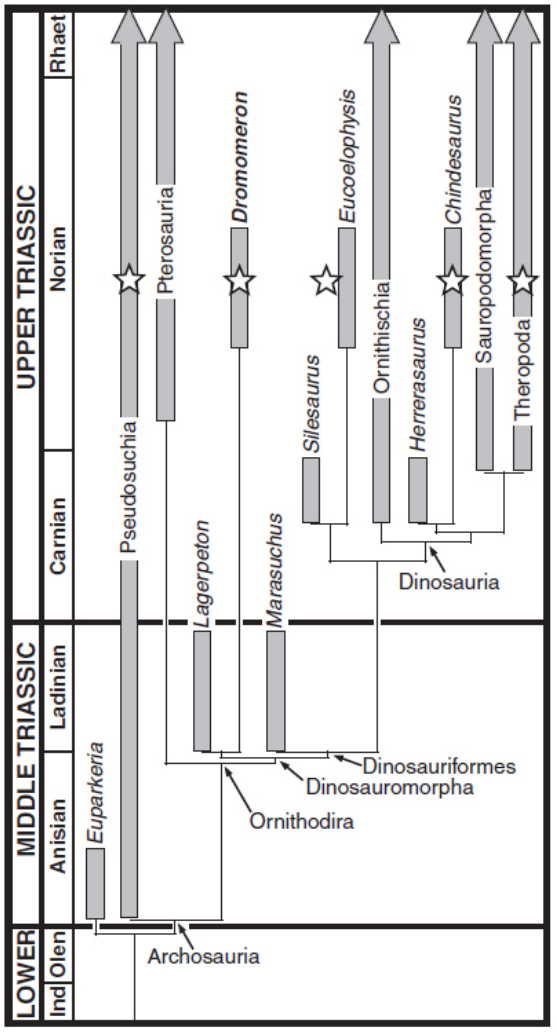


Fig. 3. Phylogenetic position of *D. romeri* gen. et sp. nov. among archosaurs. A single most-parsimonious tree was recovered from a parsimony analysis of 26 taxa and 127 characters (*17*). Pseudosuchia, Ornithischia, Sauropodomorpha, and Theropoda have been collapsed for brevity. Stars indicate taxa present in the HQ. For lineages that do not extend into the Jurassic, the length of the gray bar indicates stratigraphic imprecision. Ind, Induan; Olen, Olenekian; Rhaet, Rhaetian.

Lagerpetidae

Sin embargo, reciente revisión de *Lagerpeton chanarensis* y análisis filogenético lo sitúan como un Archosauromorfo basal, dentro de los Proterochampsidae (Novas y Agnolín, 2015; VCLAPV abstract; Agnolin (2016, tesis no publicada)

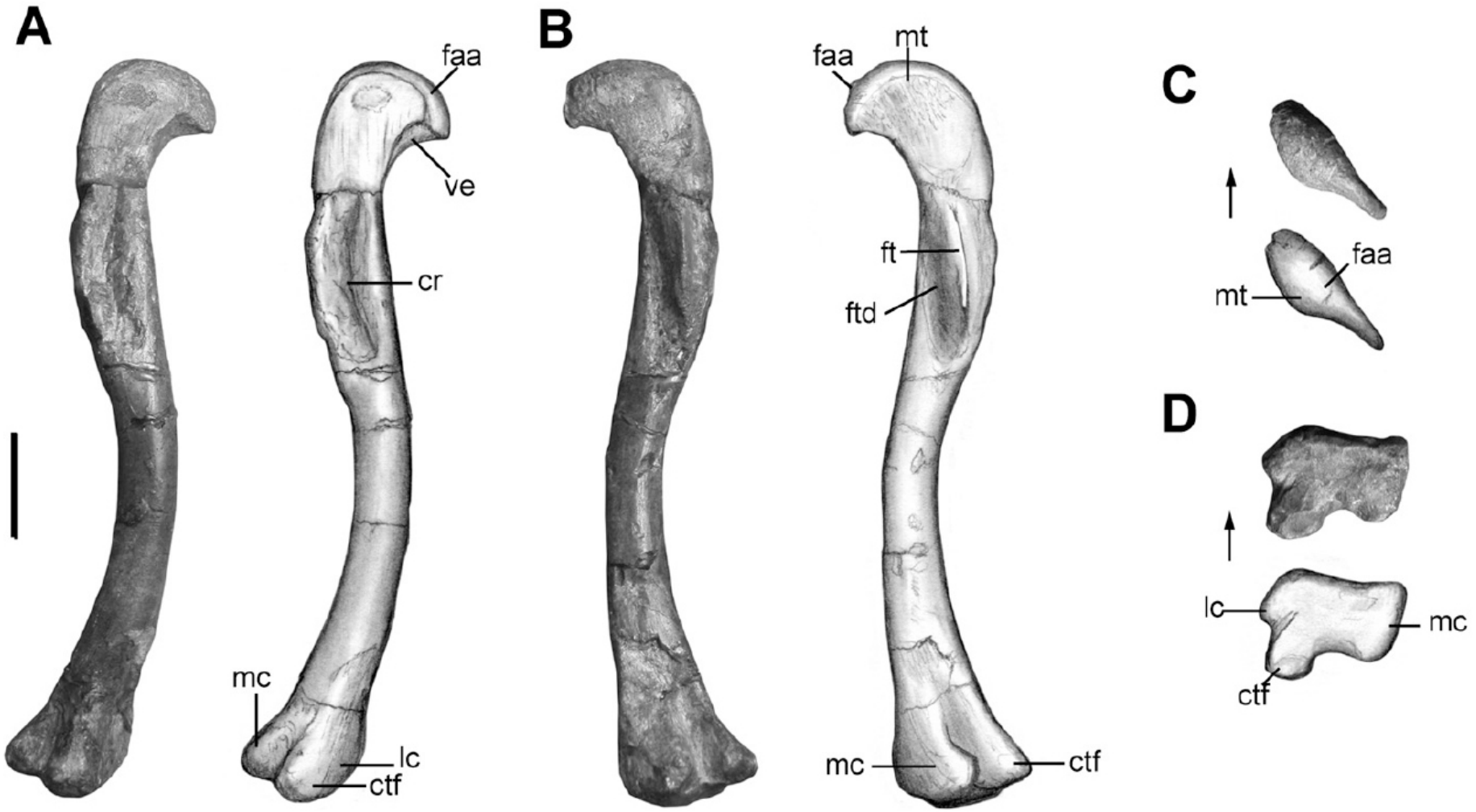


FIGURE 3. The right femur of *Lagerpeton chanarensis* (PVL 4619) in **A**, anterolateral view; **B**, posteromedial view; **C**, proximal view; **D**, distal view. The specimen is badly crushed on the anterolateral side on the proximal half of the shaft. Scale equals 1 cm. Arrow indicates anterior direction. See text for anatomical abbreviations.

Lagerpetidae

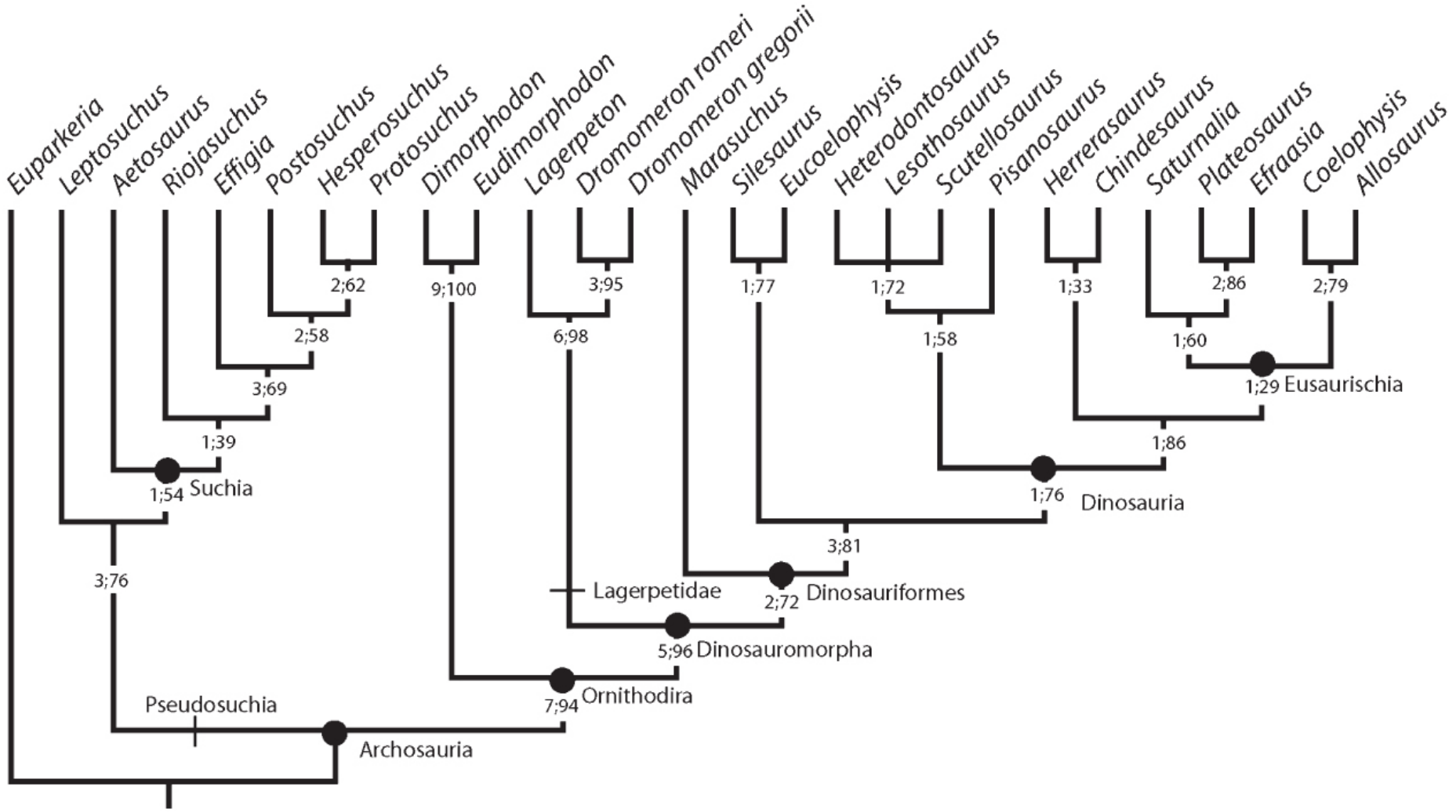


FIGURE 10. Phylogeny of the Archosauria and the relationships of *Dromomeron*. (27 taxa, 130 characters, characters weighted equally and unordered, strict consensus of two most parsimonious trees shown; tree length equals 301, consistency index [CI] 0.471, retention index [RI] 0.735). Support values (left, decay; right, bootstrap) are listed at each node.

Dinosauriformes

Definición Original: *Lagosuchus talampayensis*, Dinosauria, su ancestro común más reciente y todos sus descendientes (Novas, 1992).

Definición Actual: El clado menos inclusivo que contiene a *Passer domesticus* y *Marasuchus lilloensis* (Sereno, 2005).

Rango Estratigráfico: Anisiano (Triásico tardío) – Presente.

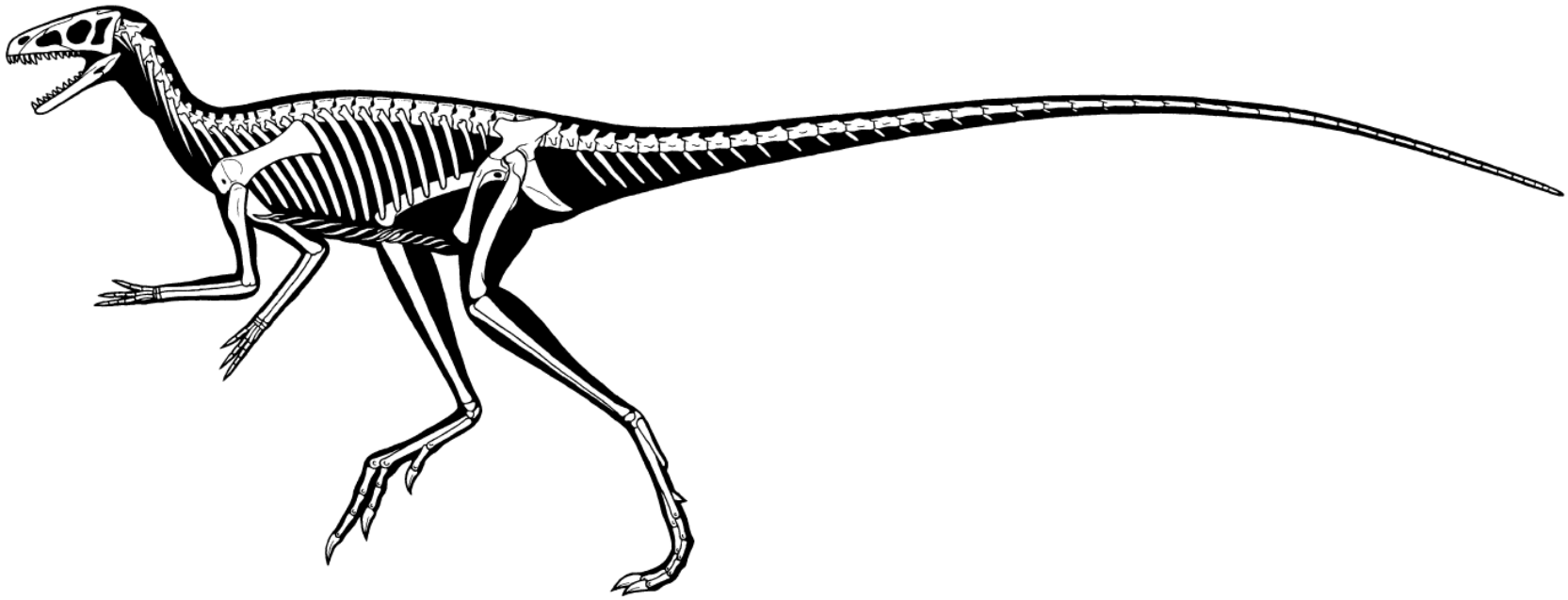


FIGURE 13. Reconstruction of *Marasuchus lilloensis* (based on PVL 3870 and 3871). The skull roof, manus, distal tail, ribs, and gastralia are restored.

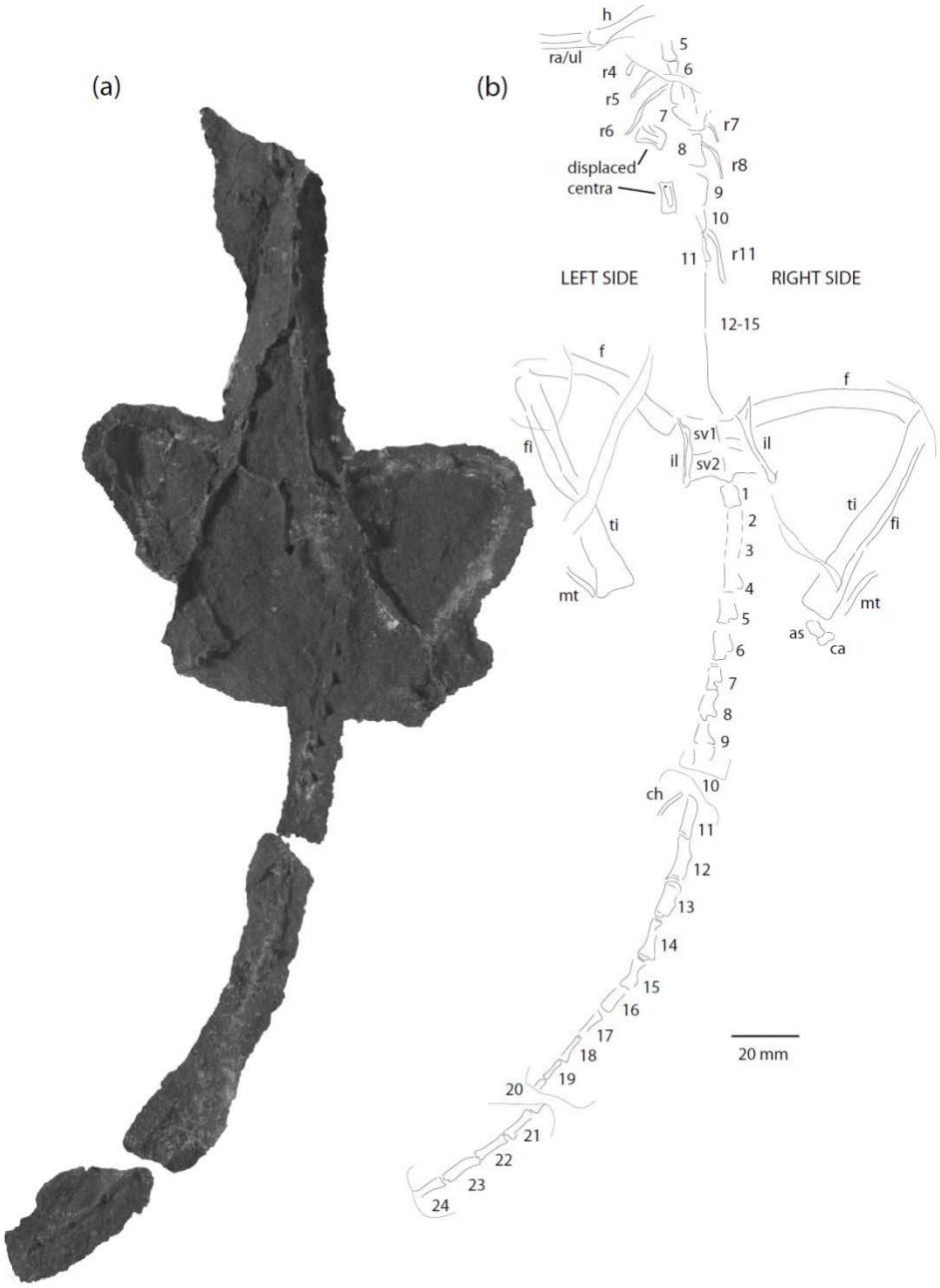


Figure 3 Casts of the counterslab elements of *Saltopus elginensis* Huene, 1910a (NHMUK R3915), showing dorsal view of the trunk, pelvic area, and proximal tail, photograph (a) and interpretive drawing (b). Abbreviations: 1, 2, 3 etc=numbered dorsal or caudal vertebrae, or ribs; as=astragalus; ca=calcaneum; ch=chevron; f=femur; fi=fibula; h=humerus; il=ilium; mt=metatarsal; r=rib; ra=radius; sv=sacral vertebra; ti=tibia; ul=ulna.

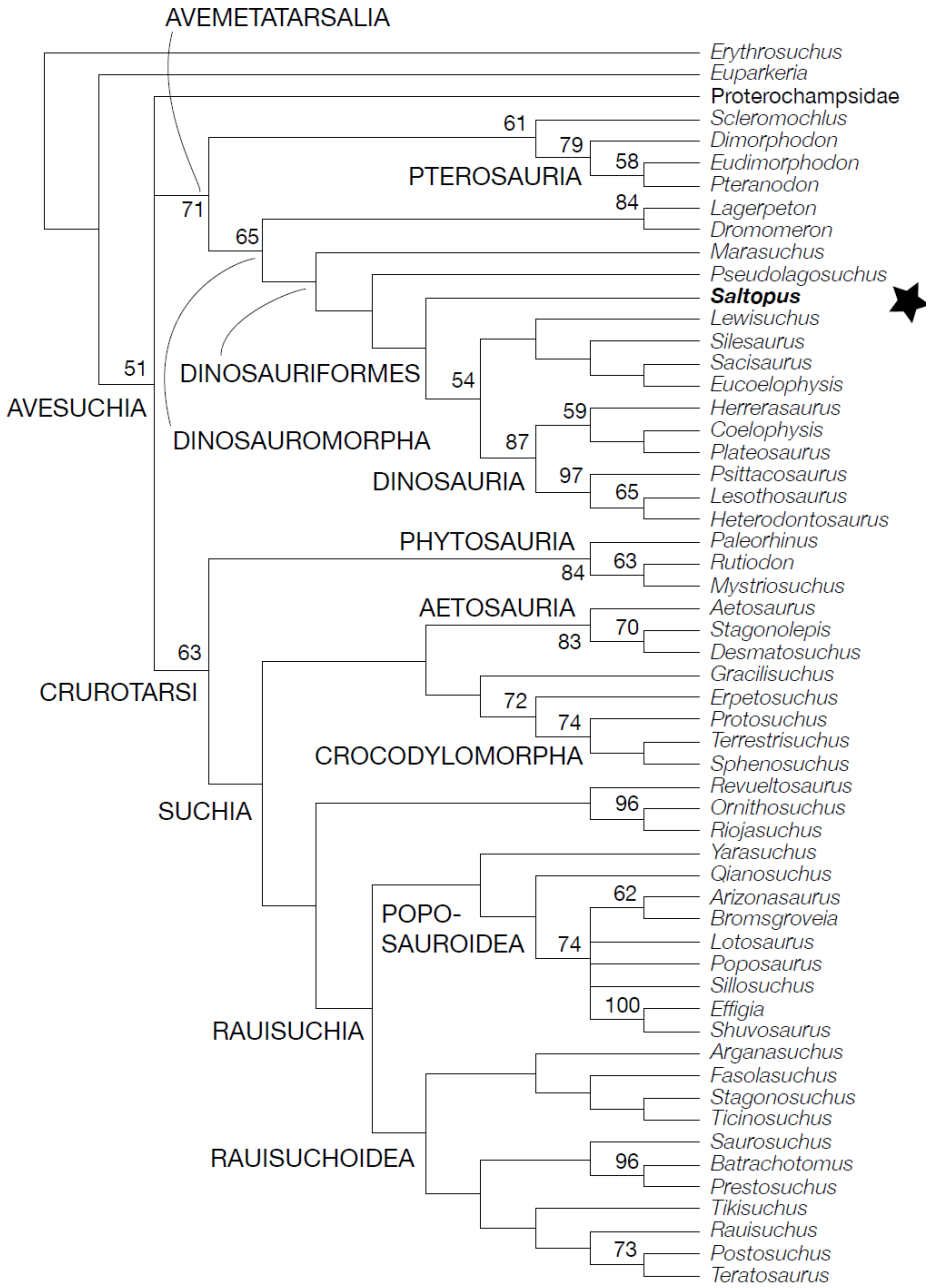


Figure 10 Cladogram showing relationships of *Saltopus* to other archosaurs, based on characters in Brusatte *et al.* (2010). Codings for *Saltopus* are listed in Table 2. Strict consensus of 15 MPTs (length 746 steps, CI 0·30, RI 0·68, RC 0·20). Bootstrap values over 50% are indicated at appropriate nodes; nodes without such numbers yielded <50% support. Major clades are named according to conventional understandings (based on Brusatte *et al.* 2010).

Silesauridae

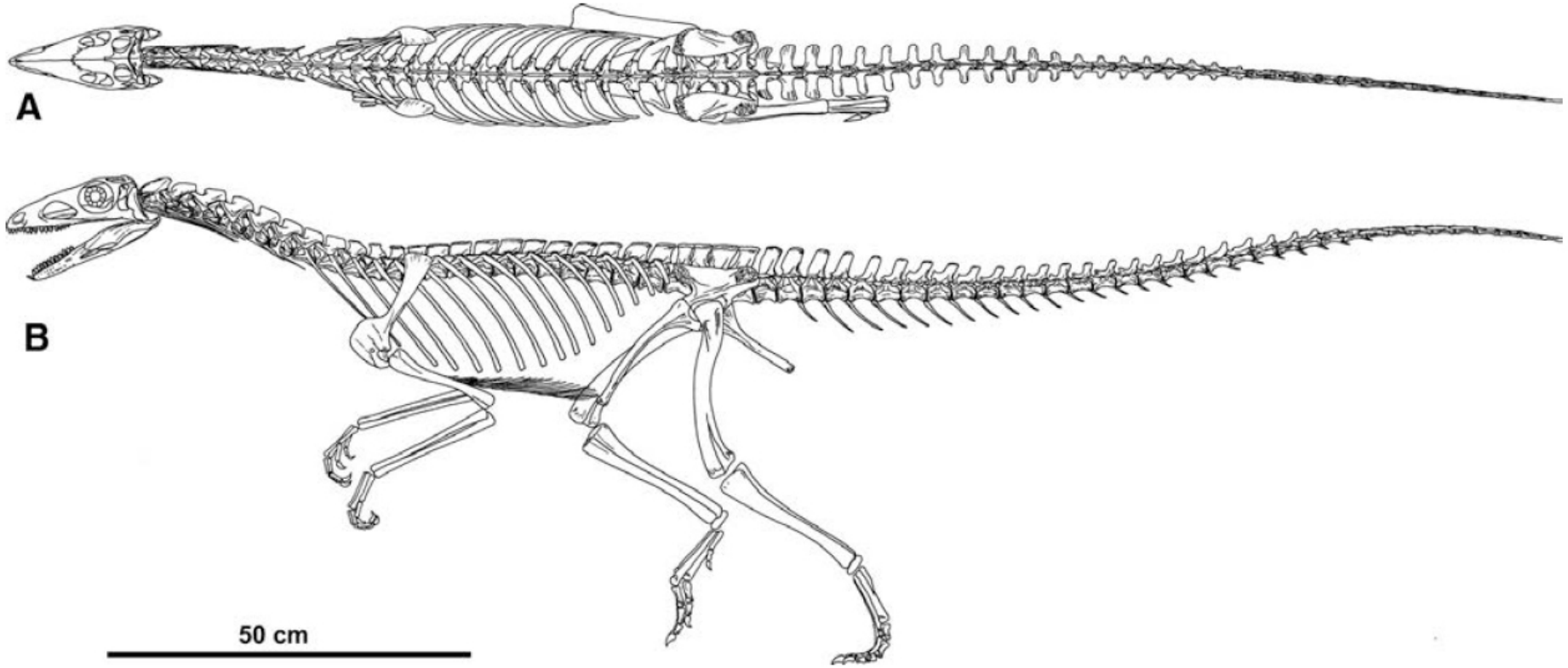


FIGURE 9. Restoration of the skeleton of *Silesaurus opolensis* from the early Late Triassic of Poland in facultative bipedal running pose; based mostly on ZPAL AbIII/1930 and 361.

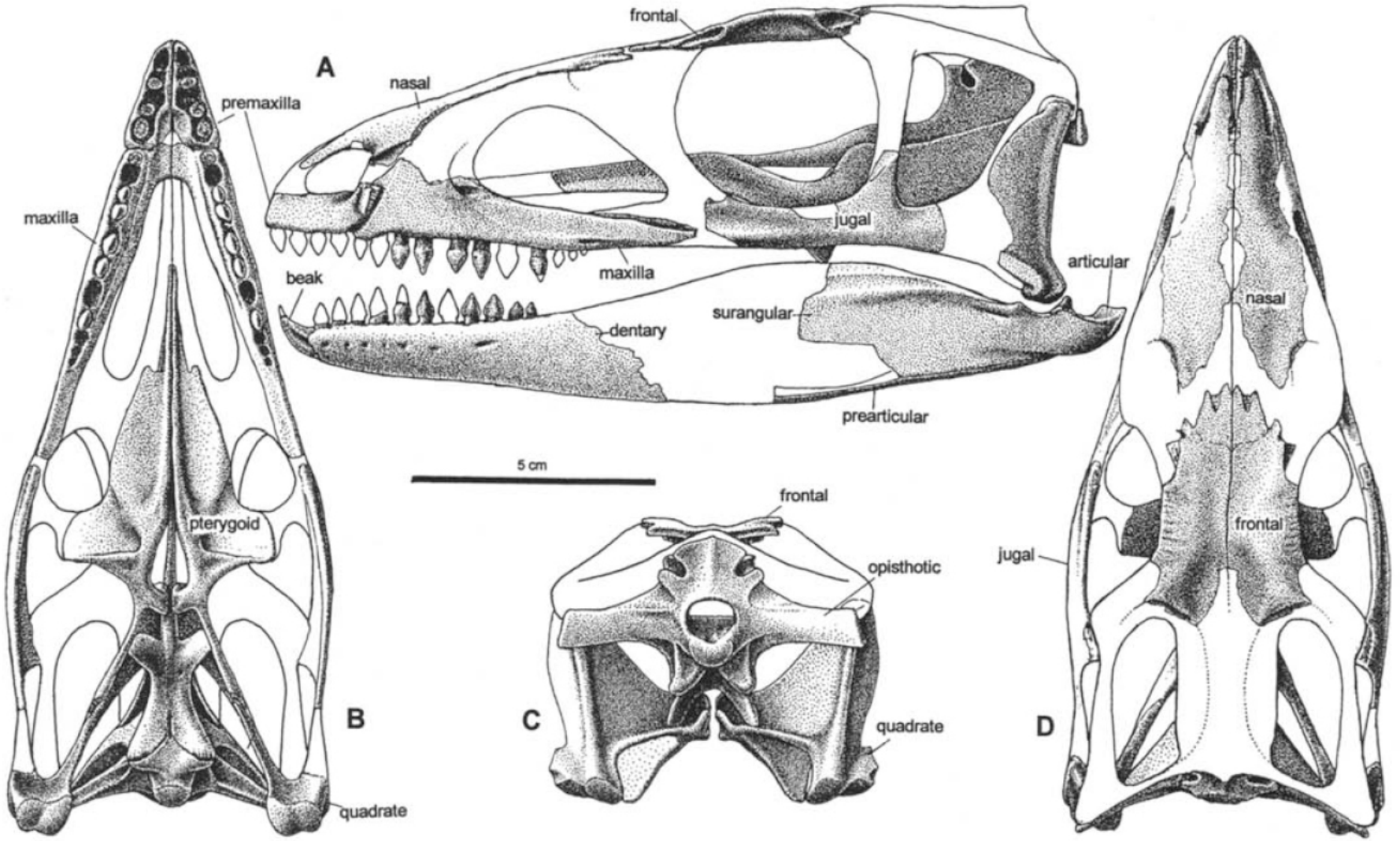


FIGURE 6. Tentative restoration of skull of *Silesaurus opolensis* from the early Late Triassic upper horizon in Krasiejów near Opole, Poland, based on isolated bones of specimens ZPAL Ab III/361 and ZPAL Ab III/437 (see Figs. 2 and 5). **A**, left lateral view, note the form of the tip of dentary that probably bore a horny beak; **B**, palatal view; **C**, posterior view; **D**, dorsal view.

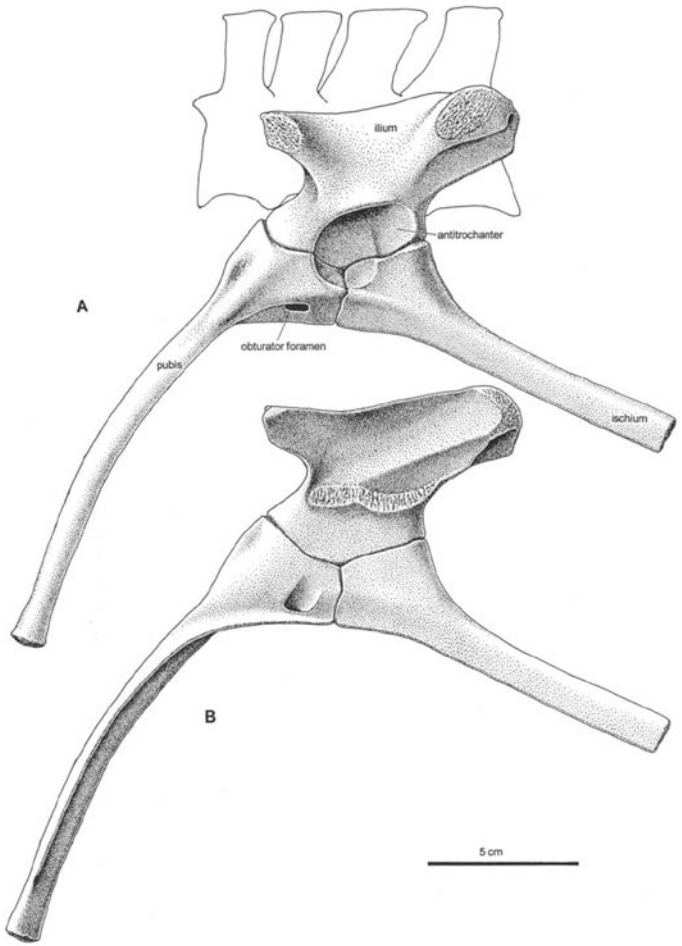


FIGURE 11. Restoration of pelvis of *Silesaurus opolensis* from the early Late Triassic upper horizon in Krasiejów near Opole, Poland; l lateral and medial views; based mainly on ZPAL Ab III/361.

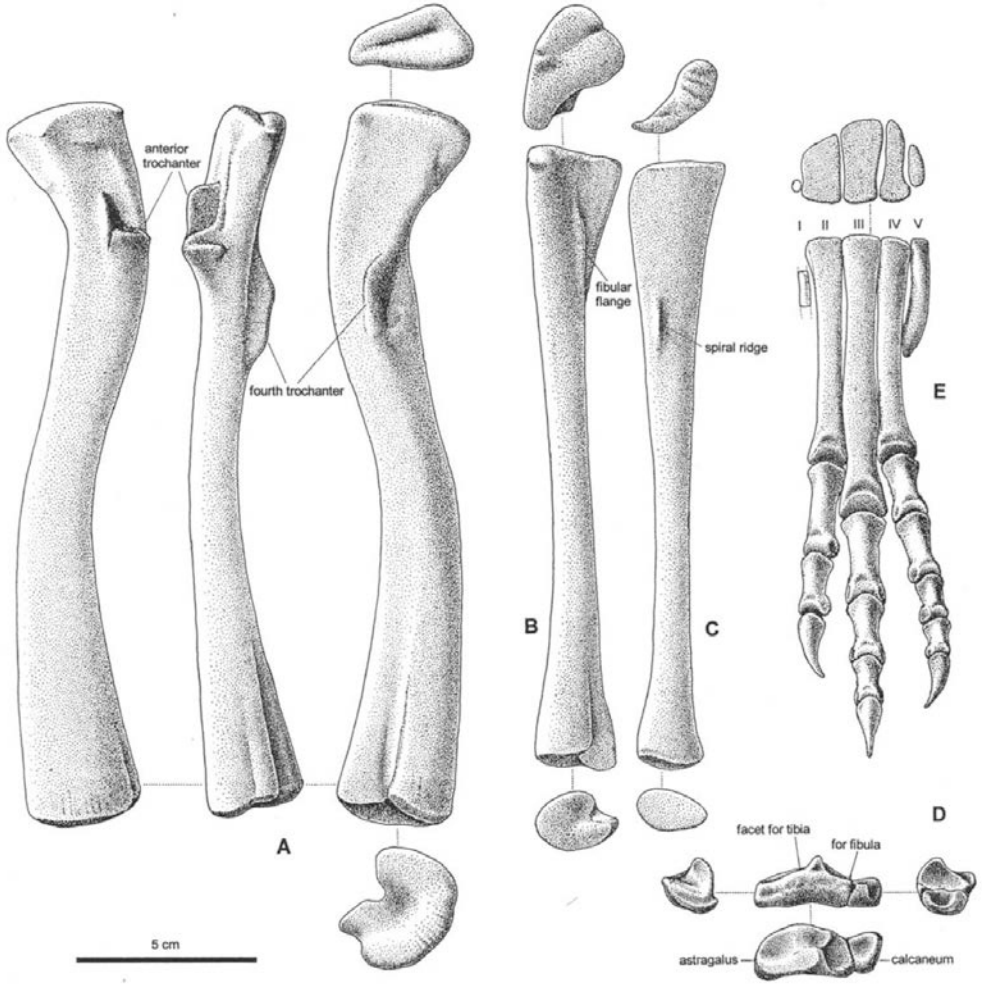
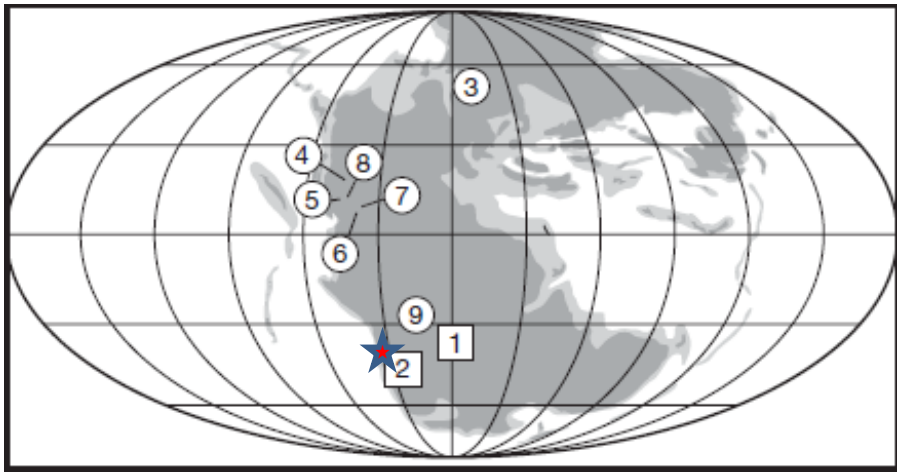
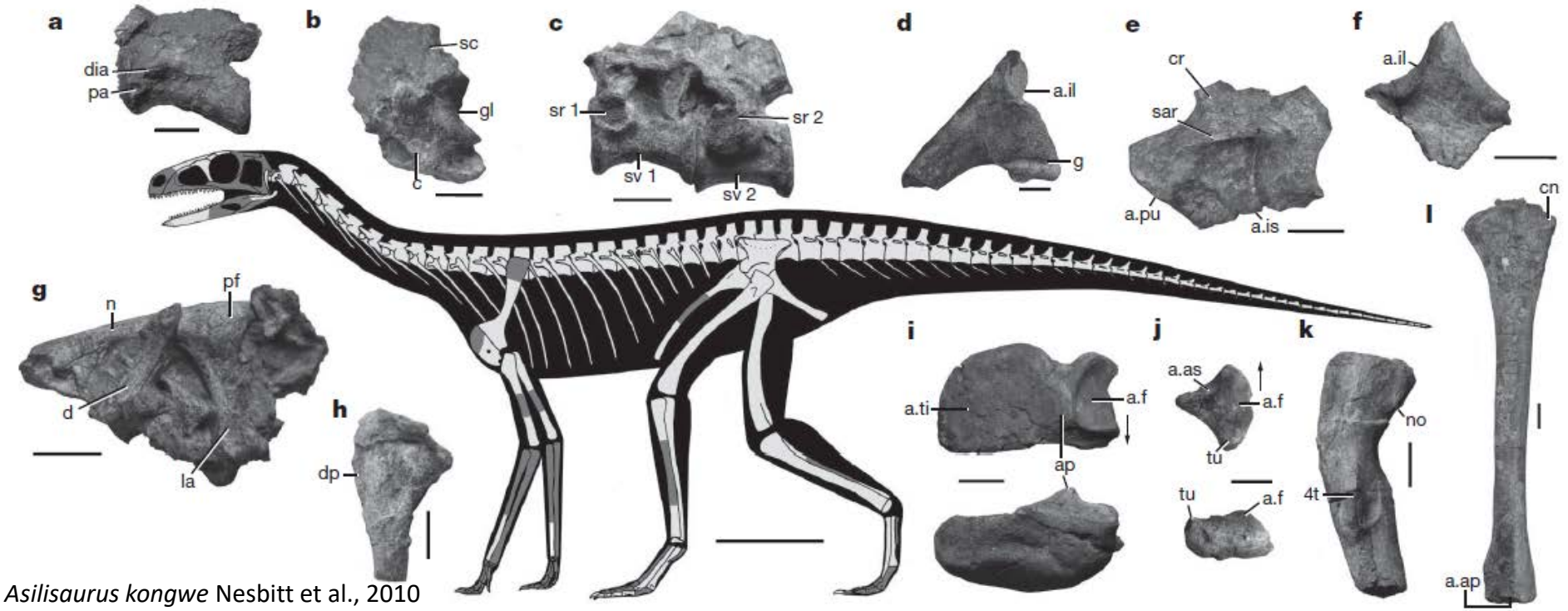


FIGURE 13. Restoration of hind limb elements of *Silesaurus opolensis* from the early Late Triassic upper horizon in Krasiejów near Opole, Poland. **A**, left femur in anterior, lateral, posterior, with proximal and distal views, based mainly on ZPAL Ab III/361/23. **B**, left tibia in proximal, anterior, and distal views. **C**, left fibula in proximal, anterior, and distal views, both based mainly on ZPAL Ab III/361/8. **D**, right astragalus and calcaneum in medial, posterior, lateral, and dorsal views, based mainly on ZPAL Ab III/361/20. **E**, restoration of right pes in anterior view with proximal view of ends of metatarsals.

Registro de SIlesauridae





Asilisaurus kongwe Nesbitt et al., 2010

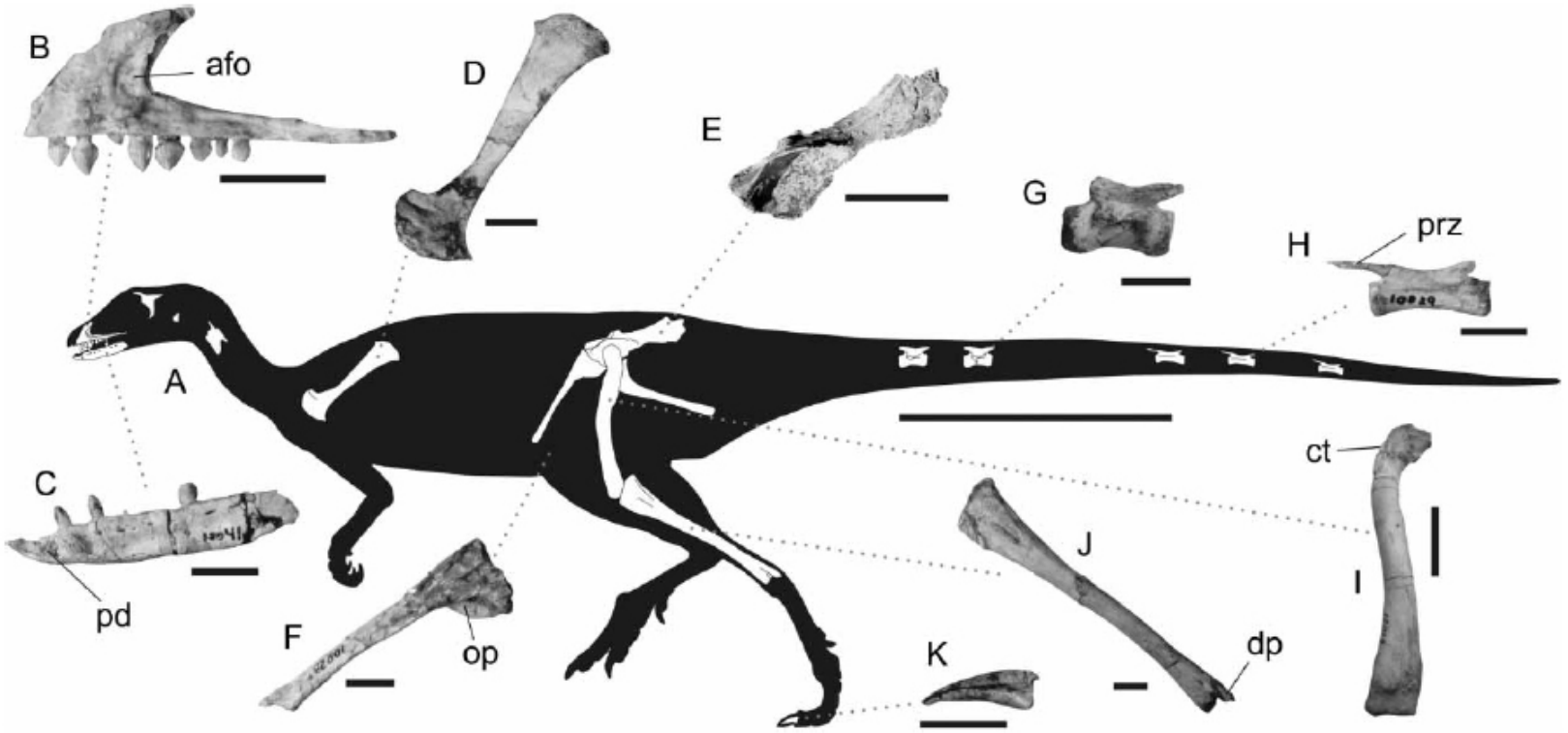


Figure 2. (A), skeletal reconstruction of *Sacisaurus agudoensis* gen. et sp. nov., with preserved bones on black outline based on *Lesothosaurus diagnisticus*. Scale bar = 20 mm. Individual bones referred to *S. agudoensis* in lateral (G–G, J–K) and cranial (I) aspects: (B), right maxilla (MCN PV10050, reversed); (C), partial left hemi-mandible (MCN PV10041, holotype); (D), right scapula (MCN PV10033, reversed); (E), left ilium (MCN PV10100); (F), left pubes (MCN PV10023); (G), mid-caudal vertebra (MCN PV10 097); (H), distal caudal vertebra (MCN PV10029); (I), right femur (MCN PV10019); (J), right tibia (MCN PV10020, reversed); (K), indeterminate ungual phalanx (MCN PV10096). Scale bars = 10 mm. Abbreviations: afo, antorbital fossa; ct, cranial trochanter; dp, descending process; op, obturator process; pd, predentary; prz, prezygapophisis.

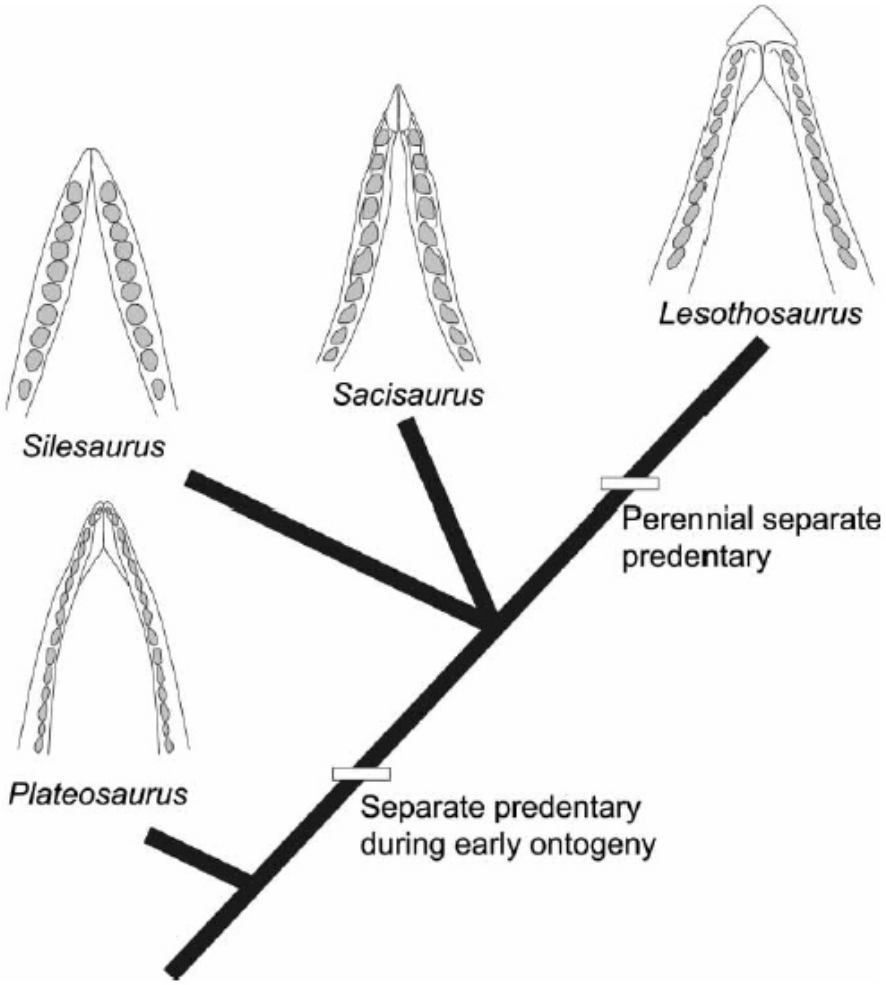


Figure 5. Graphic representation of the two-phase paedomorphocline suggested for the early evolution of ornithischians. Lower jaw reconstructions (in oclusal aspect) based on Galton (1984) for *Plateosaurus*, Sereno (1991) for *Lesothosaurus*, Dzik (2003) for *Silesaurus*, and MCN PV10044 for *Sacisaurus*.

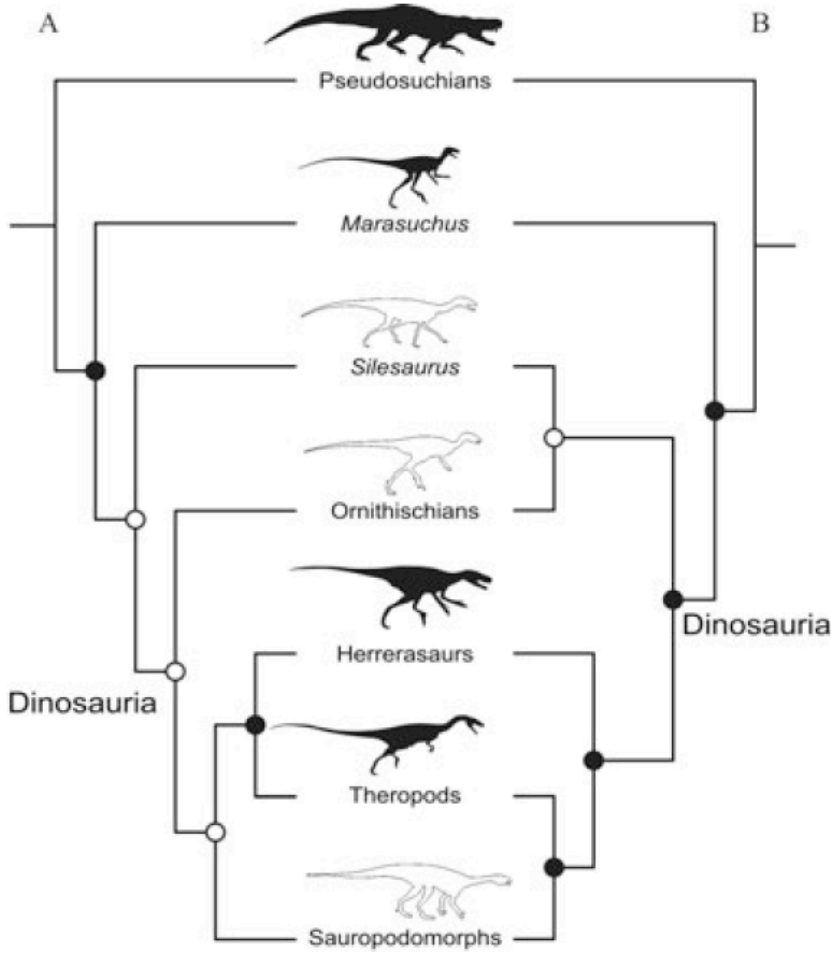
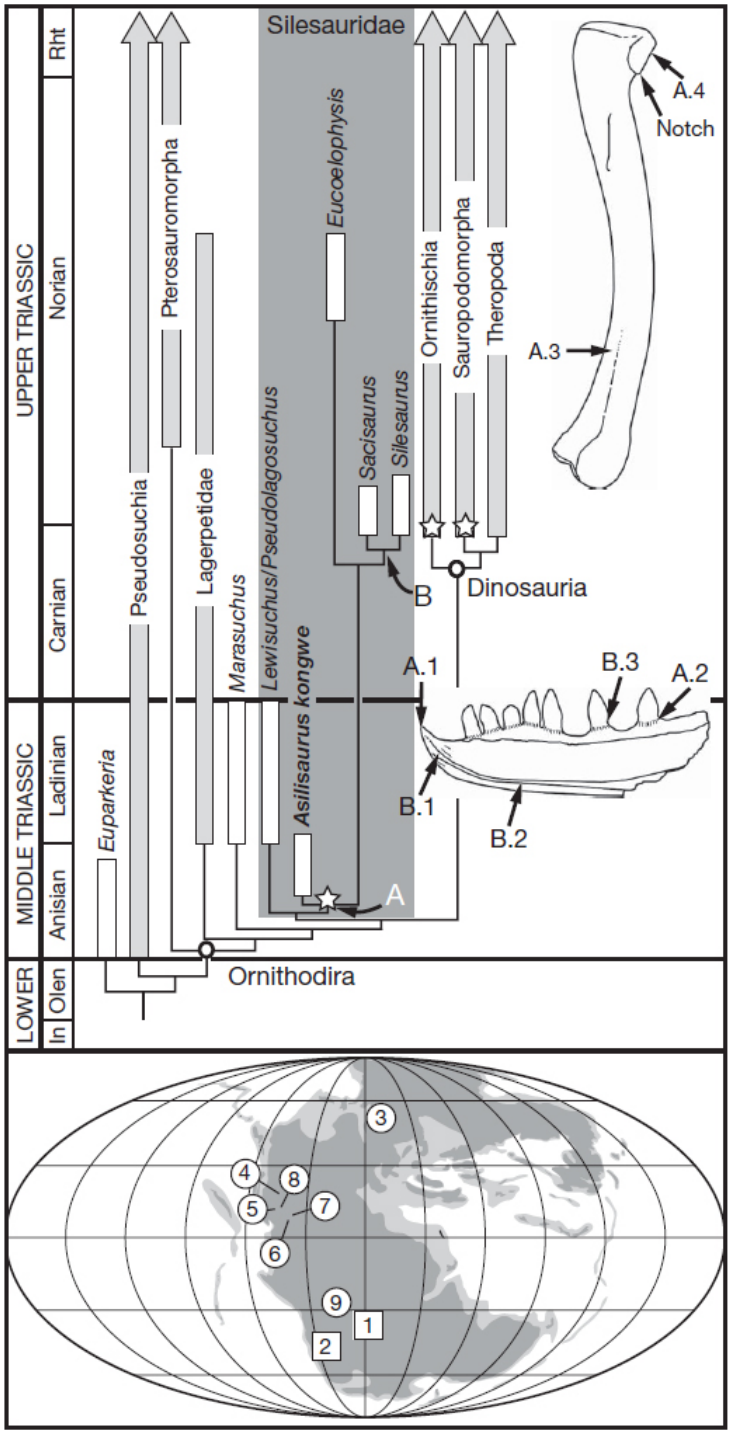


Fig. 14. Hypotheses of basal dinosaur/dinosauromorph relationships in which either omnivory (A) or carnivory (B) is unambiguously reconstructed as ancestral to Dinosauria. White and black silhouettes/circles, respectively, indicate omnivorous and carnivorous taxa/optimizations. Silhouettes adapted from various sources.

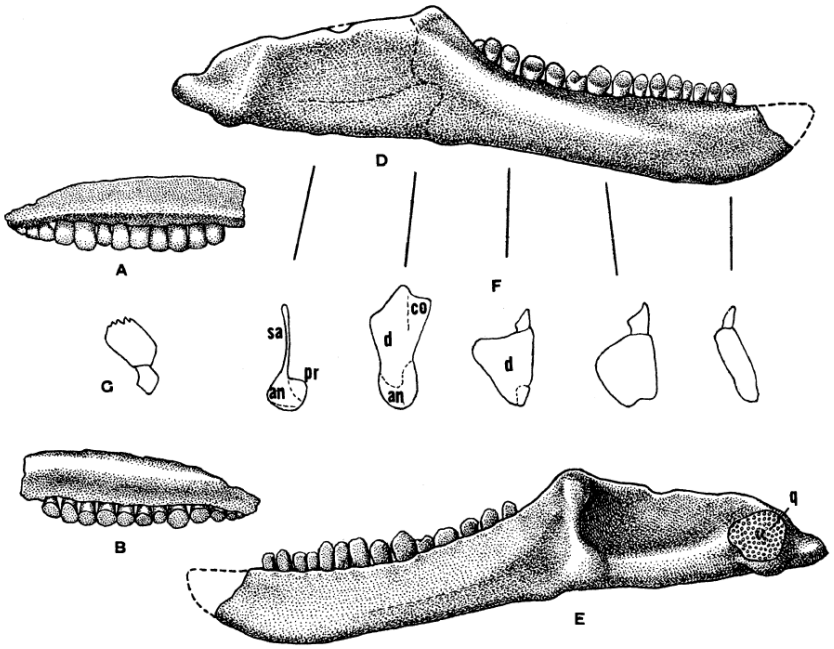
Filogenia de Dinosauriformes



Phylogenetic relationships of *Asilisaurus kongwe* within Archosauria and silesaurid biogeography. Strict consensus of six trees of an analysis with 33 taxa and 290 characters (Supplementary Information). Pseudosuchia, Ornithischia, Sauropodomorpha, Theropoda, Pterosauromorpha and Lagerpetidae have been collapsed for clarity. Stars indicate lineages with herbivorous or omnivorous diets. The length of the white bars indicates stratigraphic imprecision. Important synapomorphies for *Asilisaurus* plus *Silesaurus* illustrated on a left femur of *Silesaurus* in posteromedial view (top) and a right dentary of *Silesaurus* in medial view (bottom): A.1, anterior portion of dentary tapers to a point; A.2, teeth fused to the bone of attachment; A.3 division of the distal condyles of the femur divided for more than one-quarter length of the element; A.4, flat articular facet of the femur. Important synapomorphies for *Sacisaurus* plus *Silesaurus* (B): B.1, Meckelian groove extends through dentary symphysis; B.2, Meckelian groove restricted to the ventral margin of dentary; B.3, teeth with constricted roots. In, Induan; Olen, Olenekian; Rht, Rhaetian. Middle Triassic (squares): 1, *Asilisaurus*; 2, *Lewisuchus/Pseudolagosuchus*. Late Triassic taxa (circles): 3, *Silesaurus*; 4, Eagle Basin specimens; 5, Petrified Forest N.P. taxon; 6, Otis Chalk taxon; 7, *Technosaurus*; 8, *Eucoelophysis*; 9, *Sacisaurus*.

Reciente hallazgo de esqueletos completos de *Asilisaurus kongwe* confirma presencia de metatarso I bien desarrollado, calcáneo con tuberosidad bien prominente, acetábulo cerrado y cresta deltpectoral corta. Ostras similitudes con poscráneo de taxa problemáticos como *Lewisuchus* y *Agnosphytis* permite considerar a estos como Silesáridos (con dentición carnívora). También se confirma monofilia de Silesauridae. Adquisición de cuadrupedalismo y herbivoría sería independiente (Nesbitt et al., 2015; SVP abstract)

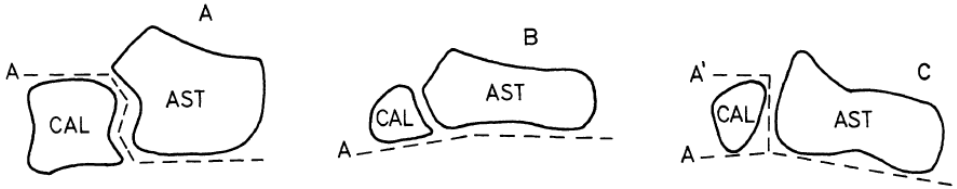
Pisanosaurus mertii: Silesauridae?



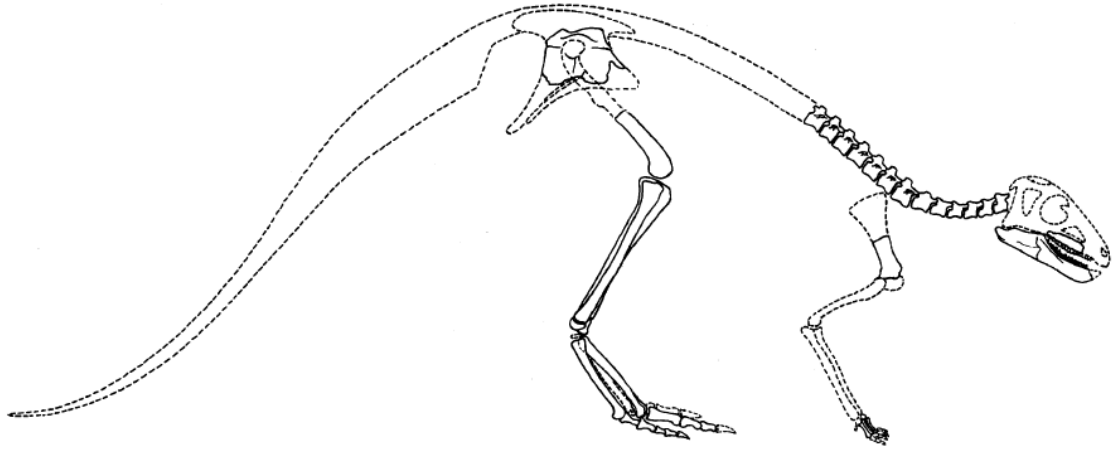
TEXT-FIG. 2—*Pisanosaurus mertii*, ×1. Incomplete right maxilla in *A*, lateral view; *B*, internal view; and *C*, section of the maxilla with the internal face on the left. Right lower jaw in *D*, lateral view; *E*, internal view; and *F*, sections of the jaw with the lateral side on the left. Abbrev.: an, angular; co, coronoid; d, dentary; pr, prearticular; q, fragment of the quadrate; and sa, surangular.

Una reciente re-evaluación del holotipo de *Pisanosaurus mertii* sugiere que es un Silesauridae (Agnolin, 2015 XXIXJAPV abstract; Agnolin, 2017).

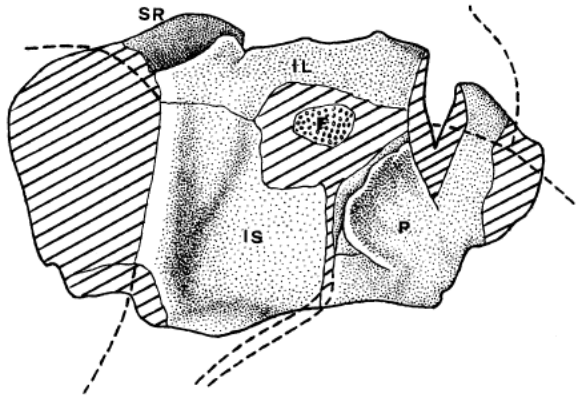
- Presencia de dientes anquilotecodontes (ankilosado a mandíbula) , sin alvéolo dentario reconocible.
- Fenestra mandibular es artefacto preservacional.
- Cadera no presenta acetábulo perforado.



TEXT-FIG. 6—Sketch of the tarsal condition in: *A*, Pseudosuchia and Crocodilia (crurotarsal); *B*, Prosauropoda (mesotarsal); and *C*, in *Pisanosaurus* which shows an intermediate stage.



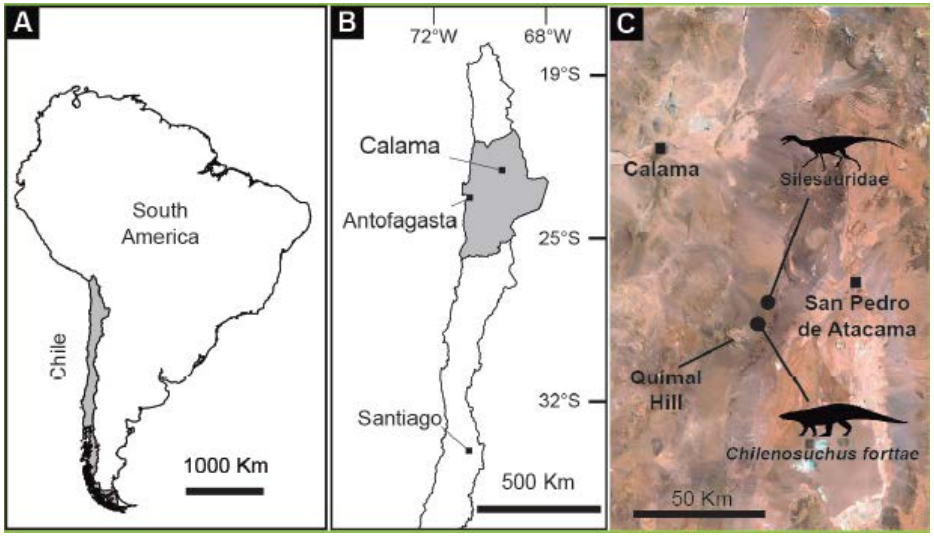
TEXT-FIG. 8—*Pisanosaurus mertii*, ×⅛. Reconstruction of the skeleton.

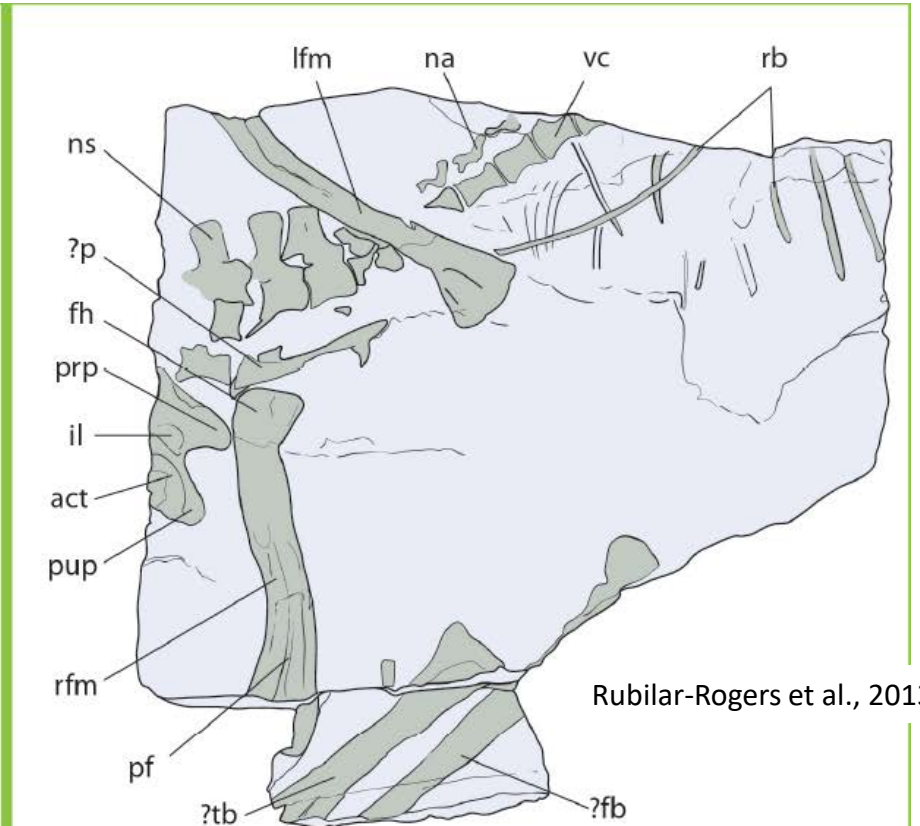


TEXT-FIG. 4—*Pisanosaurus mertii*, ×¾. Block of matrix with incomplete impression of the medial side of the pelvic bones, fragments of a sacral rib and of the head of the femur. Abbrev.: F, proximal fragment of femur; IL, ilium; IS, ischia; P, pubis; and SR, sacral rib.

Silesauridae de Cerro Quimal, Estratos El Bordo

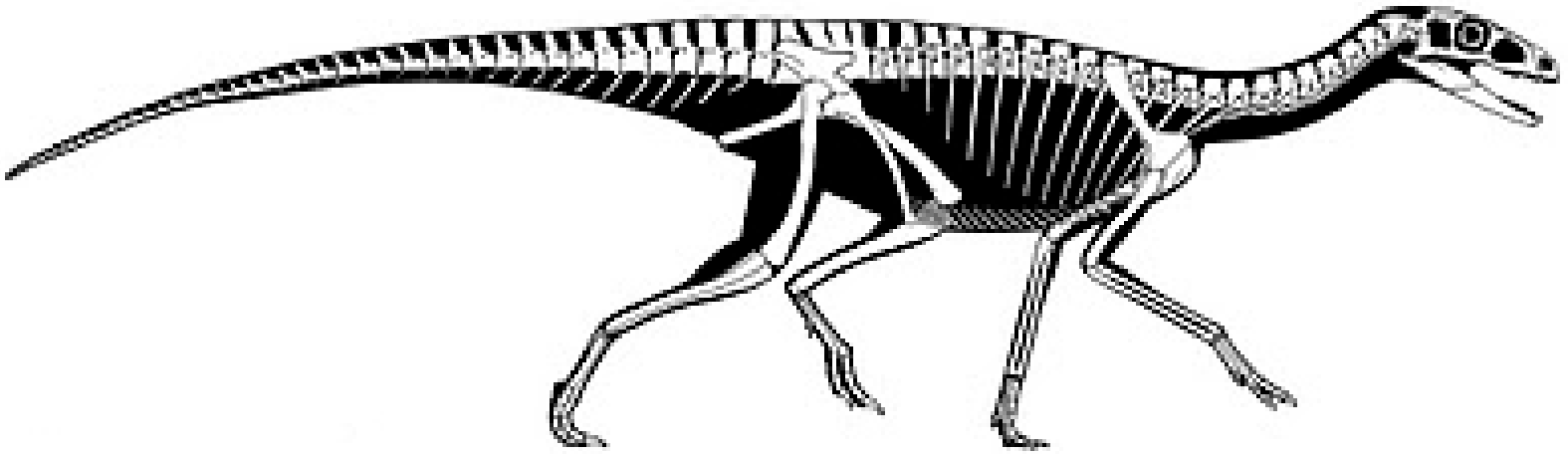
- Niveles continentales de Estratos El Bordo (Triásico medio-tardío)
- Pseudosuquios basales (aetosaurios) y ornithodiros basales (silesaurios)

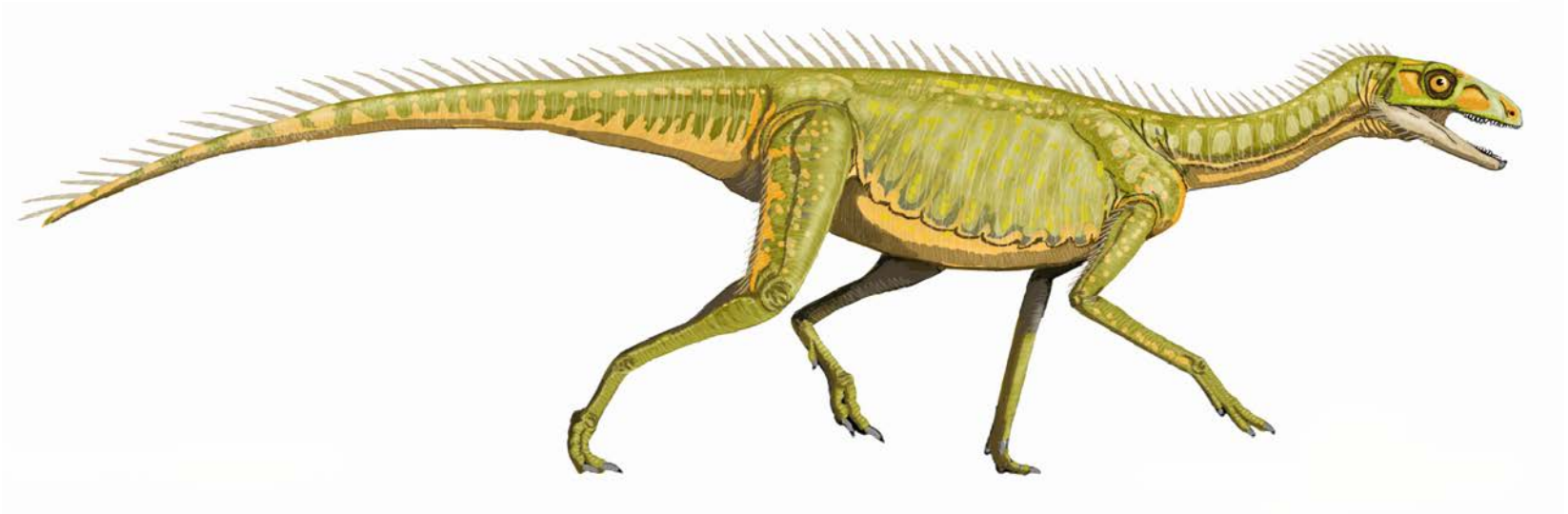




Rubilar-Rogers et al., 2013

Silesauridae de Cerro Quimal, Estratos El Bordo



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