**Information S1**

**1) Character scorings changed for *Coloradisaurus brevis* in comparison with scorings provided by Yates et al. [46] (a) and Smith and Pol [45] (b)**

(a)

31: 1→0, 43: 0→1, 45: 0→1, 48: ?→1, 55: 0→1, 57: ?→0, 71: 1→0, 78: ?→0, 79: ?→1, 104: 1→0, 107: 0→?, 108: 2→?, 109: 1→0, 120: 0→1, 123: ?→1, 126: ?→1, 137: 0→1, 176: 1→?, 177: 1→?, 178: 0→?, 180: ?→0, 182: 1→?, 190: ?→0, 191: ?→1, 200: 1→0, 201: 1→0, 204: 1→0, 209: ?→0, 230: ?→1, 245: 0→?, 247: 1→?, 249: 0→?, 267: 1→2, 272: 1→0, 273: 1→0, 279: ?→0, 282: 1→0, 294: 1→2, 304: ?→1, 312: ?→0, 330: ?→0, 340: ?→0, 344: ?→1.

(b)

355: ?→1, 356: 0→1, 359: ?→0

**2) Character scorings changed for *Adeopapposaurus mognai* in comparison with scorings provided by Sertich and Loewen [47]**

4: ?→1, 24: 0→1, 26: 1→0, 31: 0→1, 50: 0→1, 53: 0→1, 67: ?→2, 68: 1→0, 71: ?→0&1, 73: ?→1, 76: ?→0, 80: ?→1, 81: ?→0, 83: ?→0, 85: ?→0, 86: ?→1, 88: ?→1, 94: 1→0, 101: 1→0&1, 106: ?→1, 110: 0→1, 113: 0→1, 116: 1→0&1, 138: 0→1, 158: ?→1, 164: 1→0, 175: ?→0, 184: ?→0, 192: ?→1, 193: ?→0, 194: ?→0, 201: 1→0, 204: 1→0, 230: 0→1, 264: 0→1, 270: ?→1, 275: ?→0, 276: ?→1, 278: ?→0, 282: 1→0, 294: 1→2, 314: ?→0, 318: ?→1, 328: 1→0, 329: ?→1, 343: 0→1, 344: 0→1, 352: ?→0, 353: 0&1→1, 357: ?→0.

**3) Scorings for all taxa analysed in the phylogenetic analyses of the modified version of the data matrix of Yates [34].**

*Euparkeria*

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*Crurotarsi*

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*Marasuchus*

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*Aardonyx*

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*Adeopapposaurus*

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*Agnosphitys*

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*Anchisaurus*

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*Antetonitrus*

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*Barapasaurus*

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*Camelotia*

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*Cetiosaurus*

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*Chindesaurus*

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*Chromogisaurus*

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*Coloradisaurus*

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*Efraasia* 100?1001?010??1?111?112?1110?100???00100100000??0?10??01?0??1??????10?000?1?????0110100??????10010010??11?021001010100001???1?11001101001011011010000001??001?00000000000000000110000101000?0110000?0?010011212000111001101012010?11000001110100010000100131000101000010000001100101101000011110000101100010000001101?001?011010?0?01?1110001??0011?0010000010002??0???00

*Eoraptor*

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*Eucnemosaurus*

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*Glacialisaurus*

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*Gongxianosaurus*

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*Guaibasaurus*

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*Herrerasaurus*

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*Ignavusaurus*

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*Isanosaurus*

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*Jingshanosaurus*

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*Lessemsaurus*

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*Leyesaurus*

?001?00?1000211??11?????1010?11010000101101?00?1011111111?00100010(02)0011?????????01?10?110??1?00?10110??1010?111101000001?1??1111002001000111011????0???????????????????????????????????0000?001???000??????????????????????????????????????????????????????????????????100?????????????????????????????????????????????????????????????010???????12000????0???0??????00??

*Lufengosaurus*

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*Mamenchisaurus*

11000113?11120110120000000101112??001112010101011111110121100000111221010000111?201?00?????2?11(01)0000100100011111111121113?0001110121010000110002?1110101010020110001102012100000110111111111011001011111100031100100110110011011000100011?0?10?1?31?11110131011?00111110011000110100100211112??0???010?01121010?1??0??????101011111??????1101??21?2?121111102??05?1??????

*Massospondylus*

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*Melanorosaurus*

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*Neosauropoda*

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*Neotheropoda*

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*Omeisaurus*

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*Ornithischia*

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*Pantydraco*

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*Patagosaurus*

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*Plateosaurus engelhardti*

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*Plateosaurus gracilis*

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*Plateosaurus ingens*

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*Riojasaurus*

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*Ruehleia*

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*Sarahsaurus*

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*Saturnalia*

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*Seitaad*

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*Shunosaurus*

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*Silesaurus*

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*Staurikosaurus*

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*Tazoudasaurus*

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*Thecodontosaurus*

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*Unaysaurus*

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*Vulcanodon*

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*Yunnanosaurus*

100?1002??00??10011001??1011111????00101110?00??0?11011111001000001?01?0?00010???????????????10000010???0???00010?21000?1???111100110110100?0110100000011000110000000001000000?010110100000?00?0??0??001?0??11200?11100??01??0011?2101100201000(01)020?001001310000000110100010?110010111?0010110100001011010101000010011001?011010100011110010111001???11?0000110?2?0???11?

**4) Strict consensus with Bremer support and Bootstrap (absolute frequencies) values**

**Figure S1. Strict consensus of the phylogenetic analysis of sauropodomorph dinosaurs.** Analysis was based on the dataset of Yates [34] modified by other authors [8,45-49] and including *Leyesaurus marayensis* gen. et sp. nov., showing the strict consensus of 18 MPTs. Bremer decay indices are listed above the nodes and Bootstrap values are listed below the nodes.

**5) Complete list of synapomorphies**

The following list shows the unambiguous synapomorphies common to the 18 MPTs obtained in the heuristic search.

 Node 57 (Eusaurischia): Character 307: 0 →1

 Node 58 (*Eoraptor* + Eusaursichia): Character 18: 0→1, Character 19: 0→1, Character 25: 0→1, Character 33: 0→1, Character 38: 0→1

 Node 59 (Saurischia): Character 11: 0→1, Character 13: 0→1, Character 77: 0→1, Character 127: 0→1, Character 157: 0→1, Character 205: 1→0, Character 221: 0→1, Character 222: 0→2, Character 229: 0→1, Character 238: 0→1, Character 244: 0→1, Character 321: 0→1

 Node 60 (Dinosauria): Character 134: 0→1, Character 145: 0→1, Character 207: 0→1, Character 251: 0→2, Character 319: 0→1

 Node 61 (*Silesaurus* + Dinosauria): Character 48: 0 →1, Character 200: 0→1, Character 203: 0→1, Character 205: 2→1, Character 259: 1→0, Character 271: 0→1, Character 284: 0→1, Character 294: 0→1, Character 304: 0→1, Character 325: 0→1, Character 327: 0→1

 Node 62 (Anchisauria): Character 211: 1→0, Character 311: 0→1

 Node 63 (*Seitaad* + Anchisauria): Character 207: 2→1, Character 225: 1→0

 Node 64 (*Yunnanosaurus* + *Seitaad* + Anchisauria): Character 42: 0→1, Character 58: 0→1, Character 258: 2→0, Character 264: 1→0, Character 342: 0→1

 Node 65 (*Jingshanosaurus* + *Yunnanosaurus* + *Seitaad* + Anchisauria): Character 21: 1→0, Character 81: 0→2, Character 173: 1→0, Character 222: 1→0, Character 253: 1→0

 Node 66 (Massospondylidae + more derived sauropodomorphs): Character 14: 0→1, Character 31: 0→1, Character 32: 1→0, Character 40: 0→1, Character 54: 0→1, Character 85: 1→0, Character 227: 1→2, Character 234: 1→2, Character 268: 1→0

 Node 67 ([*Sarahsaurus* + *Ignavusaurus*] + more derived sauropodomorphs): Character 50: 0→1, Character 52: 0→1, Character 132: 1→0, Character 200: 1→0, Character 264: 0→1, Character 326: 0→1, Character 353: 3→2

 Node 68 (Riojasauridae + more derived sauropodomorphs): Character 29: 0→1, Character 41: 1→0, Character 57: 0→1, Character 225: 0→1, Character 242: 1→2, Character 279: 1→0, Character 296: 0→1, Character 339: 1→2

 Node 69 (Plateosauria): Character 173: 0→1, Character 220: 0→1

 Node 70 (*Ruehleia* + more derived sauropodomorphs): Character 205: 2→1, Character 258: 1→2

 Node 71 (*Plateosauravus* + more derived sauropodomorphs): Character 149: 0 →1&2, Character 253: 0→1, Character 261: 0 →1, Character 353: 2→3

 Node 72 (*Efraasia* + more derived sauropodomorphs): Character 85: 0→1, Character 94: 0→1, Character 98: 1→0, Character 131: 0→1, Character 137: 0→1, Character 177: 0→1, Character 185: 1→0, Character 191: 0→1, Character 212: 0→1, Character 227: 0→1, Character 229: 1→0, Character 244: 1→0, Character 251: 2→3, Character 306: 0→1, Character 353: 1→2

 Node 73 (*Thecodontosaurus* + more derived sauropodomorphs): Character 82: 0→1, Character 97: 0→1, Character 122: 0→1

 Node 74 (*Pantydraco* + more derived sauropodomorphs): Character 83: 0→1, Character 100: 0→1, Character 109: 0→1, Character 114: 0→1, Character 333: 0→1, Character 334: 0→1, Character 335: 0→1, Character 339: 0→1

 Node 75 (Sauropodomorpha): Character 1: 0→1, Character 98: 0→1, Character 116: 0→1, Character 142: 0→1, Character 143: 0→1, Character158: 0→1, Character 205: 0→1, Character 211: 0→1, Character 252: 0→1, Character 304: 1→0

 Node 76 (*Lessemsaurus* + *Antetonitrus*): Character 166: 0→1, Character 168: 0→1, Character 202: 0→1, Character 211: 0→1, Character 227: 2→3

 Node 77 (*Melanorosaurus* + Sauropoda): Character 132: 0→1, Character 157: 1→2, Character 281: 0→1, Character 290: 0→1, Character 291: 0→1

 Node 78 (*Aardonyx* + *Melanorosaurus* + Sauropoda): Character 32: 0→1, Character 167: 0→1&2, Character 234: 2→1, Character 240: 0→1, Character 280: 0→1, Character 286: 0→1, Character 353: 2→3

 Node 79 (Eusauropoda): Character 298: 0→1

 Node 80 (*Vulcanodon* + *Tazoudasaurus* + *Isanosaurus* + Eusauropoda): Character 187: 0→1, Character 254: 0→1, Character 315: 0→1, Character 345: 0→1

 Node 81 (*Gongxianosaurus* + more derived sauropodomorphs): no autapomorphies

 Node 82 (*Cetiosaurus* + Neosauropoda): Character 129: 0→1, Character 161: 0→1, Character 254: 1→2

 Node 83 (*Chindesaurus* + Neotheropoda): Character 260: 0→1, Character 288: 0→1, Character 295: 1→0, Character 306: 0→1, Character 326: 0→1

 Node 84 (*Guaibasaurus* + *Chindesaurus* + Neotheropoda): Character 308: 0→1, Character 318: 0→1

 Node 85 (Riojasauridae): Character 283: 0→1, Character 284: 1→0, Character 289: 0→1, Character 295: 1→0

 Node 86 (*Plateosaurus* *engelhardti* + *Plateosaurus ingens*): Character 353: 3→4:

 Node 87 (*Plateosaurus* spp): Character 107: 0→1

 Node 88 (Plateosauridae): Character 60: 0→1, Character 81: 0→1, Character 99: 0→1, Character 234: 1→2, Character 335: 1→0

 Node 89 (Herrerasauridae): Character 103: 0→1, Character 151: 0→1, Character 167: 0→2, Character 180: 0→1, Character 183: 0→1, Character 189: 0→1, Character 193: 0→1, Character 199: 0→1, Character 201: 0→1, Character 265: 0→1

 Node 90 (*Coloradisaurus* + *Lufengosaurus* + *Glacialisaurus*): Character 64: 0→1, Character 76: 0→1, Character 125: 1→0, Character 267: 1→2, Character 354: 0→1, Character 356: 0→1, Character 357: 0→1, Character 358: 0→1

 Node 91(Massospondylidae): Character 20: 0→1, Character 41: 0→1, Character 73: 0→1, Character 99: 0→1, Character 131: 1→2, Character 149: 1→2, Character 294: 1→2

 Node 92 (*Saturnalia* + *Chromogisaurus*): Character 251: 2→1, Character 288: 0→1

 Node 93 (*Sarahsaurus* + *Ignavusaurus*): Character 146: 0→1, Character 153: 1→0, Character 183: 0→1, Character 250: 1→0, Character 259: 0→1, Character 306: 1→0, Character 310: 1→0, Character 316: 1→0, Character 353: 2→1

  **Node 94 (*Massospondylus* + *Adeopapposaurus* + *Leyesaurus*): Character 11: 1→0, Character 26: 1→0, Character 65: 0 →1, Character 235: 0 →1, Character 258: 2→0, Character 296: 1 →0**

  **Node 95 (*Adeopapposaurus* + *Leyesaurus*): Character 53: 0→1, Character 94: 1→0, Character 110: 0→1, Character 137: 1→0, Character 328: 1→0**

**Table S1**. **Measurements (in millimeters) of the preserved bones of the new basal sauropodomorph *Leyesaurus marayensis* (PVL 706).** *Abbreviations*: *C3-7*, cervical vertebrae from 3 to 7; *Ca*, caudal vertebra; *dt*, distal tarsal; *mt*, metatarsal; *ph*, phalanx; \*, incomplete; ~, deformed.

|  |  |
| --- | --- |
| **Element** | **Measurements of*****Leyesaurus marayensis (*PVSJ 706) in mm** |
| *Skull* |  |
|  Maximum anteroposterior length | 147.4 |
|  Maximum dorsoventral height (anterior region to the postorbital) | 56~ |
|  Maximum transverse width (frontal-parietal sutural region) | 82.7 |
| *Lower jaw* |  |
|  Maximum anteroposterior length | 126\* |
|  Maximum antreroposterior length of the dentary | 87 |
|  Maximum dorsoventral height of the dentary | 15.5 |
| *Vertebral column* |  |
| *Atlas-axis complex* |  |
|  Proatlas: maximum anteroposterior length (right proatlas) | 22.5\* |
|  Proatlas: maximum dorsoventral height (right proatlas) | 8.8 |
|  Odontoid: maximum anteroposterior length | 13.3 |
|  Odontoid: maximum dorsoventral height (posterior region) | 9.5 |
|  Odontoid: maximum transverse width | 13.6 |
|  Intercentrum: maximum anteroposterior length | 11.7 |
|  Intercentrum: maximum transverse width | 19.6 |
|  Neural arch: maximum anteroposterior length  | 36.4 |
|  Neural arch: maximum dorsoventral height (prezygapophysis region) | 16.4\* |
|  Axis: maximum anteroposterior length of the centrum  | 65.4~ |
|  Axis: maximum anteroposterior length of the neural arch | 71.5~ |
|  Axis: maximum dorsoventral height of the centrum (anterior face) | 15.9 |
| *Cervical vertebrae* |  |
|  C3: maximum anteroposterior length of the centrum  | 79~ |
|  C3: maximum anteroposterior length of the neural arch | 107~ |
|  C3: maximum dorsoventral height of the centrum (posterior face) | 20~ |
|  C4: maximum anteroposterior length of the centrum  | 85.1 |
|  C4: maximum anteroposterior length of the neural arch | 114 |
|  C4: maximum dorsoventral height of the centrum (posterior face) | 22.2 |
|  C5: maximum anteroposterior length of the centrum  | 97~ |
|  C5: maximum anteroposterior length of the neural arch | 112~ |
|  C5: maximum dorsoventral height of the centrum (anterior face) | 20~ |
|  C6: maximum anteroposterior length of the centrum  | 97.3 |
|  C6: maximum anteroposterior length of the neural arch | 120.2 |
|  C6: maximum dorsoventral height of the centrum (posterior face) | 19 |
|  C7: maximum anteroposterior length of the centrum | 97.3\* |
|  C7: maximum anteroposterior length of the neural arch | -- |
|  C7: maximum dorsoventral height of the centrum (anterior face) | 23.2~ |
| *Caudal vertebrae* |  |
|  Ca ant.: maximum anteroposterior length of the centrum | 49.7~ |
|  Ca ant.: maximum anteroposterior length of the neural arch | -- |
|  Ca ant.: maximum dorsoventral height of the centrum (anterior face) | 38 |
|  Ca ant.: maximum dorsoventral height of the centrum (posterior face) | 43.3~ |
|  Ca mid.: maximum anteroposterior length of the centrum | 46.4 |
|  Ca mid.: maximum anteroposterior length of the neural arch | 49\* |
|  Ca mid.: maximum dorsoventral height of the centrum (anterior face) | 32 |
|  Ca mid.: maximum dorsoventral height of the centrum (posterior face) | 34~ |
| *Scapula* |  |
|  Maximum transverse width of the glenoid region | 24.4 |
| *Humerus* |  |
|  Maximum transverse width of the humeral head | 19 |
| *Pubis* |  |
|  Maximum transverse width at proximal region of the apron | 44.3 |
| *Ischium* |  |
|  Maximum transverse width of the iliac articular surface  | 26.8 |
|  Maximum dorsoventral height of the iliac articular surface | 41.7 |
| *Hindlimb**Distal tarsal* |  |
|  dtIII: maximum transverse width | 28.3 |
|  dtIII: height of the deepest region (posteromedial region) | 12.3 |
|  dtIV: maximum transverse width | 30.8 |
|  dtIV: height of the deepest region (posteromedial region) | 18.6 |
| *Metatarsals* |  |
|  mtIII: maximum proximodistal length | -- |
|  mtIII: maximum proximal height | 22.1\* |
|  mtIII: maximum proximal width | 32.2 |
|  mtIII: maximum distal height | -- |
|  mtIII: maximum distal width | -- |
|  mtIV: maximum proximodistal length | 119 |
|  mtIV: maximum proximal height | 15.2 |
|  mtIV: maximum proximal width | 35.4 |
|  mtIV: maximum distal height | 20 |
|  mtIV: maximum distal width | 24.4 |
|  mtV: maximum proximodistal length | 65.2 |
|  mtIV: maximum proximal height | 13 |
|  mtIV: maximum proximal width | 34.3 |
|  mtIV: maximum distal height | 10.2 |
|  mtIV: maximum distal width | 8.6 |
| *Phalanges*  |  |
|  ph1I: maximum proximodistal length | 48.5 |
|  ph1I: maximum proximal height | 21.3 |
|  ph1I: maximum proximal width | 30 |
|  ph1I: maximum distal height | 16.5 |
|  ph1I: maximum distal width | 22 |
|  ph2II: maximum proximodistal length | 36.2 |
|  ph2II: maximum proximal height | 21 |
|  ph2II: maximum proximal width | 22.1 |
|  ph2II: maximum distal height  | 17.7 |
|  ph2II: maximum distal width | 20.6 |
|  ph2IV: maximum proximodistal length | 28.3\* |
|  ph2IV: maximum proximal height | 14.8\* |
|  ph2IV: maximum proximal width | 17.5 |
|  ph2IV: maximum distal height | 11.8 |
|  ph2IV: maximum distal width | 19.2 |