

Data Repository Item 2003043

Characters used in the phylogenetic analysis.

- 1) Keel-like extension of the palatal rim posterior to the caniniform process present (1) or absent (0).
- 2) Premaxillary teeth present and located laterally (0), medially (1), or absent (2).
- 3) Premaxillae fused (1) or unfused (0).
- 4) Upper postcanine teeth located near lateral margins of maxilla (0), located more medially, but with more posterior teeth often approaching the lateral margin of maxilla (1), located medially and with teeth a constant distance from the margin of the maxilla (2), or absent (3).
- 5) Shelf-like area lateral to the upper postcanine teeth present (1) or absent (0).
- 6) Caniniform process absent (0), present (1), present with notch anterior to it (2).
- 7) Paired anterior ridges on premaxilla absent (0), present but converge posteriorly (1), or present and do not converge (2).
- 8) Posterior median ridge on premaxilla absent (0), present with a flattened, expanded anterior area (1), or present without a flattened, expanded anterior area (2).
- 9) Palatal surface of premaxilla with well-defined depressions with curved sides lateral to median ridge (0), with groove-like depressions that have straight sides and a rounded anterior end (1), or relatively flat with poorly defined or no depressions present (2).
- 10) Lower teeth present on dorsal surface of dentaries (0), present on a medial swelling or shelf (1), or absent (2).
- 11) Vomers fused (1) or unfused (0).
- 12) Mid-ventral plate of vomers with an expanded, oval-shaped area posterior to junction with premaxilla (0) or without a notably expanded area posterior to junction with premaxilla (1).

- 13) Mid-ventral plate of vomers relatively wide in ventral view (0) or more narrow and blade-like in ventral view (1).
- 14) Embayment of palatal rim anterior to caniniform process or tusk absent (0) or present (1).
- 15) Dentary table absent (0), present as a small, rounded expansion of the dorsal surface of the dentary located near the symphysis (1), present as an elongate grooved surface on the dorsal surface of the dentary bounded laterally by a low ridge and medially by a tall, thin, dorsally convex blade (2), or present as an elongate grooved surface on the dorsal surface of the dentary bounded by low ridges (3).
- 16) Posterior dentary sulcus present (1) or absent (0).
- 17) Lateral dentary shelf present but relatively small (1), present as a boss-like swelling that is located near ventral margin of jaw ramus (2), present and well-developed (3), or absent (0).
- 18) Symphyseal region of lower jaw with an upturned margin that is raised above the level of the dorsal surface of the jaw rami and has a scooped-out depression on its posterior surface (1), drawn into a sharp, spiky beak (2), shovel-shaped with a rounded or squared-off edge and a weak depression on its posterior surface (3), with a wedge-shaped margin that does not extend much above the dorsal surface of the jaw rami and has a groove-like depression on its posterior surface (4), or smoothly rounded and bearing teeth (0).
- 19) Labial fossa present (1) or absent (0).
- 20) Parietals widely exposed on the skull roof (0), postorbitals partially overlap parietals on skull roof, but parietals are exposed in a central groove or depression (1), parietals exposed on skull roof and postorbitals steeply placed on the lateral sides of the skull and concave laterally (2), postorbitals slope ventrolaterally and overlap parietals nearly completely (3), parietals exposed on dorsal skull roof between postorbitals that are nearly vertically placed on the side of skull, with flat lateral surfaces (4), or postorbitals slope slightly ventrolaterally for most of

their width and partially overlap the parietals, which from a slight crest along the midline of the skull (5).

- 21) Squamosal with lateral fossa for the origin of the lateral branch of the M. Adductor Mandibulae Externus (1) or without lateral fossa (0).
- 22) Palatal surface of the palatine without evidence of a keratinized covering (0), with a rounded, bulbous surface texture that may have had a keratinized covering (1), relatively smooth and flat, but with fine pitting and texturing suggestive of a keratinized covering (2), highly rugose and textured, suggesting a keratinized covering, with a raised posterior section and an anterior section that is flush with the secondary palate (3), moderately rugose with pitting suggesting a keratinized covering and flush with the secondary palate (4).
- 23) Nasal bosses absent (0), present as a median swelling with a continuous posterior margin (1), present as paired swellings near the dorsal or posterodorsal margin of external nares (2), present as paired swellings that meet in the midline to form a swollen anterodorsal surface on the snout (3).
- 24) Foramen present on the palatal surface of the palatine (1) or absent (0).
- 25) Anterior margin of orbit extended posteromedially to partly close off the snout from the rest of the skull (1) or snout open to back of the skull (0).
- 26) Pineal foramen flush or nearly flush with dorsal surface of skull (0), surrounded by a strong, rugose boss (1), or surrounded by a thin, smooth, chimney-like boss (2).
- 27) Anterior portion of palatine contacts the premaxilla (1) or does not contact the premaxilla (0).
- 28) Postcaniniform crest present (1) or absent (0).
- 29) Stapedial foramen absent (1) or present (0).
- 30) Proximal articular surface of humerus a slightly convex area on proximal surface of bone without much expansion onto the dorsal surface (0), somewhat expanded with some

encroachment onto the dorsal surface (1), or strongly developed and set off from rest of humerus by a weak neck (2).

- 31) Proximal articular surface of femur present as a weak swelling that is mostly limited to the proximal surface of the bone (0), present as a more rounded, hemispherical swelling that has some encroachment on the anterior surface of the femur (1), or present as a rounded, hemispherical to subspherical swelling that is set off from the proximal surface by a neck (2).
- 32) Squamosal with a distinct dorsolateral notch in posterior view (1) or with a relatively straight contour (0).
- 33) Interpterygoid vacuity relatively short and does not reach the level of the palatal exposure of the palatines (0), relatively long but does not reach the level of the palatal exposure of the palatines (1), long and reaches the level of the palatal exposure of the palatines (2), or absent (3).
- 34) Anterior portion of squamosal contacts maxilla (1) or does not contact maxilla (0).
- 35) Lateral palatal foramen present at level of the anterior, expanded palatal exposure of the palatines (1), present posterior and dorsal to the level of the anterior, expanded palatal exposure of the palatines (2), or absent (0).
- 36) Three (0), four (1), five (2) or six (3) sacral vertebrae present.
- 37) Transverse flange of the anterior pterygoid process well-developed (0) or reduced (1).
- 38) Ectepicondylar foramen on humerus present (1) or absent (0).
- 39) Cleithrum present (1) or absent (0).
- 40) Transverse ridge across snout at level of prefrontals present (1) or absent (0).
- 41) Floccular fossa present (0) or absent (1).
- 42) Stapedial facet of the basisphenoid-basioccipital tuber exposed laterally (0) or exposed ventrolaterally (1).

- 43) Ventral surface of the median pterygoid plate smooth and flat (1), with a thin median ridge (2), with a wide, boss-like median ridge (3), or depressed (0).
- 44) Ventral edge of the caniniform process or dorsal edge of the erupted portion of the canine tusk at level of the anterior margin of the orbit (1) or anterior to it (0).
- 45) Dorsal surface of the preparietal relatively flat and flush with the skull roof (0), with a depressed dorsal surface relative to surrounding skull roof (1), or absent (2).
- 46) Pterygoid contacts the maxilla anteriorly (1) or not (0).
- 47) Median ridge present on anterior surface of the snout (1) or absent (0).
- 48) Interparietal contributes intertemporal skull roof (1) or does not contribute to the intertemporal skull roof (0).
- 49) Prominent intertuberal ridge present (1) or absent (0).
- 50) Insertion of *M. latissimus dorsi* a rugose tuberosity on the posteroventral surface of the humerus (0) or extended into a dorsoventrally-flattened pinna-like process (1).
- 51) Zygomatic portion of the squamosal of nearly constant thickness and lacking a distinctly downturned section near posterior end (0) or posterior portion thickened and/or downturned (1).
- 52) Insertion of *M. iliofemoralis* present as a low rugosity on the dorsolateral portion of the femur (0) or developed into a distinct crest that extends down part of the lateral surface of the femur (1).
- 53) Fossa on the ventral surface of the intertemporal bar formed by the postorbital and parietal large (0), reduced (1), or absent (2).

Data matrix used in this analysis. Polymorphic character state codings are given in parentheses (e.g. (01) = 0 + 1).

Patranomodon ?0000000?0 000?000000 0000000?1? 0000000??0 ?00?00?00? 000
Otsheria ?0000000?? 11??????00 0000?21??? ?0000?0??0 ?00?20000? 0??

<i>Eodicynodon</i>	0200010100 0000103300 1110000000 0110100000 0030000000 000
<i>Robertia</i>	0211021101 1000201100 1210000010 0111101110 0021001000 000
<i>Diictodon</i>	0213?21102 1110201103 1210000010 0111111110 0021001000 000
<i>Endothiodon</i>	?112100021 100?112204 1220011?10 0110211000 003?001000 001
<i>Chelydontops</i>	0211110121 1100111100 121001001? ?11?1?1??0 ?(01)3000100? ??0
<i>Pristerodon</i>	0211011121 1000113100 1210001010 0111221000 0020000100 000
<i>Emydops</i>	1211010111 1111013300 1210001010 ?0111?11?0 0121000000 0?0
<i>Kingoria</i>	1213?10202 1101003305 121010(01)011 1110111?00 012000000? 010
<i>Cistecephalus</i>	1213?10212 1111013300 1211101002 2031101110 ?120200101 000
<i>Myosaurus</i>	1213?10212 1111003300 100110101? ?0(12)01?1??0 0121000001 0?0
<i>Tropidostoma</i>	0211012221 1100311101 1320001111 1121121000 0120001101 010
<i>Oudenodon</i>	0213?12222 1110311101 1320001111 1121121000 0120001101 010
<i>Rhachiocephalus</i>	0213?12222 1110311103 1320011111 ?111121000 0120001001 0?0
<i>Pelanomodon</i>	0213?12222 1110311112 132001111? ?1111?1?01 ?12001101? 1?0
<i>Aulacephalodon</i>	0213?12222 1100311112 1320011011 1111121001 01200010(01)1 110
<i>Dicynodon lacerticeps</i>	0213?12222 1110311113 141000101? ?1011?1??0 112000001? 0?1
<i>Lystrosaurus</i>	0213?12222 1110311410 14(12)0000011 1101131001 1120011011 010
<i>Kannemeyeria</i>	0213?12222 1110311414 1430001011 1101131000 1110111101 012
<i>Idelisaurus</i>	0213?12222 1100311111 13200011?? ?1111?1??0 ?12000100? 1?0
<i>Interpresosaurus</i>	0213?12?? ?1??0??03 ?0?0?00?? ???????0 ???10?0?? ???
<i>Elph</i>	0213?1?222 ???0311105 13000010?? ?1??1?1??0 ?11100000? 0??
<i>Dicynodon trautscholdi</i>	0213?12222 1110311114 131000101? ?1011?1??0 ?12011011? 0?1
<i>Delectosaurus</i>	0213?12222 1110????13 14100010?? ?1111?1??0 012001001? 0?1
<i>Vivaxosaurus</i>	0213?1222? 1100????14 13300010?1 ?1011?1000 1120110101 0?1
<i>Dicynodon amalitzkii</i>	0?1??1???? ??????11?4 1?1?00?01? ?1?1??1??0 ?1211?001? 0??
<i>Australobarbarus</i>	0212012221 111031110(13) 132000011? ?1211?1??0 ?120011(01)0? 0?0