



SUPPLEMENTARY ONLINE MATERIAL FOR

A re-evaluation of the enigmatic dinosauriform *Caseosaurus crosbyensis*
from the Late Triassic of Texas, USA and its implications for
early dinosaur evolution

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1.0 Trees produced in the phylogenetic analyses

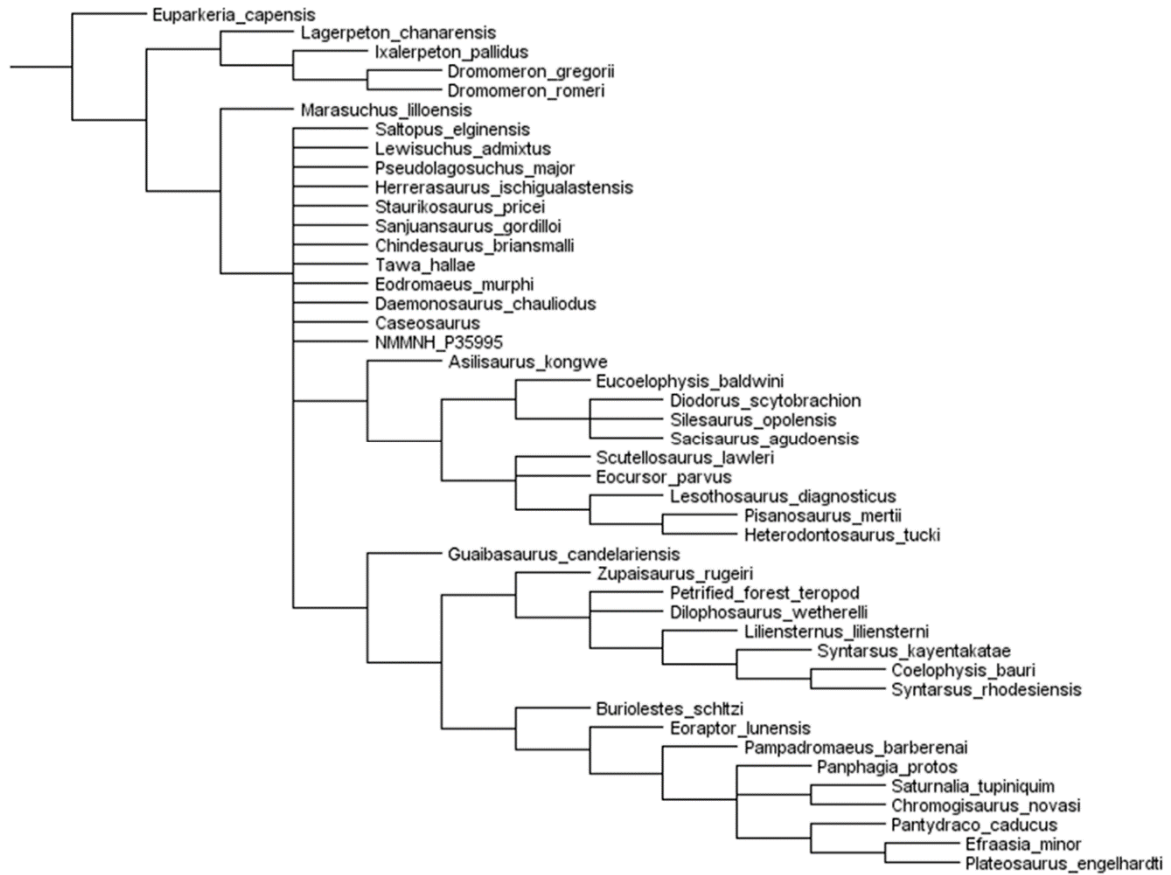


Fig. S1 Strict consensus tree produced in the analysis that used the dataset of Cabreira et al. 2016, prior to the combination of UMMP 8870 and NMMNH P-35993. Here both specimens of *Caseosaurus crosbyensis* are recovered in a large polytomy within Dinosauriformes.

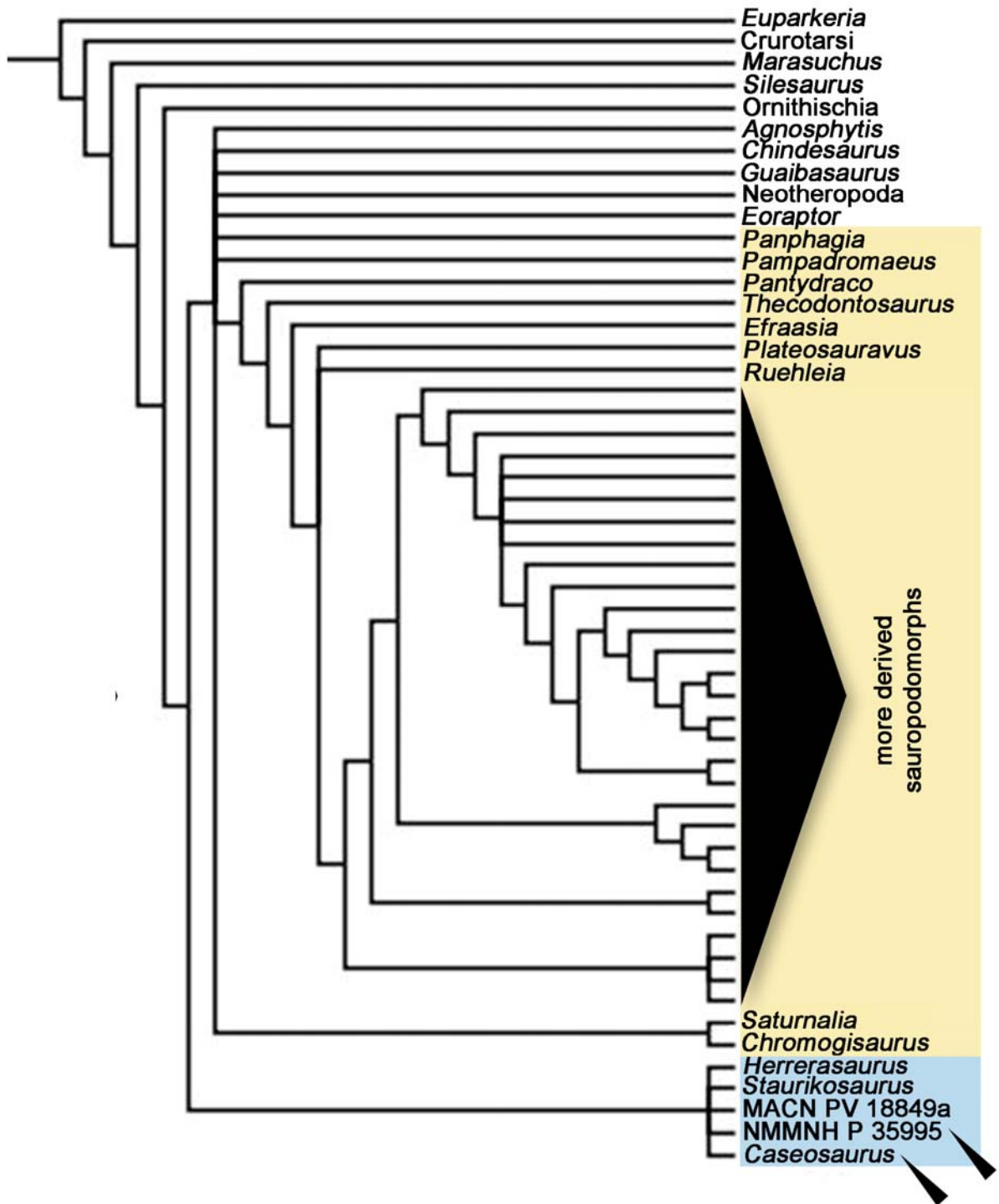


Fig. S2 Results of the phylogenetic analysis that used the modified dataset of Ezcurra (2010) and includes *Caseosaurus crosbyensis* and NMMNH P-35995. Strict consensus tree produced from 78 MPTs of length 1215 steps. Orange rectangle = Sauropodomorpha; Blue rectangle = herrerasaurids; black arrows indicate the positions of *Caseosaurus crosbyensis* and NMMNH P-35995.

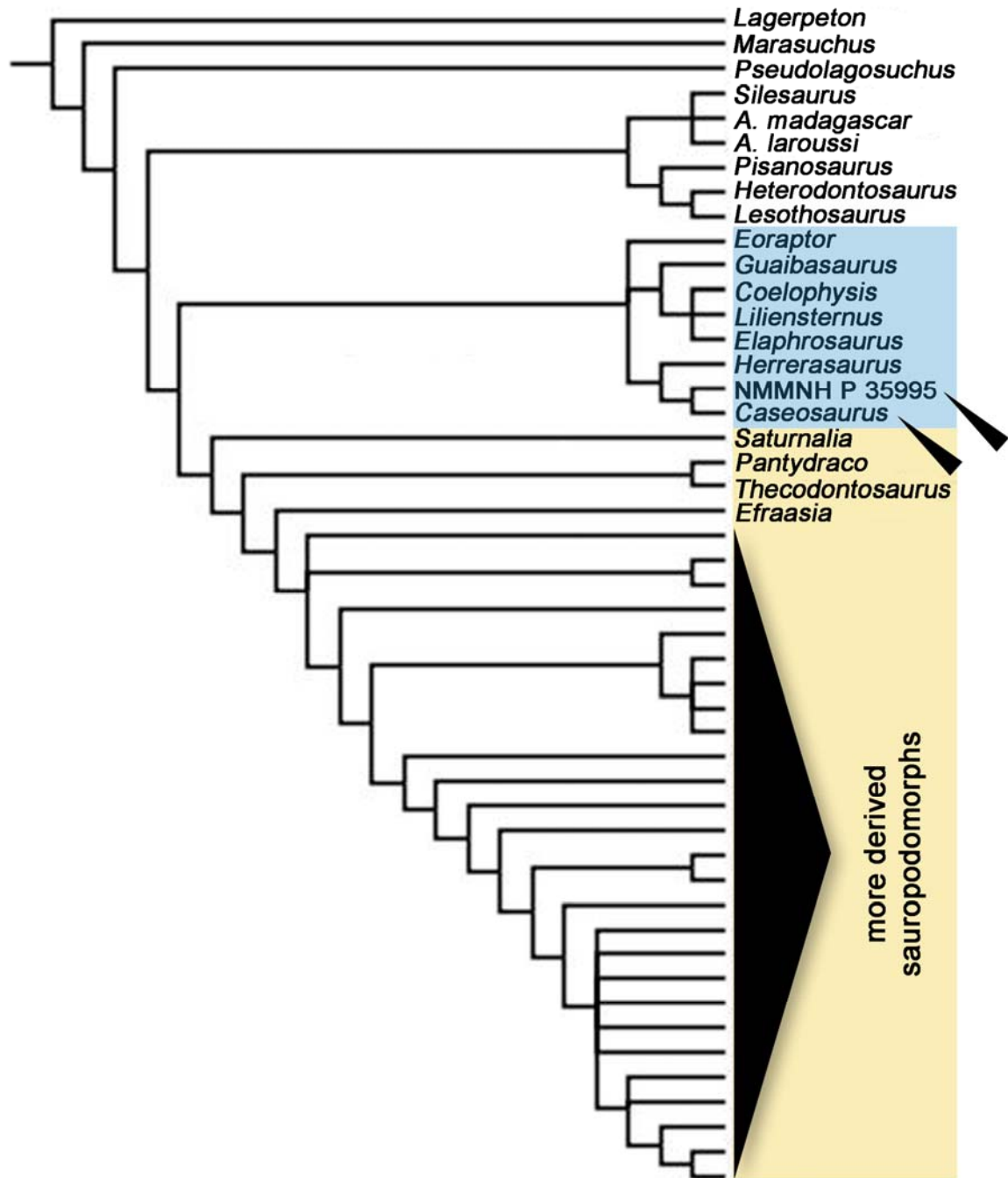


Fig. S3 Results of the phylogenetic analysis that used the dataset of Pol, Garrido & Cerda (2011) and includes *Caseosaurus crosbyensis* and NMMNH P-35995. Strict consensus tree produced from 17 MPTs of length 617 steps showing the positions of *Caseosaurus crosbyensis* and NMMNH P-35995 within Theropoda. This result suggest a very close relationship between *Caseosaurus crosbyensis*, NMMNH P-35995 and *Herrerasaurus ischigualastensis*. Orange rectangle = Sauropodomorpha; Blue rectangle = Theropoda; black arrows indicate the positions of *Caseosaurus crosbyensis* and NMMNH P-35995

2.0 Measurements taken for character data

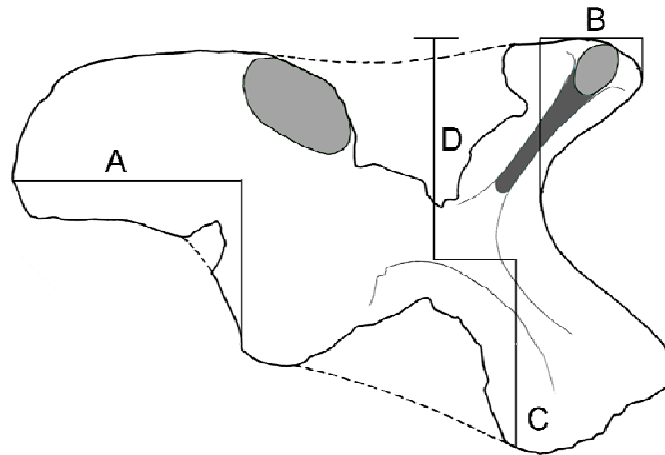


Fig. S4 Measurements taken from the specimen for use in phylogenetic analyses: (A), postacetabular process length; (B), preacetabular process length; (C), height of the acetabular region; (D), dorsoventral height of iliac blade above the acetabulum.

3.0 Characters scores

3.1 Character scored in the dataset of Baron, Norman & Barrett (2017a)

Euparkeria 000000000000-000-0-00100-000000-00000010000110000----
 000100000000100000000000001000010000100010010000-0100000?0000000000---
 000000000100000000000000000200000000-000-0?0010010000000001000?0000-0000000000-00-
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 100??000??0000000100010000101010000100010000001010000102100??1100?0021002?0---
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Eocursor

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Dracoraptor 00??100011??1??1??100?00?10?000??11?0?12????1011?0---
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002021001210100111010??11??01?00011100112??0?11?01?00001?0100?0??001??10?0010110
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Massospondyluskaalae 0????10011100-?10-1111111-1??00??01000020?00111100---
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Panphagia

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Plateosaurus

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Unaysaurus

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Eodromaeus

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Syntarsus 00?01000012210??111011011100?001?11100020?011?0110----
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Eoraptor 01001000100010?0101010000100?000-00100020101101100----
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2200?001010?00---00?1-01??00??010101001?010000??1101-
100002??????0?01?????????00011101?11?1000??1011?1?10301001002110?0000000000

Procompsognathus

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?00?????????????0???0???101?????1????1?2??1101???0?????????????????????2?0?020?00---
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Tawa 00?01000?0?210??1110?101110??000-01000?2????100100----
??1?00013000?1100100000?????10?00?0?0?110??0?010110000?????1?0100---
00000011010?010???00000?003000000000-000-
00?010?000000000?0?0?1111?10?1110011?????0?00?????00?00?0?????011??01??010111???
?1?1111110??11?0-
00???21?0?1111000110?12101?????00?001112?11100?010?0?1????2?????????0?20?0?00---
?0?00012000?20102010010?10000121100-
1000020011010001000000001?00111011111000011101100010301?01002110???0??00000?

Dilophosaurus 0010100011?211?11110110110000001010100120101100110----
101000013000111001010000001?110110010011?0001??10110?????????0?2?00---
000000110101000??1?00200000200100000-000-
001010100000001111010?011110?1120111011100?00010?2?10001101100101000101??000011
01011111111010001110-
100??212??01110000101121111030001001212211110120101011?11121??00?011020102?0---
?0001102000020101011010120?01121100-
00?0020111121?01110110101?00111?11101??0?11?00100010211?11002??010000000000

Tazoudasaurus
0????????????????????????????????????????0????????????????????????????????????0?????00???
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10100---
001?0???????121?????1?????1?????????????1?????????????????????1?00?11111?1?0?0??????????
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Yunnanosaurus 00?101?001?01???0-1?01?1?0??000???1?0?02000?110?00----
1??1?00??000??00010?000?????10?100000??00001?????????????????????????00---
01???1?0?10?0?????????0???0?????0000-000-

0?2?2?0?2100001??0??1??1?010??000111?0112??0?01??10000010010100??01??010000???
??101011101?101100-??2??1?0??00?001011211?00100100?0?001012011000200000112200201-
2??00001010200---0010100??00201010??1011-000??1101-
1000020000011001000010101000111111?1?0000101??????1011001011100000000000?

Riojasaurus 0000010?11?0??0-110?011??000??1001?20??011?100---
00112000?1000110000?001????11110????????????1????????????00---
01????0110?000??1?00200?101????000??0??0??2????21010?1??0?0?0?11000??00?11001020
??1110??11??0??00??0????????????101111111010101100-1?201?001-
001?011111131010010000000201201101--000?001?20220?-??00001010200---0011-
0010000202110??1011-000101101-
1000020000111001000010??1000111?1????00??10??0?0101?00102?0001????00000?

Vulcanodon

0????????????????????????????????????????????????????????????????????????????????
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1?000?11010000---001000?100002121201?01011-001101111-
?????10000?????10?????1010001111110?00100?011----?0000110010?10001?01000000?

Coloradisaurus 00??010011201-?10-11011110?01000-01001?2??0??00---
??10?0003??011?0000100001011011010?11001?011?100120?????????0?00---
010??10011010?001000110011?????00010000-
002?21?0?210100??0?0??1?0?0?00001??011201?0111????????????00??0??????100011010
110111101100?????????0????????????????????1?????????012?010001000000122102??2200
0001010200---0010000??002020101?01011-001??1101-
0000020000111001000010??1??0?11111?0100??0??00030110010110000000000000?

Lufengosaurus 0001????????????????1??1??2?00??100?020??011??00---1?10????01001101-
01000??11011000?0??11001?01??1?0000?0011????0????????1?010?0?????0010?????????
0000-000-00??20?0?21010?1110?00??10010200001??011101?01110100000100101001100010?0-
10000010100101111011001100-1?2111001-00??01011211?001001000100020?211101--
00000?12200201-22000001010200---0000000100002020101??10?1-000??1101-
1000020000?11001000010101000111111?111?0110?01011010110010111000000000000?

Dracovenator

0????000102211?11111?101100??0?10?1200?2????1???1????????????????????????????
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000?10?0000001???0?0????????????????????????????????????????????????????????
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Cryolophosaurus

00?01????????????????????????????????0?00????10?1?010?100110----

??10100?3?1?1?0?0100000?011??100100100000?????1?0?????0?0?0?0?????????????0?
??10002????????????????????????????0?0000?????0?0?????1?0??110??101100?00??1??2????0??
??1??1??0????????????????????????????1?0?01100-
????????????????????????????????01?0?11????1100?????001021?????0?02?0?01??00---
?0?????20?00200010??1102-001111100-
10000?????1?01100??1??10011111?0?1??11111????????????????????????????00????

Sinosaurus

0010100011221???111111011000000??0?0012??01100110----

1???000??00011110101100????011001??1?2?11000?01??110000?????????0?00---
0001001?010?000??0000200??0101000000-000-
001010000000001??000??????1??11?????1??0??0??1?12?1??0?????0?0????01??1??100011010
11111111?1?00111??1????????????????????????11030001?0121120011001010?001?2??20?-
1?10?00201020????01-??020?0??010??1?1??2010??1100-
0?1?021111??101?0?01?1000001??1?????101110?????103????0?0211?201?0?000000

Ignotosaurus

0????????????????????????????????????????????????????????????????????????????????
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Lophostropheus

0????????????????????????????????????????????????????????????????????????????????
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10??00?????????????1??0??111111010?????????2??1?001??1??1????????????????????
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Panguraptor 00?01?????????????11??????????0001010100?202?110?100----
??1?10013000?0100200001??????110????????????????????????????????????????????00---
00???001??0?00??1????0000??????000??0???0??01?00?00000????000??????1?21?1111??1??0?
?0??1?0?????????????????????????????????????10011????1????????????????????????????????11?0?0??111??1?
?????????????2??1?0?0?????02??????10????????????????????????????????1????2??0?0??1?0??01?????
??????2????1????11?????????1?01?????????00??10??01??????1?00?1?0?0??0?000?

Sarcosaurus

0??????????????????????????????????????????????????????????????????????????????????????????????????
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0?00---?????1???????010??11?1002-?01??1100-
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Pulanesaura

0??????????????????????????????????????????????????????????????????????????????????????????????????
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00??21??21?10?????0??0100??00002?1001111??101??????????????????101??00??10?????????????
????11??????1011??????0??????????????????????????????????????????????????????0?0122002?1-
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Pampadromaeus

00?010001120?0?00-1??1011?1?0010-1100002000?110100----
0?0?1000300010?0????000?????0??10????????????????????????????????????????????00---
000??000010?0?0?0?00100100210100000-000-
0?1320000100100101010?????????????????1??????0????????????????????????????????????0011?????
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000001??0????????????????????????????????????????????????????????????????????????0?0000

Liliensternus

0?????????????????????????????????????10??1?0?2????????????????????????00?30?0??10010?00???
?????01????????????????????????????????0????????0---

00???011?????????????0?0?????000?0?????????0?000100???000???11???1?101?1?1?0??
???1????????????????????????????????00???1?1?0111111?011110-
????????????????????????????110300?1?01???2011?012010?000?2??21?-???0?002010?00---
?0010???0?020?010?1??201001?110?-
10000?01??1????11???11??000???1????????????????????0????10????0?000?00?????

Gongxianosaurus

0????????????????????????????????????????????????????????????????????????????????
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?0-????1????????????????????????????????????????1?0????1????????00110?010???100?00-
01??1111110????10-
??1????????????????????????????????????????????????????????0?0????????????????0????????????00????
0??00?0121?0???00?----
????????????????1???100??0??100111?1?????00??0????00101?0?0?100010000000??

Zupaysaurus 00??1??????????11????????0000010?0100120201100100----

10100001300010100200001????11100100?????1010????????????????0?1????00---
00???011010?000???000100?0?????000?000-
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1????????????????????????????????????

Dromomerongigas

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?01?0????????????????????????????????????????????????????????????????????????

Nyasaasaurus

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1?01????????????????????????????????????????????????????????????????????????

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Lepidus

0????????????????????????????????????????0?0?00?0??2????????????????????????????????????????
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?10?0?00? ??????0????????????????????????????????????????????????????????????????????????
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Segisaurus

0????????????????????????????????????????????????????????????????????????????????????????
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11?100??11?????????????????0?????????????1?????????????????01?????1?0101??????10001?02?20?
00??00001?????????????????1?0?????1?????????????2?????????????????10??0?????????????1?01110
000????311??1?0211?20?0?0000000

Caseosaurus

0????????????????????????????????????????????????????????????????????????????????????????
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Daemonosaurus

01??1000100010?01011100001?0?00??0000020?01100?00???0?1?1001300010?0?0?0?
0??????1??01?0??1?????????????????????????????????00??000?01?010?000????00100?00300200000?
000?0?10100?00000000??010???1?????1?10?????????1?0????????????????????????????????
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Buriolestes 0??0??0?1??010??0-11??1?01??0?0-

11100?2??0??0?????????0?10003??0?1????0?????????111????????????????????????????????

00--00??011010?010??0000100?00210100000-00?-
0?13100000001001?010?????????????????????0??1?0??000011??0?0?????????0??????
?0111011?00?10??1????0?????????0??1?????10000001?00101100000020?01001?100211-
?1?0??1?????????00001011000?2000101001001-001111101-
1000020?00010?????????0??1000??10????1??0010?0??0?00?01?0110210000000?00000?

Chromogisaurus

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?????200001110?10000?010??00????????????????????????????????????0?0?0?0?0??????

Agnosphitys_Holotype

0????????????????????????????????????????????????????????????????????????????????
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Dimorphodon 001010000120?????0-01112?0?0000-?1000-20??00-

000????0??0000?0?0?0????0????000????????????????????????????????????00---
00??001000?????????000001?0201200000-000-00230-
0?0?0?000?000?????1?????????????????10?????????????????11????????11010-
??0?0200010110001100-000??0??1?0000000?10?0011201?0?100??0000000??01010?00000?-
??0?11001?000---?????011000?00?0?00--000----0-?????000?0-0?00?0?00-00?0010?1110??0-
1?1?11?1?10000?000001?01?000100000000?0000

NMMNH P-35995

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3.2 Character scores from the modified dataset of Cabreira et al. (2016)

Euparkeria_capensis

?00100?000000?0100000001000000/1?10110000000/10000000000?000100000100000000
0000000000010000000?0100101000000000??01000001000000??00000100??0??0?0010000?00
?0101000?000000000000010000000000000?0000000/1000000000000000000?00?000?000000000
000000000010?00010000?000

Lagerpeton_chanarensis

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????????????????1?000000000000????????????????????????????????????????????0001000?0000010000?0000
0000000000000100010100010?0010010110000010000100?0/211100?01101000011000001010??
??020???????

Dromomeron_gregorii

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???0000000?01010100?00101210101000000?000010????????????????????????????????
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Dromomeron_romeri

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???000000010001010000?10121010110000010000100?011100?011010????????????0?????????
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Ixalerpeton_pallidus

?0????????????????????????????????????????1??11????0????????????????????????
0?1??0010?0??010000000000??00????00000????????????????????0001001?00000?0?0??0
?0?0000000000000100010100010?0020010110100010000????????????????????????????
000001100

Marasuchus_lilloensis

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?00000000?0000010000000000?000101000020000????????????????????0/101010/10?10000110
00011011000011101000100/11001100110?00001101000000?0100001?0010001?00?00100110000
00110??0000??0100

Saltopus_elginensis

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1??1????????????1??1????????????1????????????????????????????????????00????????1?1??1?1????????????
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Lewisuchus_admixtus

????????0000101?????011?000?0100010011110??0????????????????200000000????01
001?1?000000?0?100?01????????????1011?002??0????????????????????????????????????????
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?101101

Pseudolagosuchus_major

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Asilisaurus_kongwe

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0?1000000??10101010???10?????01?11?002????????????????????????????????000?00?101??1?00??1?
1?1?11??111101?011100/1111?101?0001?0200001000100001?1000001200000??????0?????0???
10??????????

Diodorus_scytobrachion

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Eucoelophysis_baldwini

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?????111101?012110011?001?0001??11000????????????????????????????????????1?1????????????
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Silesaurus_opolensis

?0?00000?0010000?0???101?110?010100110111000?01010?0000010020011001111000/

1?10001001100010101010101010101010111001000/1111100000000000????????????????????100020/1011
010011100101011111011101/21111012100/1011100110001001/2110020001010110010?0011000
10????1010010?100001021?100011

Sacisaurus_agudoensis

????????0000101????????0????????????????????01????????????1101111011?????
????????????????????????????0??11????????0????????????????????0001/20??101??1100??1
?1?11????10/11/21111012100011100?1000110111002110101????????????????????????????
??102?????????

Pisanosaurus_mertii

?????????1?0????????????????????????????????1?111?0111??1?111110??????
?0?????010?????0??0????????????????????????????????????????????????????????0?????
?????2????????????????????0001?011010?0011?10?1?111?110?11011????1??1?1??0??1???
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Scutellosaurus_lawleri

?????0????1?0??1?????????0??0????????????????1?0?1?10????2??120111101?????
00??0?0?0?0?101000??10??0001?000011000?0?????00?????01?????00?????11????
?1?01??111100022013100/10111100000110200102111010010211?000001111????????110?1?
??1??????????

Lesothosaurus_diagnosticus

?00000000110000100000100110000?00111010?00000101110?011001112001201111010
01010?00?0100?0??001????111?000????1000101100010????0000000?000?000011111?00001
0?1100?111?0100211020022013000110111000001102001020?1101??1??1??????1?1?0??010100
11??00001010111011?

Eocursor_parvus

?0????????????????????????????????11??1??????1?11100110????201?1110??????
????0?00?1?0?0??001?1?0?0????11??01?01????????????????????010022000000100?1??1
11?010?2?111002201310011111?000011020?102011101??1????????????????1??????0????10
10??1111

Heterodontosaurus_tucki

?000011001100121000001001110001?001?001100100101111?1110111100012100101000
11000000001000000011?1001111?000?000110001120001110001110011001100000011?22100000

1001100?111?101021?????2??30?0110111?0000110201???0?1???????1?????11??1000010110
1??1011010001110110

Herrerasaurus_ischigualastensis

?0000101?0000100000100011010001110001000?1?0000100100000100010100000000000
?1001?01?111011?0111?00101000111011101?11111/2101010/210111100001001021102010120?1
010001101011111112011111021011001110111?00001002100010011010111101?0020000100110
10101101000000010110????

Staurikosaurus_pricei

?0????????????????????????????????????????????????????????0010?00?0?0???0000000000?????
00?011?010?0?01?001001001110111????????????????????????????????????????1010120?101000110111
11111?1??11111021010/100?111?10?0000110210001000101????????????????????????????????0??
?0010???????

Sanjuansaurus_gordilloi

?????????0000100????????????????????????????????????????????????????????100000000?????00?
11??1110110011100?10101011101?01111???????1?????????????????????????????????????????0?2011
111??????1021021011001111?1000?000002000010001?10?11101?00?01??10?????????????????????
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Panphagia_protos

?0?????????????????1?0?0?????????????????????????????????????????1000100011100???11000010000????
??0?11110000?1011?010?????110?01010?????????????????????????????????????????002101100??11??00
0???0111111?????????????????1?????????????02000010011010011111?00200?????????0?????????????1
020?1?????

Eoraptor_lunensis

?0110111?00110111101101111000111001010?????100010001?000010?1010/1100000000
000???1??0011000001111010100??1??0?00010121210110??10001011110000201010012101110
1?01100001110111/2121???1??1011??1?1?111?00001102010010011010011111?00200001011101
01011110111111111?????

Pampadromaeus_barberenai

?0021/211?1001110/11??0?101011001?1?????????????0???00000?0???001020100001000
000?????????????????10111010??001?01?1?10?????0?100?????????????????????????100?2101??0???1
?0???1?1????????111101/21011?011111111??00?101/20????0?????????????????????????????????
????11?10101??????

Buriolestes_schltzi

?0?21/201110011?01???010???010?1110????????00110001?00?01?010200000000?00
1????????????????01110100100110100010??111200110????0??01????????200121011001?01
?0110111?1111111/2111021011001111111?00001102000010011?10???110????000100???00111
111101000111???????

Saturnalia_tupiniquim

?1????????????????11?1????????????100????????00?1????????????11000010000?????
10?1?110000010101010010011010101010121201111????????????????????1000/121011001?1110
1001110111/21111111021011011111111?00001002010011011010011101?0020/100010?1101011
111110???1021?1?0101

Chromogisaurus_novasi

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????????????????????????????1????????????1????????????????????????012101?0?1????????????
????????????????????1????111????1?0201001101101????????????????????????????????020????
???

Pantydraco_caducus

?????101?0????????????0?????????101????0?0??10011?0?????10?12?0001001001??
??01111?000??10????????????00?00??11????????????????????0111??1?1?0010?0????
???111/21????????????????1?00001??200??00?1?1?0????????????????0010111210???1
00111?0110

Efraasia_minor

?1?2110100020101?111101???1?00????10000000?1??10011101101?01?2120?00110000?
???10?111100???10101010?0?011010101010121201110011?0101111?11011/2000001022011001?
11100001110112111111021011000111111000001002000011011010011211????00?1001100010
111200???101011?0110

Plateosaurus_engelhardti

?112110100020101111110100110/100?01110000001111001001110110100202120100111
0001011101111101001101110100110110101010100212011100110010111111000000001022011
101?1110100111011211/21110/1102101100011111100000002000010/1111010011201?0020000
101110001011020010010101101110

Chindesaurus_briansmalli

????????????????????????????????????????????????????????????????????????????????

????????????????0?10?1????0????????????????????????????????????11/21/2??1?????1?????
?????????1011021011001110110?0?001???1?01200010/11011111?1120/10?????????????????
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Guaibasaurus_candelariensis

????????????????????????????????????????????????????????????????????????????????????
??????????1?1111100001110?0??0??111?10110??1111111100111?1??1001210/11101??11100?
01110/111?111?????1?11?00?1?110/110000?012100020011110111101?01200011011100011111
110???020???????

Tawa_hallae

?012211?00020100???1000?001010?0100?1100000100010000000?00?001000000000?001
????11112111111?10111?10?000??0?0?001??1111/210100000101110001001011?1?010120?101?
?011020?1011?1??2?10210221111011110010000110211012000101011111?1121000110110001
1111010111000011?1111

Eodromaeus_murphi

?0?1??0??0011010???????1??0?????1?00????????0????0000100???0?1?000000000000?0?
0011?1??110?0?01?1110?0?????010111?11121011111010?1?0100?1101/210010102101101001
1/21011?10?111??11??1?21?11001?1?????00001012210010011110?111?0?002000011????0???
????0??0020??0101

Coelophysis_bauri

?012212?1002100111001011110/10110100112001000010110000100?1000112000000001
00111111112111101?101011111110010100110111?1?101102111111011111121?12100221111
01?121021?10111111212?0002211200111100100000/11122200????1110110111?002011011001
0111101101010001011110???

Liliensternus_liliensterni

?????????0?1?????????????????1??1?????????????????0000?00?????????000?00?00?????
11?121?110?11010111?11100?0?????????11110?10?????????1?????????21002201111?121021?
1011111212111022112110111110?00001002220020111110010111?0020110?1?????1?1101??0??
?0121???????

Syntarsus_rhodesiensis

?01221211?011000110010?101?????10011201??10?1??0000000?????112000000?010011
???11112111101?101?111111100101001111111210?11211111?11111011121?1210122111101?1

?100??10111111212111022111/2010/1111100?00000112220020111010010111?0020111?1?01011
1101101011?0111?110101

Syntarsus_kayentakatae

?01221211?021010?101101101?10101110??00?1?010010000000?1000112000000?00001
????11112111101?101?111111100101??110111??1????????????????????11?1?????1??1??1?1
021?101111??2?211102?1120011111001000011122200?????10?1?????????111?1?0??111101??
01000101111?1??

Zupaisaurus_rugeiri

?????2??011010?101101011101100011??00????01100?0100?1000??2000000?0000??
1????????????????????????????????????1????????????????????????????????11????????????????
????????????????????????????????0001??????2111110010101?0000010?1?????????????1100??
?1??????

Daemonosaurus_chauliodus

?00011??010100?0010??11001001001??00??111010010000?0000000?00000?0000??
????10????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????0110?????
?????

Petrified_forest_teropod

????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????00221111?1??11021?1?11
1?112?211102?112101111110??0001?021200211111001010?0??0110?100101?11?1????????11
1???????

Dilophosaurus_wetherelli

?0121/2?2?10010010??11?0101101100101?2011001110010010000110?01110000000?00
01111011111210?110101110110110100110111211/210110??11111101100121?1210022011
101?121021?11111111212111022112100/11111010000000212002111110010101?00210111100
10111011010011012111101?0

Caseosaurus

????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????1010020?1011?01?????????
?????????????????????????????????????????????????????????????????????????????????????
?

10???00?0102?1??11?????111011?010?001010110001100111101200?10?????201?001101?1?200
2010?????10?10?00??100?0000101?12?0111?0011???1001001111011?10000?010?001100?000?
?0000000??0100?0??0?01?00?10?????1110??21100101100??0??200101110010020100000200011
0102100000?1111100010011?001010000101101000010111101000000110111?1?01?010???10111
?0?01??0011?1010000010011??0????1020000??01?11?110

Antetonitrus

?1????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????????
00?????????10000?01100???0?0011??31100010110?????0010?3100??1010????????????????
??111010001?????????????111011110011111110100000011011101?????????????????1011110??
??21?00?0????31?100??1?????????????110??0

Barapasaurus

????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????????
00?021001?10?11??1?????????101?00?1?????????11?????????????????????????????????2111002101100
0011110011???11110010?????????????????????????????1?1?1?????????1?1?????????1?????????0??????????
1?1??????5?????????01?????????0?11?1?1

Blikanasaurus

????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????0000?0110111?1?000010110101110010111112012110000
100?211?0?1?1?????????????????????

Camelotia

????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????????
?????????1??0??011?????????????????????????????????????????????????????????????????????????1?
?????????1??00111?111011110111?1??110?000000?????????????????????????????????????????????2??0
00????5????????????????????????????????????????????????????????????????????????????

Cetiosaurus

1????????????????????????????????????????????????????????????????01????????????????????????????????
????????????????????????????????????????????????????????????2??0011110111110100100020?2001?10?1020??101110201010
0???2?????1001??00100???0111101031100100011???????1????????????????????????????2111002?0210
?0010?1?011??1101?00???211112??0???010?111210100010010111????????????????????????????????
?????????????5????????????????????????????????

Chindesaurus

????????????????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????0????????????????01?0?0?1??0?1?????000?00????
000???1?0????1000????????????????????????????????????????????????????????????????????0??001????
?0????????????????0000101110001011100?????10111100??01?110100????????????????????????????
?????1??????0?01??????10?10???

Coloradisaurus

?00?1002?0102?11111?1??1110?1111000?10??00?001?01110101?100100100?1011011011???11
0111???0?1?100101101011101100101010000?1?00?1100200100011?0110??00?001?10011000000
00000000101110??0100100?0?????????0110111121?011?????0????????????????????????????0010
0021100?0?1110110010011110111?00101101000010111010000?0110110??011110?000101??
?001110012?101?0000210021?011?110?0000????????????0

Efraasia

100?1001?010??1?111?112?1110?100???00100100000??0?10??01?1??1??????10?000?1?????011
0100??????10010010??11?011001010100001???1?11001101001011011010000001??001?0000000
000000000110000101000?0110000?0?010011212000111001101022010?11000001110100010000
100021000201100010000001100101101000011110000101100010000001101?001?011010?0?01?1
110001??0011?1010000010002??0??000100001??1111??10

Eucnemosaurus

????????????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????0???01?001100100000??00?0??
????????10000?01100????????11????????????????????????????????????????????????????????11
0???0????????????001101?1010?1010110?00000110110????????????????????????????????
??????4????????????????????????10???

Gongxianosaurus

1????0????????12????????????????????????????????????????????????????????????????????????????????
????????????????00??1?2121????????????0????????????1?0?001?0?0????0?0?00000??
????????0?0?0?1?0?000?011??2110????1?1????????????????????????????????0?100??0?????
????????????????2111?2????0??1101?????1?0??1??0?1?1????1?11??010??10?2?01110
00020005????????????????????????

Plateosaurus_ingens

????????????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????????????????
01??01????????10????????????????????????????????????????????????????????????????????????
????????????????????????????????????????00?010????????????????????????????????????????1??0?0?
??4????????????????????110???

Guaibasaurus

????????????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????????????0??01??011001000000??00000?
?001000?01000?01?0??100??1????110????1?0?????0????110??0?1?00??0?0?000?0111002201
10010000000010?1011000000100100001011010100?0?0111100100?01101?00101110000000010
1100000000001100?00??002?????0111?1111

Herrerasaurus

00000000?0101000000000000?00010000000000100000010001010101000100001101000000101?0
000000?1000?00000000?1000000000000000001010001000000100000?000010000011??00101100
00002000000100000101110000110010100?1110??011000000000000012000000100000110110100
10000012000000010000010??01?0101001000010111000101100010000100001000100100101000
00011000100001001000000000?020000000001000001110111011

Isanosaurus

????????????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????0?0?0?????????2??10?0?????????????2?011000?
????????????????????101?0????????????????????????????????????????????????????????????????
????????????????211112??0??001?1?0????????????????????????????????????????????????????????
??3?110??1????????????0???

Jingshanosaurus

1001?002??10211111100?0?111011101100?102001??1?10111011101001000???01100000101?21
1001000??1?10110010??11101100101211001????111??010??????1??10100??0011100?1??0000
000000000??10??01000000001000000?0010??11201011100??00??0011?3100100?0100010200001
00021000002111001002??110010110?01001101000010111101010000110110?12011010?00?????
?0101111012010100000010?4????????????????????????

Lessemsaurus

????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????????
00????????????????????????????????????0001??1110010110?????0?1?310?????1?0??1??0010002100000
?11?110002??1?10110?111011?10??11111?0?000000100101??011011001?????????11??121
11??00??0??311?????101?????1?1111??10

Lufengosaurus

100??02??0211?1?11?11111111110100101011010000101110101110010?1????0110??0110??01
010100?011010010????0111?11011010100011?00011100200110111?01101000200111001100000
0000000001001101001000000011000000001011112110111001101121011131001012010001020
00010002110000211101100210110010110000101101000010211101010000110110010011110?000
1?111010111001201011000021004101110110?00000??1????1??

Mamenchisaurus

11000113?11120110120000000101112??001112010101011111110120100000111221010000111?2
01?00?????2?111000010010001111111121113?0001110121010000110002?11101010100201100
0110201210000011011111111011001011111100031100100110110012011000100011?0?10?1?31
?21110021011?00011110011000110100100211112??0??010?01121010?1??0?????101011111??
????1101??21?2?021111102??05?1????????????????????????

Massospondylus

1001100210102111111111211011111010000101101000110011011111001000102?01?0110010110
10101??101001001011010101011011010110011100?1110020010011110110100020011100110000
0000000000101110100110000000000000?011011112010111001101121011121001012110000020
00010002100020011101100100110010111000101101000010210101000000110110010011110100
0111110001110012010100000210020?00?011??00000?????????1?

Melanorosaurus

1001?103101021111101?1110101111???1010101101011001101011?00000010220110110010??2
002010011011101?00111?1000110?10021100110?010110011011010010111?0000001??00210000
00001000000?020100110010?001100???0000??21200000110??????00?0?210010120?00010200
00100021000001111010001???1?010110?1110111100111001110100000011011001021101010000
1110010111001?111110000110?301100?11??00000?0???????

Neosauropoda

1100011311112011012000001010111211101112010101011111101201001101122211100101111
20120000010201110000120100011111112121112100001110011110100110020121010101102011
10011020121100002100111001111110000100111000311001100111100020100000000110001??1?
30021110021021000011110011001110110100211112??0??010?11121010?110000111110101111
11011??111100210200211111021105?11???110200000?01?100??1

Neotheropoda

0011100210102010011000011000000000000110000000010110010101000110001
20100000010110000001110001000000001?00000000000000001011001100000100001100001020
00010101100100000010000000002100011000000000101000010001011000001000100022000001
10??0010011002010101002000221111010000111110000110100001?011000100000000101101111
1002001011000011111000?0?00000110000000001200000?1?0111111120111100

Omeisaurus

110001131111201101200000101011?201001112010101011111010120100000112221110010111??
?0?00???1???11100001?0?00011101111121113??001110120011010111002?121010101102011000
11020121100?021??1?10011100100?01111100031100100011?????0100001000110001001?310
21110021011000011110011000111100100211012??0??010?01021010011?0??111?011010?11??1
????1111021020021111102?105?????????0?00000??1?1????1

Ornithischia

0010000000000?0000000?000?1011000100100?10000001001000010100001000100100000000100
000000010010101100000010011100111010000100000000001010010000??010000000?00?0?00?0
000000000000021000000000001000010000100111110000010000000000000100000000000000
000110102100020011??000?000110000000100001?0101111020000000001001110002?01?110000
011110000000000011000000000010?000????01120000010110102

Patagosaurus

11????????????????????????????????????????????????????????????????????????????????????????????
?????1?00001?????0?0111012111?????1100101100000110020?2001010?00201?01111120121
?00?0210011100?1?0?100??0?111?00?1100100?11?????????????????????????????????21110021010
00001111001100111110010?211112??0??0011111?101000?0?????????????????????????????????????
?????????????5????????02??????1?11??1

Plateosaurus_engelhardti

1001100110102011111112111100101100001001010101100110011010110010011011011011011011
1101100010111100101101011111001010100001100111100110100101101101000200111001100
00000000000101101000100000001000000010011112000111001101121010111001002010000
01000010002110020210101000111110010111100001111000010110001000010111110010011010
1000101110001100011110100000100040000001102000001011110?10

Plateosaurus_gracilis

?00?001?0102?110111?1??1110?101??00?10?1010?0?0?10001101??10??????????????????1??
??????????0?0110?????11100101010?001?????1100?01???01101101?00?001?1001100000000
0000010?1010001010000001000?00?????????1200?11100?1011?10101010000???10?????0?00100
0211002021010100011111001011??00001111000010110?010000?0??0110????????????????????
?????????0?0????????3????????0?00001101111?1?0

Plateosaurus

????????????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????????????
00??10??011??0??110?????????0??31110011100?????????????1?????????????????0010002110020
1?01?????????11??10110?00001111000010110001000000110110?????0?????????????????11?0????
0?????????4????????????????????????????????????

Riojasaurus

1001?00??0102011?110??00111011011000?100001000?10010?00111001000001101?0?100101?0
1011??????1?001000?1??101?100010101000010??111100110100101101101000100111001100000
0000000001011101001000000011000?0?01001121210111100111112?011111011001010001020?
0010002110020211101000110110010110010110111010110201101000000110110010011010100??
011?00011100121111000001??13?????????0100?00?011110?00

Ruehleia

????????????????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????????????????????????
0?1100001?00?0?0110?????01001111200011100?0100?01011101000???0?00???00100021100
0021??11000110110?10110?101011010000102100010?00?011011001?000010100????????????????
?????????????????3?????????????????????????????????????

Shunosaurus

11000113?110201101200000001011?20100111201010101001101012100011011121010001011?12
0020???110200100000120100011111112121112??01011?1001?1?10010012?1100001011021?0?0
01?0201210000?11?00?100111011001?111?1?000211001100?11000?2011001?000110000??1?310
2111002101100001111?01100?111100100211112??0???000?01121010?01?0????110?101???1101
1??1111102002?02111?1021105?????????0?00000??1?10??0

Silesaurus

00?0??00?0000?00100000??0?00?0?01010??????????0010??0???01??????????00?0?0?0000??0000
00?????1?00?0?010??0?0000010001000010?0000000000??00100000000000101000011000000
00000000??10000100000?0?0??????111?1110000100000????????????????????????????000001
000001001000000000?010100?0?10000110110001001000100011010000000?0000000??11?1?00
??000000?10??000?001100000?0?0100?0???11000?00

Staurikosaurus

00????????????????????????????????????????????????????????????????????????????????????????????
?????0000000001000?00?0000000000?????????00010?????00?01001?000011?000?0000000002000
0001??010101100000110010?????1?1????????????????????????????????????????????????00000120011
0001110?010?00010?00000100001?000?0101?000000001000000001????01????????????????????
?????????????????1?????????01?????????1?110?01

Tazoudasaurus

11????????????????????????????????????????????????????????????????????010??????????????00?1????????????
??????00000001??0??10?111101210?????????????????????????????02??1??001??102011?001??20111
?00?????????00????110????11????????????????????????????????????????????????????????????
111010001????????????21???1?1001?0???????0????0?????????10101?111?????????????????????1?
?10?1????51?0????????????????????????????

Thecodontosaurus

?0????????????????????????????????1??1??1000??????0?0?0?0?0?000????????????10?0?0?1010??01100
0????????00?11010??????1100101010000?1?????000101010?1?01101?000001??00110000000000
000000?1000?0101100?01000??00?010011211000101001100022010001100001010000010100000
021000001??0?000?011??01010?000011110000101100010000000101100??011010100????1100
01110?1?010??00?0????1?0?????020000??01?110???

Pantydraco

?0???0????????????100?0???1??1????000100100000010?100001?10????????00?000?1?10??0010
0011?000?00?01010??0000?1001010000001001??1100110101001101101?00??1????1??????????
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100001?????????0011??10110?00??????????1?1?000?0000000?01?001?????????????????001110
011?100000001001?0??00000020??01??1????0??

Unaysaurus

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00??????010?10110?????01100101010000??0?1?????0?1?0??????????0??0?11?00?10000?0??00
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Vulcanodon

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11000100111110010?111011110010011?1??20?10001?0??11?1010110111011??11?01010120011
110?121?05?1??00?1????????????1??11

Yunnanosaurus

110??002?010?111110????101?11?01010?102?????0??0??0111?00??00010??01?0??0010?????
??????????10?00010??0?011001012121111??111100110110100?0110100000011000110000000
001000000?010110100000?00?0?0?001?0??11200?11100?01??0011?21011002010001020?001
000210000001110100010?110010111?0010110100001011010101000010011001?01101010001111
0010111001??11?0000110?2?0??11?0100000?01?1??00

Glacialisaurus

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MACN_PV_18649a

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Saturnalia

10????????????????????1??1???00?100?0????????????????10????1?00???0?0?0?0000
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0220210000000100110010010000001001100010110001000000010100010010010100000010000
00001011000?000?00100000000012?000???11111?11

Chromogisaurus

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0???10?????????12????????11?11???

Eoraptor

0001?001?01010?0011000111010000010000110100000?10110010100?011000010011??11?1????
???????????00000010???0?0?00?1010000001?????110000000000?1011?000?00?00??00?000?
?00000011??10??100?001?00?000?0000?1?10?00101?????20?00011?00010?000001011010
0110000201??0?00?0???10?1011?10?0?0110000101100000?1?0011010??1?0?0????01????0?
0???00?0010000000?000?0????1?02001111011110011

Panphagia

?0??????1??????0?1?????????????????0??1??????1?1?0?????10?1?11?????????
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000?0??00?????????00?0?000?????????????????????????????????????????0??0?1101022
01?00?000????1??0??10????????????????????001000110100??010?1010????????????0?????
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Pampadromaeus

00???00211001?1?011??0??000?1000000?110?0?0?0?0?10?1?0??10????111?1?????????????
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000000?0??0000?11?0??01??00?1010??1?????1?0?1????????????????????????????001001110
10202????????????????????0000111110011011100?00?000?????010?????????????????????
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3.4 Character scored for the dataset of Pol, Garrido & Cerda (2011)

Lagerpeton_chanarensis

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Marasuchus_lilloensis

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1000?0?00010????????????????????00?00000000000000110000001??0?000000?0110000?01?
10101??00?00?????0000???

Pseudolagosuchus_major

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Silesaurus_opolensis

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00??0??10????????????????????????????????????000000?000100011????00101000010000??0110000?11?1010
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Azendhosaurus_madagascar

0?0????????????????????????????????????????????????????????????????????????????????????00010?????
??00??0?012011?0?0001????????????????????????????????????????????????????????????????????????????
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Azendhosaurus_laroussi

0?0????????????????0????????????????????????????????????????????????????????????????????????????00010?????
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????????????????????????????????????????0????????????????????????????????????????????????????????
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Pisanosaurus_mertii

0?0????????????????????????????????????????????????????????????????????????????????????????10?1?0??
?100?00?11201??0100?0????????????????????????????????????????????????????????????00??2???1????????????1??
????????????????????????????????????????120?0?0????????????011????????00????????????11?1110???
1??????????1??????

Heterodontosaurus_tucki

000?000??0{01}1?0?00?0?????0101000?01?000??????001000?0000??0???0????????????0010?
1000??100?000112?1??0100?0000??00?0010??000000?000000?000?0000?0000?2?0?1?????????
00???1000?0?0?000?000?000000?100000?000111012000001100???0000111??01010000??11?00
0??01?21?????1??0??????0??????

Lesothosaurus

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00??1001000112011?0100?0????????????????????????????????????0?????????????0??2???1?????????????
1?????????0????????????????????????????????????12?????1??0??0000111??01010000??101?0?0?00?21
010??1??????????0??????

Guaibasaurus_candelariens

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01000??????0?000?0

Eoraptor_lunensis

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0???100?0000010000000000??????????11????0100?010000?000????1?000?01?1?0?????????10?
??000??0????1????????10110????000010??0??020100?{1
2}?101??0?0?011??0?0??000??00?00??1??2010??0??????????0??????

Herrerasaurus_ischigualas

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00?1000000000000?0000000001110010?000110000010?00?0000000000010?0000001?0000010
000101100000000000101001000001110?01011010?0000020100000001?0100?{0
1}10??002100000?0110010011?1010100010000000010??000?

Coelophysis_bauri

000000000011110020000000101001001000001?11?000000000010010011??00??0000000100000
0011000000000000?00000000011110100?00110000210110100000000000101?00?201?1?00010
???0000000000000000010?100011111?001?1101001121020100120?01??001?01??010?00000?0?
?00?0??1???110??1??0?000?001?00000

Liliensternus_lilienstern

0????????????????????????????????????????????????????????????????????????????????????
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000000000000?????????????0??????001121020100120101000010011??010100000?0?1000001??1
1110?01100??????1?000?0

Elaphrosaurus_bambergi

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0000?00?????1????????????????????001121020100120101000010011??010?00000?0??00?0?????0
?0??1?????????????0???

Saturnalia_tupiniquim

01????????????????????000?????????1????????????????????????????????0??????00?0000????00?11????
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0100101000000?????????????????????0001001010002100111001001010000?00000?0110010001
11010100010000000011000??0

Pantyraco_caducus

010?000??0?0?1??2?????0?10001?00001?11?00??000?0?????00100?0000100010?01000111

?0000000011101201100000000?11?20?1??110000010110100000000100010100?001??101100000
?000001001010000?01????????????????????0010100201?01?100111?0?????0??0?00001000?00
1?00??111?100010100001110010100

Thecodontosaurus_antiquus

010??0??0????????????????????????????????????????????????????????????????????????0?000111????
?000?1110120110000000????????????????????0?0?000?010001??00?001?????1?0????000001
00?010000??01?00111?0100111000????????????????????0????????????0000100??0010??????
1?????1?????0???????????

Efraasia_minor

01010000?0100??110211??010?????1000101?11?????000??10?????0?0?????00100110?01000101
??11?100011101?0110000000????120?100111000011?1010?000000?00010?000011?0?01000101?
0000011010100000011??111??00111??0?0010100201101210?11110100?010000?00001000?00
1000?0211?10001?100001?1?010100

Plateosaurus_engelhardti

01010000001001111021111011001111100010101101000010001001101100000110101101100000
20110111100111101211100000000110120110011100001111010000200010001010011011?100000
111000000110101000000111111110011111000000101002011001110100101001000000100001
000?001010?02110100010100001?10010100

Plateosaurus_gracilis

01010000?0100??110211110110?1?1?1?00101?11????00?0??????1?1?????????????1?????000?01?
0???100111?012?11?000000?????0??????0???11?10?0?00?000??0010?00?10????0???0???000
?0110?01000????????????????????????????????????1???1110?00101001000000?00001000?00101?1
?2?1?????????0??????????1??

Ruehleia_bedheimensis

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101000?0????????????????????00101002?1100?110????????????0000?00001000?00101?1???1?
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Coloradisaurus_brevis

01010010?0110?1121211110110?1?111?101011111?001?00001001101?????01101111011100002
01?01?110001110121110000000?????00100??00001210010000?000100010?00?????????010?????

?0001011110100????????????????????????????????0?01002011???110?11?01?0?1?1000100001000?001
1101020111???1010?001110010200

Massospondylus_carinatus

0101001010110?11212011100101?111111010101100011110101000201??01101101100011100002
01?00?11000111{0
1}121111000000??10?200100111000011?00100002000100010?0010111010000?011?0001011010
1000000111121110?11121200?0001010020110011001111010011?1000?00001000?00101?102?1
?100010100001110010200

Lufengosaurus_huenei

010???01?????1?202111100101??11101110111101011?10?01001?0?100??01101??00??00000??1
101?11000111012111?000?0001???200100111?00011100?0000?000100010?000011?0?000?11110
00010111101000000111?12111??111212001?001010020110011001111010011?1000?00001000?0
0111?102?1?10001?1000011??010200

Gyposaurus_sinensis

01???010?0110??1????????????????????????????????????????????????????????????????0002??????
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111001?000?????1211??111212??1?00101002011001100??1010011?1??0??00??0?001?????
2?1?????1?1?????????1????

Yunnanosaurus_huangi

01??10?0101?0??12?2?1????101?01?111??01?11?1011??000?0?020????????????????????1?000201?
00??1000111012111?00??00?????200100????00011100?0?00?000100010?00?01?10?0????????00
01011101?0000?????2111????1212??1?001010020110011001111010011?1000?00001000?0011
1?102?1?1???1010?001???01????

Riojasaurus_incertus

010?000?101?0?11??2?1????101????100?101011??01111000?00010????????????????10?100000101
?00??0001?1?012111000??00?1??1100100110?0001011010000100010001{0
1}?00101?10?0000110?000001111011000001?1??1111?0111112001?01101002111002110101101
?011?0000110101100?01111?102?101??01010?00111001010?

Anchisaurus_polyzelus

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1}1010?0????00??1210120001?1000201?00?011?101?012?11100?100??10020010011100001??0

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1001100?11011?011?0010?10001000?00?11?1?2?1?{1 2}?0?1??0000????010100

Aardonyx_celestae

011?000010?1?11?20211100010????????????1??10??10?01????????????1????0????0002?0??
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2}1000?0100?10?00?01110?0100110?????0??????000?0????13?1?0????1??0?1?????????????
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Leonerasaurus_taquetrensis

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1}110????????????????????????????????111012011???100???{0
1}0????????????0????????????????????????????????011????0?0?

Jingshanosaurus_xinwaensis

01??00??10?10??1?02?????????0?????????1?????????0????0????????????????????00010????
???00?11?0121???00?00?????0?????????????????0?0?00?000?????00?01??0?1????????0000?1
10?010?0000?????11?????11?????0010100201110?100??1?01?0?1?1000?10{0 1}01?00?0{0
1}0????0??1??????1???0?????1?????

Camelotia_borealis

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Melanorosaurus_readi

1??01{01}010110??1?02?1??1101????111??01?11010?11??0??0020??011????????????1?00010
??00??1000??012?11100?100?????00100????0001??10?0?000000100011?00?12110?0000110??
0100?110010110100?????{2 3}?1?????11?????011{0 1}10{0
1}2011001110???10??011?0000?1?101100?010110102?1?20???010?00111?01????

Antetonitrus_ingenipes

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010110100????1311?????111?????0?????0?????0?????000?10201100?01111??02?1?
200?????1111??01??0?

Lessemsaurus_sauropoides

0????????????????????????????????????????????????????????????????????????????????
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?101101?0????1311?????111?????00101002010101100?????0?1?1000110101100?011110102?1
0?????10??11??0101??

Blikanasaurus_cromptoni

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0011111?011100

Vulcanodon_karibaensis

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011?111????????????????????????????010???1011110011?????010?10201000?11?1???02?1????
??11111101?11011?

Kotasaurus_yamanpalliensi

0????????????????????????????????????????????????????????????????????????????????
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1}?11??0?00111??0000??0001011?11?????????????????????0??11012?10{0
1}01101?11???10?1??0???11201000?110?????????10??1??11??????????

Isanosaurus_attavipachi

0????????????????????????????????????????????????????????????????????????????????
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1}?????????????1001????????????????????????????????????????????????????????????
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Barapasaurus_tagorei

0????????????????????????????????????????????????????????????????????????????????
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2??11?1????????????????????????????102010???1?1???00?1??1??111??121???0?11?????1?????1
1??1???????????????

Shunosaurus_lii

011001?111??0?112?2000000101?00??11?11010??0?2?00?00?10211??01112210?20000?111010
0?00?0011?1100121111101210??0141?0??1111??10?01?????00??1?22??20011??0?0001110?1
00??12000211?1101100?011?1??0?0?2??1?10111102010101101?11?011011?1111?1121??0?11
00??1?1??1??1??11?111100?1?1211

Omeisaurus_maoianus

0110011111?10?112020100101?1000?1?11111010??02??1??0?10211?????122100??00?111010
0?0??0111?01001211?1101210??0041?0??1111??12?01?????00??012211?31?120?0?100111011
0011120002011?101????00?1??00??2????10112102010101101?1100?1011?1111?112????0?110
0??1?1??1??1??1??11100?1?1211

Lapparentosaurus_madagasc

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Volkheimeria_chubutiensis

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Patagosaurus_fariasi

0????????????????????????????????????????????????????????????????????????????????????
?????????1?????????????????????2?22111?101111?1?2212?0110?2?11?31?1??0?1?0?1??0011120
00201111?1????????????????????????????????10112102?10101101??00110?1?11111121??0?110??02?1
????????????????

Ferganasaurus_verzilini

0????????????????????????????????0????????????????????2????????????????????????????
????????????????????????????????????????????????????????????????????????????????????20002
0111101????000110?001?02??1?101121020101?1101?????1011??1111121??0?1101??1??1??
??111????????????

Diplodocus

01100111111?01112020?0??0101?0001?1111111000102101010110211?011112210020?00111101

00?00?0111001001211??1012100?1003020221111?121111122120021012211?32012??0?100111
01?00111200020111111?011000?1??001002??1?10112102?101011011??101?010??111?1121??0
?110????1??1??11??11?1?????1?12?1

Camarasaurus

01100111111?011120201101010100001?11111010001021010100102{0
1}11011112210020?00111101?0100?0111001001211??101210??00302022111112111?11121201
11012211?330120?0?1?011??100011200020111111??000110?0?1?02????10112102010101101
1110101011?111111121??0?110?1?112?1?211??111111????1?1211

Brachiosaurus

01100111111101112020110101?100001?11111100010?101010010211101111221002?000111101
00?00?01110010012?1??101210??0040?0221111?12121?1122120111012211?330120?0?10011??
??0011200020111111??????01??001002??1?10112102?101011011??0101011??11111121??0?
110????1??1??????1??11000?1?12?1

Caseosaurus_crosbyensis

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NMMNH P-35995

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