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SUPPLEMENTARY ONLINE MATERIAL FOR

**A new proterochampsid archosauriform  
from the Middle-Late Triassic of Southern Brazil**

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**Supplementary Online Material**

**SOM 1.** List of morphological characters

**SOM 2.** Data matrix,

also available at [http://app.pan.pl/SOM/app69-Muller\\_SOM/SOM\\_2.tnt](http://app.pan.pl/SOM/app69-Muller_SOM/SOM_2.tnt)

**SOM 1.** List of morphological characters.

Characters were selected from the data matrix of Sengupta et al. (2024), with the exception of character 339.

1. Cranium and lower jaw, interdental plates
  - 0 absent
  - 1 present, small and well-spaced from each other
  - 2 present, large and close to or contacting with each other
  
2. Cranium, total length versus length of the presacral vertebral column
  - 0 <0.15
  - 1 0.18-0.38
  - 2 0.44-0.72
  - 3 0.94-0.98
  
3. Cranium, strongly dorsoventrally compressed skull with mainly dorsally facing antorbital fenestrae and orbits
  - 0 absent
  - 1 present
  
4. Cranium, well developed nodular prominences on the lateral surface of maxilla, jugal, quadratojugal, squamosal and angular
  - 0 absent
  - 1 present
  
5. Cranium, dermal sculpturing on the dorsal surface of the skull roof
  - 0 absent
  - 1 pits or low tubercles/ridges scattered across surface
  - 2 prominent ridges or tubercles on frontals, parietals, and nasals
  
6. Cranium, dorsal surface of nasals and/or frontals ornamented by ridges radiating from centres of growth
  - 0 absent
  - 1 present
  
7. Cranium, dorsal orbital margin
  - 0 orbital margin of the frontal level with skull table or raised slightly
  - 1 orbital margin of the frontal elevated above skull table
  - 2 shelf/ridge elevated above skull table extends along the lateral surface of the lacrimal, prefrontal, frontal portion of orbital rim, and postorbital
  
8. Cranium, dorsal surface of the temporal region
  - 0 flat
  - 1 supratemporal fossa immediately medial or anterior to the supratemporal fenestra
  - 2 thin, blade-like median sagittal crest

9. Skull, orbital medial margin
  - 0 rounded
  - 1 forming a marked angle
10. Skull openings, relative size of external naris
  - 0 as long as or shorter anteroposteriorly than the antorbital fenestra
  - 1 longer anteroposteriorly than the antorbital fenestra
11. Skull openings, relative size of orbit
  - 0 longer anteroposteriorly than antorbital fenestra
  - 1 equal or shorter anteroposteriorly than antorbital fenestra
12. Skull, maximum width versus length of the presacral vertebral column
  - 0 0.044-0.117
  - 1 0.132-0.208
  - 2 0.236-0.303
  - 3 0.336-0.440
  - 4 >0.5
13. External naris, anteroposterior position in the rostrum
  - 0 terminal, close to the anteriormost point of the premaxilla-maxilla suture
  - 1 nonterminal, considerably posteriorly displaced a distance equivalent to the length of the external naris from the anteriormost point of the premaxilla-maxilla suture, but posterior rim of the naris anterior to or at the level of the anterior border of the antorbital fenestra
  - 2 nonterminal, considerably posteriorly displaced a distance equivalent to the length of the external naris from the anteriormost point of the premaxilla-maxilla suture, and posterior rim of the naris posterior to the anterior border of the antorbital fenestra
14. External naris, facing
  - 0 laterally
  - 1 dorsally
  - 2 anteriorly
15. External naris, shape
  - 0 sub-circular
  - 1 non-sub-circular
16. Antorbital fenestra
  - 0 absent
  - 1 present
17. Antorbital fenestra, anterior margin in lateral view
  - 0 gently rounded
  - 1 nearly pointed
  - 2 with a squared or slightly obtuse anteroventral corner as a result of a sharp inflexion between the anterior and ventral margins
18. Orbit, shape

- 0 anteroposteriorly longer than tall
- 1 approximately as anteroposteriorly long as tall
- 2 dorsoventrally taller than long

19. Orbit, laterally thickened orbital rim along the jugal, postorbital, frontal, prefrontal and lacrimal
- 0 absent or incipient
  - 1 present, restricted to the ascending process of the jugal and sometimes also onto the ventral process of the postorbital
  - 2 present, well-developed along the jugal, postorbital, frontal, prefrontal and lacrimal
20. Infratemporal fenestra
- 0 present
  - 1 absent
21. Posttemporal fenestra, size
- 0 larger than or subequal to the supraoccipital
  - 1 smaller than the supraoccipital
  - 2 developed as a small foramen
  - 3 absent
22. Rostrum, rostrum length (anterior tip of the skull to anterior margin of the orbit) versus total length of the skull
- 0 0.29-0.40
  - 1 0.43-0.64
  - 2 0.70-0.76
23. Rostrum, dorsoventral height at the level of the anterior tip of the maxilla versus dorsoventral height at the level of the anterior border of the orbit
- 0  $\leq 0.33$
  - 1 0.40-0.52
  - 2 0.59-0.80
  - 3  $> 1.00$
24. Rostrum, proportions at the level of the anterior border of the orbit
- 0 transversely broader than dorsoventrally tall or subequal
  - 1 dorsoventrally taller than transversely broad
25. Rostrum, lateral margin of the snout anterior to the prefrontal
- 0 formed by the nasal
  - 1 formed by the nasal and maxilla with gently rounded transition along the maxilla from the lateral to dorsal side of rostrum
  - 2 formed by the nasal and maxilla with sharp edge along the maxilla between the lateral and dorsal sides of this bone (= box-like snout of Kischlat, 2000)
26. Premaxilla-maxilla, suture
- 0 simple continuous contact
  - 1 notched along the ventral margin

27. Premaxilla-maxilla, subnarial foramen between the elements  
 0 absent  
 1 present and the border of the foramen is present on both the maxilla and the premaxilla  
 2 present and the border of the foramen is present on the maxilla but not on the premaxilla
28. Premaxilla, alveolar margin does not reach the contact with the maxilla and forms a diastema (= subnarial gap)  
 0 absent  
 1 present
29. Premaxilla, main body size  
 0 small, the premaxillary body forms less than half of rostrum in front of the posterior border of the external nares  
 1 large, the premaxillary body forms half or more than half of rostrum in front of the posterior border of the external nares
30. Premaxilla, anteroposterior length of the main body versus its maximum dorsoventral height  
 0 0.70-0.73  
 1 1.07-2.00  
 2 2.22-3.80  
 3 4.15-4.68  
 4 >5.00
31. Premaxilla, downturned main body  
 0 absent, alveolar margin sub-parallel to the main axis of the maxilla  
 1 slightly, alveolar margin kinked approximately 20° from the alveolar margin of the maxilla  
 2 strongly, prenarial process obscured by the postnarial process in lateral view (if the postnarial process is long enough) and postnarial process parallel or posteroventrally oriented with respect to the main axis of the premaxillary body
32. Premaxilla, angle formed between the alveolar margin and the anterior margin of the premaxillary body in lateral view  
 0 acute or right-angled  
 1 obtuse
33. Premaxilla, narial fossa  
 0 absent or shallow  
 1 expanded in the anteroventral corner of the naris
34. Premaxilla, prenarial process (= nasal process) length  
 0 absent  
 1 developed as a very short, approximately as long as or shorter than its anteroposterior depth at base  
 2 well-developed, less than the anteroposterior length of the main body of the premaxilla

3 well-developed, greater than the anteroposterior length of the main body of the premaxilla

35. Premaxilla, base of the prenasal process (= nasal process)  
0 anteroposteriorly shallow  
1 anteroposteriorly deep
36. Premaxilla, postnasal process (= maxillary process)  
0 absent or incipient  
1 short, ends well anterior to the posterior margin of the external naris  
2 well-developed, forms the vast majority of the ventral border of the external naris
37. Premaxilla, postnasal process  
0 wide, platelike  
1 thin
38. Premaxilla, sharp dorsal flange at the base of the postnasal process delimiting the posteroventral border of the external naris  
0 absent  
1 present
39. Premaxilla, postnasal process  
0 fits between the nasal and the maxilla or lies on the anterodorsal surface of the maxilla, always lateral to these bones  
1 overlaps the anterodorsal surface of the nasal  
2 fits into slot of the nasal  
3 is overlapped by an anterolateral lamina of the maxilla
40. Premaxilla, palatal process on the medial surface  
0 absent  
1 present
41. Premaxilla, number of tooth positions  
0 10 or more  
1 5 or more  
2 4  
3 three  
4 2  
5 1 or edentulous
42. Premaxilla, alveolar margin in lateral view  
0 straight  
1 distinctly convex
43. Maxilla, anterior extent  
0 posterior to the anterior extent of the nasals  
1 anterior to the nasals

44. Maxilla, length of the portion of the bone anterior to the antorbital fenestra versus the total length of the bone  
0 0.12-0.22  
1 0.29-0.60  
2 0.64-0.76
45. Maxilla, anterior maxillary foramen  
0 absent  
1 present
46. Maxilla, antorbital fossa on the lateral surface of the bone  
0 absent or not exposed in lateral view  
1 present on the ascending process of the maxilla, but not along the horizontal process (= posterior process) of the maxilla  
2 present on the horizontal process (= posterior process) of the maxilla ventral to the antorbital fenestra, but not reaching the posteroventral corner of the maxillary contribution to the border of the opening  
3 present on the horizontal process (= posterior process) of the maxilla ventral to the antorbital fenestra, reaching the posteroventral corner of the maxillary contribution to the border of the opening
47. Maxilla, anteroposterior length of the antorbital fossa anterior to the antorbital fenestra versus length of the antorbital fenestra  
0 0.09-0.24  
1 0.28-0.66  
2 0.83-0.94  
3 >2.00
48. Maxilla, width of ascending process in lateral view, excluding the area that articulates with the lacrimal  
0 tapers at some point of its length  
1 remains the same width along all its length or broadens
49. Maxilla, contact with prefrontal  
0 absent  
1 present
50. Maxilla, shape of the posterior portion of the bone (ventral to the antorbital fenestra if it is present)  
0 tapers posteriorly  
1 has a similar dorsoventral depth as the anterior portion ventral to the antorbital fenestra  
2 expands dorsoventrally towards the distal end of the horizontal process with a concave ventral margin of the antorbital fenestra  
3 expands dorsoventrally towards the distal end of the horizontal process with a straight ventral margin of the antorbital fenestra
51. Maxilla, triangular dorsal process with clear dorsal apex formed by discrete expansion of the posterior end of the horizontal process in lateral view  
0 absent

1 present

52. Maxilla, palatal process on the anteromedial surface of the bone
- 0 absent
  - 1 present and both counterparts do not meet at the midline
  - 2 present and both counterparts meet at the midline
53. Maxilla, position of the palatal process
- 0 adjacent to the ventral margin of the medial surface of the maxilla or base of the interdental plates if they are present
  - 1 distinctly dorsally to the ventral margin of the medial surface of the maxilla or base of the interdental plates if they are present
54. Maxilla, alveolar margin in lateral view
- 0 concave, straight or gently convex
  - 1 distinctly convex
  - 2 sigmoid, anteriorly concave and posteriorly convex
  - 3 sigmoid, anteriorly convex, starting close to mid-length, and posteriorly concave
55. Maxilla, edentulous anterior portion of the ventral margin of the bone
- 0 absent
  - 1 present
56. Maxilla, alveolar margin on the anterior third of the bone (anterior to the level of the anterior border of the antorbital fenestra if present)
- 0 approximately aligned to the posterior half of the alveolar margin
  - 1 distinctly upturned
57. Maxilla, posterior extension in non-early juvenile individuals in lateral view
- 0 at level or posterior to posterior orbital border
  - 1 anterior to posterior orbital border but posterior to anterior orbital border
  - 2 at level or anterior to anterior orbital border
58. Maxilla, number of tooth positions (if the maxillary tooth count is not available the character can be scored using the dentary tooth count)
- 0 4-7 (<7 dentary tooth positions)
  - 1 8-9 (8-10 dentary tooth position)
  - 2 10-14 (10-17 dentary tooth positions)
  - 3 15-22 (13-25 dentary tooth positions)
  - 4 23-35 (26-40 dentary tooth positions)
  - 5 >36 (>41 dentary tooth positions)
59. Maxilla, neurovascular foramina on the lateral surface
- 0 absent
  - 1 present
60. Maxilla, shape of the ascending process of the maxilla in lateral or medial view
- 0 straight
  - 1 posteriorly arched



61. Maxilla, ventral margin of the antorbital fossa  
 0 smooth (continuous to the more ventral area)  
 1 elevated relative to the ventral surface (sharp longitudinal ridge present) (= alveolar ridge)
62. Nasal, total length versus total length of the frontal  
 0 0.68-0.79  
 1 0.90-2.07  
 2 2.26-3.09
63. Nasal, dorsal surface around posterior margin of external naris with a depression that lacks sculpturing  
 0 absent  
 1 present
64. Nasal, small lateral process that excludes the anteriormost tip of the prefrontal from the lateral margin of the skull roof  
 0 absent  
 1 present
65. Lacrimal, exposure on the skull roof in dorsal view  
 0 absent or marginal  
 1 present
66. Lacrimal, anterior process forming the entire or almost the entire dorsal border of the antorbital fenestra  
 0 absent  
 1 present
67. Lacrimal, antorbital fossa forming a distinct inset margin to the antorbital fenestra on the lateral surface of the bone  
 0 absent  
 1 present, but strongly restricted anteriorly  
 2 present and occupies almost half or more of the anteroposterior length of the ventral process
68. Lacrimal, naso-lacrimal duct  
 0 completely enclosed by the lacrimal  
 1 enclosed by the lacrimal and prefrontal
69. Lacrimal, shape of ventral process in lateral view  
 0 does not fold over the posterodorsal part of the antorbital fenestra  
 1 folds and extends over the posterodorsal part of the antorbital fenestra
70. Lacrimal, height  
 0 distinctly less than the height of the orbit and usually fails to reach the ventral margin of the orbit  
 1 approximately as high as the orbit and contacts the jugal at the level of the ventral margin of the orbit

71. Jugal-quadratojugal, ventral margin in lateral view  
 0 straight or convex  
 1 concave, though nowhere dorsal to tooth row
72. Jugal, anterior process shape in lateral view  
 0 continuously tapering or subrectangular, being lower than the portion of the maxilla underneath it  
 1 subrectangular or slightly dorsoventrally expanded, being higher than the portion of the maxilla underneath it  
 2 with an ascending subprocess excluding the lacrimal from the posteroventral border of the antorbital fenestra  
 3 with a strongly developed ascending subprocess that excludes the lacrimal from the posterior border of the antorbital fenestra
73. Jugal, participation of the anterior process in the border of the antorbital fenestra  
 0 present  
 1 absent, excluded by contact between the maxilla and lacrimal
74. Jugal, longitudinal ridge or bump(s) on the lateral surface of the main body  
 0 absent  
 1 present
75. Jugal, ascending process forming the entire anterior border of the infratemporal fenestra  
 0 absent  
 1 present, postorbital excluded from the anterior border of the infratemporal fenestra
76. Jugal, length of the posterior process versus the height of its base  
 0 posterior process absent  
 1 0.49-1.27  
 2 1.59-3.77  
 3 4.07-5.37
77. Jugal, posterior process forms entirely or almost entirely the ventral border of the infratemporal fenestra (it also applies in the lower temporal bar is incomplete)  
 0 absent  
 1 present
78. Jugal, posterior process  
 0 lies dorsal to the anterior process of the quadratojugal  
 1 lies ventral to the anterior process of the quadratojugal  
 2 splits the anterior process of the quadratojugal  
 3 is split by the anterior process of the quadratojugal
79. Jugal, participation in a well posteriorly rimmed antorbital fossa  
 0 absent  
 1 present
80. Jugal, height below the most ventral level of the orbit in lateral view

- 0 lower than half the maximum height of the orbit
- 1 equal or higher than half of the maximum height of the orbit

81. Jugal, orientation of the ascending process in lateral view when articulated with the maxilla

- 0 mainly dorsal to posterodorsal in an angle higher than 45°
- 1 strongly posterodorsally oriented in an angle equal to or lower than 45°

82. Jugal, long axis of the body when articulated with the maxilla

- 0 nearly horizontal to the alveolar margin of the maxilla
- 1 oblique to the alveolar margin of the maxilla

83. Jugal, ventral margin across anterior and posterior processes in lateral or medial view

- 0 straight or forming an angle of more than 180°
- 1 forming angle of less than 180°

84. Prefrontal, lateral surface of the orbital margin

- 0 smooth or slight grooves present
- 1 rugose sculpturing present

85. Frontal, suture with the nasal

- 0 transverse
- 1 oblique, forming an angle of at least 60° with long axis of the skull and frontal(s) entering between both nasals
- 2 oblique, and nasal entering considerably between frontal(s)

86. Frontal, orbital border

- 0 absent or anteroposteriorly short
- 1 anteroposteriorly long and forms most of the dorsal edge of the orbit

87. Frontal, dorsal surface

- 0 flat or slightly depressed
- 1 with longitudinal ridge along midline

88. Frontal, suture with parietal

- 0 mostly transverse or parietals slightly entering between frontals on the median line, forming an obtuse-angled suture
- 1 parietals strongly entering between both frontals, forming an acute-angled suture
- 2 W-shaped suture

89. Frontal, participates on the anteromedial corner of the supratemporal fossa

- 0 absent
- 1 present
- 2 inapplicable in taxa that lack a supratemporal fossa or fenestra (-)

90. Postfrontal

- 0 equivalent in size to postorbital
- 1 reduced to approximately less than half the dimensions of the postorbital

2 absent

91. Postorbital-jugal, postorbital bar  
0 composed both of the jugal and postorbital in nearly equal proportion  
1 composed mostly by the postorbital
92. Postorbital-squamosal, upper temporal bar  
0 positioned distinctly ventral to the level of the dorsal border of the orbit, broadly exposing the supratemporal fenestra in lateral view  
1 positioned approximately aligned to the dorsal border of the orbit and the supratemporal fenestra is almost not exposed in lateral view
93. Postorbital, lateral boss adjacent to orbital margin  
0 absent  
1 present
94. Postorbital, supratemporal fossa extending onto the ascending process  
0 absent  
1 present
95. Postorbital, posterior process extends close to or beyond the level of the posterior margin of the supratemporal fenestrae  
0 absent  
1 present
96. Postorbital, extension of the ventral process  
0 ends much higher than the ventral border of the orbit  
1 ends close to or at the ventral border of the orbit
97. Postorbital, ventral process in lateral view  
0 continuously anteriorly curved or straight  
1 distinctly anteriorly flexed
98. Postorbital, depression on the lateral surface of the ventral process  
0 absent  
1 present
99. Postorbital, anteriorly projected, rounded suborbital process on the ventral process delimiting the eye-ball  
0 absent  
1 present
100. Postorbital, anterior process  
0 equal to or longer than the posterior process  
1 shorter than the posterior process
101. Squamosal, completely covering the quadrate in lateral view  
0 present  
1 absent

102. Squamosal, overhanging quadrate laterally  
0 absent  
1 present
103. Squamosal, anterior process forms most of the lateral border of the supratemporal fenestra  
0 absent  
1 present
104. Squamosal, anteroventral process  
0 absent  
1 present
105. Squamosal, transition between the anterior and ventral processes  
0 sharp, squared posterodorsal border of the infratemporal fenestra  
1 gentle, widely rounded posterodorsal border of the infratemporal fenestra
106. Squamosal medial process  
0 short, forming approximately half or less of the posterior border of the supratemporal fenestra  
1 long, forming entirely or almost entirely the posterior border of the supratemporal fenestra
107. Squamosal, posterior process  
0 does not extend posterior to the head of the quadrate  
1 extends posterior to the head of the quadrate
108. Squamosal, posterior process shape  
0 straight  
1 ventrally curved
109. Squamosal, ventral process shape  
0 anteroposteriorly broad and plate-like  
1 anteroposteriorly narrow and strap-like
110. Squamosal, ventral process orientation  
0 posteroventrally directed, vertical, or more than 45° from the vertical  
1 anteroventrally directed at 45° or less
111. Squamosal, contribution of the ventral process to the posterior border of the infratemporal fenestra  
0 forms less than half of the border of the fenestra  
1 forms more than half of the border, but quadratojugal or quadrate broadly participates in the border of the fenestra  
2 forms almost completely the border of the fenestra
112. Squamosal, posterodorsal portion with a supratemporal fossa  
0 absent  
1 present

113. Squamosal, suture with the posterior process of the postorbital  
 0 mainly straight and diagonal  
 1 V-shaped, with a posteriorly oriented apex
114. Quadratojugal  
 0 absent or fused to the quadrate  
 1 present
115. Quadratojugal, infratemporal fossa marked by a sharp edge  
 0 absent  
 1 present
116. Quadratojugal, anterior process  
 0 absent, anteroventral margin of the bone rounded  
 1 incipient, short anterior prong on the anteroventral margin of the bone  
 2 distinctly present, in which the lower temporal bar is complete, but process finishes well posterior to the base of the posterior process of the jugal  
 3 distinctly present, in which the lower temporal bar is complete and participates in the posteroventral border of the infratemporal fenestra, and process finishes close to the base of the posterior process of the jugal
117. Quadratojugal, widely concave notch on the anterior margin of the ascending process  
 0 absent  
 1 present
118. Quadratojugal, orientation of the main axis of the dorsal process with respect to the coronal plane of the skull  
 0 approximately vertical (ca. 90°) or slightly anterodorsally to posteroventrally oriented in an angle higher than 60°  
 1 moderately anterodorsally to posteroventrally slanted in an angle between 60° and 40°  
 2 strongly anterodorsally to posteroventrally slanted in an angle lower than 40°
119. Quadratojugal, dorsal process  
 0 longer than the anterior process  
 1 equal to or shorter than the anterior process
120. Parietal, extension over interorbital region  
 0 absent or marginal  
 1 present
121. Parietal, supratemporal fossa medial to the supratemporal fenestra  
 0 well exposed in dorsal view and mainly dorsally or dorsolaterally facing  
 1 poorly exposed in dorsal view and mainly laterally facing
122. Parietal, distinct transverse emargination adjacent to the posterior margin of the bone in late ontogeny  
 0 absent  
 1 present

123. Parietal, posterolateral process  
0 nearly vertical  
1 ventrally inclined greater than 45°
124. Parietal, posterolateral process height  
0 dorsoventrally low, usually considerably lower than the supraoccipital  
1 dorsoventrally very deep, being plate-like in occipital view and subequal to the height of the supraoccipital
125. Parietal, median posterior projection in dorsal view  
0 present  
1 absent, the posterior margin of the skull roof is concave or straight
126. Postparietal, size  
0 sheet-like, both together not much narrower than the suproccipital  
1 small, splint-like  
2 absent as a separate ossification
127. Quadrate, shape  
0 straight posteriorly  
1 shallowly emarginated  
2 with conch
128. Quadrate, angle between the posterior margins of the dorsal and ventral ends  
0 41-47°  
1 60-96°  
2 106-137°  
3 143-158°
129. Quadrate, proximal head  
0 partially exposed laterally  
1 completely covered by the squamosal
130. Vomer, teeth  
0 present, more than one row or no rows are distinguishable  
1 present, mainly in a single row, but multiple teeth present immediately anterior to the contact with the pterygoid  
2 present, single row along entire extension or single tooth  
3 absent
131. Palatine-pterygoid, teeth on the palatine and/or ventral surface of the anterior ramus of the pterygoid  
0 present  
1 absent
132. Palatine, transverse extension  
0 narrow, subequal contribution of the palatine and pterygoid to or pterygoid main component of the palate posteriorly to the choanas

- 1 broad, the palatine is the main component of the palate posteriorly to the choanas
133. Palatine, anterior processes forming the posterior border of the choana
- 0 subequal in anterior extension or anterolateral process longer
  - 1 anteromedial process longer
  - 2 single process
134. Pterygoids, contact with each other
- 0 present, anteriorly
  - 1 absent, remain separate along their entire length
135. Pterygoid, anterior ramus (= palatal process)
- 0 extends anterior to the anterior limit of the palatine
  - 1 forms oblique suture with palatine but process ends before reaching anterior limit of palatine
  - 2 forms transverse suture with palatine
136. Pterygoid, anterior ramus (= palatal process) shape
- 0 transversely broad at its base, converging gradually with the transverse ramus
  - 1 transversely narrow along its entire extension, converging in a right or acute angle with the transverse ramus and the bone acquires an overall L-shape contour in ventral or dorsal view
137. Pterygoid, teeth on the ventral surface of the anterior ramus (= palatal process), excluding tiny palatal teeth if present
- 0 present in two distinct fields (= T2 and T3 of Welman, 1998)
  - 1 present in three distinct fields (= T2, T3a and T3b)
  - 2 present in three distinct fields (= T2a, T2b and T3)
  - 3 present in one field that occupies most of the transverse width of the ramus (= T2 + T3)
  - 4 present in only one posteromedially-to-anterolaterally oriented field (= T2)
  - 5 present in only one field adjacent to the medial margin of the ramus (= T3)
138. Pterygoid, number of rows on palatal tooth series T2
- 0 more than two or do not dispose on distinct rows
  - 1 two rows parallel to each other
  - 2 single row
139. Pterygoid, most lateral row of teeth on the ventral surface of the anterior ramus (= palatal ramus) raised on a thick, posteromedially-to-anterolaterally oriented ridge
- 0 absent
  - 1 present
140. Pterygoid, orientation of the lateral ramus
- 0 posterolaterally, forming an obtuse angle with the anterior ramus
  - 1 laterally or anterolaterally, forming a right or acute angle with the anterior ramus
141. Pterygoid, lateral margin of the lateral ramus



- 0 posterolateral margin with an acute corner
  - 1 posterolateral margin merges smoothly into anterolateral margin forming a smoothly convex lateral outline
142. Ectopterygoid, shape along suture with pterygoid
- 0 transversely does not reach the posterolateral corner of the transverse flange
  - 1 reaches the posterolateral corner of the transverse flange
143. Ectopterygoid, contact with maxilla
- 0 absent
  - 1 present
144. Supraoccipital, posterior surface
- 0 smooth or with a low median ridge
  - 1 with a prominent median, vertical peg
145. Opisthotic, contact between paraoccipital process and parietal immediately lateral to supraoccipital
- 0 absent
  - 1 present
146. Exoccipital, medial margin of their distal ends
- 0 no contact with its counterpart
  - 1 contact with its counterpart to exclude basioccipital from the floor of the endocranial cavity and diverge from each other on the occipital condyle, exposing the basioccipital dorsally
  - 2 contact with its counterpart along the entire dorsal surface of the basioccipital, excluding the basioccipital from the floor of the endocranial cavity and the dorsal surface of the occipital condyle
147. Exoccipital, number of foramina for the hypoglossal nerve (CN XII)
- 0 two
  - 1 one
148. Pseudolagenar recess, between the ventral surface of the ventral ramus of the opisthotic and the basal tubera
- 0 present
  - 1 absent
149. Lagenar/cochlea recess
- 0 absent or short and strongly tapered
  - 1 present and elongated and tubular
150. Basioccipital-parasphenoid/parabasisphenoid, contact with each other in non-early juvenile individuals
- 0 loose, overlapping suture
  - 1 tightly sutured, sometimes by an interdigitated suture, or both bones fused with each other
151. Basioccipital-parasphenoid/parabasisphenoid, basal tubera shape

- 0 clearly separated
  - 1 partially connected
  - 2 medially expanded and nearly or completely connected
152. Basioccipital, notochordal scar on the occipital surface of the occipital condyle
- 0 absent or developed as a small sub-circular pit
  - 1 developed as a vertical furrow or a large sub-circular fossa that occupies approximately half of the height of the occipital surface of the condyle
153. Parasphenoid/parabasisphenoid, orientation
- 0 horizontal
  - 1 oblique, main axis posterodorsal-to-anteroventrally oriented
154. Parasphenoid/parabasisphenoid, posterodorsal portion
- 0 incompletely ossified
  - 1 completely ossified
155. Parasphenoid/parabasisphenoid, intertuberal plate
- 0 absent
  - 1 present and straight
  - 2 present and arched anteriorly
156. Parasphenoid/parabasisphenoid, semilunar depression on the posterolateral surface of the bone
- 0 absent
  - 1 present
157. Parasphenoid/parabasisphenoid, recess (= median pharyngeal recess, = hemispherical sulcus, = hemispherical fontanelle)
- 0 absent
  - 1 present
158. Parasphenoid/parabasisphenoid, foramina for entrance of the cerebral branches of the internal carotid artery leading to the pituitary fossa
- 0 ventral
  - 1 posterolateral
  - 2 anterolateral
  - 3 absent, internal carotids do not enter the braincase
159. Parasphenoid/parabasisphenoid, position of the foramina for the entrance of the cerebral branches of the internal carotids on the ventral surface of the bone
- 0 immediately medial or posteromedial to the base of the basipterygoid process
  - 1 close to the suture between basioccipital and parabasisphenoid
160. Parasphenoid/parabasisphenoid, outline of posterior margin in ventral view
- 0 approximately straight or slightly concave
  - 1 deeply concave, with bone at median line anterior to basal tubera
161. Basisphenoid/parabasisphenoid, anterior tympanic recess on the lateral side of the braincase

- 0 absent
- 1 present

162. Prootic-supraoccipital, auricular recess
- 0 largely restricted to the prootic
  - 1 extends onto internal surface of the supraoccipital
163. Opisthotic, paroccipital processes
- 0 no or slight dorsal and ventral expansion distally
  - 1 markedly expanded dorsally at the distal ends
164. Inner ear, relative position of the common crus
- 0 the common crus is positioned centrally on the anteroposterior axis between the anterior semicircular canal and posterior semicircular canal
  - 1 the common crus is positioned posterior to the midpoint of the anteroposterior axis of the labyrinth
165. Inner ear, curvature of the anterior semicircular canal (ASC)
- 0 <1.40
  - 1 1.53-1.64
  - 2 1.85-2.00
  - 3 >2.00
166. Lower jaw, external mandibular fenestra
- 0 absent
  - 1 present
167. Lower jaw, anteroposterior length of the external mandibular fenestra versus anteroposterior length of the dentary anterior to the fenestra
- 0 0.07-0.36
  - 1 0.44-0.53
  - 2 0.62-0.78
  - 3 0.88-0.94
168. Lower jaw, morphology of symphysis (classes sensu Holliday and Nesbitt 2013)
- 0 flat symphyseal plates, conspicuous smooth region, equally high and deep joint (class I)
  - 1 narrower symphyseal space, more rugosities and better organized rugosities (class II)
  - 2 smooth area absent, heavily interdigitated rugosities (class III)
  - 3 complete fusion of hemimandibles (class IV)
169. Dentary, minimum height of the bone (at or posterior to the third tooth position or excluding the downturned anterodorsal margin of the bone if present) versus length of the alveolar margin (including edentulous anterior end if present)
- 0 0.05-0.14
  - 1 0.16-0.19
  - 2 0.22-0.29
  - 3 0.32-0.36

170. Dentary, shape of the anterior region of the tooth bearing portion  
0 mostly straight  
1 distinctly dorsally curved during all or most of its extension  
2 ventrally curved or deflected
171. Dentary, longitudinal groove approximately centered on the lateral surface  
0 absent  
1 present
172. Dentary, position of the Meckelian groove on the anterior half of the bone  
0 dorsoventral centre of the dentary  
1 restricted to the ventral border
173. Dentary, dorsal margin of the anterior portion compared to the dorsal margin of the posterior portion  
0 horizontal (in the same plane)  
1 dorsally expanded, resulting in a convex anterior margin and a straight or concave posterior portion
174. Dentary, posteroventral process, in which its margins are not confluent with the dorsal or ventral margin of the lower jaw  
0 absent  
1 present
175. Dentary, posteroventral process, in which its ventral margin is confluent with the ventral margin of the lower jaw  
0 absent  
1 present and excluded from the border of the external mandibular fenestra  
2 present and contributing to the border of the external mandibular fenestra
176. Dentary, posteroventral process length  
0 extended anteriorly the level of the posterodorsal or posteroventral processes  
1 extended posteriorly beyond the level of the posterodorsal and posteroventral processes
177. Dentary, anterior extent of the Meckelian groove  
0 ends well short of the dentary symphysis  
1 present through the dentary symphysis
178. Dentary, anterior end of the bone in dorsal or ventral view  
0 similar transverse width than at level of or posterior to the sixth tooth position  
1 distinctly transversely broader than at level of or posterior to the sixth tooth position
179. Surangular-angular, suture  
0 even with lateral surface of mandible  
1 elevated and separates dorsal concave area on surangular from concave area on angular
180. Surangular-angular, suture along the anterior half of the bones in lateral view

- 0 anteroposteriorly convex ventrally
  - 1 anteroposteriorly concave ventrally
181. Surangular/articular, retroarticular process
- 0 absent
  - 1 anteroposteriorly short, being poorly developed posteriorly to the glenoid fossa
  - 2 anteroposteriorly long, extending considerably posteriorly to the glenoid fossa
182. Surangular-articular, retroarticular process
- 0 subrectangular, approximately straight dorsal and ventral margins
  - 1 upturned, resulting in a concave margin immediately posterior to the glenoid fossa
  - 2 ventrally expanded, resulting in a concave ventral margin of the hemimandible at the level of the glenoid fossa
183. Surangular, lateral shelf
- 0 absent
  - 1 present, low ridge near dorsal margin
  - 2 present, presence of laterally or ventrolaterally projecting shelf with straight or gently convex lateral edge
  - 3 present, presence of laterally projecting shelf with strongly convex lateral edge
184. Surangular, dorsal margin in lateral view
- 0 straight, sigmoid or gently convex or concave
  - 1 strongly convex
185. Surangular, anterior surangular foramen on the lateral surface of the bone, positioned near surangular-dentary contact
- 0 absent
  - 1 present
186. Surangular, posterior surangular foramen on the lateral surface of the bone, positioned directly anterolateral to the glenoid fossa
- 0 absent
  - 1 present
187. Surangular-angular, distinct coarse ornamentation on lateral surface
- 0 absent
  - 1 present
188. Prearticular, area ventral to the IMF in medial view
- 0 larger contribution of the prearticular than the angular
  - 1 larger contribution of the angular than the prearticular or subequal contribution of both bones
  - 2 prearticular absent (-)
189. Prearticular, ventral margin in medial/lateral view posterior to its contact with the splenial
- 0 straight or ventrally curved anterior half of bone
  - 1 dorsally curved anterior half of bone, acquiring a semilunate overall shape

2 prearticular absent (-)

190. Prearticular, anterior portion in medial/lateral view  
0 unexpanded or slightly expanded  
1 dorsally expanded, in which the maximum height of the anterior portion, measured perpendicularly to the main axis of that part of the bone, is more than 2.0 times the minimum height of the bone  
2 prearticular absent (-)
191. Angular, ventrolateral surface  
0 continuous with lateral surface of angular  
1 laterally projecting ridge present that separates lateral and ventral sides of the angular
192. Angular, posteroventral surface  
0 ridged or keeled  
1 transversely convex
193. Articular, foramen on the medial side  
0 absent  
1 present
194. Articular, ventromedially directed process  
0 absent  
1 present
195. Stape, stapedial foramen piercing the columellar process  
0 present  
1 absent
196. Teeth, maxillary tooth crowns in labial view  
0 all the tooth crowns possess a rather similar distal edge morphology along the entire alveolar margin  
1 the distal edge of the posterior tooth crowns possess a distinct different morphology from those of the anterior tooth crowns, usually the posterior edge becomes convex
197. Teeth, distal edge of the maxillary and dentary tooth crowns along at least the anterior and middle regions of tooth rows in labial or lingual views  
0 concave  
1 straight or gently sigmoid, without concave edges  
2 convex in at least some anterior tooth crowns  
3 maxilla and dentary edentulous or with strongly worned crowns (-)
198. Teeth, serrations on the maxillary/dentary crowns  
0 absent or present in just a two or a few centrally placed maxillary crowns  
1 distinctly present on the distal margin and usually apically restricted, low or absent on the mesial margin of most crowns  
2 present and distinct on both margins of most crowns

199. Teeth, tooth shape at crown base of the marginal dentition  
 0 circular  
 1 labiolingually compressed  
 2 labiolingually wider than mesiodistally long
200. Teeth, multiple maxillary or dentary tooth crowns with longitudinal labial or lingual striations or grooves  
 0 absent  
 1 present
201. Teeth, serrations in the mesial margin of the premaxillary crowns  
 0 present  
 1 absent
202. Teeth, shape of serrations in maxillary and dentary tooth crowns in labial or lingual view  
 0 square or chisel-like  
 1 triangular  
 2 serrations absent or maxillary and dentary edentulous (-)
203. Teeth, maxillary teeth much enlarged below the dorsal process  
 0 absent  
 1 present
204. Teeth, dentary teeth apicobasal height  
 0 crowns remain relatively same height throughout dentition, in which the anterior teeth could be shorter  
 1 maximum height on central third of tooth row  
 2 hypertrophied crown or crowns among the first three teeth  
 3 maximum height on posterior third of tooth row  
 4 maximum height on the anterior third of tooth row but not among the first three teeth  
 5 presence of blade-groove mandibular occlusion or edentulous dentary (-)
205. Teeth, first dentary tooth long axis with respect to the longitudinal axis of the bone  
 0 vertical  
 1 inclined anteriorly (i.e. procumbent)
206. Axis, neural spine posterior margin  
 0 convex or acute, placed anterior or approximately level to the posterior tip of the postzygapophyses  
 1 acute, posterodorsally oriented apex extending posteriorly beyond the postzygapophysis through a distance equal or longer than the length of the postzygapophysis
207. Cervical and dorsal vertebrae, length of the pectoral centra (last two cervical and first two dorsal vertebrae) versus the height of their anterior articular surface  
 0 1.63-4.00  
 1 1.09-1.54  
 2 0.72-1.03

3 0.36-0.62

208. Cervical and dorsal vertebrae, at least one or more cervical or anterior dorsal with a parallelogram centra in lateral view, in which the anterior articular surface situated higher than the posterior one  
0 absent  
1 present
209. Cervical and dorsal vertebrae, anterior centrodiapophyseal lamina or paradiapophyseal lamina in posterior cervical vertebrae, anterior dorsal vertebrae, and sometimes middle dorsal vertebrae  
0 absent  
1 present
210. Cervical and dorsal vertebrae, posterior centrodiapophyseal lamina in posterior cervical, anterior, and sometimes middle-posterior dorsal vertebrae  
0 absent  
1 present
211. Cervical and dorsal vertebrae, prezygodiapophyseal lamina in posterior cervical, anterior dorsal, and sometimes anterior-middle cervical and middle-posterior dorsal vertebrae  
0 absent  
1 present
212. Cervical and dorsal vertebrae, postzygodiapophyseal lamina in posterior cervical, anterior dorsal, and sometimes anterior-middle cervical and middle-posterior dorsal vertebrae  
0 absent  
1 present
213. Cervical vertebrae, distally restricted transverse expansion of the neural spines (not mammillary process) in anterior-middle and sometimes posterior postaxial cervical vertebrae  
0 absent  
1 present
214. Cervical and dorsal vertebrae, distal surface of distally restricted transverse expansion of the cervical and anterior to middle dorsal postaxial neural spines (not mammillary process)  
0 strongly convex  
1 flat  
2 concave
215. Cervical vertebrae, atlantal articulation facet in the axial intercentrum  
0 saddle-shaped  
1 concave with upturned lateral borders
216. Cervical vertebrae, ventral surface of the centrum in anterior cervicals  
0 transversely convex



- 1 with a low median longitudinal keel
  - 2 with a median longitudinal keel that extends ventral to the centrum rims in at least one anterior cervical
217. Cervical vertebrae, height of the neural spine of the axis
- 0 dorsoventrally tall
  - 1 strongly dorsoventrally low
218. Cervical vertebrae, dorsal margin of the neural spine of the axis
- 0 dorsally convex
  - 1 mostly straight or dorsally concave
219. Cervical vertebrae, length of the fourth or fifth cervical centra versus the height of their anterior articular surface
- 0 0.63-0.98
  - 1 1.02-1.24
  - 2 1.31-1.73
  - 3 1.75-2.08
  - 4 2.15-2.35
  - 5 2.41-2.75
  - 6 2.92-3.34
  - 7 3.50-4.33
  - 8 5.04-9.75
  - 9 14.16-14.33
220. Cervical vertebrae, diapophysis and parapophysis of anterior to middle cervical postaxial vertebrae
- 0 single facet or both situated on the same process
  - 1 situated on different processes and well separated
  - 2 situated on different processes and nearly touching
221. Cervical vertebrae, swelling dorsal to the postzygapophysis (epipophysis) in postaxial cervical vertebrae
- 0 absent in all cervical vertebrae or if the series is incomplete absent in at least the fourth or fifth cervical vertebrae
  - 1 present in at least one vertebra, if the series is incomplete present in at least in the fourth or fifth cervical vertebrae
222. Cervical vertebrae, excavation immediately lateral to the base of postaxial cervical neural spines
- 0 absent
  - 1 shallow
  - 2 represented by a deep pocket or pit
223. Cervical vertebrae, distinct longitudinal lamina extending along the lateral surface of the centrum at mid-height in postaxial anterior and middle cervical vertebrae
- 0 absent
  - 1 present

224. Cervical vertebrae, maximum height of neural spine versus height of the posterior articular surface of centrum in the third to fifth cervical vertebrae
- 0 <0.38
  - 1 0.42-0.81
  - 2 0.85-1.10
  - 3 1.17-1.36
  - 4 1.40-1.68
  - 5 1.74-1.90
  - 6 >2.0-<3.0
  - 7 >3.0
225. Cervical vertebrae, anterior and middle postaxial cervical neural spines with an anterior overhang
- 0 absent, straight anterior margin of the neural spine
  - 1 present, anteriorly curved anterior margin of the neural spine. Character-states slightly reworded from their original formulations
226. Cervical vertebrae, development of parapophysis in the axis
- 0 well developed on a distinct peduncle
  - 1 reduced to a low, mound-like structure or absent
227. Cervical vertebrae, neural arch (from base of neural canal to top of postzygapophysis) in postaxial cervical vertebrae
- 0 higher than posterior articular facet of the centrum
  - 1 lower than posterior articular facet of the centrum
  - 2 depressed down onto, or even confluent with, the centrum
228. Cervical vertebrae, depression on the dorsolateral surface of atlantal neural arch, between the prezygapophysis and the posterior process
- 0 absent
  - 1 present
229. Cervical vertebrae, position of diapophysis (or dorsal edge of synapophysis) in third or fourth cervical vertebrae
- 0 posteriorly positioned relative to parapophysis (or ventral edge of synapophysis)
  - 1 positioned directly dorsally relative to parapophysis (or ventral edge of synapophysis)
230. Cervical vertebrae, diapophysis in fifth cervical vertebra
- 0 present on a process shorter than the anteroposterior depth of its rib facet
  - 1 present on a strongly developed stalk longer than the anteroposterior depth of its rib facet
231. Cervical and dorsal vertebrae, ventral keel on ninth presacral centrum
- 0 absent
  - 1 present
232. Cervical vertebrae, postzygapophysis of the axis in lateral view
- 0 well developed posteriorly, forming a distinct notch between its dorsal margin and the posterior margin of the neural spine

- 1 confluent with the neural spine of the axis, not protruding posteriorly from the base of the neural spine
233. Cervical vertebra, centrum length of third cervical  
 0 subequal to the axis centrum  
 1 longer than the axis centrum
234. Cervical vertebrae, shape of neural spine base of anterior post-axial cervicals  
 0 elongate, subequal in length to the neural arch  
 1 short, spine restricted to posterior half of neural arch
235. Cervical vertebrae, serial position of complete migration of diapophysis into the neural arch  
 0 Cv8 or posteriorly  
 1 Cv7  
 2 Cv4 to Cv6  
 3 Cv3  
 4 inapplicable if there is a synapophysis in cervical vertebrae (-)
236. Cervical vertebrae, posterior expansion of the neural spine, resulting in a  
 0 absent  
 1 present, tilting higher than 15°
237. Cervical and dorsal ribs, tuberculum in posterior cervical or anterior dorsal ribs  
 0 short  
 1 long and distinct
238. Cervical ribs, shape  
 0 short, being less than two times the length of its respective vertebra, and tapering at a high angle to the neck  
 1 short, being less than two times the length of its respective vertebra, and shaft parallel to the neck  
 2 very long, being two times the length of its respective vertebra, and parallel to the neck
239. Cervical ribs, atlantal and axial ribs  
 0 thin splints of bone  
 1 transversely broad and short, being broader than half of the width of their respective intercentra
240. Dorsal vertebrae, length of the centrum versus height of the centrum in the third to fifth dorsal vertebrae  
 0 0.45-1.10  
 1 1.18-2.00  
 2 2.19-2.90  
 3 >3.00
241. Dorsal vertebrae, length of the centrum versus height of the centrum in posterior dorsal vertebrae  
 0 0.66-1.39

- 1 1.48-1.86
- 2 1.95-2.10
- 3 2.39-2.46
- 4 >2.70

242. Dorsal vertebrae, ventral surface of middle and posterior centra
- 0 transversely convex
  - 1 ridged, with slightly swollen sides
  - 2 at least some with a single keel
  - 3 double keel
243. Dorsal vertebrae, lateral fossa on the centrum below the neurocentral suture
- 0 absent
  - 1 present, but not well-rimmed
  - 2 present and well-rimmed
244. Dorsal vertebrae, ratio between transverse width of diapophysis and length of the centrum in anterior dorsals
- 0 <0.70
  - 1 >0.75
245. Dorsal vertebrae, development of the transverse processes in middle and posterior
- 0 short
  - 1 moderately long
  - 2 extremely long, being considerably broader than its respective centrum
246. Cervical and dorsal vertebrae, hyposphene-hypantrum accessory intervertebral articulation in middle-posterior dorsal and sometimes cervical and anterior dorsal vertebrae
- 0 absent
  - 1 present
247. Dorsal vertebrae, dorsally opened pit lateral to the base of the neural spine
- 0 absent
  - 1 shallow
  - 2 developed as a deep pit
248. Dorsal vertebrae, fan-shaped neural spine in lateral view
- 0 absent
  - 1 present
249. Dorsal vertebrae, ventral keel serial variation
- 0 keel restricted to the anterior one-third of the dorsal series
  - 1 keel restricted to the anterior two-thirds of the dorsal series
  - 2 keel also present in at least one of the elements of the posterior one-third of the dorsal series
  - 3 ventral keel absent in anterior dorsal vertebrae (-)
250. Dorsal vertebrae, position of diapophysis in middle and posterior dorsal vertebrae
- 0 level with the anterior portion of the centrum

- 1 level with the anteroposterior middle of the centrum
251. Dorsal vertebrae, lateral surface of dorsal end of neural spine  
0 smooth  
1 marked by multiple dorsoventrally oriented striations
252. Dorsal vertebrae, distally restricted transverse expansion of the neural spines (not mammillary process) in anterior and middle dorsal vertebrae  
0 absent  
1 present
253. Dorsal ribs, angle between proximal end and shaft in anterior and middle dorsal ribs in anterior or posterior view  
0 low, gentle bowing  
1 sharp flexure close to an angle of 90°
254. Dorsal ribs, lateral surface of the proximal half of the anterior-middle dorsal ribs  
0 smooth  
1 at least some ribs with a rugose ridge or flange
255. Sacral vertebrae, number  
0 two  
1 three  
2 four or more
256. Primordial sacral vertebra two, sacral rib  
0 consist of a single body in one plane (could contain a lateral notch)  
1 has a separate posterolateral process positioned dorsal and posterior to the main body of the sacral rib
257. Sacral vertebrae, transverse processes and ribs development  
0 anteroposteriorly short not roofing the space between ribs  
1 anteroposteriorly long, roofing the space between ribs
258. Sacral vertebrae, first primordial sacral rib articular surface in lateral view  
0 circular  
1 C-shaped
259. Sacral ribs  
0 almost entirely restricted to a single sacral vertebra  
1 shared between two sacral vertebrae
260. Caudal vertebrae, length of the transverse process + rib versus length across zygapophyses in anterior caudal vertebrae  
0 0.29-0.41  
1 0.62-1.32  
2 1.51-1.85  
3 2.20-2.72
261. Caudal vertebrae, distal end of the transverse processes of anterior caudals

- 0 tapering or squared
  - 1 anteroposteriorly expanded
262. Caudal vertebrae, neural spine height versus anteroposterior length at its base in anterior caudal vertebrae
- 0 <2.21
  - 1 2.36-2.65
  - 2 2.92-3.05
  - 3 3.21-3.54
263. Caudal vertebrae, neural spines in anterior caudals
- 0 inclined posteriorly
  - 1 vertical
264. Chevrons, distal anteroposterior width of anterior and middle haemal spines in lateral view
- 0 equivalent to proximal length
  - 1 tapering distally
  - 2 longer than proximal width (= paddle-like haemal spine)
265. Gastralia
- 0 present, forming an extensive ventral basket with closely packed elements
  - 1 present, well separated
  - 2 absent
266. Scapula-coracoid, both bones fused with each other in non-early juvenile individuals
- 0 present, without a complete line of suture
  - 1 absent
267. Scapula-coracoid, notch on the anterior margin at level of the suture between both bones
- 0 absent
  - 1 present
268. Scapula-coracoid, glenoid fossa orientation
- 0 mainly lateral, being more laterally facing than posteriorly and without a posteriorly prominent supraglenoid lip in lateral view
  - 1 slightly posterolateral, being more posteriorly facing than laterally and resulting in a posteriorly prominent supraglenoid lip in lateral view
  - 2 posteroventral
269. Scapula, total length of the scapula versus minimum anteroposterior width of the scapular blade
- 0 0.90-6.73
  - 1 7.92-11.31
  - 2 >12.0
270. Scapula, lateral tuber on the posterior edge, just dorsal of the glenoid fossa
- 0 absent

1 present

271. Scapula, acromion process  
0 in about the same plane as the ventral edge of the scapula  
1 distinctly raised above the ventral edge of the scapula
272. Scapula, acromion process  
0 gently raised from the anterior margin of the scapular blade  
1 sharply raised in an angle close to 90° from the anterior margin of the scapular blade
273. Coracoid, biceps process  
0 absent or small  
1 large
274. Coracoid, postglenoid process separated from the glenoid fossa by a notch  
0 absent  
1 present
275. Coracoid, postglenoid process shape  
0 rounded posterior margin in lateral view  
1 tapering posterior margin in lateral view  
2 postglenoid process proximodistally expanded (-)
276. Interclavicle, posterior ramus  
0 little change along the anterior half of the ramus and posteriorly it may taper  
1 gradual transverse expansion present  
2 strongly tapering, without subparallel lateral margins on the anterior half of the ramus
277. Clavicle, portion articulated with the interclavicle, shape  
0 broader than distal portion of clavicle  
1 similar in narrowness to the distal portion of the clavicle
278. Humerus, transverse width of the proximal end versus total length of the bone in non-early juvenile individuals  
0 <0.25  
1 0.25-0.46  
2 0.48-0.70
279. Humerus, proximal articular surface  
0 continuous with the deltopectoral crest  
1 separated by a gap from the deltopectoral crest
280. Humerus, proximal end in anterior view  
0 approximately symmetric  
1 medially expanded, being asymmetric
281. Humerus, internal tuberosity distinctly separated proximally from the articular surface

- 0 absent
- 1 present

282. Humerus, shape of the deltopectoral crest in lateral view
- 0 rounded or subtriangular
  - 1 subrectangular or trapezoidal, broad, and short (campylognathoid-like in pterosaurs)
  - 2 trapezoidal, narrow, and long (Dimorphodon-like in pterosaurs)
  - 3 mid-proximally constricted with an expanded and rounded apex (Rhamphorhynchus-like in pterosaurs)
283. Humerus, length of the deltopectoral crest versus total length of the bone in non-early juvenile individuals
- 0 0.16-0.18
  - 1 0.24-0.49
  - 2 0.52-0.55
284. Humerus, ectepicondylar region
- 0 foramen present
  - 1 foramen absent, supinator process and groove present
  - 2 supinator process, groove or foramen absent
285. Humerus, position of the deltopectoral crest in anterior/ventral view
- 0 adjacent to the lateral margin of the bone
  - 1 medially displaced from the lateral margin of the bone
286. Humerus, entepicondylar flange
- 0 present as prominent postaxial crest
  - 1 absent
287. Humerus, development of the distal condyles in ventral/anterior view
- 0 entepicondyle subsequally extended distally to the ectepicondyle
  - 1 entepicondyle distinctly more distally extended than the ectepicondyle
288. Ulna, olecranon process
- 0 absent or low
  - 1 prominent but lower than its anteroposterior depth at base
  - 2 strongly developed, being higher than its anteroposterior depth at base
289. Ulna, lateral tuber (= radius tuber) on the proximal portion
- 0 absent
  - 1 present
290. Radius, total length versus total length of the humerus
- 0 0.55-0.66
  - 1 0.69-0.92
  - 2 0.95-0.97
  - 3 1.12-1.28
  - 4 =>1.33



291. Metacarpus, transverse width of the distal end of metacarpal I versus the total length of the bone
- 0  $\leq 0.33$
  - 1 0.36-0.45
  - 2 0.48-0.53
  - 3 0.58-0.64
  - 4 0.73-0.75
  - 5  $> 1.00$
292. Metacarpus, metacarpal III-humerus ratio
- 0 lower than 0.35
  - 1 equal to or greater than 0.35
293. Pelvic girdle, acetabulum
- 0 completely closed
  - 1 perforated, slightly concave, straight or slightly convex
  - 2 perforated, markedly concave
294. Ilium, preacetabular process
- 0 absent or incipient
  - 1 present, being considerably anteroposteriorly shorter than its dorsoventral height
  - 2 present, being longer than two thirds of its height and not extending beyond the level of the anterior margin of the pubic peduncle
  - 3 present and extending beyond the level of the anterior margin of the pubic peduncle
295. Ilium, lateral crest dorsal to the supraacetabular crest/rim
- 0 absent
  - 1 present and divides the preacetabular process from the postacetabular process
  - 2 confluent with the anterior extent of the preacetabular process
296. Ilium, slope of dorsal margin of iliac blade in lateral or medial view, excluding the preacetabular process if present
- 0 sub-horizontal, angle below  $10^\circ$  with respect to the horizontal plane
  - 1 posterodorsal, angle higher than  $10^\circ$  but lower than  $30^\circ$
  - 2 strongly posterodorsal, angle equal to or higher than  $30^\circ$ , usually being sub-parallel to the posterior half of the supraacetabular crest
297. Ilium, dorsal margin of the iliac blade
- 0 convex
  - 1 mostly straight
  - 2 concave
298. Ilium, supraacetabular crest
- 0 crest absent, posterodorsal margin of acetabulum similar in development of anterodorsal margin
  - 1 prominent anterodorsal bony lamina frames the anterodorsal margin of the acetabulum
299. Ilium, postacetabular process in lateral view

- 0 squared or rounded
- 1 subtriangular, tapering posteriorly

300. Pubis-ischium, contact

- 0 present and extended ventrally up to or beyond the distal end of the pubic shaft or tubercle
- 1 present and extended ventrally but not reaching the level of the distal end of the pubic shaft or tubercle
- 2 present and reduced to a thin proximal contact
- 3 absent

301. Pubis, total length (along anterior margin or pubic shaft or tubercle) versus total length of the femur

- 0 equal or lower than 0.29
- 1 0.32-0.45
- 2 0.48-0.57
- 3 equal or greater than 0.60

302. Pubis, anterior and posterior portions of the acetabular margin

- 0 continuous
- 1 recessed

303. Pubis, tuberosity for the attachment of the ambiens muscle in non-early juvenile individuals

- 0 prominent
- 1 incipient or absent

304. Pubis, shaft orientation

- 0 anteroventral
- 1 vertical or posteroventral

305. Pubis, shape

- 0 plate-like, with approximately constant transverse width anteroposteriorly
- 1 laterally thickened anterior edge or distinct shaft (= pubic tubercle, = pectineal tuberosity) that curves posteriorly in lateral view
- 2 laterally thickened anterior edge or distinct shaft (= pubic tubercle, = pectineal tuberosity) that is straight in lateral view
- 3 laterally thickened anterior edge or distinct shaft (= pubic tubercle, = pectineal tuberosity) with a proximodistally concave anterior surface

306. Pubis, transverse width of conjoined aprons versus total length of the bone

- 0 0.27-0.59
- 1 0.77-0.97
- 2 1.12-1.28
- 3 1.48-1.94

307. Pubis, distal end in lateral or medial view

- 0 unexpanded or gently expanded anteroposteriorly
- 1 sharply expanded anteroposteriorly, forming a distinct pubic boot

308. Pubis, pubic shaft in anterior or posterior view  
 0 straight  
 1 laterally curved
309. Pubis, medial articulation of the pair  
 0 complete, reaches the distal edge of the pubis  
 1 forms a medial hiatus on the distal portion (bevel)
310. Ischium, total length versus anteroposterior length of the acetabulum  
 0 1.04-1.24  
 1 1.55-2.50  
 2 2.72-3.53  
 3 4.25-4.48
311. Ischium, distal portion  
 0 unexpanded  
 1 expanded relative to the ischial shaft (= ischial boot)
312. Ischium, proximal articular surface  
 0 articular surface with the ilium and pubis continuous  
 1 articular surfaces with the ilium and pubis continuous but separated by a fossa  
 2 articular surfaces with the ilium and pubis separated by a nonarticulating concave surface
313. Ischium, medial contact with antimere  
 0 restricted to the medial edge  
 1 extensive contact but the dorsal margins are separated  
 2 extensive contact and the dorsal margins contact each other
314. Ischium, cross section of the distal portion  
 0 plate-like  
 1 semicircular or subtriangular
315. Femur, total length versus total length of the humerus  
 0 <1.02  
 1 1.09-1.56  
 2 1.62-1.74  
 3 1.86-1.96  
 4 >2.05
316. Femur, minimum transverse width versus minimum transverse width of the humerus  
 0 <0.80  
 1 0.95-1.01  
 2 1.08-1.32  
 3 1.46-1.80  
 4 1.93-2.00
317. Femur, femoral head  
 0 not distinctly intumed with respect to the shaft

- 1 distinctly inturned with respect to the shaft
318. Femur, femoral head orientation (long axis of the femoral head angle with respect to the transverse axis through the femoral condyles Parrish, 1986)  
0 anterior (60°-90°)  
1 anteromedial (20°-60°)
319. Femur, proximal articular surface (= posterolateral portion of the head sensu Nesbitt 2011)  
0 limited to the proximal surface of the bone  
1 extends under the proximal surface of the bone
320. Femur, proximal surface  
0 rounded and smooth  
1 transverse groove present
321. Femur, posteromedial tuber (= anteromedial tuber of Nesbitt, 2011) on the femoral head  
0 absent  
1 present
322. Femur, trochanteric fossa (sensu Novas, 1996) on the ventral/posterior surface of the proximal end  
0 present  
1 absent
323. Femur, dorsolateral trochanter on the anterolateral surface of the proximal end  
0 absent  
1 present
324. Femur, transition between femoral head and shaft  
0 smooth  
1 notch  
2 concave emargination
325. Femur, anterior trochanter (= lesser or minor trochanter) (= iliofemoralis cranialis muscle insertion)  
0 absent  
1 present and forms a steep margin with the shaft but is completely connected to it  
2 present and separated from the shaft by a marked cleft  
3 present and approaches the proximal articulation of the bone
326. Femur, osteological correlate for the insertion of the M. iliofemoralis in skeletally mature individuals  
0 absent or developed as a striated surface  
1 developed as a shelf (= trochanteric shelf), usually adjacent to the anterior trochanter, and extending laterodistally towards the lateral surface of the bone  
2 developed as a distinct tuber approximately at mid-length of the bone on the posterolateral surface of the shaft

327. Femur, shape of the process for the attachment of the caudifemoralis musculature  
0 mound-like and rounded  
1 sharp flange
328. Femur, process for the attachment of the caudifemoralis musculature in medial or lateral view  
0 distal end forming a low-angle slope to the shaft  
1 distal end forming a steep angle, close to 90°, to the shaft
329. Femur, proximodistal extension of the process for the attachment of the caudifemoralis musculature  
0 restricted to the proximal half of the shaft and low  
1 distally extended beyond mid-shaft and well posteriorly developed
330. Femur, distal transverse width versus total length  
0 0.08-0.11  
1 0.13-0.24  
2 0.26-0.36  
3 0.39-0.41
331. Femur, distal articular surface  
0 uneven, fibular condyle projecting distally distinctly beyond tibial condyle  
1 both condyles prominent distally and approximately at same level  
2 both condyles do not project distally (distal articular surface concave or almost flat)
332. Femur, anterior extensor groove  
0 absent, anterior margin of the bone straight or convex in distal view  
1 present, anterior margin of the bone concave in distal view
333. Femur, shape of lateral condyle in distal view  
0 lateral surface is rounded and mound-like  
1 lateral surface is triangular and sharply pointed
334. Femur, distal end, medial condyle in posterior view  
0 smooth surface or a small depression  
1 well defined proximodistally oriented scar extending from the posterior portion of the condyle well proximally
335. Femur, medial condyle of the distal portion  
0 tapers to a point on the medial portion in distal view  
1 smoothly rounded in distal view
336. Femur, medial articular facet of the proximal portion in posterior view  
0 rounded  
1 straight
337. Femur, greater trochanter shape in posterior view  
0 rounded  
1 angled

338. Femur, development of attachment of muscle caudifemoralis on the posterior surface of the bone  
 0 not distinct or developed as a rugose scar  
 1 distinct, crest-like, but dorsoventrally/anteroposteriorly lower than the shaft at its minimum depth  
 2 distinct, crest-like, dorsoventrally/anteroposteriorly taller than or subequal to the shaft at its minimum depth
339. Tibia, ratio between the maximum width of the proximal end and the total length (NEW)  
 0 0.18-0.22  
 1 0.23-0.27  
 2 0.28-0.32  
 3  $\geq 0.33$
340. Tibia, separation of the proximal posterior hemicondyles in proximal view  
 0 absent  
 1 separated by a distinct change in angle or shallow notch or notches  
 2 separated by a deep groove or grooves
341. Tibia, distinctly anteriorly projected process beyond the articular portion for the femur on the proximal end (= cnemial crest)  
 0 absent or just a slightly bump  
 1 present and anteriorly straight  
 2 present and curved anterolaterally
342. Tibia, lateral posterior condyle of the proximal end  
 0 offset anteriorly from the medial posterior condyle  
 1 level with the medial posterior condyle at its posterior border
343. Tibia, posterolateral process (= lateral malleolus) on the distal end  
 0 absent  
 1 present, distinctly medial or extends laterally approximately at the same level as the anterolateral corner  
 2 present and extends well lateral to the anterolateral corner
344. Tibia, posterior surface of the distal end  
 0 rounded  
 1 distinct proximodistally oriented ridge present
345. Tibia, posterior side of the distal portion  
 0 smooth and featureless  
 1 dorsoventrally oriented groove or gap
346. Tibia, lateral side of the distal portion  
 0 smooth/rounded  
 1 proximodistally oriented groove
347. Tibia, distal surface outline (excluding the posterolateral process if present)

- 0 anteroposteriorly longer, circular or subquadrangular (approximately as wide as long)
  - 1 mediolaterally expanded
348. Fibula, proximal end in proximal view
- 0 round or slightly elliptical
  - 1 transversely compressed
349. Fibula, anterior edge of the proximal portion
- 0 rounded
  - 1 tapers to a point and arched anteromedially
350. Fibula, proximal portion in lateral view
- 0 symmetrical or nearly symmetrical
  - 1 posterior part expanded posteriorly
351. Fibula, transverse width at mid-length
- 0 subequal to transverse width of the tibia
  - 1 distinctly narrower than transverse width of the tibia
352. Fibula, area of attachment of the iliofibularis muscle
- 0 not on a prominent process
  - 1 on a low, distinct tubercle
  - 2 on a hypertrophied tubercle
353. Fibula, distal end in lateral view
- 0 angled anterodorsally (asymmetrical)
  - 1 rounded or flat (symmetrical)
354. Proximal tarsals, articulation between astragalus and calcaneum
- 0 roughly flat
  - 1 concavoconvex with concavity on the calcaneum
  - 2 concavoconvex with concavity on the astragalus
355. Proximal tarsals, foramen for the passage of the perforating artery between the astragalus and calcaneum (= perforating foramen)
- 0 present
  - 1 absent
356. Astragalus, crural facets
- 0 separated by a non-articular surface
  - 1 continuous
357. Astragalus, tibial facet
- 0 concave, flat or flexed
  - 1 divided into distinct posteromedial and anterolateral basins
358. Astragalus, posterior groove
- 0 present
  - 1 absent

359. Astragalus, proximal articular facet for fibula  
 0 equal more than 0.3 of the transverse width of the bone  
 1 less than 0.3 of the transverse width of the bone  
 2 vertical (no horizontal platform)
360. Calcaneum, orientation of calcaneal tuber  
 0 lateral, between  $0^{\circ}$ ? $35^{\circ}$   
 1 posterolateral, deflected between  $36^{\circ}$ ? $70^{\circ}$   
 2 posterior, between  $71^{\circ}$ ? $90^{\circ}$
361. Calcaneum, proportions of calcaneal tuber at the midshaft  
 0 taller than broad  
 1 about the same or broader than tall  
 2 just short twice the transverse width of the fibular facet
362. Calcaneum, calcaneal tuber distal end  
 0 rounded and unexpanded  
 1 flared, dorsally and/or ventrally
363. Calcaneum, calcaneal tuber distal end in proximal or distal view  
 0 tapering or squared  
 1 expanded
364. Calcaneum, ventral articular surface for distal tarsal 4 and the distal end of the calcaneal tuber  
 0 continuous  
 1 separated by a clear gap  
 2 separated by a gap with a ventral fossa
365. Calcaneum, fibular facet  
 0 slightly convex or flat  
 1 hemicylindrical  
 2 concave
366. Calcaneum, articular surfaces for fibula and distal tarsal 4  
 0 separated by a non-articular surface  
 1 continuous
367. Pes, foot length (articulated fourth metatarsal and digit) versus tibia-fibula length  
 0  $>1$   
 1  $<1$
368. Metatarsus, configuration  
 0 metatarsals diverging from ankle  
 1 compact, metatarsals I-IV tightly bunched
369. Metatarsus, metatarsals overlapping proximally  
 0 absent  
 1 present



370. Metatarsus, length of the longest metatarsal versus length of the tibia  
0 0.20-0.23  
1 0.29-0.34  
2 0.37-0.59  
3 0.62-0.70
371. Metatarsus, metatarsal I distal articular surface  
0 symmetrically distally developed  
1 with a distinctly more distally extended lateral condyle, resulting in an overall mediolaterally facing distal articular surface
372. Metatarsus, metatarsals I and V mid-shaft diameters  
0 subequal or greater than those of metatarsals II to IV  
1 lower than those of metatarsals II to IV
373. Metatarsus, articular surface on metatarsal II for metatarsal I in proximal view  
0 straight or convex  
1 concave  
2 deeply recessed, with an inflexion between the anterior portion and a posteromedial flange
374. Metatarsus, length of metatarsal I versus metatarsal III  
0 0.17-0.21  
1 0.27-0.42  
2 0.46-0.79  
3 >0.90
375. Metatarsus, length of the metatarsal II versus length of the metatarsal IV  
0 0.49-0.85  
1 0.90-1.02  
2 1.06-1.15
376. Metatarsus, metatarsal II midshaft diameter  
0 less than or equal to the midshaft diameter of the metatarsals I-IV  
1 more than the midshaft diameter of metatarsal I
377. Metatarsus, length of metatarsals III and V  
0 metatarsal V equal to or longer than 50% of metatarsal III  
1 metatarsal V shorter than 50% of metatarsal III
378. Metatarsus, metatarsal IV mid-shaft diameter  
0 subequal to that of metatarsal III  
1 lower than that of metatarsal III
379. Metatarsus, proximal portion of metatarsal IV  
0 narrow  
1 expanded, overlapping the anterior surface of metatarsal V
380. Metatarsus, distal articulation surface of the metatarsal IV

- 0 broader than deep (nearly symmetrical)
  - 1 broad as deep or deeper than broad (asymmetrical)
381. Metatarsus, shape of metatarsal IV in anterior/dorsal or posterior/ventral view
- 0 straight
  - 1 laterally curved at the distal end
382. Metatarsus, dorsal prominence separated from the proximal surface by a concave gap in metatarsal V
- 0 absent
  - 1 present
383. Metatarsus, metatarsal V with a hook-shaped proximal end
- 0 absent, articular face for distal tarsal 4 aligned to the medial margin of the shaft
  - 1 present, with a gradually medially curved proximal process
  - 2 present, with a sharply medially flexed proximal process and, as a result, the metatarsal acquires a L-shape in dorsal or ventral view
384. Metatarsus, metatarsal V outer process on the proximal lateral margin
- 0 absent, smooth curved margin
  - 1 present, prominent pointed process
385. Pedal digits, phalanges on pedal digit V
- 0 present and 'fully' developed first phalanx
  - 1 present and 'poorly' developed first phalanx
  - 2 absent
386. Pedal digits, pedal unguals
- 0 weakly transversely compressed, rounded and triangular in cross-section
  - 1 dorsolaterally compressed
  - 2 strongly transversely compressed, with a sharp dorsal keel
387. Pes, pedal unguals of digits II-IV
- 0 subequal to or shorter than at least one non-ungual phalanx of the same digit
  - 1 longer than all non-ungual phalanges of the same digit
388. Pedal digits, length of first phalanx versus length of second phalanx of digit IV
- 0 1.01-1.18
  - 1 1.20-1.31
  - 2 1.34-1.62
  - 3 1.65-1.79
  - 4  $\geq 1.9$
389. Osteoderms, dorsal osteoderms
- 0 absent
  - 1 present, one row
  - 2 present, two rows
  - 3 present, more than two rows
390. Osteoderms, sculpture on their external surface

- 0 absent
- 1 present

391. Osteoderms, dorsal prominence on paramedian osteoderms

- 0 absent
- 1 longitudinal keel, extending along all or most of the anteroposterior length of the osteoderm as a transversely compressed flange
- 2 blunted, anteroposteriorly restricted eminence

392. Osteoderms, paramedian osteoderms

- 0 thin
- 1 very thick

393. Osteoderms, relation between paramedian dorsal osteoderms and presacral vertebrae

- 0 one to one (includes pairs)
- 1 more than one osteoderm

394. Osteoderms, dorsal osteoderm alignment dorsal to the dorsal vertebrae

- 0 staggered
- 1 one to one

395. Osteoderms, dimensions of presacral dorsal osteoderms

- 0 square-shaped, about equal dimensions
- 1 longer than wide
- 2 wider than long

396. Osteoderms, unornamented anterior articular lamina on paramedian osteoderms

- 0 absent
- 1 present

397. Osteoderms, anterior edge of paramedian presacral dorsal osteoderms

- 0 straight or rounded
- 1 with a distinct anterior process

398. Osteoderms, presacral paramedian osteoderms with a distinct longitudinal bend near the lateral edge

- 0 absent
- 1 present
- 2 inapplicable in taxa that lack paramedian osteoderms or possess a single row of osteoderms (-)

399. Osteoderms, appendicular osteoderms

- 0 absent
- 1 present

400. Osteoderms, ventral osteoderms

- 0 absent
- 1 present, scattered, not forming a carapace
- 2 present, forming a carapace

401. Osteoderms, X-shaped middle and posterior paramedian dorsal osteoderms in external or internal view

0 absent

1 present

**SOM 2. Data matrix**

*Euparkeria capensis*

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*Diandongosuchus fuyuanensis*

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*Gracilisuchus stipanicorum*

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*Prestosuchus chiniquensis*

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*Gnathovorax cabreirai*

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*Buriolestes schultzi*

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*Vancleavea campi*

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*Litorosuchus somnii*

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*Polymorphodon adorfii*

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*Proterochampsia barrionuevoi*

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*Proterochampsia nodosa*

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*Tropidosuchus romeri*

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*Cerritosaurus binsfeldi*

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*Pseudochampsia ischigualastensis*

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*Rhadinosuchus gracilis*

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*Gualosuchus reigi*

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?[12]100000?020011000301100?01002012?0[01]01?1?00001000?????????0101[01]0  
1[01]100??1010??2110????????????0??????1??0?00130100010010001[12]111001022  
01000101101101?????????0??1??1??????????0??10011?100?0??

*Chanaresuchus bonapartei*

220021210[01]0101110210310020001[23]1013021001101[12]00?0110100101310011  
0002?0001010200000100010[02]0201000001[01]11010[01]0110011111211101101[01



J2120200[01]1[01]0021[01]001010?10101012100011?01011002100011001111300[01]  
00101100?00[12]10000001[12]011000?020[01]11000[34]010101010020121[01]00111  
0000010000000121000[01]1111010100??1010012110??1??010111111010130??10000  
[12]4010001000000111100010221100010110110121100010100001012101101110?00  
00201110011?000?001

*Stenoscelida aurantiacus*

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000101001000011100?102101000101101121??1?????????1012?0?1?1110?0?00100??  
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*Pinheirochampsia rodriguesi*

[12]?00??21[01]01?0111[01]210210020?01[12]10130210?11??10[01]?0?10[12]00?01[  
23]?0??1000[12]?00010102?0000100?11?020100101111101000110011110212101101  
02120?00??0021[01]0010?0?1?1010?2?0001??0??11[01]021?00[12]??1111030??00??  
11?0??0?1????1??  
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*Kuruxuchampsia dornellesi*

[12]?0021210?????????10???3????10?????????  
??????????10202?1000?01?11010101100?11?????0110?1?130?0????00210?????????  
?????????????????102100???11?????????????????????0?1????[023]????????????????  
?????????????????31??  
?????????????????0101010000001[01]11000102111000101?????????????????????????  
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MCP 4195 PV

?00[12]?210?0?[01]??10210?[12]?02?????????????????????????0??10??0??1?10??00??  
?001010200000100?10?02010000011110101?1000?111?2?11?1101121?0? ????????????

??0????????????????????1????????????11[12]30?10??11????0?1????????????  
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*Jaxtasuchus salomoni*

[01]??020????????1??0??[01]????????????????101?0?0010000?300????????  
????????????????????????0??0????????????????????????0??0????????1?01??  
??1????????????????????????1????????1??00011?0??1??0??[01]??6[12]0  
0011?[01]?0??1000?[12]?1??1????????111????????????????10110110100??3?  
????????????????240100??0?000?010011?10??0?10?1?0001????????????0  
12?0??000??000110??31201?0101100

*Doswellia kaltenbachi*

2?1020[01]0??[01]??????13????????????????????????04??????????11  
?0?0??1?1????0?2?10?0?0?01100?111000?001????0?00102120?00??00011101110  
11?101010?0011??0??0?102000??10012001001??01001?0?0?????00100000??1?5  
1001?1?[01]?0101?0000[12]11[12]0112000?010111000130011[01]?????????11????  
?????????01010100?0100??0?10000?01????0?????1?1?0110????????????????  
????????????????????????3120?1[02]101?00

*Rugarhynchos sixmilensis*

2?101?2?0??00?0?121?111100011100[123]020001100?0??01?0[12]1300030??00??  
??0?0?1?0??1110111????10??1?????00?1?????0?10??????????130?0??0?001????  
????????????????????????????????00001??????01001??????0??????2??1?  
?0??  
????????????????????????11?0????????????????????????????????????  
?????????[123]1????0?????

*Sphodrosaurus pennsylvanicus*

??0??????3??  
??1????????????  
??????0????????????10????110011?0????????????1??????2??2?????1??11?0?2  
?0201021?[01]??1??00????????0??1????????????????????[01]??????[01]0??

0??????0????????000?[01]?0??12?[01]????????????????????01[123]10  
2[012]?0????????[02]1????????00?

*Retymaijychampsia beckerorum*

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