Tschopp et al., in review

Lacertid osteological intraspecific variability

Supplementary Material

Character list for disparity analyses

1. Premaxilla, number of teeth: 7 or less (0); 8 or more (1).

2. Maxilla, number of labial foramina including only large ones and the small ones which are on the same level with them: 6 or less (0); more than 6 (1).

3. Teeth, crown complexity, maximum number of cusps in single tooth: 4 or more (0); 3 (1); 2 or less (2).

4. Teeth, number of maxillary teeth: less than 16 (0); 16 or more (1).

5. Teeth, number of dentary teeth: less than 13 (0); 13 or more (1).

6. Presacral vertebrae, number: less than 27 (0); 27 or more (1).

7. Presacral vertebrae, number of posterior elements with short ribs: 5 or fewer (0); 6 (1); 7 or more (2).

8. Cervical intercentra, number: less than 7 (0); 7 or more (1).

9. Xiphisternal ribs, number: 2 (0); 3 (1).

10. Anterior caudal vertebrae, number of non-autotomic elements: 4 or less (0); 5 (1); 6 (2); 7 or more (3).

11. Premaxilla, ascending nasal process, cross section at base, minimum transverse width to anteroposterior length ratio: more than 1.1 (0); 0.9-1.1 (1); less than 0.9 (2).

12. Premaxilla, angle of ascending nasal process to horizontal plane: more than 70 (0); 50-70 (1); less than 50 (2).

13. Premaxilla, tooth bearing portion, curvature, anteroposterior length to transverse width: less than 0.2 (wide) (0); 0.2-0.4 (intermediate) (1); more than 0.4 (narrow) (2).

14. Nasal, length relative to frontal length: less than 0.40 (0); 0.40-1.00 (1); more than 1.00 (2).

15. Frontal, dorsal surface, anteroposterior length of frontoparietal shield to anteroposterior length of ornamented portion: 0.40 or less (0); more than 0.40 (1).

16. Frontal, anterior process, dorsoventral depth: less than 38% (0); 38-55% (1); 56-71% (2); 72-87% (3); more than 87% (4).

17. Frontal, transverse width posterior end compared to midlength width: narrow, less than 1.8 (0); intermediate, 1.8-3.0 (1); widely expanded, more than 3.0 (2).

18. Frontals, anterior transverse width to minimum transverse width: more than 1.20 (0); 1.20 or less (1).

19. Postorbital, length of contact with squamosal compared to total anteroposterior length: more than 0.41 (0); 0.41 or less (1).

20. Parietal, interparietal shield, length compared to occipital shield: less than 0.95 (0); 0.95-1.05 (1); more than 1.05 (2).

21. Parietal, width of occipital shield compared to posterior width of ornamented portion: narrow, less than 0.40 (0); intermediate, 0.40-0.60 (1); wide, more than 0.60 (2).

22. Parietal, length to width of ornamented part of dorsal surface: longer (0); equal to wider (1).

23. Dentary, length compared to length of the rest of exposed lower jaw: equal to shorter, 1.0 or less (0); longer, more than 1.0 (1).

24. Presacral vertebrae, dorsoventral height to centrum length ratio: 1.1 or less (0); 1.2-1.3 (1); 1.4 or greater (2).

25. Presacral vertebrae, width across postzygapophyses to greatest length: 0.7 or less (0); 0.8 (1); 0.9 or greater (2).

26. Axial neural arch, pedicels, minimum anteroposterior length to height of posterior edge: less than 1.0 (0); 1.0-1.4 (1); more than 1.4 (2).

27. Axis, neural spine height without pedicel to greatest height: less than 0.5 (0); 0.5 or greater (1).

28. Postaxial presacral centrum length to posterior condyle height ratio: less than 2.5 (0); 2.5-3.5 (1); more than 3.5 (2).

29. Sacral vertebra 1, greatest height to width across pleurapophyses: less than or equal to 0.38 (0); more than 0.38 (1).

30. Interclavicle, length of anterior process compared to posterior process: less than 0.40 (0); 0.40 or greater (1).

31. Humerus, greatest length maximum shaft diameter at midlength: less than 10 (0); 10 or greater (1).

32. Humerus, proximal transverse width to distal transverse width: less than 0.95 (0); 0.95-1.05 (1); more than 1.05 (2).

33. Humerus, minimum to maximum shaft diameter at midlength ratio: less than 0.82 (0); 0.82 or greater (1).

34. Tibia to femur length ratio: less than 0.70 (0); 0.70 or greater (1).

35. Premaxilla, shape: two bilaterally symmetric elements (0); single midline bone (1).

36. Premaxilla, tooth bearing portion, shape in dorsal view: tapering laterally, anterior and lateral edges form an acute angle (0); retaining width along curvature, angle between anterior and lateral edges approaching 90° (1).

37. Premaxilla, tooth bearing portion, dorsal surface: pierced by a circular pit close to origin of nasal process (0); no pits present (1).

38. Premaxilla, tooth bearing portion, maxillary facet, size: small to absent (0); large, reaching almost base of nasal process (1).

39. Premaxilla, tooth row, shape: U-shaped (0); V-shaped (1).

40. Premaxilla, ascending nasal process, lateral margins: parallel (0); expanding transversely around midlength (1).

41. Premaxilla, ascending nasal process, ethmoidal foramen at base: situated within fossa (0); without fossa around foramen (1).

42. Premaxilla, fossa around ethmoidal foramen, if present, delimitation: with distinct ridge posteriorly (0); with distinct ridge anteriorly (1).

43. Premaxilla, second pair of ethmoidal foramina: absent (0); present (1).

44. Premaxilla, ascending nasal process, posterodorsal end, shape in anterior view: pointed (0); widely rounded (1).

45. Premaxilla, ascending nasal process, shape in lateral view: relatively straight (0); convex (1).

46. Premaxilla, ascending nasal process, dorsoventral constriction in lateral view: present (0); absent (1).

47. Premaxilla, ascending nasal process, ventral surface, longitudinal medial ridge, development: extending nearly throughout entire length (0); restricted to posterior portion, accompanied laterally by two shallow fossae (1).

48. Premaxilla, ascending nasal process, ventral surface, longitudinal medial ridge, posterior end: fading (0); distinct (1).

49. Premaxilla, ascending nasal process, posterior end of medial ridge, shape in lateral view: bifid with dorsal and ventral spurs (0); single (1).

50. Premaxilla, ascending nasal process, length of articulation with the nasals: less than or half nasal length (0); more than halfway to frontal between nasals (1).

51. Premaxilla, ascending nasal process, constriction at the base anterior view: absent (0); present (1).

52. Premaxilla, ascending nasal process, thickness in lateral view: thickness is retained from base until midway (0); thickness is gradually decreasing from base until posterior end (1).

53. Premaxilla, posterolaterally projecting palatine processes on horizontal plate: absent (0); present (1).

54. Premaxilla, horizontal plate, medial depression: absent, plate straight (0); present, depression bordered by ridges that extend onto palatine processes (1).

55. Premaxilla-maxilla contact: continuous (0); incomplete, with opening between premaxillary processes of maxilla (1).

56. Snout, medial depression around premaxilla-nasal contact: present (0); absent (1).

57. Maxilla, external surface of facial process: uniform, without distinct subdivisions (0); subdivided into dorsal and ventral halves by horizontal groove (1).

58. Maxilla, dermal ornamentation: absent to weak (0); well developed (1).

59. Maxilla, anterolateral premaxillary process, shape of ventral edge in lateral view: straight to convex (0); concave (1).

60. Maxilla, anterior margin of facial process, orientation relative to dental crest: posteriorly inclined throughout (0); perpendicular for some distance (1).

61. Maxilla, anterior margin of facial process, distinct subtriangular process projecting anteriorly or anterodorsally: absent (0); present (1).

62. Maxilla, prefrontal process on dorsal end of facial process: weakly developed (0); develops two distinct posterodorsally projecting spurs (1).

63. Maxilla, bifid prefrontal process, if present, in lateral view: anterodorsal projection reaching considerably dorsal to posteroventral projection (0); both projections at subequal height (1).

64. Maxilla, facial process: straight, flat (0); curves considerably medially towards dorsal tip (1).

65. Maxilla, facial process, incisura nasalis: absent (0); present (1).

66. Maxilla, nasal recess: absent (0); present (1).

67. Maxilla, anteromedial premaxillary process lying between vomers and premaxilla: absent (0); present (1).

68. Maxilla, dorsal margin of anteromedial premaxillary process: smooth (0); bears a dorsally or anterodorsally projecting spur close to anterior end (1).

69. Maxilla, transition from orbital margin into posterior process: smooth (0); separated by step or spur (1).

70. Maxilla, morphology of separation of orbital margin and posterior process, if present: incipient step (0); distinct step, forming right angle (1); posteriorly projecting spur (2).

71. Maxilla, posterior process, posterior extent: reaches mid-orbit (0); posterior to mid orbit (1).

72. Maxilla, facial process, medial surface, anteroposterior ridge on supradental shelf connecting anterior margin of facial process with carina maxillaris: absent (0); present (1).

73. Maxilla, supradental shelf articulation facet for palatine, shape in dorsal view: slight medial extension (0); distinctly offset from crest (1).

74. Maxilla, tooth row, shape in ventral view: curves laterally at distal end (0); straight (1).

75. Septomaxilla, anterolateral process: distinct (0); reduced (1).

76. Septomaxilla, posteromedial process, length: scarcely developed (0); long (1).

77. Septomaxilla, posterolateral corner: angular, projecting posterolaterally (0); rounded (1).

78. Nasals, anterior width: exceeds nasofrontal joint width (0); is subequal to nasofrontal joint width (1); less than anterior frontal width (2).

79. Nasal, anterior border, nasolateral process: present (0); absent (1).

80. Nasals, ventral contact beneath premaxillary nasal process: broad contact below (0); not in contact except near apex (1).

81. Prefrontal dorsal process, length compared to length of orbitonasal flange: longer (0); equal to shorter (1).

82. Dermal skull bone ornamentation, frontal and parietal: absent, dermal skull roof smooth (0); present over dorsum (1); present also on jugal postorbital bar (2).

83. Frontals: paired (0); fused (1).

84. Frontal, anterior descending processes: reduced (0); long distinct (1).

85. Frontal-nasal margin: rather straight (0); highly irregular (1).

86. Frontal, medial and lateral processes: well developed (0); reduced or absent (1).

87. Frontal, facet to accommodate dorsal process of maxilla: conspicuous (0); weak to absent (1).

88. Frontal, prefrontal shield, impression: absent (0); present (1).

89. Frontal, prefrontal shield, impression, if present, shape: connected anteromedially (0); medially separated (1).

90. Frontal, suture with parietal: interdigitating (0); rather straight (1).

91. Postfrontal, maximum anteroposterior length to maximum anteroposterior length of postorbital: longer to subequal (0); distinctly shorter (1).

92. Postfrontal, anteromedial process: expanded (0); not expanded (1).

93. Postfrontal, short subtriangular anterior projection close to suture with postorbital: absent (0); present (1).

94. Postorbital-postfrontal suture: fused (0); separate (1).

95. Postorbital, anteromedial process: absent (0); present (1).

96. Postorbital, postfrontal impression of lateral shield, location: does not reach lateral margin (0); reaches lateral margin posteriorly (1); reaches lateral margin along most of its length (2).

97. Postorbital, anterolateral process, ventral extension compared to level of quadrate cephalic condyle: ventral (0); same level (1); dorsal (2).

98. Jugal, quadratojugal process: absent (0); distinct (1).

99. Jugal, quadratojugal process, if present, shape: acute bony process (0); forms nearly a 90° angle (1).

100. Jugal, posterodorsal process, posterior margin, shape: distinctly curving posteriorly towards tip (0); nearly straight (1).

101. Jugal, medial process on medial ridge: present (0); absent (1).

102. Jugal, posterodorsal process, position of medial ridge: on anterior half (0); on posterior half (1).

103. Jugal, maxillary facet on anterior process: large (0); small (1).

104. Lacrimal, orbital margin: forked, with posterodorsal process (0); posterodorsal process absent, tapering to a pointed posteroventral end (1).

105. Quadrate, anterior surface, pit above mandibular condyle: absent (0); present (1).

106. Quadrate, anterior margin in medial view: angular (0); rounded (1).

107. Quadrate, anterior platform: concave (0); flat (1).

108. Quadrate, medial edge, pterygoid process: distinct (0); small to absent (1).

109. Quadrate, central pillar, position: at medial border, only laterally accompanied by a flange (0); inset, with flanges medially and laterally (1).

110. Quadrate, cephalic condyle, medial edge: straight (0); with distinct expansion accompanied by a short vertical ridge extending ventrally on medial surface of central pillar (1).

111. Squamosal, posterior end: medially expanded (0); slender, curving laterally (1).

112. Squamosal, ascending process: present (0); absent (1).

113. Supratemporal, position on parietal: partly ventral (0); partly ventrolateral (1); all lateral (2); dorsolateral (3).

114. Parietal, anterior margin: small concavity near midline (0); straight (1).

115. Parietal, parietal tabs: well developed, projecting far anteriorly (0); reduced to absent (1).

116. Parietal lappets, lateral expansion: present (0); absent (1).

117. Parietal, dorsal ornamentation, if present: irregular (0); symmetrically subdivided by distinct grooves (1).

118. Parietal, facies dorsalis, outline shape: strongly diverging anteriorly (0); subquadrangular to subrectangular (1); converging anteriorly (2).

119. Parietal, posterior edge of parietal fossa: concave transversely (0); straight (1).

120. Parietal, posterior margin, extension in dorsal view: not exceeding anterior margin of supraoccipital (0); extending over anterior margin of supraoccipital (1).

121. Parietal, posterior margin, single or bifid projection near midline: absent (0); present (1).

122. Parietal, posterior margin, midline projection, if present: single (0); bifid (1).

123. Parietal, postparietal processes: straight (0); twisted (1).

124. Parietal, ventral surface, anterolateral and posterolateral ventral crests, contact: absent (0); present (1).

125. Parietal, ventral surface, anterolateral ventral crests, orientation: forming V-shape (0); forming U-shape, being subparallel anteriorly (1).

126. Parietal, epipterygoid processes: absent (0); present (1).

127. Parietal, ventral surface, bony structure between facies triangularis and parietal fossa, shape: wide shelf (0); narrow ridge (1).

128. Parietal, ventral surface, parietal fossa, anterior end, shape: U-shaped to rectangular (0); triangular to trapezoid (1).

129. Parietal foramen, shape: circular (0); pear-shaped (1).

130. Parietal, parasagittal crest, strongly developed on the dorsolateral surface for the insertion of the adductor mandible musculature: absent (0); present (1).

131. Epipterygoid-parietal contact: absent (0); overlaps parietal temporal muscle origin parietal downgrowths (1).

132. Paroccipital process, length: long, exceeding posterior margin of otoccipital in lateral view (0); short (1).

133. Supraoccipital, lateral margins of processus ascendens: parallel (0); converging (1).

134. Supraoccipital, supraoccipital crest, shape: distinct crest (0); wide ridge (1).

135. Basioccipital, shape in ventral view: subtriangular, exoccipital margin straight (0); mushroom-shaped, exoccipital margin concave (1).

136. Basioccipital, cornua basisphenoidea: medially separated (0); medially co-ossified (1).

137. Basioccipital, occipital condyle, shape in ventral view: continuously rounded (0); bears weak recess (1).

138. Basioccipital, posterior process on lateral sinuses: absent (0); present, separating lateral sinus from exoccipital margin (1).

139. Basioccipital, dorsal surface, texture: smooth (0); ornamented (1).

140. Sphenoid, ventral surface, depression close to base of basipterygoid processes: present (0); absent (1).

141. Sphenoid, ventral surface, depression close to base of basipterygoid processes, if present, shape: rounded (0); longitudinal trough (1).

142. Sphenoid, ventral surface, distinct longitudinal ridges or bosses at base of basipterygoid processes: absent (0); present (1).

143. Basipterygoid processes, shape at base: narrow, margins strongly concave (0); widened, margins nearly parallel (1).

144. Prootic, alar process, development: weak, scarcely developed (0); well developed (1).

145. Prootic, posterior process, length: long (0); reduced (1).

146. Prootic-epipterygoid contact: absent (0); present, alar process of prootic reaches dorsal end of epipterygoid (1).

147. Vomer, size: relatively small, extends posteriorly less than half the length of the maxillary tooth row (0); elongate posteriorly, extends one half or more the length of the maxillary tooth row and usually restricting internal naris (1).

148. Vomer, ventral longitudinal ridges: absent (0); present (1).

149. Palatine, anterolateral process, shape: rounded margins (0); straight margins (1).

150. Palatine-ectopterygoid contact: absent (0); present, anterolateral process of ectopterygoid reaches posterior extension of lateral process of palatine (1).

151. Pterygoid recess, development: weak, angle between posteriormost point of recess and anteriormost points of anteromedial and -lateral processes > 90° (0); deep, angle 90° (1).

152. Pterygoid, palatine processes, orientation in articulated skulls: parallel (0); convergent (1).

153. Pterygoid, dorsal surface, crest separating concave area between columellar crest and transverse crest: absent (0); present (1).

154. Pterygoid, quadrate process, pterygoid ridge on dorsolateral surface, development: weakly developed (0); laminar crest (1).

155. Pterygoid, ventral surface, distinct ridge on transverse crest: present (0); absent (1).

156. Pterygoid, teeth: present (0); absent (1).

157. Pterygoid teeth, arrangement, if present: patch (0); mostly in single line (1).

158. Ectopterygoid, posterolateral process, length: long process (0); short knob (1).

159. Dentary, shape: continuously broadening dorsoventrally towards distal (0); sickle-shaped, subparallel in distal half, tapering mesially (1).

160. Dentary, subdental ridge, shape: straight (0); concave (1).

161. Dentary, splenial facet on subdental ridge, development: weak (0); well-developed (1).

162. Dentary, symphysis, distinct articular facet: absent (0); present (1).

163. Dentary, Meckelian fossa, anterior portion, shape: closed, open portion restricted posteriorly (0); open portion nearly reaching symphysis (1).

164. Dentary, Meckelian canal, shape: triangular (0); tubular (1).

165. Dentary, orientation of teeth at the anterior tip: upright (0); tilted anteriorly or procumbent (1).

166. Dentary, tooth row, differences in tooth size: significant (0); minimal (1).

167. Dentary, tooth row, orientation in lateral view: tooth apices are on same level, forming nearly straight line (0); tooth apices form concave to s-shaped line, with the distal-most teeth reaching significantly dorsal to more mesial teeth (1).

168. Dentary, coronoid process, dorsal expansion: level with tooth row (0); strongly expanded above distal-most teeth (1).

169. Dentary, coronoid process, length: shorter than angular process (0); equally long to longer than angular process (1).

170. Dentary, coronoid facet on labial surface, shape: shallow, with indistinct margins (0); distinct (1).

171. Dentary, surangular process: absent (0); present (1).

172. Dentary, angular process, posterior end: blunt (0); pointed (1).

173. Dentary, angular process, posterior extension: reaches below or exceeds coronoid apex (0); restricted anterior to coronoid apex (1); restricted anterior to entire coronoid bone (2).

174. Splenial, anterior extension relative to dentary tooth row: around one-third (or less) (0); about one-half (1); about two-thirds (2); three-fourths (or more) (3).

175. Splenial, anterior end: single (0); bifid (1).

176. Splenial, medial surface, anterior to splenial anterior inferior alveolar foramen: flat or weakly concave (0); strongly concave dorsoventrally (1).

177. Splenial, posterior end, shape: single (0); bifid (1).

178. Coronoid, anteromedial process, anterior end, shape: pointed (0); blunt (1).

179. Coronoid, angle between anteromedial process and posteromedial process in medial view: more open, > 50° (0); more acute, < 50° (1).

180. Coronoid, surangular articulation: coronoid restricted to medial aspect of mandible (0); coronoid extends onto dorsal surface of surangular (1); coronoid arches over dorsal margin of mandible to reach lateral surface of surangular (2).

181. Surangular, labial surface, distinct horizontal crest: absent (0); present, delimits adductor fossa ventrally (1).

182. Surangular, adductor fossa on labial surface of mandible: shallow, not extending further ventrally than midheight (0); deep, extending nearly to angular (1).

183. Articular, dorsal margin of anterior ramus: with distinct bulge (0); straight (1).

184. Retroarticular process, dorsal surface, posterior to articular facet: flat to weakly concave transversely (0); strongly concave transversely (1).

185. Retroarticular process breadth (greatest width) relative to mandibular condyle (glenoid): narrower (0); wider (1).

186. Palpebral, posterior margin: strongly concave, with elongate dorsoposterolateral process (0); relatively straight, palpebral outline subtriangular (1).

187. Ossification of temporal scales: little or none (0); extensive (1).

188. Teeth, premaxillary crown morphology, bicuspid teeth: present (0); absent (1).

189. Teeth, premaxillary, crown morphology (of monocuspid teeth): fang-like/pointed (0); rounded (1).

190. Teeth, premaxilla, median tooth: absent (0); present (1).

191. Teeth, premaxilla, median tooth, size: same size as neighbouring premaxillary teeth (0); enlarged (1).

192. Teeth, maxilla, size compared to premaxillary teeth: significantly larger (0); similar (1).

193. Teeth, maxilla, crown morphology in majority of teeth: monocuspid (0); bicuspid (1); tricuspid (2); more than 3 cusps (3).

194. Teeth, maxilla and dentary, location of most robust teeth: anterior half (0); central (1); distal half (2); distal-most (3).

195. Teeth, maxilla and dentary, differences in tooth robustness along tooth row: absent to minimal (0); present, not more than 50% different in robustness (1); present, 50% or more difference in robustness (2).

196. Teeth, maxilla and dentary, distal transition from larger to smaller teeth: gradual (0); distinct (1).

197. Teeth, dentary, crown morphology in majority of teeth: monocuspid (0); bicuspid (1); tricuspid (2); more than 3 cusps (3).

198. Teeth, crown surface: smooth (0); with longitudinal striae (1).

199. Teeth, crown surface, striae spacing, if present: wide (0); narrow (1).

200. Teeth, dentary tooth crowns overtop dental crest: by less than half their height (0); by half their height or more (1).

201. Atlas, foramen on lateral surface: absent (0); present (1).

202. Atlas, foramen on lateral surface, if present, position: centrum (0); neural arch (1).

203. Atlas, intercentrum, ventral keel dorsoventral height in comparison to centrum: subequal to smaller (0); considerably larger (1).

204. Atlantal intercentrum, ventral keel anteroposterior length compared to centrum length: shorter to subequal (0); considerably longer (1).

205. Atlas, ventral keel, shape: confluent with centrum anteriorly and posteriorly (0); separated from centrum by transverse grooves (1).

206. Atlantal neural arches, anterior and posterior articular facets on base, dorsal separation: present (0); absent (1).

207. Atlantal neural arch, posterolateral projection on base: small tubercle (0); distinct projection (1).

208. Atlantal neural arch, dorsal process, width to length: wider than long (0); subequal to narrower (1).

209. Atlantal neural arch, dorsal process, medial edge, dorsoventral height: high, with distinct medial surface (0); tapering to a thin edge (1).

210. Atlantal neural arch, indentation of posterior margin of dorsal process: deep, forming distinct posterior extension (0); shallow (1).

211. Axial centrum, articular surface with odontoid process, dorsoventral midline groove, width: narrow (0); wide, approximately 1/3 of facet (1).

212. Axial centrum, depression on posterior articular condyle: absent (0); present (1).

213. Axial centrum, longitudinal ventral crest: absent (0); present (1).

214. Axial centrum, neural canal floor, longitudinal median ridge, shape: continuous (0); interrupted at midlength (1).

215. Axial intercentrum, ventral keel, anterior extension: absent (0); present (1).

216. Axial intercentrum, ventral keel, collateral posterior projections on proximal base: absent (0); present (1).

217. Axis, postzygapophyseal facets, shape in posterior view: straight (0); concave (1).

218. Axial neural spine, posterior extension: terminates anterior to or at posterior end of centrum (0); exceeds posterior end of centrum (1).

219. Axial neural spine, sprl, shape: simple (0); bifurcates ventrally, forming transverse ridge posterior to prezygapophyseal facet (1).

220. Axis, posteriorly projecting process dorsal to postzygapophysis: absent (0); present (1).

221. Presacral centrum, posterior articular condyle, transverse expansion compared to centrum: wider (0); narrower, condyle circumscribed by distinct groove dorsally and laterally (1).

222. Cervical neural spine, dorsal edge, shape: simple (0); with longitudinal groove, resulting in slight bifurcation (1).

223. Postaxial presacral neural spine, shape in lateral view: subparallel anterior and posterior edges (0); anterior edge much more inclined than posterior edge (1).

224. Postaxial presacral neural arch, zygosphene-zygantrum articulation: absent (0); present (1).

225. Anterior postaxial cervical neural spines, inclination of anterior edge in relation to neural canal floor: weak, less than 40° (0); strong, 40° or greater (1).

226. Cervical vertebra 3, ossified cervical ribs: absent (0); present (1).

227. Cervical ribs, expansion of distal end of anterior elements: wide (0); narrow, not significantly wider than anterior end (1).

228. Cervical intercentra, lateral crests: absent (0); present (1).

229. Postaxial cervical intercentra, position: articulate with anterior or between anterior and posterior centra (0); articulate only with more posterior element (1).

230. Dorsal synapophyses, foramen on dorsolateral portion: absent (0); present (1).

231. Dorsal vertebrae, posterior centrosynapophyseal lamina: absent (0); present (1).

232. Dorsal vertebral spines, foramina on lateral surface of spol: absent (0); present (1).

233. Posterior dorsal vertebral centra, ventral keel: absent (0); present (1).

234. Posterior dorsal neural spines, development: distinct, elevated (0); reduced to a ridge (1).

235. Sacral vertebra 2, pleurapophyses, shape in dorsal view: curved (0); straight (1).

236. Sacral vertebra 2, pleurapophyses, posterolateral projection on posterior edge: present (0); absent (1).

237. Caudal autotomic vertebrae, transverse processes on posterior portion: absent (0); present (1).

238. Caudal autotomic vertebrae, transverse processes on posterior portion, if present, length compared to anterior process: shorter (0); longer (1).

239. Caudal centra, pedicels for haemal arches: present (0); absent (1).

240. Chevrons, articulation with caudal vertebrae: entirely with more anterior element (0); between anterior and posterior caudal centrum (1).

241. Scapulacoracoid, secondary ventral coracoid emargination: absent (0); present (1).

242. Clavicle, medial loop: complete (0); interrupted posteriorly (1).

243. Interclavicle, transverse arms orientation: perpendicular to sagittal axis or slightly curving forward (0); directed obliquely backwards (1).

244. Sternal fontanelle: absent (0); present (1).

245. Sternal fontanelle, if present, shape: heart-shaped (0); oval (1).

246. Xiphisternal fontanelle: absent (0); present (1).

247. Inscriptional ribs: absent (0); present (1).

248. Humerus, area dorsal to deltopectoral crest: concave (0); flat to convex (1).

249. Humerus, subcondylar and subtrochlear fossae, shape: form an m-shape, with a deep dorsal incision between them (0); conjoined completely medially (1).

250. Manus and pes, distal-most non-ungual phalanx, length compared to preceding phalanx: equal to shorter (0); longer (1).

251. Ilium, preacetabular process: present (0); absent (1).

252. Ischium, posterior process, shape: subtriangular (0); pointed process, posteroventral edge of ischium is concave (1).

253. Ischium, posterodorsal edge, shape: straight to slightly concave (0); convex, or somewhat sinuous (1).