Bollettino della Società Paleontologica Italiana, 57 (1), 2018. Modena

The assembly of the avian body plan: a 160 million year long process

Andrea CAU

A. Cau, Museo Geologico e Paleontologico “Giovanni Capellini”, Via Zamboni 63, I-40126 Bologna, Italia; cauand@gmail.com

SUPPLEMENTARY ONLINE MATERIAL

Nexus file of the phylogenetic data matrix (for character list, see Cau et al., 2017, supplementary information).

```
#NEXUS
begin data;
dimensions ntax=132 nchar=1781;
format missing=? symbols=”0~1”;
matrix

Euparkeria
1000000000000000010000001000000100010000000000000000000?001000100000?000000000000000100001000000000?000000000000100?000000000
?000000000?000000000000000000000000000010000000000000000000000000000000?000000001000000?000000000000?000000100000?00000
000000010001000000000000000000000000000000?000????10?000000000000?00?0????000000?????0?????????????00000?000000000000000000000000
000000000000000000000000000000000?000000010000000000000000000000000000?000000000000?000000000000000000000000000000011000000
000000000000?????????1000000010??0?000000100?000?10?0?000000110000000?010000000?0?00001000000??0??000000000000?00?000000000?
000000000??000?00?000000000?10000?000000?00?010000?00000?0100?0010000000000000000??0??00?000000000000000000?000?000?0000000000
0010?000?000000000000000000000000?000000?0000?00000?000?000000000000?00??0?0000??00000?0?000?00?00?000000000??000000000?0000000000
000?000000000000000000000000000??00??00?000000?000000?????000000?0?????????00000?0?0000000?000000000000?000?00000000?00000000000
000000000000000?0000???00???00?00??000000000???0???00?000000?000???00?0?000000000000000000000000000001000??00000?????????00
0?0?000000000000???0?0?000000000000000000?0000000?000000000000?0000000000??0?0?000000000000???0?00000000?00100000?0000000?000000
00000?000?0?00??0?000000000000?000000000000000?00000?????000??000000001000?0??00000??0010000000000?000?0???0?000000000000000?
0?000000?0?????0?0?????00??0?00??000000???0?0?????????00?0?????0??0?0??00??0?0??000000?00000???00?????????0???????0????0?0?00??
????00?0????0??0???0000??00???0?0??0????0???00?????????????????????????0???0?????0?????????????????????????0???0?????????????????????00??
?0??????0?????????????????????????0??????0????0?0???000?????????????????????????????????00????????????????0?000000000??00?0??00?????0?0????
?0?????????????????????????00??0000???????0????0??

Acrocanthosaurus
1000000100011001010011001010000010000010001001110000101111100010011?10001000?001001100010110000100 0???000001000000001?01100?
?10?10???00?????1?1010?1010000000000000?0110?00001???1010??00?0000111?1110?101101111110?1100??011100?001011000000010010010 0???
01111001010 1?0010?110000101000001010001?0011?0110101101100001?00?0?0??0?101?00?0???1001????????1?0?10?00?0100?010010000101000
?000111?11?0?101?0000???00010?11??011011?001001001011110011111001111000011101????011010?0??1??1?01???1??010000100000001?000?0?
101?0000?01?????????000010000110 0?001010000????100001?00?0???0001110??000000110000?000?01000?000?000000000????010101?0010?00
000??11?01?111?110100?1?00001101??1??01100??01110???00?0?11????0?0000?000?010011??0000011?0??0??0000??0?01000?000001??1?1?00
11??01?00?01?0??111???0001?01000?000?0??0?11000???0101000000000????10??010001?110000101000000?000?00000?10??0?0?????0???0?10?0
000?000000000010000?0????000001000??00????????101001?1?1000??01?0?????????001??00?011?11?10?1000?0?0????0?????0?0??00??01??0?
010?11100?1?000100?11?0?0?01?0??100?1110?00????0?001?001001 10???00010?1???0??10101??0?000?0??1?00??1????0?000??0?00000?001?0?
?0???0101010?011??00000?????00010??0011?1?00?001????1?10?0?0?1?????0?10?00010???000001 00??010??0000?00????00??1?10?0010??0?
0??0?0?????0?????????????????1000???0??000??0??00?000????0????00????01110?0?00??0101101010?010?11000??01?0011111 0?000????0?0
00?01000??0???00??????000???01?00????0011101101110000000000???000??00?0101001101 0?00110000???00??0?01?000001101??1?00??00100??
10000?010?00000??000000000???1000?00??0?0??0?010?0?110????????100?01?1?0010011???011?1????00?1??11??101000?001011????0?0000??
000000?00??0?????????????0?0?0?0?????????????00000100?????????1000?011000??0??0?????000????0?110000000?00000?100??000?0?000
?0?0???000000000101?0?1000??1?0?000??0??0000?
```

```
Allosaurus_fragilis
1000000100001101010011001001000010010010101000100000101111110010001?0100110000000001100001000000101000100100100000001111110 00
0101100001010101001010010001000000000010001001010100010011000010111110110111101001100010010001000010101000000010010000
0011100101010001001100000010000010100000001?0110101101100011001000110?101?00101??1001??????01110000010000000000110000101000
1000111011101100011101000001001111011010000100100100111001101100111000001101?0110110100011101100111110001000010000001?100100
10110000011 0????????0000100001100100100000100 1?101101000000000001110100000011 0000?000000000011000000000000000010100000000
0000011111001001001000100000110 10?1000100010011000000000?0101?000100000000000011??001001110000000001000001000?00110111111000
1100010001010010111000100100000000000?000001110000001010000000001011000010011011000010100000?000100000?101000110100011000000
000?000000000100000110000000001000??00?000000100000?0110000001?0????????000100000101000110110000000000100000000011000000
0100111000100000000000?0010?000000100001100000??000000001001100100001001000000100010000100000000?00000?001000000001000
00?1000001?00001?00000000?10?000100001000010000000000000000000100000001100001010?000001000001000000000000000?0101000010?00?
000000001?0000000000???00?001110 10?001000000?000?00??0?0????0000?001000010000000000110000000111000?001?000101000000000000
00?00000??0???0000000?0001?000000000000000000110000000000000000??000010100010100001100000100100?00??000001101101000??0110000
10000?010000000000000000000000??0000000?000000000000000000000100100100?0?10??000???011?10??00??10110?1000000000010?0000000000?1
000000?000000100001 0?0000000?1?00??000000?001000000100011101101000?0110000?000011?0?000000000110000000?000000100?00000?000
00?0000000101000011??0?100010000000000?00000?

Alvarezsaurus
????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????????????????0?0?????????????10000000?100??0????01?????????????????
??1?100??????0?00????0?????????????????????????????????????????????????????????????????????001????????1?1000??00??????0001110??0?00
1??0111000000010?00000??0?0111?100?????????????????????????????11001000???????0????????11??0???1?01?01?1111?00?10?010???0010?01000
```

????100?01?????????????1?????????????????????????????????1?????????????0?1?11?0??????????00???0?????1??????1??01????0?0??0???00?0???????
?10?0???0??????0?0???0?????????????1?????????0?????0?0??????????0??0?0?????????????????1?????????????????00?????????????????1???
???0?????????????1???1??0?01?????0?????????????????0??????????0?????????????????????????????????00
10?????????????????????????????0?????????0?????????0????1??0??????0?????????????????0?1?????0?0?????????????????1?????????????
??????1?????????0???????1????00???0????0??0??????0?????????????0????????1?00?????????????????????0???0?0??01?000????????????0
???????????1??????????0???????0?????????????????????1?0???0??????????0?????????????????????
??0??0?????????????????0?????????????????????????????0?????????????????0??????1???????
?0?????????0???10?????????????1?????????????????????000?????????????000??????????0???000?????????????????1?????????????0???????????00?????????
????????????01?00????000?????????????0???????0?0????0???00?????00?????????????0????1??????0??????
????00?????????????????????0??????0???
????00?????????????????????????????????0?0????000?

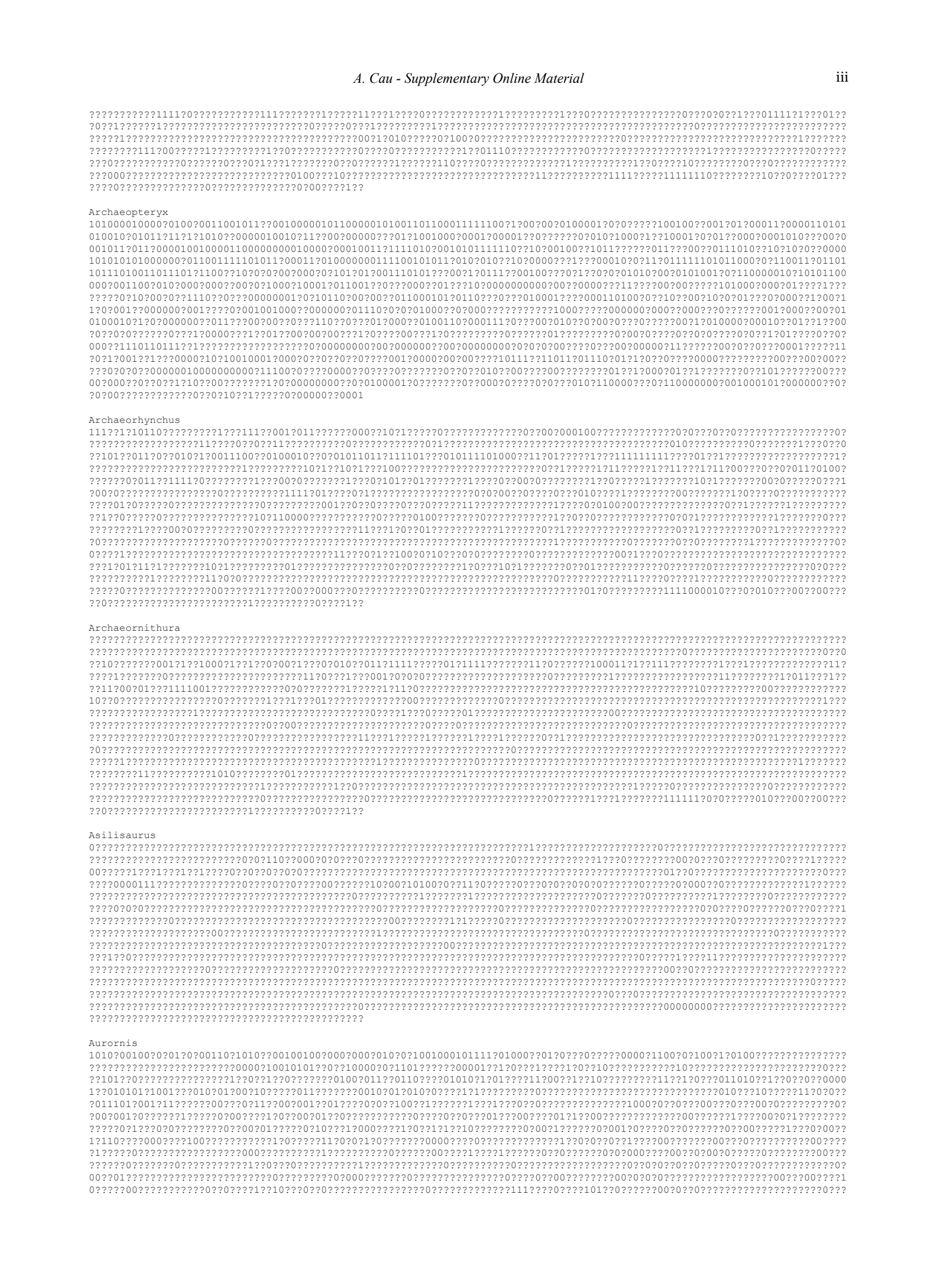
Anchiornis_type
??
??
??101?????00??1??????11?0??0??0?????0?0001?011?111111??0101?11101?0??11?0??????1?????????01?????????????1??????1??0????0?
?0??10101101100010011?10?10?110?????????????01100??00???011????0??01011?0?0??
10?1?01?101?????????0?????????????????0??????1??1?00?1?????????????????0?????????????????????1?????????????0?????0???00????1??????0
0???0?????????????????0?????????????1??01?????0?????????????????????0??????????????????????????0?????????????????????????1?????????????
??00?????????01?????????10?????????????????????0??00??0???
????????????????????????????????1?00????????0?0?????????0?0?????????????????????????0???
????0?????????????????????????0?????????????1?????0????0?????1??????1?????????????0?????????????????????????0??11????01?0??0??01??00???
?0?????????????????????????0???1???00?0??????????????0?????????????????????????0????
?????1???0????0?????????????0????????0???
??????????0???00???00?????????1??00??????????0????1??????????0?????10?????????0?????????????????????????0?????????????????????????
??????????0??0?01????00?????0???0?????????????????10????????????
??0???0?11000?????????????????0????1??010??000??1????
????????????????????????0??1?????????01????0??

Anchiornis_LPMB00169
00101????0????1??????1????1?????0??1???0?10?????????????0????1????1?????????????????????????????????????0????0?????????????????????????
????????????????????????????0??0?1001?1?????????????????????1?????????1?????0???0?????0??0????0???
??10??????00??1??????11?0??1??0?????0?0001?011?111111??0101011101?0??11?0??????101???????01?????????????1??????1??0????0?
???0101010100 1?0101001 1?10?10?110?????????????011???0?0????????1???011????0??0?011?0?0??
10?1?01?101111111110????0?11?????000???1?1????00?1?????????????????0?????????????????????????1?????????????0?1????0???00???1???1?00
0???0?????????????????0?????????????10?01????0?????????????????????1???0?0???0?????0?????0?????????????????????????1?????????????????
????????????????0?????????????????0???1????00??????????????1??????0?0100????????0??????????0??001?0?????????????????????????????0?????????
0??0?????10????????1?????????0?1?00????????0?0??????????0?00????0?????????????????????00?????????????0??0????00???0??????????00????
?0?????????1?????????????????00?????0????1???0?0??0?????????100????1?????????????0?????????0?00?????0?0??????0?1111?0????00?0??????00???
?0????0???????0???????0???1??01??0??????????1????????0?????????????????????0??????1?????????????00?0?0??0??0?0?????????????????????
00???1???0?????????????????0?????????????????000????0????0??????????0????1?0?0?1?00????????00?0?000?????????????????????????????01
???1?0?0??????00???00?11?????1??00?????????????????????????????????????10?11????1?0?011???01?????00??????0?????????????????????0???
????????0?0?0?1??00000000?0?1???0?????????0?????????????????????10???0?????????????????????1?010?????????0?????????10?????????0???
0??????????0????????0????????1?????????????????01?????????????????????????????1????10??1000????0?????????0?00?0001010000??1????
?0?????????????????????0?1???1?????????01????0?1

Anzu
1100?11111?00???0???000???1111111?100??00??0?????????????????0??????11?????????????????????????????????1???0?1?????0??00????0??1???
?????????????????????1?????0??0???1?????????01111101?0000????0?111?1101?0?1?????????????????1????1??1?????11?011?????????????????1??
0?????????????????????????0???0??0??0?1???0?000????1?????????????0?0?1?0??0?????????????????1110010????10?010????0????1????0??00?00?1
0??01?10???01??001000???1?00??100011?11????0?11000?000??11011??0?????????????1?????????????0?0?0???11???1?10?????????????????????
???????????1????????00?????0?????????????0?1?00?0??1????1??0?0??????????10?????0??10????10??????011??0???00?????????0???????
0????11?0??1?????????????????????0?????????0??0?1?1?????????????????????0??0??0??????00?????11??1????100????????0?0?????????????????
??0010?1?????????1?????????????????0??0?????????1?00?0????00?11?????????0??0?0?00?11?????????0??0?0????0?????1?0?????????????????1?????00?????????
0???1??1????0?????01?????0?????00??????????00????0????1000?????????????????????0??1?????????????0????????0?????????????0????
00????0?????????????????????????0????????1?????1??0????????00????1????1???1????????0????0???1??11????0????0???????0???????1???
?????????????0???????0????1??0??0?????????????1?????????????????????????10?????????????????1??0?????01?????????????0??0?0?????????0?
?1?????????????????????01????0?????????????1?00?????????????????????????00???????00?????????1?????0??1?????????????1??0?11?10??0?0?
0?????0?0?????00?????????????????00?????????????????????0?????????????????00?????????01?????0?????0?????????????????????????0?0???
??????????0????????1100????1?0?0?????????????0?????????0?????????????0????0??????1????????1?????0?????????????????????????1???1???
???????????0?????????0?????????????????????0?????????00?????????????????0111?????????????????????????????1110000?????1???0??1??0??????
10?????????????????????1??1?????????????0????0??

Aorun
?0001???00?0?0?00?001101??1????0100100??0?1?????????????1?1??1101110?????????????????????????????00??00??????00?0?????????????????
????????????????????????????0?0000000?000?00????????0000???1?1?????1???0?????1?????????????101001000?10?????????1?????0??00000????????
0???0????0110??01?101?10?01?0??11?0???1??1000???
??0110??00?????????????????????????????????????0??????1?01???????1??1????????1?0?01????0111?0?110
?0111000011?????????????????1?????0?1?????????????0??0?00???0????0???0?????0???1?001???????0????0?????????0?????0?0?????1?0?10
?0??0????0??0???0??0????1?0??10??10?0???1?0??10?0???1?0??????????1?1?????0?????0????11???0??00??????1????00???1?1?????
???1?0?????????1???????1?????00????00?000??0???0????10??0??????0????0???0???00??????0101?0?????0???????0?????0?????1?????0???
???1?0?00?00?????000????00??????0?????0??10???0?0?????0?0?????????????????????10?00??0?0?????????0?????????????????????????0?????
01?????????????0??0?????0?000?????????????????????????????0?????????????????00??1??????0?????0???0?00?1??0?????????0????00?1??0
10????????0?????????00?????????0??????0?????????????????????????????????1??????0????100???00?????????????????1?????????????????
00?????????????????????????????0????????0???0?????????????????????????0???0?1?0??0???????0?????0??1??0?????????0????0???????0
00????00??????00??????00?????000??0??0?????????????????00?????????10?01???10???0011000??????0???????0??0???????0??????????
??????????0????101?10????00?000?????????????????????????????????0??0???0?????????????????1?????????1?0?????????????????????0???
??0?????????????????????0?????????????????????????????0?????????0?00?0???0?????001????
?0?????????????????????1?????????????????????

Apsaravis
1???
????????????????????????????00?0??11?????????11???0?????0?????????????????0?1?????????100?????????????1????0?????0?????0??????1??
??11111011?000111010101110?110100110110?010?1011?111100???????1???1??????1????????1???101?????1??10011?11??10?????0????0110
?0?111100000???????0????00010??0?0010?010?1?1111000?0?01011001??0111?1??0?????????????????????1?????????11??00110??10011?0111?
????1001001?????????????11??1????0?0??????1??0000?????????????????0??10??????11???1???0????11?0?????0010???0?????????100???????0???
100?????????????????????????????????1??01?????????1???0??????????1?0000?0?0?????????????????0?????0?????0?00??????1?????????
????????????????????1?????????????????0?????????????0??0???1???10?????????????????????????1???10?0???0?????????????????????????????
????????????????????0???????0100?1????0??0?????????????????0?1????0?0?????????????????0??????????1?????????????????????????1???????1?1?



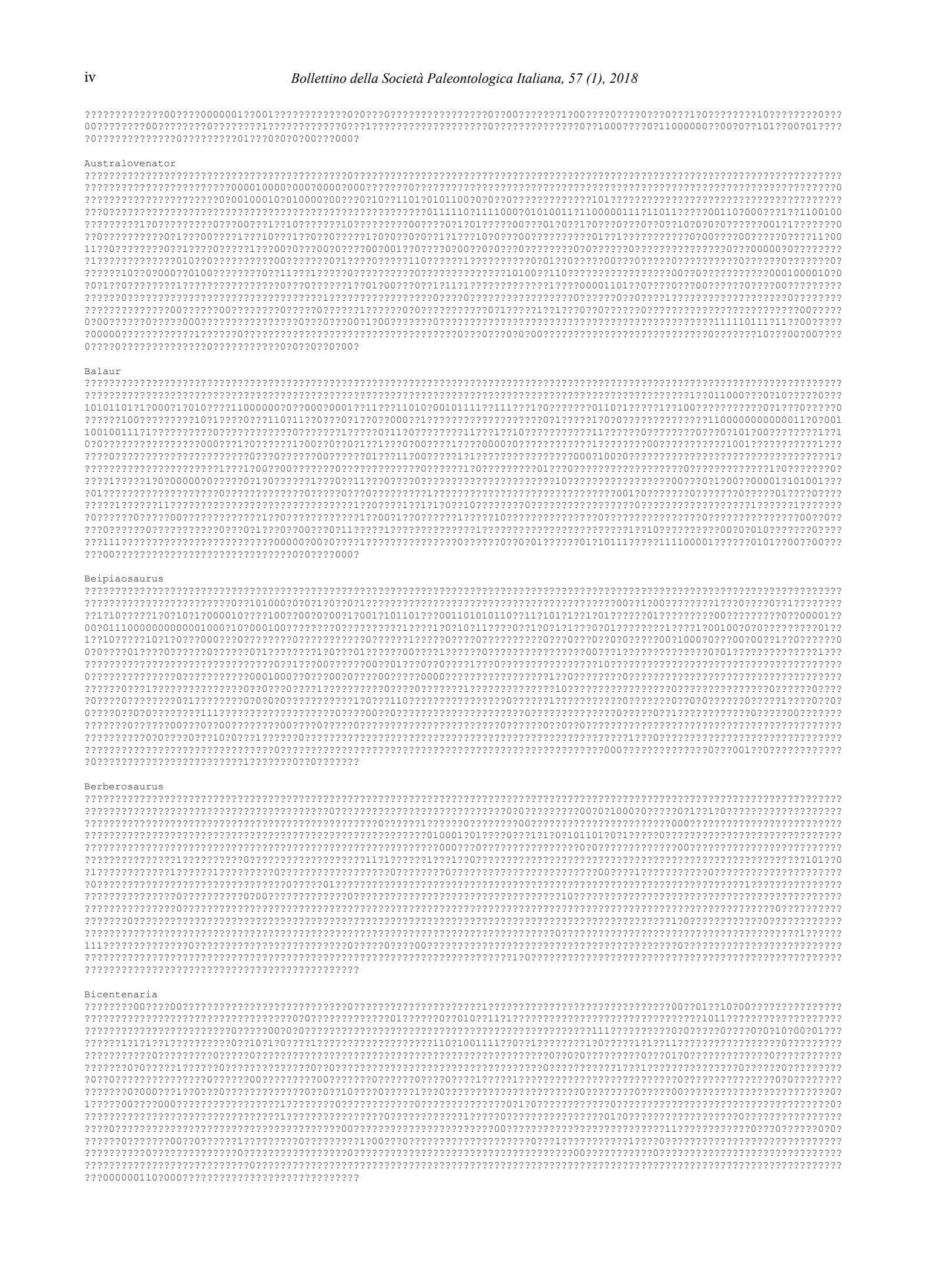
Archaeopteryx

Archaeorhynchus

Archaeornithura

Asilisaurus

Aurornis



Australovenator

Balaur

Beipiaosaurus

Berberosaurus

Bicentenaria

Bohaiornis

```
110110?1?010?01?0?00?10??011???0100000???10?00?010?0?101?0?11?011??????0??01????00???????????????????????????1???????????????
????????????????????????100?0?10010??1??0??00?0??0???000???????0?1????0??????????????1??????????????10??????????????????????????
????1?111??000?1??1000?1??01?1??0?????0?010100l???111?????1101???0?00???11?0???????1???11110111?10?????1??????????????????11?
????11???????0??????????11????????11???????????1?01??0?0?0????????110??0?????????1??????????????????????????100?????????11?0??1?
?101??1?1?1??????????????????1????????00???1?????0?0?11?00????????1?????????1????????0??1???????0??????????10??????????0?0??????????11
1?0?0??????????????????0????????1?0111??01????0?1???????01????0??0?????0???0????????000?????????1??????0????????110???00??1?????1???
?????0?1??????0??????????????????0?????????001??0??0????0?0?????????1???????????????1?????????1?????????1??????????0??1???????1?????????
?????0???????????0?1?????????????????0??????????1??????????0???????????????????????0?????0??0??????0??0?????0????????0??????????????????
????????0???????????????????0?????????????????11???1?????1??0??????????1???????????1?????????0??????????????1??1?1?????1??1????????0??0
??????0??????????1??????????????10????????????????????????????????????????????1??????????????0??0?????1??????????????????????????????0?
0????????????????????????????????????????01????11??100?1?1??1?0?0????0???0?????0??????????0?0???0??????????????????????????0?0???
??????1?10???0??????11??????????????????0??????????????????0??????1?????????0??????????011???????????????????????????????????????????
???????????0??1?????10???0?????0?????????????????????????????????????????1??????????????????01???????1???????????????????????????????
?0??????????????????????????????????????????1?????????????????????????????????????????????????????1111?0001000?0?000???00???0???
??0?????????????????????1???1????????????0?????0??
```

Buitreraptor

```
10??0???0??????????????10?????100?11??0??000?000010?00?????????????1????1?110???011000??0???00?010?100??????0??0????????????????
????????????????????????0??0?00010100???0??000???????10????1??????????0?1?1????1??1010110000?????1??01?010??00??001????1?00??
001011101010000l?1100??01?0??0?00?10?00?0101?011???1100000010101110100??10?00?11??1011??????01100000????1111?0010110000?0?00
10101010l?0001?0001000111101011l0?11110??0010001110000011010010101 0?1?00?0001001011 0?010????????11?????10110001 1?111011?0?011
?011000110?0????????0001??001??01?00??00??0001?11?10?0?1?010?010???0???0?0??1?0?1??0?0???????000?100??0???00?100?1??????00???
?00?111100???0?00??100?000?0?10?0?10001?00?0?1??10?100????1??0?010100?0?00???0??????0???1?????0?0??????????11?0???????0??????1???
??1?0?????????0????1?00?????????000010??100??1???00?0011?00????1111???0??0010??????00?0?00000?????1??????????????????0?0??1????1?
0???00???10???????0?0??0000?10??00???00?000?0??????0????10000???000???????????1???000????????0?????0??00?????????????0???0???0?0???
?????0??0????1??0?0?0?????0000??????0??1????????01?0?0???11????????????????110?00?01???????????0????????00?11??1?001?00?0001??0?10?0
??01????????1??0??1??10?????????11?0??10???????1?0??????001?10????????????????????????1?????0???0?000???????0????00????0?????01????????0?
0?????????????1??????0???????????????????????0?????????0????0000??????0?0?????????0???????????????????00??0??0??????????????????000??00????????0
?0?1?00???0???00??001000?????11000????0????????0000?1??00???0?0??0??10?01???00?0??11??0?0???????????????000?????????????????????01??????
??1??0????0000000?100000000?1?0?0?000?????00???????????????????0????11??????1?????????????0?00??1?000?10?????????001??1??????0?0??????
???000??0??????????????0???0??0???0?00??00???????0????????????????????????0????1??????????????????0??????11000000???1??010?000001??????
???00?000110000?110????????1???????0??10111001?
```

Buriolestes

```
1000????00?0000?0?00??????11??000?00?0?0???0????????????????0????????1??????010?0??????????????????01??????????0???0????????????????
?????????????????????????0?00?00000000?0?00?0??00??00?00??????0????????????????????????????????????????????????????????00???0????????0???
00?10??10???????????????0101??0??1?10??0??????????????????????????????????????????????????????????????10??00???00??????0??0?????0??0?
???00000?0?00000000000??00?10?101?????????????11?00??01?00??011?100??00?00??1?00??10??00?????0????????000?0???0??????11???11?
?00000???1???????????0?0??????????????????????0?00?11??1??0?????????????0??????0?00?????????????00?0???0??0??0??00???0?00???0??0??0?
?00?????????????00?????????????0????1?????????????1??????00????0??0????00???0????????????0??????0??????????00????????0???1??1??????1?11
??????????????0??????00?????????????????0????????????0??00???00??0000??????????0?????1????????????????????0????????????0?????????0??????0???
??1?????1????????0000????????0?????????0?????0??????0?0???????0????????????????????????0?????0?????000??????0???????????????????????????????
??????????????????????????????????????1??????????????????0?1?????0????????1???0??0???????0?0???????????????0???0?????0??????????????????
??????0?????????????0????????????0???????0????????0???????????????????????????????????????????????0?0??????????0????????????????????????
?????????????????????????????????????????0?????????????0???????????????????0??????????????????00000?0?0?????1???0??????????0???????????????
??????0??????????????????????????????????0???????????????????????????????0??0???????0??01???????????????0????????0??????????????????????0???
??????0??????????????0001???0???0????0???????????????00???????????????????0??????0??????????0???????????????????????0????????11?0????????0?0???
?0??????????0????????????????????????????????????????????????????????????????????????????????00000000??00?0?0????0???????????
??????0??????????????????100?????????????????????
```

Caudipteryx

```
0111?0011000?0100??11?1???11??0?1?00001001?0001111?0110?100?1?0?100?1??0?????1110?0?000?000?01?0??0??10000010???????????????
???????????????????1????100?11?11??????0???11?1010???0000???0?1??0??01?0?010????1????????1??????0??0?????0?01???00??0?0?1111?01?0
001111001 1?0?????01?0??0??0?????1????00?000??011?10?101?0?010101100110??11?00?0???10010??000011?0?0?0??10100???00100000?0010
0?00111000000100001001??10?10??100011?11000000111 00?0001?1?0110?0????10??000???????1??01??0??1?01111?100011000?1?110011?01100
1?11100001101 1001?0100?01??010??0?0?0???1?1?00?10?10?001??????1??110?????00?????0???0???010?????0??1000?????00?000110?0???????1
000?0?110?????0?00?????0??0?????110??10?01?00?001????????00?????????????0?00???0??0??00???00???1?????????000???0?01?0?10?0??1?????1???
????01?0???0?0???11???0??????0?00?1?1??00????000????110001?0?01100?????????????????????00101000????????????????0??1???0?000??1?0???
???0001????0??????01?????0?1??1000?000?0?0?0???0?0???01000???????0????????????00?00?????0?0?????????00????0????????00?0???00?0?1
0??0010?1?0???????????0??????00?0???0????1???0?100??0?0???100????10???1?0???00??10??????0?0?0?????????0??0??100001?00?0???0??01000
?0??0?0????????00?1?????0???1???????0???1???????1?0??????????????0??????????00????????????????????????00??????????01????????0??????1?????0??0?
0????????001???????????????????????????01?010??0??00???0????????????0???00?0?000?00????????00???000?11??????????????0???0010000??01
00?110000?0???00???00?00??????1?000????????????0?????0?0???0??????0????01010???1??1??001?0?01?1?0??0???????0???????????????????????0???
?0??????0??0?00?00??11000000?0????????????????0???????0?????????1??????1?????1??????0?0?????0?????????1010????00??0???????0???????????0???
0????????0??????????????00??????????0???????????????00??????????????????????00?0????????0??????01?0?0?0???0?11000001?000000100?100??1????
?0????????????????????0?10??1????????0?00???0001
```

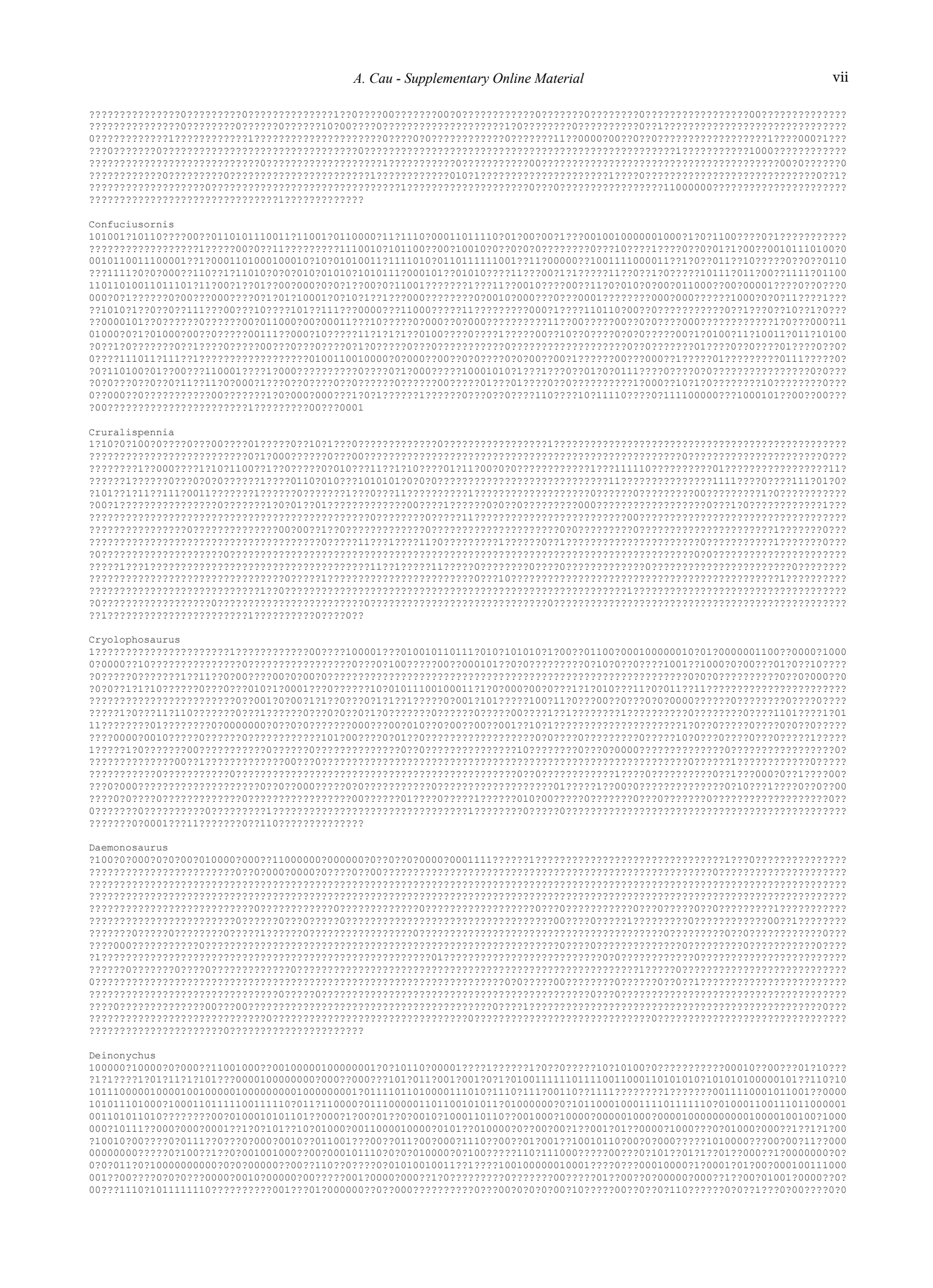
Ceratosaurus

```
1000000100011001010011000001000000001001010001011000010011010010101 0?0000100000000011000000000000?0?00?0000001000000001?11?0?
010000?0000???0????00??100001000010000?0010000001??0100100??100000?1110110001101000110?1100100010001110111100001001000010 0?0?
0111100100010000000000000001?00001010000000 10???1???01011?????00?0?0??0010010????001????????????1??0000000000000100100100 00?00
11011111101 0?1?000110??00?011010100 11?1010?00010?00011??0100011011 0?00000111?0010110100 0?1100100011 1??00?000000000??10001???
???????????0?????????0?0000?00000?00?1000000?00?1010?0?00?000001001 1?0?000000?110?0?100101000?00100000000000??1?00?00?10???0?
??0????01??0000100??1??00?000?01??100?00?00?1?10????0??01?101??000?0??0000000010??000001110000??000110??00000?000101111?1001
1100?0?1?101001111111100010 00??00?00?0??001000????0?010000?000??1??0001010101??0?00000?0??01??001010??0100000000100 0??0000?0
000?010?1?1100?000001??0100000100 0??10?01?00001010?0?0000001000?0?????????00001000110?0????0000?01000000 1?01000000 1111100000?
01???1110000000000?00?0?0?0?00??00001110?011???000010?0100110?0?01010??10?????0001100?01000111000101 00?0000???0?0??00000100?
01?1?0010?00?001??100?0???????00000?000????10??000????1?0?00?000?????0?00?0?0001?0010001 0?01000??0000?00??0?00?010100000000 0?
00??????0??0??0????0???0100010000 0?0100000010 0?00?00?????0????00????0000?00?00?0??1??100000000??1000??11?001101?00001????000
0000?000??????????0?????0???00?00?00000??00?00001000?00?0?0??00??00?0100?0000100001 10?0001?1?00????0010000011 0000??00000001
01100?00???00000?000000000?????00?0?0??0???0?000?0???000????0?01??000??10??0?0???0?1?10??????000?0?100010?000?00?0?????000?1
00?000??0?0000000000??110000?0?1?????00???00????0001000110011 00100??011010??0000?11??????0000?111?0000??00000?1000?000000?0?
?0?0???001000001?01?0?0??0000?0?100?00??0?0??
```

Chilesaurus

```
??10????00?0???????????????0????????????????0?????????????????????????????????0??????0????1???0??????????????????????????????????????
?1????????????????????????0100?1000?00??00???0?????????????????????????????0?????????1????0???00???0????0?01?11???????????????????0???
??1?10?0010100?00?0?0?00101????????1?0?0?000??011?1011011???000000?0010??01?0???????1000?????????1?????????????????????????????????
```

```
????111000?001?0?000001?00?10?1??0010?000111101000?1?10?111010?1?1??1???1000?00?1?0100000??01?001?00???010???0000?111?0??0?
?001?01?0?????????????0??0?????1???1?????????????1??1?00??????1?1?????????0?????????????10?0??00?10000??0?????0?1??01??????1
?00?0?00??????00????0?????0?1????1??01?1????1??????00??1???0???10?0??0??0?0?????00???0????0??????0????1000????????????1???
11?00?0?????0??11?0????????????0???000??????0???1???0??1??0??1?00??0?????????????0??????01????00?0?0????1?0?????0??0?0??1??????
????????????????????????????1?0?000???0???0?????0?????010??????????????????0??000?????????????0?0?????????????0???0?????
?1???0??0????0?1????0?????0?????????0?????????0????01??????1????1???1??0??00??0??????0?1?????0??????0?00???0?0??????010??
?0???0?????????1??1???0???0?0?0?????????????0?????100?????????????0??????10????????0?0??01???0?0?0??????0??10????????????
0????0?????????????????????????????1????0?10??????00??00??0?????????????0??????01????00?0?0????1?0?????????0??????0?0??????
?????0????????00?????????????1??0?????????????????????0?0???????0????0?????????????????0??????0?????????00?????????0?????0?0??0
??????????00??0000?00??????0????????1??1??0??1?????????????????0?????????????1?????0???????11????????0??0?????10????????????
?0???0?????????????????????0???????1?????????????????????????????????????0????????????11??0000?????1???????1???0?0010????????????
????????????????????????0????????????0????0??

Chongmingia
????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????
??????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????0
??10?10???000?1??10?0?11?1??0??0?????0?010??011??1?11???11?11?1?10?1??11?0??????1?????????111?????1???????0??1????????????
????????????????????????????????????????????????10?????????????????????????????????????0????????0?1?????????????????11110?0?0??00?11?0?10?
1??1?01?1?1??11?????????????????????0?????????1?????1?1?????????????????1?????????????????1?????????????1110???0??????0????????????
000?1?????????????????0???????1????1???1?????????????00??????????0?0?????????????????1?????????????????????????1?00????????????????
??1?????????????????????????????????????????????0?????????0?????11?????????????????????????10??0?????????????????????????????????????
????????????????????????????????????00???????0?????????????0?0????0?????????????????????0?????????????????????????????????????????????????
????0?????????????????????0?????????????1?????????????????1?????????????1??????0??10?????????????????0??1?????????0???
?0?????????????????????????????????????????????????????????????????????????????????????????????????????????????????0????????????????????????
?????1???1?????????????????????????????????0???????1?????001???????0?????????????????????????????????????????????????????????1???????
????????????????????10?????????????00?????????????????????????????????1????01?????????????????????????????????????0????????????????????????
????????????????0?????????????????????????????????????????????????0?????????????????????????????????????????????1?????????????????????????????
?????0?????????????????????????????????????????????0?????????????????????????????????????????????????????????0?111??????1111?????????????010???0???01???
????????????????????????????????????????????????????

Coelophysis_rhodesiensis
1010?0?1000010100100110110100?000101001000000000000001?0100000001??0?100010010001?01?1010000?0??000?0?1???00001?00?1?00010?01
010?00?110?0??1???1?1?0?0?0000000?000?0???000?00?0000???????000?0????0?1?00010100?11000000?00?1?0110001010?0?000100100??100000
0011000100?10??0??1?0??0?00000?010100?0?00?00011?1001011???100010?01100?00000??0001??1??????011?000001??001??010?100?0010?00
0??111111010010010010000?000101?110110?00101?0?10100?1110010001101010?00?0000???10??0?00??1??0?100???00111?0?0?0100001100?10?
?0?1100?01???????????01?00?01?00??000???101??0?111?0?00????001??1?0??0?000??010???1?1111010?0010000001??0?0??0001?100??????0
?00???0????1???1?0???0??0?1?11?00?10??00?00?011?????0???001???10?0?00000?0000100??00??0010000??0000????0?0?00?110?011?1?1000
?110?1?0000110111111100?1?111?????0?0??1?00?00?00010100??10000?????0?10??001??0?0?000000001?10???00?0010?01???0?000000?00??
0?1?100???00??0??0???1???10??0000??10??1000?00001?000000???1?????????1?001001001???1?00?00000?0?00000??00?0?????011????
?1?????0??00?0?00??00?????000000?????11??00????010?0??011111?00????1?????0??000?0??0?000000?10?0??00??00???00??0???????1???
?0???00???000000??00??0???1??0?0?0??010?001??00????0??0000?????????0?000?00?100?0???0??00100???0?00??0????00??1010?0000?0??
0???00??0?????????????0?0??00010??1?1?1000?0??0???0??????????00???000??010?00?0?????10000??00?0000???0?010?000000?01??????0
0?00??0???000?101000?00?01??01?1?00??0?00??1??00000?0????0????00?001?0??10010111?10000?1?00??????0???00000?00???1??10??0
??000?00??000??0?0?0000?000??0????0?00?0?1?0???0?00000?00010??0??10??0?00????0?????1?1??????10???0?0?00?0??11?00?1?????00??0
?0??00?????00?0??????0??00????1?0???0??0??????00?00000?????????10??000??????0110000?0000?0?00?110000000?00?000100??000?0????
?0?????????????????????10??10??0??00??0??0000?

Coelurus
????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????
??????????????????????????????00??0?????????????????????1?????????????????0?????????????110000000100?1??0?00101100?00?00?01??1?0?0?
0?11?????????0?????????00000?00001010??0?0001?0?1?????????????10??101?????????0?????????????????????????0?0???0?000100000?0??0
???0?????????????0?????????????????????1111111000100?????????0110010111??000?11?1?0?1?11?00??011?1?0111?????0?1????0??????10?1??0
????????????????????????01???????0?????????1???????1???????0?00?00??????0????1??011?00??0???0??0?00???0????????0??0?????????
???0?????0?????0?0?0?????0?????????????0????0?11??????0?????????0???0?0?????????????????1?????0?????????0????00?????????111???
1110?????????0101?1??0?????0???0?0???0???0????????0?0?00?0?0?11?0?1?????????????????????01?00???0????????01?0?????0?0?0?????00
0?????????????????????????00????0?????0?00????????0????10?0??0?????????????????00???0?????0????0?????????????????000????????????0?
???????????0???100??????0????0???????1?0??0????0??????0?????????????1????????????0?0????????0?????0???0??0?0????????????001???
0?????????10???0?????????????0?0???0?????????????001???1?????????????0?????????????????1?1?????????00?????????????00??01??1????????0?
?????00?1?????00000?????????????????????0????????0?????????????????????????????????????????????0????????1?????????0??0??????00???????
????????????????????????????0???0?????????????????????0??????1?????????????0?0?????0???????1?????????????????????0?????0?????
?????????????0????????00?????????????????????000?????????????????????1?????????????????????0????????01?????????????????0????????????
????????????????????????????????????????????????????????????1?????????????????????0????????1??1?00?????????????????????0????????????????
???0110?????????????0????????????????0??0??0?0??

Compsognathus_corallestris
1010?0?1?0?0???000?10010111??11001?0?00??000????0??101??001?11????????0??0???1??0????0000?0?0???????0??0?00??0???0??????0?
?10?????????????????????000000000000000?000000000??????000???1?0001????1?0?0??1??????10?00?0??0?10011???0?????0??10?0?01??00?0
0?1010?100?10??10?1?0?00??1??0??1?????1?0001???1??0110?????10?0?0?0110??11?01?0???1001??????01?1???????00000?0?01?00?00?0?00
??0?11???????1????1????????10???0?111?????0?001100001010?????????????????????0???????1??00?1?????011?????0011000?0???0011?011??
101110001110??0???0?01?????????0???1101??1?1?00?10??0?????0??0?1?0?????0??0?1?0?0?????0??0?0?0?????0??0?0??010?????0??00010?????0?01
000?0?11?????????01??0??0????1?0??10?01??0??0???????00????1????0??0???00?0???0????00??????0??0???0????1?01?0????0??1????1???
???0??00?01?0???11???1?????00??0?00?100?0??000000???0000001?1000???0???0??0?????000?0?000???00?????????0?00???0??0???1?00?0
0?0???0????0???0001????00?0??0?000???????010?1?0?0???0?000??0?????????????0???0?00??0??00??????0??00????0???????0??0???00?0?0
01?0111?0??????0???0?????00?0???0???110??0?0?????0??0?0?0100110??????1?0???00??1?00??0?0?0?0?????0??1????00?0???1?10?0?0??01?00
?0????0????0?0?0??0???0???1??00??00000??00??0?0?0?????????0??0??????0??0????10??????????0??0????0??0?0????0?00??1?????0?0??0?
00??00001?0?????000?????????????????????010010??0??00?0?0?????????0????0?0?000?00?1??????10???000?11?????????00??00??0?00????000
?0??0000??0???00????0?000???0??00????10??0??0????00????00?0??00??0?00100??1101??00110?00?1?0?00??????0?00?0????0000??00?00??
?0?00?0?0000000000000000?00?00?00?????????????????????00??????0?????????????????0?1?????00?0??1?10?0?????00?0???01?00
00??????0??0??000000?????????0?0?????????????0?00?0001?????????????1?0????0?????????????????????????0?????????1?0000?0100?000001?????
?0?0?????????????????????0?10??1?????0????0???0?0?

Condorraptor
????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????
??????????????????????????????????????000?0?0?????????????????????????????????0?????????????1110011000?001??0?00111?0000?????????100???
????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????
?000??10111?????0001?01?0??????10?001??200???0?10?000?1??0????10?11100?0?010?1?010??0?????????????0?????????????????????????????0100??0
????????????????????????0?????????????????????????0?????????0??1?0??0?1?????????0?????????????????????0??????0??000?????0?????????
???0??1?????????01?????????0?????????????0????1??0?0??????0??01??01????10??0?????????????????????????????0???0?????????????????1?????
???0?????????????????????????????????????????????????????????0????0?????????11?????????????????????????0??1?????????1?00???0?0??????????
```



Confuciusornis

Cruralispennia

Cryolophosaurus

Daemonosaurus

Deinonychus

?0???000??0???00??????000??101?00????00?????0?00?00100000?00?00??0000100?010?10??11100?001?0??1????0?00?????????00???00??0??
10001?????0?00001000001?00?1??00?0000??010000???00??????00??0?111?0?001???010????01?11??0?0100l?0?10????0?0?010????00?0????
??0000???0?01?1?100??????0?0???0???0????0????00?0??1??????????0??0???0??0000?0???11???0000?????11000000?001??010000000?0??0?
0??00??????????????????1???1?????0?0??0000000?

Dilophosaurus
101000010000000011001000101000000000000100010000??0?0?00101100?11010?100????0???????1000010100000001000001?01000?00?0000110000
01000000001???????0???10000100001000?01000000001?001000?????00001?10100??0000010011100000000001?01?01011?00000100100??100?0?
0011000000010000000100000001000001010000?0000??010?001011??000001000010000010000100000l????????10000000?0000001001 0?00001?00
?001111101 0?1??100100000?010?11000100000001?0010000011100l0001?010000000010110010110100011100??001111??0110000000000000000010?
1??1100?0110????????00?000?0011?000?1000001?00?1000?0000??0000100110??0010000?00?0?00111?000?00100000000000000000100??0?0?00
000?00?001?11011?0?00010?0001100??10000000?0011100??00?01?1?0?001000000?00110110??000001??00?0000000???001000?111?01??111001
110000?0?1?101111111?10?01000?000000?000001?0000?0010100?0?0?0000??00110??011??00000000?0000?0001100??0100010000000011000000
000?000??00000?000011????00000?000??0??010000??000?1?000000?000??????????000001000000????0??????00???00????000?0?1???11000?
11??1110??0?000000?00?010?0?00001000?010?000???0?00??0011111??00???1001000000000000000000?000000000000000?0000??00?0???????1000
00?1?0010??00000??????0???1??000000000????10?0000????0?000??000?????000000?1000?00000000010?0??0000?00000?00?010100000000?0?
00???0?????0????????0???000000000000?1010100000000?00?00?????0??????0????000?000?00??0?????10??0??0111000?????1001000000000??????0?
000??000??????00??0???00????0??00?????00????00001000000?0?0??00??0000100?00?0100001?000?00?0??????????0?00010100000001001000?0
1000??????0?00000000000000000??1?00?0000?????0000??0?00????0?1?000?1???0????00?0???001?1????????0???0?1?0???0?0??00???????000??
100000??0?000??00000?0???0?0?1?0??????00?????1???0??10?????????001?0??0?10000?0000000?00000???0?1?0000000?000000100??00000??0?
00?0???000000011000???10???00??0000??0??0?0??

Dromomeron
??
??
??
??00?000000?10000?0?0?0?00?01000??101??0?0001?0?????????????????????????
??????????????????????????????????0?????????1?????????????????????0???????????0??0?0?????????????0??????????????????????????????
???????????????0???????????????????????????????1?????????????0???1???????0???????????0??0?????????????????????????????0???????00
00??11????????0???
??0???0???????????????????????????????????
??1???
???0????????????1?????????
???00??0?????????????????1??????????
???0??
??0???????????????????????????0???
??00??
??

Elaphrosaurus
??
???001??????????0001100000000100?1100010?10000110100??100?0?
000??0010?1100?0??1???00000??10011100??????????1???????0?????1???????00???1?????0??????????????1?0000?11?00?0?110?00000010?00
1?011111101011001011010000010010100 1???100??0010?010101001000101110010 0??111000100100000011??01?00??11??0?110000100001?001??0
????1?00?????????????0???1?????0??0????????0??0?10?0????1??000?0000??????????0?10?0?10???1??0??01?00?????1?00?0?0???11???????
??00?0100????0?0??11?????00?????????0?00????0?10?0??0?010??00??01?00?00?00??????????????1????????????????1??011?????0???11??10
?010???????????110110 0?????????00?0???0?????????????00?1??0??10?1?00???0?1??????????0??????????0??0?????????01?10???101???10????00
01????????????????????00??01?????0???1?101?00????01????0??0?1?0?0??????????00???????1???????0?0?????????????????010?001??????0??
?????100??00?000????????1??11??1????1100000???0?0???00???11??1??????1?1???0???0000?????????1??10?01?????0?0????0?????????????10??
0???00????1??0?0??1???0???0???000???0?????1?10?000?10010??????1?????00??????????10?1001??0101?00?0?0??0???000?01110?0000????
???????????0????????????????????00?01100????00?00????????0???00?0????????0?000?????1???????
?00????????0????????0??????????0?0??????????????0??000000??????1??????0???????0??????0??????0???0?01??????0??????????????????001??11??1?0
0?11?????????0000?0???000??????????????00??????0??0??1????010101?0?1?1?????????????????????0?00??????1??00????0???000?01???0?000????
0???00???????????????0???000?????1?????00?????1?????????????????????????0???0?0?000????????????????11100000????0??????00??????????
0??000????????????????????0??????????1???0??0?0??

Eoabelisaurus
??0???????????010111??100???000???0???010?1?0000100?00?0????1??1?001?1100???00??0?0?
????????????????????????????10???0?0???????????111?10001??1???0?1??11?1?0?0?00100??1?????
?011100100?1??????1?0?000?1??100100???1???10???1????1011?????00?0????00?0000????0?1000?????????1??00?????0000110?00??0000?0?
01?1111110100 1?0?01101?????111???1010?001?0?0010000?1?10??000?1?1?????????11?0?01??101??????????????????????10???0???0011?0?????
??????????11?????????0??00?00?????0?0????00?00?11?0?1??0???00?1???1????????0???????????????????001?00?0???0??????0??0?????????
??0????0?0?1???100?????0????1?????10??00?0??11???00?0???1???1??000?0??0??0??????????????????????????????????001????????1??1?????
??0?????????1??1101?0?00??0?????0???0?0?0?????0??????0??0?????0?????????1????1??????0???????0??????????????1?0??0?00????000???0?
??????0?1?1????????????????11????0????????1??0????0????0?0??0?0???????????????0????001??0?????????????10?0?000?0??01????1???0?????
???????10??????0????0?????1????????????1?0??11?????0?0???????????1????1????11????01????????1000?0?0110???00??0???????0????????1??0
?0??????????0??0????????????1??????0?0???????????????????????????????????0?????????1?????????????1??????100?????0??0?1100??01??????
????0?????????????????????110????00????????0??0?0????????????????????????????0?????????0???????0??????????1??????????0?101??????????????
??0??00?????????0??????????????????0??????????????????????0??????????????0?????????????????0?0????1???0?????0??????0????0???01???10?
???0??1????????????1???????0?????????????????????????????00?????????????????0????????????11?0???????????????0?????????????????????????????
????????0??????????????????0??0????????????????????0?1110000????????????????????????
?????????????????????????00???0?1????????????

Eodromaeus
10?0?0?100?0?0??0?001000?0?0??0000000??0000000???????????0?????1??????0???????????????0??????????????????????????????????1?????
?1?01???????????????0?????00?0000001000?000?100??0??????????????????????0??????????????11???00??0????01?0??11???0??000??0??1????0
?01000?10???????????????00??0??0?01?1???0?0000?001?0000011??00????0????0??00000??0000??1?????????1???00???00??0????????0????0??0?
???00?111???0??????????????????1??0011?00001000?00????01??????11?1?????????0??????1?0???00???0???0???0??10?0?????????????1??????
??00?????????????????????????1????010?????0???0????????0?0????????00??????????0????????????0???0???0???00??00???????????0?0????????00
????????00???????????????????????0??????0???????????????????0?1???????????1???????01????0??????1???????????????????00??00?????????????
?01???????????0??????0????????1??????????????0???0??????0??????????????????1????0????????0?0??0??0??????????00????????0??????0???
????0??????????????000????????0??0?0???00???000???0?0???0?0???????????????????????00??
????????????????????????????0?????????????0??????????????????00???1????????????????0????????????
?0??0?????????????????????????????0?????????????????1?0????????0??000??????????0?????????????0?
0????0?????????????????????????????????????0???0?1?0????0?????00??????0??1???11????????????????????????
???0??????????????????????????????????10???????0??00???00??????0???????????????????????1????????
????0????????????????0?00???00?????????0??0????????????00???????1??????????0??????????????????????????????0???
?0?????????????????????????????1??????????????????????1?????????????1?????0????????????????????????????00000000?00?0??10???00?00????
?0?????0?0000000??????1??????????0????0???????

Eoraptor
100000?0000010000?0000011010??000001000000000000?000000011010111 0?100??????0?0?0??110000000010?0????0000000?????????10????
00?????????????1??000?0???000000???0000?0?00000?00???00000???01?00000??000?0??0?1???1000000?0000?000000000?00?0??0000??1?000?
0011000100?1?0????0???000?1??0??10??0?0?0000?001100000011??000010000100?001000000010001????????10?0?100?0?00
?0?000?0101?01?0000001?0?0010?1100010?001?00001000?1010?00001001 0????0??00?1?0000001??0000??1000???0000000?00000000?110?00?
1000000?0110????????00?????00?10?10?0??00?1?0??101?100?0????0?010?10?????000??????0000?00?????00???0?0??00???000?000????00
000?0??0??????000??00????0??0?0??10?000?0?00??????00????1????010000?0???0?01????000??01??????000??????0?0??000?011?000001
11?000?0??00001001 00?0?00??1???0?01???01?00?00????000?0??0?00??1??00?100?001???0??0?0000?0??00000????0000???0?0?0100000??1
??0?0001?000???0??0??0???000??0000???0?0?0?0???100??0000??1?????????????0?00?001?????????00???0????00?????0?0??????00????
0100000?0???000??0?????????0?????00??11???0?0??0????0010110??0????11????00?000??0?????0?000??0?00??0?????????00?0???????1?00
?0?1??0????1??0??????0???0??0??00??????????00?0??1?0????????????????0???????????1?????0?0010???00??0?0???0??0?000?1?000??0?
0????0?????0??0?????????00?????????000?000000???0??0?????????????0???0?0?00??????1?????00??0?001??100????????000?0?000??????0?
0?0???00?????????????????000????1?00????01??0??01??????0???0??0??0??0?1??00?00?1000000?100???0??0????????00?000???0?01001?00?0
?0??0?????0????000000?0?00??0??0?0?0?????????????????00???1??????1??0???????0?????0?????????0?????0?0?????1???0????????00
10?000??0?????????0?????????0?0?????0??????00??0001?????????0??0???000?????????????????????0?000000000?00?000000??00000??0?
?0?0???001??0???000?0?1??010????0???00??0?00?

Eotyrannus
??000?010001?0010?00?1?0??0????????00?1?1?100111?0?00???1?????????1?????????????????????????????????0?01000?????????????????????
?????????????????????0????00?0100?000?0?000????0???????0????????10??11?0???00???1?010?00000???0?1??0??00001000????????????????
??1110010 0?10?0??1?0000001?00?0??1000??0????0?11??1?010????100??1??1?????????????1?????????????1?1?????????????????????????
?????????1???0?1?01???0?????????00????????0?1000?0??????1???00
????????????????????0???0?????0????0??0??1??????0?00???0????01?????????0?0?????????????????100??0????????????100??0?????0?1???00?????
?????????????????????00??0?0????00??????????0?0?????????0????0??0?0?0?????????0?????0????1??????00?0??1??1?00???1??1????1???
?????0??0???1????0?????????00??????????0?0??????1??0??0??????11????0??????0?1?????????????????0?????????0???0?????0??????0??
?????1????0?0???010???????0?001?????????0??????0?????0????????0?????????????????????0?????????0?????????????????????1?????????0?
?????1????0??00?????????????????????0???1?????????0??0??0??1??0??????0????????0011
?????00????0?0?????????????????0?????????????????01?????????????1??????????0?????????????????00????????0????0??????????0?????????
???1???0???0?????????????????????????????????1?1?????????????????????????????????0??????????????
???????0??????00??????00????????0???1?00?????????????????1??1?0?????????0?0???????001??00??????????0?????????????????????0?0???
1??1??????0??????0?????????????0???0???????0?????0?????????????????0?????????????01?0??????0????????11????0?????0??0??0??????
?0?????????????????????????????1?????????????????0?????0?????????????????0????000?????????????????????????????????????00?????0????????????
??????00000?00011????1?????????????????????

Epidendrosaurus
?????????0???11???11?????0???0?00100???0??????0?????0??1??0001????????????????
????1?????????????????????0?????????1??????1011?000?010?0?????0?0?0????0?????????????????????0???????0?0?????????00??00????????0??
?0100?0???10?0????1?0001000?0?00?????0?0000?011??11100?0?0101011001 10??10?00000??1011????????1??0?00??011010??1??1??0????0?
1??1110?0000000?0?0001?01?10???0?010?????????00?0???0?????????1?????????????01?????????????0110?1?0??00011?0110?
1001101?011??1????0??01?1???1???0?0???????0?00?00?01?0????????1??110???0????????1??????01?????0????00?1?000?000????0???0??0
000?0?111????0????0??0??????11????1??01?0??000?????00????1??????000??0?????????????00?????????????0??????1?0?????????????1???
????0?????????????1?????????????????????00????000???11?00??1??10?????????????????????0?101000?????????????????????????0??????1?????
1?????????0???000??0?????0??1000??0??0?1?0?????0???0?000??0?????????????????00?????????0?????????0?????????????????1?0??0?????
?????????????????????0?????0??????0????00??????01?0????01??00??0????0?????00??10???????0?????????00???01??????10?0????????0?00
?0?????????????????????????????????0??0??0?????????0?????????????????????????0?????????????????????0?????????0??????01????0?????0??0?
0????1?????????????????????????????????????0????0??0???00?????????0????0???00?????????????????????0?????????????????????0?????0??0?
0??1??01??????00??????00????????0?????????????????????00??????00????1??????????0????????0?????????????????0?????????????????1????????1???
??????????0?00??1????000?00?0?????????????????0?????????????????????????1?????1???0?????0?????????????????????????????10????????????
??0?????????????????????????1?????????????????00?????0?110000000?????00001?011??0????
????????????????????????0??1??????????0??????0

Epidexipteryx
11?1?0???0?1??????110????0??????100????001?00???0?????????????????????????0??01?1??000?????????????????????????0?????????????????
????????????????????????0??1?00000?0???1??????10???0?????????1??????0?????????????????????0?????????????????????????????00?0
?0100???0??0?????????????0??10?0?????0?000???1??101??????1??0?00??11??10?????0??0???01?
???010??????0?0??0?0??0???101?0?????10?0??00?0011000?0?1?0???011????0?????11??????
???1?????11110?0?00?0?????????????????????0?0??01???????0?????????????????????????????0????1?????????????????????01???0?????0?
??0????0???????0?????????????????????????1?0??0?????????????1????????0??0?????0?????0?????????????????0?????????????1????????1???
???0????????0??????0????????1???0?????????
????????????????000????????1????????0?????????????0?????0?0?????????????????????1?????????0?????????????????????????????????0????
?1???0?????100??0?????0000??0????0?0?????????????????0?????????0?0??10??????0?0??0????0???
??????0?????????????????????????0???0??0???1?????????????????????????????0????????????0??0?
0???0?????????????????????????????0??0??00????????00???0?0?????????????????????????00
0??1??0?0?????????????????????1?????????????????????????0?????????????????1?????????01?????????????????????????????????????0???
????????????0??1?????000???0????????????????0?????????????0?????????????????????????????
?0??????0???
?0???????????????????????????1??????????0???????

Eustreptospondylus
101000?100?0100101001100??11??01???10?1?1??0???????00011?0000?????0??00100?0?0000000000000100??000?0000????000000001110001
?110??01?001?????????????000000000?0??0100000???????1?????????????????1?0?000101?110100100000001??0100001?000000000000?10??0?
001110?10?11?????????????00001000001010 0???110000??0?0??001000000?000?00
?0?0111010100101001000001001 0?1010011000000100110000 10??0110010011100 00?0101000101101000111?11?111?????0??000000000011000100
????0000?0?0?????????0?0110?????1?01?000100??00?0?10?????00??000??????0?01?????????0?0?????????????1??10?????????0?0?0?0000??????0?1???000???
?000?0?1000?0??000?0?0?010?00?10??1?00?0?00?0??0????0?00??1010?01??0?00?000?00?1??0?10011?1?00?000?0?0100?000?10??01??0?1??1
1??0????0101?1101110?0001?00?100?0???0???00????000?0?000?0000?00?001?10??011?11???0????0??0?0??0??11?0??0000?010?????00
000???0?0010???000?11?0??001????????10?00?00?0?000????0???0?000??????????0???000?000?0??0?0???0?00???0000??0000???0000100?0?
?1???11?0100???0????????00??0?00?????10??0????0?0?0??0?????????1??10?????????0?01???0?10?????????????????0?01???0?10?????????????10?0
0???000????000?0?????????0??0?000??00????10?0??0????010?00??0?????0?10?110?00?1000000??0?010??0??0?00?000???10??0000??0?0
00?????????0????????0?????????1001???0???0???0?????????????????????0?????100??0?00?0?????110?0000???1?0???0110001000?000????00
?0?0?00?????????0?0?????0???010?????0?????0??000?0000??00????0?????0?10??0??01??0?1??0?0?110??????1??0000??0110001???0010??0
????????????000????0000????????00??0?00?????000????000???????0000?0????1?????0?????1?1?0????01?0???1???????0??00????????0?10?
?00?00?????????????10?0???0?????0?????????0???0?00?10??????????000??000?000?0?????????????????????11000000??00????????0??0??????
00?0???000100000?1??0?1???????????0?????0?0??

Falcarius
????????????????????????1????10???10???0?0?10???0?????????????????????????0?0001???00?????0?00?0???000?010??????0?01?000000101?0
?100?01011?1??????????????00?0110000010?010??010???????0?????????????1?0?1?????????0110110001?1??1?1111111111??0???0??????10????
0011100100110001001?0000100000101011000?0001?0110101101011011101010110?111?10101??1111??????01??0?10?0?001001??10?0??0???000

```
1?1011101?0?0100000001?1000101100101 1?10000000110000000?01101101010?0?0??1?00?01?11000?0100??1?111???000100?000000001010010?
??11010?01?????????0000101?1???0?0??010?010?1?00?1??001??0??00011?0??0000?00???01?0??001??0???0?1000?0?0?0?000001000??0???0
?00?0?110??0?1??0??000???0?1?10???1??0110??001?10?0?0??00?1?1??0?0?0??0?????????????00?0????????0???????0??1000????????????1???
?10?0?????????0??11????????00??0?011??000??????00???1??00??0?0110???0???0??????????0?100001????10???????????????11?????????0???
00??????00001??000??111??0?0001000??0??000?00??0?0???0?000????0?????????????011?00?????0??0?0???????0???????????????1????????0?0?
??????1?0?100000000000????0????0?0???110?????????0????01??????1????110????0???0??0?????????0??0??0???????0?0???00?0?????0?1???
?0?1??0????1?0???1????1???0???10100?00????0?110000100 11?????????????00??????1???0??0???00??0?0??0?00000???0?0??1001?00?0??0?
0????0?????0???????1??????????????????0??0?????0??00?000??0?0??????0?????????0???????0??????????0????11?????001?0?1000???00???????
?0?????????????001???1000????11??0?????0?????0????000?00????0?00??0000?0??011?101????00?0?1?0??????????0??????????????000??00??0??
1000??????0?000000000100??0????00?000??00???00???0000????00??0?111????????????0???????00??1??1010????????00?0??10????????0????
??0000?????????????????0???0?1???0???0?00???????????0?1??????????0???????0???000?????101100000??????????????0???0??0100?000?00????
0??0001000100001100?0??0???0??????0000????00?

Fukuivenator
???????????0??11????11?1??????00?0000??00??0???????????0?????????????????0??01??????0???11?00???????????????????0?10???001?1???
?10?10???1?????????????????????0?00?10????0????????????????????????????????0????????????1?10?10001111?11??0101?0?0??100100??1101??
001?10?0000100?1?0100??0??0???100010??0??00????1????10????01?0??11?110??11?0???????1?11?????????1?00000?0?0??10?100110?0100??0
?0???????????????????????????????????????0???????????1?????????1?10?????????1????????????????????????????????011????0???0?1????0??
1?1?100?101???????????0??????0?????010????00??????0?10??????0???1????0????000????????????????0???0????0?0???0??????0???0??????1??0
000??1????????????00??00??????11?1??1??01?0???01??????00????????10?000??????????0?????0?????????????1?0????????1????00?????????????
??10????????00?10??????????0???0??0?????0?0??1???0?1??11?10??????11?????0???0???1????????0?0???0???100??0?????10?0????????0??01?00?1
0?1?0????????0????????11???00?0?0?0???????????11???1???0???0??01?0????????????????????0?0??????0???0??0?????????????????1????????0???
????1???0????0??????????1??00???????????????00????0?0???????????????????????1????00??1???0??0???0?1??1000????1????????0??0????????????0
0???????????1??01??????01??????????0???1????????1000??????????0??????????0???????0???????????1??0?1???110??0?0??????00?010???01??????
?????????????????????????0??????000??????0????????0???0??????????????????????0?0????????????????0?0?????????????????0??0???????0????0?0
???0?0?????????00?1????00?1??0???0????????????????0?0???????0??????0????????101?0?????????1???0???????0??????0??0?????????000????0?????
????????????00??0?000?01????1?????0?00???1?0????????00?0????????1????0??????????0????????0?0????????????????1???????1?????????0????
?0?????????0???????????????00???????1?????0????????00?0001?????????????????0????????0??????????????0????011?00000????0?0010?0?0?0??????
???0???????????????????????????????????0????0??

Gansus_yumenensis
?????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????
?????????????????????????????????????????????????????????????0?????????????1???????????????????1?????100??00?0?1???01?1
?0101?101??00101001?0011100??01000??110?010?1011??11100???110?11101001??11?0??????1000101110111??1?0???1??????????????????11?
???111?00000010????0????000100?0??111?0??10?1010101???0??????1????11?11???1??1?????1?1?0??????????????1111000????11011?0?001
?110100?001???1??001???1?????????0??????????1??00?1?1??0???????????????0??0????????10??01????1??????1??0110???????0??10????0???????
1000??????????????????0??????????001??01?0??0?1??1???00??????????10?00????0????????11?1??????????0????????????1?0???????1?????????
???????????????????????????????????????????????0????0??????????111???????????????????10???????0???????????????????????????????????
???????????????????????????0101?110100?1??0?????????????????011????1?1????????????????0????????????????????0???????????????1????????????
??????????1?000?????0??????0?111??????1???????1????1????0??????????????1?????0???????????????????1???????????????????0??1????????11?0
?0?????????????????0????0?????0???????????????????????????????0????????????????????????????????0??0????????0?????????????????????????0????
?????1???????????????????????????????????????11?1??1001010001?000?????????0????????????????????????????????????????????????????1????????
????????11??01?????00??????????1??1????????????????0?????????????10001110????????????????0??????????????????1?????????????????0?????
???????????????11?????1???0?0???????????????0??????????????000??????????????????????????????11?????0?10?????????0???0?????????????
?????0?????????????????0??????0????01??000?????0?????????????????1????????????100??????????????????1111110???????0101??00??00???
????????????????????0??????????????????0????1??

Gobivenator
10???0?????????????????1?000??1001110000?0000000010000?101001010110 10?1100100 1?01101010000100001001?0????11?100??11???1???0?11
?00?????1???011???101?010??010?000110????00??0101??1011?1???0?00001??0???0????1????1??10???????1?0????????????????10?????????0??
101110?01??00001??100??0??0??00010????????1??????????????????????????????????????????????????????????????1?????????011000??01?0??0??0?00
1???1?10?000?1??001001??1??10???01011?110???0011100?01010???01010????1???00????????0?????????????11?????00??0?0?1???1011?11?01
1????1?????????????????1?1?10?01??00??00??01?1?00?011??0??11?????1???101???100????00??0?0????10?0??011??????00??????0??0?????0?1??
0?0???1?0????????00??????0???1??0??10?????0??0????????0?????1??1??????0??00?0???0?1????????1?????????????0?????????????0?0??1????????
???????????0??0??????0??0010??01??????0?1?????000???????10?11???01????????0??1??0????????0???00?????00????????????????????00???0?0???
????00?00??0?00???01???????10????????????1???0?11????????1?0???0??0??????????????????000?00??????0010?0?0?000???0????1?????10????
110?????1??????????????????1?0?????????????1???0???1??0?00???1???????????1???????????????0??0?00000????0???0?11??0??0???????????????1???
????????????1??00?????00???0???????0?0?1???0??1????????????????????????????????????????1??????????????10??0???0?00??????0?0?1???????????0????
00??0???????????????????0????????0????????????0??????0?????????????????000001?01?0??????1?0???1?000?000???0?0??00?????01?0??01???010?
0??1?000??????????????????????????0???????????????0???????10??01????00????1??01???01????011????0????00???????1??0?0????????????????0???
????000????001?1??00000?01???110?0?????????????????????????1?0?????????????00??????????0?0?01??1???000?????0????????????0?????????0???
?0???????0??00?0????????????1?????1??????????????????010????1?????????????????????????????????????????????????????11100000???????????????0?????????
?0??????????????????????????1???0?????00????0??

Guaibasaurus
?????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????
?????????????????????????????????????????????????????????????????????????????????????????????????????????00?0000?0??100???
?01?000????10?????0?0?????1??0??1?1???0?000??????????1??1???01??10??01????0???????0?1001?????????1???????????????0?00?0????000??0
???00000100?0??0?00000?100?1??100?010?0??0??0010000?1?100???01001?10?0????0?1??0?110100?1?1???0000010??0000???0?????00?0?10?
1000000?0?1??????????????????????????????????00?10?01?1???????????0??0???????????????????????0?????????00???????00?001????????????
?????1??????????????1??0?????????????1???0?0??001???????0??????????????0???????????????????????1?????????????????????????????10?0?
???????????????0??0???????????????????????????????0????0???0??0??0??????????0?????????????????????0??????????????????0?????????011??????
?????????????????????????????0?????????0??1?0???????0????????00??0???????????????????????????????????????????????????????????????????
????????????????????????????????????????1?????????????????0??????????????????????0????????????????????0????????????????????????????0???
????????????????????????????1???????????0???????????????????????????????????????????????????????????????????????????????0????????????
??????????????????????????????????????????????????????????????????????????????????????1??????????????????1????????????????????????????
?0???????????????????????????????????????????0??????????????????0????????????????????????????????????????????0????????????????????????
?????????????????0????0???????????????????????????????????????????????????????????????????????0????????????????????????????????????
?????????????????0?????????????????????????????????????????????????????????????????????????????00000000??????????0?????????????
?????????????????????????????????????????????

Gualicho
?????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????
?????????????????????????????????????????????????????????????????????????????????????????????????????????00????????????0??0
??1110010?0?0??00?1???00100?0100110 00?0?001??0110??100110?0011000001?1??01??????????00???????????????????0?0??????????????0110???
???????????????????????????????????111???00?????????????011111??110?100?11010?110??0??00?????1?????????00????00????0??????????
????1?0?01?0??????????1?????????0???0????????0????????0??0?????0??1????0?????????0???????????0???0??0??00?0??????????0??0?1?????0???
?00?01???0???0?1????00???0????????????00??1??001????000????????0???10?0??????????????????0?0?????????????????????1000????????????????0
????0?????????????0???10??????????0??0???0??0??????0???1??0???????10???????????????????0????0??00?????????????1?????????0?????????????
```

0?????????????????????????????1?010?0???0??0????????0????0?0?0????0?????????????1??0??????00??1?????????????????????0?1?1?????????
???????0??0?000?????0?????0?????000??1???0?0?????0????0?????????????????1??00?0?0?????????????????????????0?0???0000???????10?0
00?????????????0??????0?????????????0?????????00?0????1?0??1?????????????????????0?000?????????????00??????00????0??????????
?????1?????????????????????????????????0?????0??0?????????????????????0???1?????????????
??????????0???00??????00????????0?????????????10?0?0??0?????????????1??????1?????????????????00?????????????????????????1???0??
0?11???????0?0??001????00????????0??0????0??0?????????????????????0???0011?01?????00?????
?????????????????????0?????1??????0???0???00??0???1????0000?????????????????????????0?0????????1????
??????0?????????????????????????????01???0????0??

Guanlong
1000?0?10001000100??11011100??001001001001101111000000011110??111?101000100000??000011000000010?0?0????0010100000??001??000?
?10?10??1?1????????10??0?00000?0000?0?000??00?11101?????????????????00000?0??0?0??????00?10000?0?0?0?10??01?0?0?0???0???10?1?00??
?0111??10??10??1??1???00001??00?1??0??0?0001?0111?011010??0101010101110?1111001?01?1001????????110?00????010000?010??0????0??0
????111011100111011000?110010111110111100?0?0010000??0100111110111110?00??10????1?110000011??11?1?1?????0110?1?00?0??11?0110?
1??10?00011?????????00??10?00???0?0001000?1??0?10?1?1000??00?00?1?1??????00??1??00?0?0?011??0?0????0011?00??00101??0?01?200
000?0?01???0101?00??????0???11?0???0?00?00?001?????????0??1??1?0?????100?0??10????00????1??????200????0?1?0??000??1????1??1
??00?1?00?00?01?11?????1?1??001??00??00?01?000?0?0101?0??1?011???????0?1?001??????0?01???????00????????0??0???0??1?????0???
??1?010?00??0?011?0??????0?0??1000??0??000?0???0???10??000????????????????????1??00??0????0?0???0?00????0???0????????00?01????
?1?????????????????????1????0??0???0????1?????????????0??010???0?1????1?????????1?????0????0?0?????0??1?????????????0?????1?00
?0???????0???000??0???0???1??00?00000????10??010????????00?001??????0?1?????0??????00?00???0??0?000???00?0??1?0?????0??0?
0??000?????????????????????????????????????000??0??0?????????????????0????0?0?001?11????????00???0?0????????0??0???0??0??0?????00
0?0?0001?????001????00001??1000?00010??0??0??????????0100110?????1?10010?1?10?0011??00????00?01???00?0?????????????00??0?0?
?0?0????????0??0000000000???100??00?????1?0??100??00?????????1111?10?1???00??????0???00?0001??1100?0000?010???1????0???
0?????0000000100?0????????0?1?0??????????????0?000??????????????0?????????????????11?0?000????0011000000?00?00?10??000?0????
?0?1?00?????????????????10??1?????1?0??0????0??

Halszkaraptor
1010000?0010?1110?00?100??1???0?111000?10??0?????????1?1?0??1?0111??11?00000?00100000??0100?0??00????????0??0000??????0??0?0?
??0?????????????????????0??010000010???????000000?01010????????0?0011?001?0????0?01?0?00000??0???11?00110???00?0101??????00??
001?????????????????????0??0??0??0?10??0?01?0???1????????000?11?10?010????0?00??0??10000??0????1??1???????10100?0??00?0000?00
?0??11?000?0?11????0??1?0011101111?????????????001???0?0?011001??0??????0?10?????????0??0?????????1?????????100?1?0??????0?01011?0?000
?011010111?0????????100????11??0???00??01?1?0??01000???1?0?????1??10????10??????0?0??0??10???0?0?1???0?000???0001??1??00?00
?00?011?????????0??0?0???0??1100??10?11?00?001???0??00??1?1??0????10????1???0???100????11???00???00??00?01????00??1????1???
?0?000?1??0???10?1????00????0???0??1?000???0?000?0100?01?1??100????000100?1????????0?1??????0???????1?0?0?0?????0???0?0?0?
0??00?????0??0?000000000???100??00?????1?0??100??00?????????1111?10?1???00??????0???00?0001??1100?0000?010???1????0???
01??????1??0??????0?????1?0????1??????1??00?1?00???0???11011?????????????00?01??00??0?00000????0?0?1001?0????0??0???????11?0
0??1?????????0????0?????1???0???0??0????0??11??0??????????1???????0??0????1???????????0??0???10????0???0?0??000??????0????
0?????????????????0?????????????????0??0?0?0???????0?????????0????1?0?0???00??0????000?00000????????0?0?0??00?000??????0?
?0?1?001??????00??0???001???01?10??0?????????0?????????????0????0????10?0??0??1?0?0111010??????0??????0??0???????0????????0???
?????0?0?0000???0??00?000?0??000??0????0???0??????0???0????0??????0???1?????????1?????????1?1?????1?0?????1?0????0?0???00??
?0?100??0??00???????0????????1????0???0????0?00?0?????????????1??0?0?????????????????????????0?111?00000?11?0?1?011??00?000???
?0?????????????????1??0?1???1???0???0?10?00000?

Haplocheirus
100?1??100?010100000110110111000110100?0111000100010000 1???00011110?10101??0??1????1?000?000?00??000???001010?????001?10???
??001??????1????1110?10?00?0?00000000?00?01?0000?001?100???100000?10?0?????????????1??000???1???0???11?0?0?00????1??0?110010
?0110010?0??100?1??110??00?1??0??1?00?0?0001?01???1101???0101010?0110?11??101?0??1001????????110?00????000????????00?00?0??0
1??01??01??1?1?0001?0??10??11010?0111?01000000100000111101 1?01?011???00??1?????1???000??????11??1?????00?1??0?0???0??1?0?1??
1?????????1?????????01?????01??00?100?101?1??0?1??1?000?1??????00?1???0??10?0?0??0??0?0?????0?0?0?00?000??0???000010????0?000
000?0?11?????0??0???001?????????????10??1??0?101????0????????1?1?00?0?0?????????0????00????1??0?????000??0?0?1?0????0????????????
????1???0????1?0??10????????00??0100??000????0?10??1?000???1100???0??1?1??01?????0?10?00?????1?????????0?????????0???1?????
???0??01?00?000?000?????1?11???000???0?11???01?10????0?00?????????????????01??10?????????1?0?0??0?????????0??????0????1?1??
1???1?????1???????1??0????00?????????1????????1?0??????1?????????1??????0???0???????0?00??????0??1??1?00??????0?????????0?
0?????0??11?00?????????????0???0???1?????0?10????1000?1?????????0?0??????1?????????110?01??0?????000??????0??1?01??????0?
0????0?????????????????????????????????0????0??0?????????????????0???0????00??10????????0??????0??????????1????0?????0????????0
0?????00??????00?????????????0??????0?????????????????????????????????????0????1??0??01?1100?????????0??0?????????????????????
?0?????????0?00???0000?0000???0100?00?1?????0??????0??????0?0???11?1??001???00?0??01??00??0?????0???10???100??0?????????0???
????????0??00?1?0?????????????1?1?????00?0?????????????0????????11?????????????????11?1?0?0??????110000000?00000?1000?000?1????
?0?00?????????????????0?1?????0??????0?0???????

Harpymimus
?00010?001000???0???110?1000??0?1?000000000000101?001010000 10?1????1000?00??0000?0?0000000?010???????00?00?????????????????
?????????????????????????1010111010???1??00000?000??010000????0000101??0?1?0??1?????110?0000010??011000?00??000??00?010????0??
?0111001 00?1?00100?0?000000?0100?010000?1000?101?10110100?0101011001 10??0?00000??1000????????1???0??11001 00???010?00010?00
10001?10?0?0010??0?0???10??10?1?1?01?????0???01?0???1????110?1?????????????????????1??00???01?1101?1111?00??000110110011001 00
????100001?0????????10?10??1010??0?0??1??0?????00?0?101????000?0?110??00?0???100??0000001010???10?0?000?00??000?1?0000??????20
??00????11????0??00??00??0?????00??10?01000?001?0???00?????00???0?010???0????00????00???1????????00????0??1?0??0?0??1????1???
???001?0???0?0??1?????????0????000??00?????0?0?0???100001??????0?????????????????????0?01010?0????????????0?0000??????0???0?0?00
0??0000????0????000?????001000000?????????0???0?0???0100?0?0?????????????001??00?????????????????0?????????????????????0????
0?0????????????0??000?????0??0???0?????0?????00?????0?0???????????????0???00???0??0?????????????0??1????0?00?000000??????1???
??????0?????????????????0?????00??0??0?????????00?00001?????????????????????????????0????0??0????0????0???0?00??1?01????0??0?
0????0?????????????????0?????????????0??010??0?????????????????????0??????0?00??00?????????00???0?0??1????????????00?0?0?????????
?0???000??0???00?????00???0?0000??0?00?????????????????????????????????11?00?????????01?0?0?????????????????0?????????????????0???
?0?00?????1?0??000?11?000000????0???0????????0?0?0?0?????????????0????00?????????0???00?1???0?????????????????1?????????????
????????0?0????0?0?????????111?????????????????0?0?????????????00?????????????????????0????000????0?111000000???000000??000?0????
?0?000?????????????????????????????0?0???????0??

Herrerasaurus
1000000000001000010010001000000100100000100000000000000000110011011 0?000100000000001000000000001 01???000000000100000100?0?
000000???0????000101001000000000001000?0100100010?0010010??0000000?0110000101001000110000000000100000000?10100000000??100?00
1011100100 01?000000?0000000?0000100000??000?0010010001000001010000101000100001100001?????????00?0100000000??0000000000000
1?000010010010000100100?000000010001?1?000100010?1?000100001010100?000000000110?0?000000000?00000?0100000100000100000100010?
0000100?0?00????????000000000?10100?00000010?0?1010100 00?000000?100?0?000000000?000000000?0000000?0000100000000?00
0000???010?000?0000000?000001000??10?00000?00110???00?0?01?0?0010000000000000001??000?0111??????00????0001?00?000?0011100000
10??01?0??0100100000000?00001???0?01?0000?000000?000000000?0?010?0??000001001 0?000000000?1000??0000000??100?00000000?100000??
?00?0001000000000000?0???0001000000??0?1?000100000?0?0?0?0?????????????????????????0?00?000000000000?0??100?0?
000?010?0?10000?00?00??00?0??0?0?0?0?110???????0?0?0?0000010?100???1000??00??0000???0?0?000????000?00??0100???0?0???????0000
00?1000????00?00???0??0???0??00000?000??0?00??0??????0?????????????????0??0????0????0??00000000?0000000?001?0?00??0?1000000?000
000??0?????0????????0???000000?0000?000000000000?00?000????0?????000000?00000?00??0????100000000011?0111100??000000000????000

Haplocheirus
100?1??100?010100000110110111000110100?0111000100010000 1???00011110?10101??0??1????1?000?000?00??000???001010?????001?10???
??001??????1????1110?10?00?0?00000000?00?01?0000?001?100???100000?10?0?????????????1??000???1???0???11?0?0?00????1??0?110010
?0110010?0??100?1??110??00?1??0??1?00?0?0001?01???1101???0101010?0110?11??101?0??1001????????110?00????000????????00?00?0??0
1??01??01??1?1?0001?0??10??11010?0111?01000000100000111101 1?01?011???00??1?????1???000??????11??1?????00?1??0?0???0??1?0?1??
1?????????1?????????01?????01??00?100?101?1??0?1??1?000?1??????00?1???0??10?0?0??0??0?0?????0?0?0?00?000??0???000010????0?000
000?0?11?????0??0???001?????????????10??1??0?101????0????????1?1?00?0?0?????????0????00????1??0?????000??0?0?1?0????0????????????
????1???0????1?0??10????????00??0100??000????0?10??1?000???1100???0??1?1??01?????0?10?00?????1?????????0?????????0???1?????
???0??01?00?000?000?????1?11???000???0?11???01?10????0?00?????????????????01??10?????????1?0?0??0?????????0??????0????1?1??
1???1?????1???????1??0????00?????????1????????1?0??????1?????????1??????0???0???????0?00??????0??1??1?00??????0?????????0?
0?????0??11?00?????????????0???0???1?????0?10????1000?1?????????0?0??????1?????????110?01??0?????000??????0??1?01??????0?
0????0?????????????????????????????????0????0??0?????????????????0???0????00??10????????0??????0??????????1????0?????0????????0
0?????00??????00?????????????0??????0?????????????????????????????????????0????1??0??01?1100?????????0??0?????????????????????
?0?????????0?00???0000?0000???0100?00?1?????0??????0??????0?0???11?1??001???00?0??01??00??0?????0???10???100??0?????????0???
????????0??00?1?0?????????????1?1?????00?0?????????????0????????11?????????????????11?1?0?0??????110000000?00000?1000?000?1????
?0?00?????????????????0?1?????0??????0?0???????

Harpymimus
?00010?001000???0???110?1000??0?1?000000000000101?001010000 10?1????1000?00??0000?0?0000000?010???????00?00?????????????????
?????????????????????????1010111010???1??00000?000??010000????0000101??0?1?0??1?????110?0000010??011000?00??000??00?010????0??
?0111001 00?1?00100?0?000000?0100?010000?1000?101?10110100?0101011001 10??0?00000??1000????????1???0??11001 00???010?00010?00
10001?10?0?0010??0?0???10??10?1?1?01?????0???01?0???1????110?1?????????????????????1??00???01?1101?1111?00??000110110011001 00
????100001?0????????10?10??1010??0?0??1??0?????00?0?101????000?0?110??00?0???100??0000001010???10?0?000?00??000?1?0000??????1??0
?00????11????0??00??00??0?????00??10?01000?001?0???00?????00???0?010???0????00????00???1????????00????0??1?0??0?0??1????1???
???001?0???0?0??1?????????0????000??00?????0?0?0???100001??????0?????????????????????0?01010?0????????????0?0000??????0???0?0?00
0??0000????0????000?????001000000?????????0???0?0???0100?0?0?????????????001??00?????????????????0?????????????????????0????
0?0????????????0??000?????0??0???0?????0?????00?????0?0???????????????0???00???0??0?????????????0??1????0?00?000000??????1???
??????0?????????????????0?????00??0??0?????????00?00001?????????????????????????????0????0??0????0????0???0?00??1?01????0??0?
0????0?????????????????0?????????????0??010??0?????????????????????0??????0?00??00?????????00???0?0??1????????????00?0?0?????????
?0???000??0???00?????00???0?0000??0?00?????????????????????????????????11?00?????????01?0?0?????????????????0?????????????????0???
?0?00?????1?0??000?11?000000????0???0????????0?0?0?0?????????????0????00?????????0???00?1???0?????????????????1?????????????
????????0?0????0?0?????????111?????????????????0?0?????????????00?????????????????????0????000????0?111000000???000000??000?0????
?0?000?????????????????????????????0?0???????0??

Herrerasaurus
1000000000001000010010001000000100100000100000000000000000110011011 0?000100000000001000000000001 01???000000000100000100?0?
000000???0????000101001000000000001000?0100100010?0010010??0000000?0110000101001000110000000000100000000?10100000000??100?00
1011100100 01?000000?0000000?0000100000??000?0010010001000001010000101000100001100001?????????00?0100000000??0000000000000
1?000010010010000100100?000000010001?1?000100010?1?000100001010100?000000000110?0?000000000?00000?0100000100000100000100010?
0000100?0?00????????000000000?10100?00000010?0?1010100 00?000000?100?0?000000000?000000000?0000000?0000100000000?00
0000???010?000?0000000?000001000??10?00000?00110???00?0?01?0?0010000000000000001??000?0111??????00????0001?00?000?0011100000
10??01?0??0100100000000?00001???0?01?0000?000000?000000000?0?010?0??000001001 0?000000000?1000??0000000??100?00000000?100000??
?00?0001000000000000?0???0001000000??0?1?000100000?0?0?0?0?????????????????????????0?00?000000000000?0??100?0?
000?010?0?10000?00?00??00?0??0?0?0?0?110???????0?0?0?0000010?100???1000??00??0000???0?0?000????000?00??0100???0?0???????0000
00?1000????00?00???0??0???0??00000?000??0?00??0??????0?????????????????0??0????0????0??00000000?0000000?001?0?00??0?1000000?000
000??0?????0????????0???000000?0000?000000000000?00?000????0?????000000?00000?00??0????100000000011?0111100??000000000????000

0000?000??????00??0???000???0?000?00000??00?0???0000000?0?0??00??0000100?00?000000010000?0?0??0??????0?00?000?000?01?0100000
00000?00??000000?0000000000?01?00?0000??0??000???0?01?01?0???000??0??0?1???0??1????0?00??????0???????0??0??0?00????????00?0
?0??00??0?????????0?0?00?00?0?0?????0??????0??00??100????????01?0000100?0???000000?0000?0000?000000000?000000000??00000??0?
??0?0???000000000000?0?10?010?00?0?0?00??0?0??

Hesperornis
1011?1?101100???00??0000?0100?11101110??010000??00?1?11100?11011??0????0?00???011?0???0?????10?01??101??????0?01?0???1?????
????????0?????0??11???100?010000?11??00??00???01?1??1010???0?0???0?1?????????000??0????????1???1???????1??00???11???1?1
10????10???0????0?????????????1??010???1????????11??1?????????????11?
????111????0010????0?????0?10????1?10?0???1?1?10000?0??111?1???00111?11?????11?????1?1?0?????0????????1110??1?????1?11?0???1
??????1??01??????0?????1???1????????0???1?0???0????00?0?????????????????0????1????1?0??10??01???11??01???1?????????????0?
110????????1????0?????????????????00?????????????????????1????1????0???1????1?????1????????1?????????????????00????????1???
??1??1?1?????0?????????????????????????????????????0??????0?????????????????1????????1?????????????1???00?????0?1??????1?????????
?????0??1??0????0?????????????????????????????1?????0?????????????????1?????????????????????????????0??????0??????1?????1????????????0?
????????1????????1???1?????????1?????0?????????????????????????????1????????0?????????1???
??????0?????????????????????0??????0?00?????????????????0?????????????????????????????0?????0????????0??????????????????????
??111110000?????????????????0?????????????????????????????0?0?????????1?????????????????
??????1?0?????????????????????????0??????1?????????????????????????0?0?0???11????????01????????1?????????0?????????????????0???
????????????1???00?1?????????????0?????0??0?????1??????110?????????0?????????????????????????????0?????????????????????????
??0000?????????????????10????????????11??001?0?1???1??????0??????0?????????????0?????????????1?????1111111?????????????????????
????????????????????1?1?????????????????01????1??

Heterodontosaurus
110000000100000000001?011000000000100000000000001000000?00010001110?1000100000110001000000000010000?0101001000010000001000000
010000000?001?000100100010011000010?1100100101000010010000001000000?000?0100?100001100000000000000100000?000000000000000000?1
001100010001000100?000000000000000010000?000000010000001100000000100010000000000000000011000000?010000000000000000000000000000
0000111?00?001000000000010100010100000010011000001000011001?0100000000110100000000001?0100000?0000?0000?0000?0000?0000?0011001?00
?000100001100??0?????0100100000010000?0000001000?100010000?000001010100??010000000?0?000001000000000100010000000?001010000000000
?00000?00?0000?000?000?000000110??100000001?011000000000?0100?00?000000000000001??10000110?000??000?00??00000?000?0010011000
10000100??000000?110000000000?000000??00??100000?000000000100100?0?0100?001?00?000000000000?01000000??000000000000010?000000
000?000100000000??00?00?000?00000?000?0000?0?????????????000000?000?0?????????000000?0??0?00?0?000?0000?000?0?00?0?00?0000?
0100?01?0?10000?00000?000?0?0000?00001000000???000000?010100?000???1001?000000000000?0?00000?0?0000?000?00000?0??0?0?????0000
00?0000????10000???0?0?????0??00000?000?????0??0????????0000?00??????0???????0?00?0????000?0000??1000000?00000?0000010?00??00
00???0?????0????????0???00?00000000?000000000000?000000????0????0000000?0?000?00?01?0?0?00?0000011?0100?00???000000000001???00?
?00000000?0???000?0???0000?001000?00001??00?0????000?00?000??00?00010000?01?110?00000000???0??1??????0?????????00??0?0?0?0???
?0?00?00??0000?000000000000??00?0??10???0???0?????000?????????????0??0?0???0?00?0?000??????00???0???0????????00????????00??
00??????0?????????????0?????0?1???????00?????1??000000?????????????0??????????00??00?00000??00?1110000000?000000100??00000??0?
??0?0????????????????????00??1???0?????00??0?00?

Hongshanornis
1011?1???0?0????0????????011????10?1???????00???1?????????????????????????????0?????????????????????1?????????????????????????????
?????????????????????????0??0?1?00?1???????0?????????????????????????????0?1?????????????????????????10?????????????????1??????0
??111?01??0?1????1?0011100?001?0?????0?0101??11??1110????110111101001??11?01?????1001?11111111????????1?????????????????11?
?????????????????????????????0????????11?0??11?10??10??????0?????????????????0??????????1?0?????????????????111000?????1??11?0?0??
??01101?011?11111?01???????1????0?0?????1?1??0?111??01???????1????0?????0????????01???0?0????1????10??????????00?????????????1
100?0?????????????????0???????1??1111?01?0??0?1??????0?????0??????000???0????????1011?????????????????????1????0???1?????????
????0????????0?????????????????????????00??????0????1??10?????11?????????????????????10??10?0?0????1?????????????????????0????????
?????????????????????1???0????1?1?10000?????0?????0????????0????????1?????????????????0?????????????????????????????????????1??????01?0?
??????????11000?????0?????0?101?????????????????1????1????0?10??????????1??????0?????????????????????????0?????????????00?1???????1???
?0?????????????????1????0???0???????1??0?????????????????????0?
0???0?
??????1????1?0?????10100?????????0?????????????????????????????????1?00??1??0??????????01?????????????????????1?????????????????????
?????????????????????10???0???1?????????????1???1??????0?0?????????????0????????????
??????0?????????????????????????????010??0??????0?????????????????????????????1?0?????????????????????1111110010??????10???00??00???
??0?????????????????0?????????????????0????1??

Ichthyornis
101??1?00110?????????????????1?????????????????????0???????1?????????????????????00?0????11?????????????1??1?1?01?????????????????11?1??
????????10?????????????????00?01?0000?11??0000000?????100?0110??00????0?0?1?0??101??100?0?000?1????????11?1?0100????10???0?????
??111?100??00101001000111000101000101100?0101101111111000001001110110?1??11?0??????1???1110??111?01001??11??10??????0????110
???1111000000?0????01?????????????0?0????????1???10?01?000101100100011?11???0?0101???1?1?0????11????????11?0001?0??10011?0??0?
????1?????????????????????1?0????????0???????1??00?0?1???0???10?01??????10??????10???1???0?0?0?10??1110?1???10??10??0????????1
1?0???1????0???0???????0????????0?1???1????0?11?1???0?????1?1??010000???0???????111?????????11?????????????100??????1????????
???1?????????0??0?????????1?????0???1?????????????0??0?10???11?????????????????1????0??0????10????????????????????????????
?????0??1??1????001?????00110?110????100??????0???????011??0?1?1?????????????0?????????0?????????????????????????1???????0?1?
??????????1?000?1???00??0???111??00??11?????11?????1???0???0??1????0?1?????????0???
?0????0????1?????0????0?????0?????????????????????????????0????????????????????1?????????????????????0?0?????????????????????0
0????1???1?11?1?010?10??0111??0?????????????????????????0?????0??1??????11?????????????1???????
???????111?100?????10?????0??????1?????????????????????00??????1??0101?????????????????????????????????????1?????????????????0?????
?????????????????????0?????????01????????1??0??????1??????100?????????????????????????0?????????????10????????0????0?????0?????0???
????????????????????????????????????1111??0?0?????????????????????????????????????11?????????????????1?????1111?000????1???1?????????0???
???000?????????????????0?????????????????0?0?????1??

Incisivosaurus
?111000110001011001111?0?101010011000001001000011?00?011001001?011?0000001????111?0010000000?01111???0?00?00??0?11???01??1???
110??1???0??0110?111110?00?0111000110?0001111100??010000000001?0?1101???
??
??
????????????????????????0??0?0??????0000?00?????????0?1?????????????1?????100?????????0????0???0??????000?0??????1??????0?10?
??????????10???0?????00???1?00??0?????0?????????????????0???0????????0????00????0?????1??????000???0??????1000??1?????????
?????0?10?00?0????????00??0?00??0??0?????????0??1????0??1???0??????0?0?010?????????0?????????????10????????0???0?????0??????0???
??0?001???10??1??000?????????????????????????????0??1?00?????????????????????????????0??0?????????????0??0????00?????????????????0????
011?????0?????????????0?????0?????????????????????0????0????0?????????????????????????????????0?00?????????0??0?0?????????????????0?
??????0?????????????????????????0???000?1?????????????????????????0?????????????????????1?????????????????????0?0??0???0?????????????????01
01?????????????????????????0?????????????????0000?????????????????????????01000?0??00?00????0???00???000?????0??00?0??????0000?000??01
0????001????????10?????0011???0???0??1??0?????????????00?0?????????10?????0???0011??01??????0?????????0?????????0?????????0????????0???
??????00???0?????000??00???0?0?00?????????????????????????????????0??001???0?00?????????????????????00?????????????????????00??
????????0?????????????????????0?1?????????????????00000?0?0??????????01?????????????????????????????000?????????00?0?????????00???0?
????????????????????????0?1????0??0????0?????????

Iteravis
1010?1??01?0????0?????????11????101?0??????00??????1??
????????????????????????????0?11010?11?????00?0???????0?????????????????1?????????????????????????10???????????????????????0??0
??101??????001?1??1000?1??0?????0???????0?011011?11110????0101111010O1??11?0???????1??01??11?11??0???1??1??????????????????01?
???11110?0?0110???100?0?10?11????0111?01?10?1010001?0?0?01???1????1??1????0????10????11?????1?????????1111?0?????1??1????00?
?111100?00???11?1?01???1????????0?0?????1?????0?1?11?0??????????????1??????????000?11????10???????0100?????????1?????1???0??1
100?0?????????????????0???????1??001??01????0?1??????0????????1???0000?0?????1???101???????????????0???????1?1????0???????1???
????0??1?????0???1?0??????????????????00??????0????0?0?0??1??101???????0????1????1???0??0????????????????0??1?????????????????
?????0??0????????????????????1?010101???1??0??????0????????0???????????0??0??????0??0????????0?????????0????1??????0????
?1????????????0??1??????????0???????????10?????11???1????01??????1????1??????0??????????????????????????1??????????0??1???????0???
?0????0?????????????????????1??0??????????????????0????0?????0???????????????????????????
00???1????????????????????????????????????1???1??0??1?000?1??????0????????0????0?????????0????????????????1?????????????01???????
????????11?????????00??0?????1??01????????????????0????????????1?11?0?????????0?????1??????????1?????????1????????????1??????0???
??????????1???0?1??100?????0?00???????????????????1??????????????????????????????????????11??1??0???1?????????????????????????
????????????????????0???????0????01???????0??0????????????????????????????0?0???????1???111???????????????1??????????????????00???
????????????????????0??????????????????????????

Jianchangosaurus
?00?1??101?0????????010??111??0011011???010???????0?00??11???0??????????????????????????0??
????????????????????????0????10000010?100?0??1???????0????????????????0????????1?0????????????????0?????1?????????????????????0
??1?1??10??10??10?100???1?1??0????1?1?0?00???0?????1101???0110??????1??????0???????011????????????????????????0??0???0??0?0???
?????1?10?0?001?0?010?1??00?10??1?001??????0??0?10001?101???1?0?1???1???????0??
??????????????1??????00??????0??????000??0??????0?0???????01??????0???????????????????0???????????10???0?????0?00????100??00?????????0?
??????11??????????1?0??????????0???????1?00?00????????????1?1???????0?0??0??10??0?????0??????1???????????0??????00???????????????1???
????0????????0????1?0??????????0??0?1???00??0?????1???????????1???00???0????????11???????????000????10???????????0????????1?????????
????1?0???????????00?????????1?0???????0?1?????0?1?0?????????0???0?????????????????????0??1???????????00???????????????0?????1????????0???
????????????????0???????????0??????????11???0?????????????????????0????1???????????????1?????0???0?????00??1?0?0?0??????0????????????
??????0?????????????1??1????0??0???????????????1?0?????????????????????????????????1???????????0?????0??0??0????????????1???????0????
00?????????????????111?????????0?????????1??????0???0????????????????????????????00??????????0?????????1?????????????????????????0?????
??????????????????????00???????00??????1??????????????0???00????0????????01???????????11??????????0?????????0?0??????????????????????
??????????0???0???0000??0?????0???0???????????????????????????????1??????????????????????????????1?????0??????????1??????????????????????????
??00??0?????????????
????????????????????????????11??????????0?????0??

Jianianhualong
01???????????????????01?1??????00010010000??0??????????100?00010?11???????0??00?0??00??????0?0??
????????????????????????0?00?00000010?00??00?0010??1011?????0?000????0?1?0???????????????000????????10????????????????????0???00?0
?0?110?00??00?????1????0000?????0?????0?0001??11?1??10????01010111011O??10??01?1??1011????????1????????????1101???????1??0??0?0?
1???10?????0????????1???????????1?????????000??10111?0001??00111?0??????0?10?11?00
0011???????1?111?1?1?10?????00??????000??0??1?00?01?10?001???????1???????????0????????????????1??0???????0???00????0?0???????0??00
0?0???1?00????????????????0????1?0??1???1?00?000??????00????1??1???000??00?????0?1??00????????????????0????????1????000??1?????1???
????0????????0???11???0?????01?????0??10??0?0?0?????1?1????????11?????????0?0??????????0?0???0????1???????????????????????????????00??
??00000???????????0?0?????????????00????01??0???1?0?0?????000??????????????????????????0???????0????0??0?0??00???0?????????????????
????0???????????????????????0??????????1???????????0?0???1??????????????1??????????1???0??0?0??????????0??01?0?0????????0???????????
?0??????????????????????????????0???0?????????????1??0??????????????????????????????????0????
00???1???1??0??0??????0?0???00???0???????????????0???00??????????????????????0????????????
0??????00??????00???10?00???????001????0???????????0??????11????????????1??01??????0??01???0???
??????????00??00?0?00?0??1??011???0?????????????????????????????????????0??????????0??????????????????0????????????????????????????????
?0??????????0?????????????????????1?0???????????????0?????????????????1???????????????????01??0?0????0??????????0????????10???000??????
???????????????????????????1?????????????????0??

Jinfengopteryx
1100???1?000?01?0?00010????1??0?10000??00100??0?0???1?0??????0??1?????1?0?????0010?0?????0000??10???0??????????????????????????0???
????????????????????????00?01?000011??000????0?????????1?1??????????0??0????????????????????????????0??????0????????1????01??01?0
?01111001??0?0????1?0?0000?0?0??00????0?0101?011?101101????1010111?110??11?0???0??1?1???????????????????11111????1?1?10??000?
1?1010???????????????????1??1???????01?????00?10???????????????????????????????????????0???????????01???????0???????????1????????????11???0??
?????????????11??1????00??????????000??1?0???????1??0????????1??????????1????????????100???????????????????0???????????????????????????0000???????00
???????10?????????????????????????0??1???1??0?001??????????????1????0?0??????????????0??????????????????????????0???????1???????0??1????????
?????1???????0???????????????????????????????????0?????1?0?0????011????????????????????????101???????????????????0??????????0???1?????
????0????????????000?????????0????00??0???????001???0??????00????????????????????????????0????????????????0??????????????????????????0????
???0????1????????????????????0??????????????0?????0?1??0????010???????????1??????0??????0????????????????????0???????????1????0?????????????
??0??0??0?
???0??????0???????????????????????0?0??????????????????????0????????????????0??????????????????1
???1??????0???00???0??00??????????????????????0???????????????????????????1??1????????1??01????1??
?????????????00??????00?0?0??1??
0???0????????100???0????????
????????????????????????1???1???????????0?????0??

Jixiangornis
1?01?0?1?1?0?0??0?????????11????1?0???????1000????1????????????????1??
????????????????????????00?1???1??????????11???10??10???????????????????1???????
???????011?0?0???01?00011?0??10?00????0?0?01?011???110????1101011O?011??10?0?1????10011?1?00011????0?????1??10??????????????00?
????????????????????????????0???????????????0???111?0???0??0?011?0?00?
???1?01?1?1?????????0????????0???????1??????0??1?00?????????????1??????????????10?????0??????????10?????????00????????????0
?00?0???????????????0???????1????1??01?0??001??????0??????????????0?0???????0???0??1???????????????????????1?????0?????????????
????0????????0???????????????????????00??????0?????1?0?0?????11?????????????????????????10??
??????????????????0????????????????00?0?????1?????0?0?????0???????????????????????????0??
???????????????????????????0????????????????0?????1?????1????010??????????????????0???????????????????????0??????????????????1???????????
?0??????????????????1???0???
??0???????????????????????????????????0??
????????10??????????110???1?????????????????0??
???????????????????1?????????1???0???????????????????0???0?????????????
??11110000????????0010????0??01???
???????????????????????????1???????????0?????0??

Khaan
011100?011010???10??111?1101101 1?000000010000101000110110010?11100?00000000?10100?100?0000?01011????0?000000???1???????1?0?
?????????0?????????????101??1??11?????????11110100??0000?1???1110100 1?0?110?1111?0111??1000?10?10101?1?01???0??00000?11??01?0
001110000?1000010?1?0000?00?000010???00?0000?011?1011010??010101 0?0110??11?00001??110100?1??011???10?010????0?????????????????

?0?011100000010??0000???00010???0001???10??000110000010?0110?10001???10??00??0?1?1?0?01????01?011?11??0010000?0?1?0011?0110?
101100000010?????????00101??11????1000?0?0?1?00?000100001?????01???10??0??00??0?????0?1?010?0?0??010000??01000000?10?00000??0
000?0?11????10??00??00??0?1011?0?010?01?0010?1??????00?????????0?000??00?0??00???100???11??????001?????01?0?10?0??1????1???
????01?01?00?0?1?11???0??0?0000???0?100??0?0000??11000001?0010?????0???00?10??000100000?????????????0?00???0??0???0?0???
??00011??10???????0??????01001001??00??00100?10???0???00?????????????????????00???????0?????0??001??00??????01?0?1?000???
1110?10?1?????????????0?????00?0???0????1?????1?01?0?0??010?????1????1??????0??10??0????0?0?0?????0??0??1100???0??0?????011?0?
?0????0????1??0001???00???1??0???0?0?1??????110?????????????0?????????????????????????????1???0??0??11???0?????0??0??1???????0?011
000??1110?1?1111111?????????????????????100?0??0??0?0?????????????0????0?0?000?00????1???01???000??1??0??0?????1111101010101010?01
10?00000??????00???0??00????01?000?0?????0??0????000???00????00???010?0???1??10??0110?00?1????0??????0?????????????00??????0???
?????????????00000?1100010?00??1?????????????011???0?????????1??????0??0?????0??100??0?0??01??00?????100??0??0??10????????00???
0??000??0?????????????00?????0?1????0?????????010???1??0??????????01?0????0???????1???0000??00?1111000000???0100100010001?0?0?
?0?????????????????????0??0??10??0?0???00???000?

Lagerpeton
??
??
?0???
???0000010110000000000000000000?000001000000000011000000?000000000001?0??000000??0000000000?0010000??010000010000?0???0011?0100?
1000000?0100?????????????0?????????00?????????1?0?01?????????0?????????0??0?????????????0?00?0?0021?0?????00?????????0?0?????????00?????????
000????0?0?????0?????0???????1????0??0????0???1?????00??????0???1?0????0?00?????????????????????????????????0?????????????????00000
00?????????????????00?????????????????0?????????????0??11?0??0??00????0?????????????????0?????????????????????????????0????00????????????
?0???00?0?0?0????00?????????????????0???0????????
????00?????????????????????????????????0?????????????????????????????????0????0??1???0?0???
??0???0??0?????????????0????????????1???????
??0?????????????????????????????????????00??0?????????????????1???????
??1?????????0???
??0?????????????????????????
??0????????????????????????????????????00?????????????????00000000????????????0?????????
??0??

Lewisuchus
????????????????????????00?1????0000?100??0?0??0?????????????????????????01??100?????????????????00?00010??0?????0??000100?00????01?0?00
?10??????0????????0?????????10????000?1?0?????????????????????????????????0???0??00100000???0?0?0??1??0?????0???0???1????????????
100?000100?10??0???1?????????????
??
????????????????????????????0?11?????????1??01?????????????????????0?????????00?????????0??????0??00???????0?????????????????????
?????1?????10?????????????????1??????0?????????????????????????????????1?????????????????0???????0??1?????0???0?0?????0???0????11?0????
??11?????0????1?????????????0??1???0??0??????0??0??????1?????????????????0???0???0???????0?????????????00??00???1??0????????????1?0???
??0????0??0?????????????????0???0?0001?????????????0??00??????????????????1?????
????????????????????????????0???0??0?0?00??0??????1?????????????0?????????10??
?????????????????0???????0?????????????0?1?0?0?????????????????????????????????0??0?????????????????????????????00?0?110?????????????????
????0?????????????????????????00?????????????0?0??????0?????????????????000???0?????????????????????????0?00?????????0?0?????????????0?
??????0?????????????????????????????0???0?????0?????1????????1??0?????????????????????????0??
????????????????????000????1????????0???10?????0???0?????????????00?????????????????0???
???????????0?0???1???
??

Liliensternus
10?????????????????????0??1??????00?00?010?????????????????????0?????1?10??????0????????0?0????0?0????0?0???0?0???00???????0??0???
????????????????????1?1???00?0?000000000?0100000?00????0??0????0?0?0????00?????????????0010?000?000??0?1?01001?000??10?000??10??0?
??1100010?01?0000?0??000001?000010000000?0000???1????10?1?????10?????????????????????0?1001????????1?00000??000000??001?0000?0?00
1???111111100100100?00?000?10?1010010?0?001000101001010010001101 0???00??000?0?10010100?1?1001?00111???0?1000001?00000000110?
????100?01?0?????????????????????1?00????????1??0?10??00??0??0?0?1?1??0?????0????10?0?00??????0??01?00???0?0??????0??0?0???0???
?00????0?????????????0????0??1????1??00?????????????0???0?1?0??0??0???0?0?????????????00?1?????????????????0?????????01??11?000
1100?????????111?111????????1?????????????????????????0??1?0??0??1??0?????1?????????0????????00?????????001?0?????0?0?0????????
??1????1???0???0000??????00000??????10?01??0?????1????0?????0?????????????0???0??0??????0?????????????????????????????????????
????????????????0?0????????????0???????0????0?????????0???11??0????1??????0??????0????????0?????????????????????????????1???
????????????1???0?????????1???1?????0??0?????????0?????????1???0??????0?
????????????????????????0?0?????0??1010?0????0?????????????????????0?????????????????????????????????10??0????????0000????1???????
????????????????00??0?????????????????????????????????1?????????????0????0????????01?1??1??????0?????????????????????????????????
????????????????????000?????????0?????????????????????????????0?????????????????????????????00???0??0?????????????????????1?????????
??1?????????????????????0?????00?????????????????1000000?????????????????????
???????0?0100????0?????????????????????????????

Limusaurus
0010?0?101?00???0???010110110?001?001000010000000??0000?0?1010101?0100????????10???0??0?0000???0?0????0???0?????????????????
????????????????????1?????00?1??11?????????01??010??00?0??????1?0?0????0?1?0?00?1?0?001?00100?0??00111?01??0?0??10?1??00??0???
000110?101?10??10?10???00?0??1001000??0??000???0???110?0?????0???0?01011000000??0010?01??00001???0?????000001?0?????0010??0
?0??111?1010010??001010?0011011111?011?001?0?0010?00??01???00010???10?0???10?0????1????0?????0?0?1????00110?0?0??00?11?0?11?
1?11??0?0?11?????????0???????00?????00?????0?0?00?10?00??1?????0?0????1?100????0?0?1?0????0??10?0?01???0?0?????000??1???0??0?????1
0?0?0?00?????0?100??10??1??1?1????10??0??0??0?????1????????01????0?0????????00????00???1?????????0??????0?0??0????1????1???
????0??0?????0??01?1?1???????0????0??0?0??????01?????000??1???0???????1?????????????0?10?000?????????????101?0?0????0????000??
?????00????0??????0????????1?01?0???0??1?0?0?0?10????0?00???0?????????????????0???01??????1?0???????0?0??0????????0001?????????
11??1?????????????????????0?1??????0???11???0??1????0?0????0?????????????????0????????????0?0??01??0?????????0???0??01??0?????????000??????1?0?
?1?????????????01??1???0???1??0?????0??????1???1??????0????0?????????????????????0?????0???1?????????0?????0??1??1?0?????0??0?
0?????????????????????????????????00?0????11??????0?????????????????????????0?00??00????????00???000?????????????0?????????????????
0?0?00010?????????????000??0????0?010?????????????0????0???00??????0?????1??0???11??0??011??0????0?????????????????????????0???01?0
0010?????????00??01?1100?00?????????????????????0?????????????????00???0????0????????1???00??0?1???1?1?????0?????????????0??0????0???
????????0?????????????0???0????1?1?????????????????0001?????????????????????????????11?????????0?????????1???000?100??00??0????
?0?????????????????????????010?0?001??00????0??

Mahakala
??
???????01?????????????????????1???0?1???1????1?1???0?????????
??1?1?????????????????????????????1????10?0?0??01???0?????????????????????????????0???????1?1?????????1??00??1??1111???00?00?0??0?0?
1??01110000?0??0?010001?10?101100?????????????????????????????11?001010?????????0?????1????0?11??0????011???1??011001?0??0101??0???0
?????1?11??0?????????????0?????????????????0?????????1?????????????????????????????0?????????0???01????????10?????0?????0??????0??0????
??0?01?10??01??00?????????????1?????????????????????????????0?????????????????????????1?????????????????????????????????0?????????????????1???
????????????????????1???01?0?0?????????????0???1?

0??????????????????????????????1????????0??00??01????0?0?????0???
????????1?????????????0?????????????????????????????0????0?????????0????????????????????????????????0?????????0?????????000100???1??
??1?????????????????????????1?????????10????????????00??????1??????0???????1?????????????????0?????????????????????????????????????
??
???1????????????01???1????????0?????????????????????????0?????????????????????
????????????00??????0?0?????????????????????0???0??0????1?0?????????????????1?????????????
???100?????????????????0???00?????????????????????1110000??????????11?00??0????
?????00?????????????????????????????????0110????00?

Marasuchus
??00?00????0
?00000?????0?????????????????????0????000?0?0?????????????????????????????????????0?0?0000?000?000?0000??001?0000000?000000?10????????????
?0???00??000000000000??00?00?00?0?00
0??000001111100?000000000000?00?000001??000000001100?000001000110000?0000000?0?00?000100?000000000?000000010000000000011001000?
0?00?00?11?????????????0?????1?0?????????0000?00??1????0?????????0??0????????1?00?0?00?0?0?????00?00??????0?0?????????000????????
0?0??????0?????0?????????0?1?????0?????????0?1????00?????0??01?0??00?00?????0?????0?????0?????????0?????????0??000000
00????????????00?001?0?????????????????????????0??00????0??00????0?????1?????????????????1?0?????????????0????0??0????????0?
0??????????0??0?????????0?????????00?0?0???????0???????0?????????????????????????????????????0?????????????????????????????????????
????0?????????????0??????0?????0?0??????0???0?00?00?????0??1??????0?00?00?????????????????????????0?????????????????????????????00??
????0?0?????????????????????0????0?0???0?????0???0??000??????????10??0???0???1????????
??0?????????????????????????????????00?10??????????00?????0???????
?0?????????????????0??????????1???001?????????0?????????????0?????????????0?????????????????????
????????????????????000???0?????????????????1?????????????
????????????????????0?????????????????????0?????????????????????????????????00?????????????????00000000?????????????0?????????
??0??

Majungasaurus
10000001001100010100100000010011 00?1100?01100100111110000111111?1010110110001010?0111111100101100000?0?10?1000001100000001100 0?
010000??0000??000110000100001000000000?0010101000?100101000011000001100100001111001011010001001110011001111000011010100 10?000
100100010101000010?100?100010010011000000?0010???00??00000??00?0??0?00?0000000000?0?001?????????011?001001000000010001000000?00
100?1111110010000011000000100111?????????????????????????????01?0010001??000?01111001 0?1000001100111111111?00??000010000001100
????010001?1????????0?00?1?01010?00?000001000???01000?0??0000?01111000000010111 0?0?100??1000?0010?0?0000000??1000?1011000001
?00?00001?00?0?110101000?00?1?00??100000?0??01?1?0?00?00101110001 0?00??00?000011??0?0?011?00?0?0000011100000011?000?011?111???
??00?101?110?01111??0000000000??0?00?0??0?00000?000000000001?000????000?010101?00???010?0?01??000100???0100000000100011010100
000??1111?1?000000000000101100?00???1?01?0010000100??011000?111?????????000?0011110 00?0?00??11011100??0?0?00??11011011100011?1000?
010??1110?0?000000?00?010?1??000?0001?110111??000001000100111?1001010?1111101?0101110111000111101000?0000???0?0?00110?1000
01?1000??101001??10000???1??00000?1000???10?0100????111?01??01?????0000?000001000101010100?001??1100?00??0?11?0100100100 0?0?
00????00??00???????0??11111111100110100000000?00????00??0????00????0001100?00?1??100110?10100?110?0??11?0011011000010???000
00000000??0?????0?000???0???0?0110000001 0?0?0000000000?0?00?01??0000100?01?111?0011010001?1?000?0??000000001?01001?00010?11
0011?111?1??00?0010000000000?01?00?0?0010???0001???010?001001?0010?0?0?011?10?00??0?11100?0???0?????110?00??0??00??0????000?1
10?000??0?00????????0?0101110?0?1??????????00?0?0001100011001100 1?0??00??00??0??0?????????1101?110000001?00000?1000?00000?111
00?0???0010001001?0?1001?0001000?00?00?0??
Masiakasaurus
??0?????00?????????101?1???00010?000?0000??0??????????0?????????????????010000???00?????00000????0???110????????00?????11?000
?1?????0?0?1?????????????0000100000000?0001100 0?????10?0???01????????010?0011110 01?11?1010100101?0?1?01111?00??0?0?1??100???
0???100001110??00?100?10000??1000100???001????????1?000001000000011000 0??0000?00
01??1?1?1010?1??000???0000?10?111001100000000?0?0?0101010110001000110100101011001011000 00?1100110111 11??0?110000?0?0010001?10
??????0????1????????0???00??0???0?????10??0??0?10?????0?????00?1?????0????0000?0001?10?0?1010??01?00???0?1??0?1?01110??00????
??0001001 0?1???100110??0?00??201?????0??????1?11?1?000?000?1010?01??000??00???0?1??0?0?01??0??0?????00?0??0??01??1??0???111?10
11 00????000?011011?01?00?1????000??????0?????1?00????000?1001?0??00?10?0??1?000?????0??10???0???0??01?0??0000?100??100000?
000?????0?1????000000?0??????0??????10011??0?0?010????1??00?00??0????????00???1?01???0????0?????1100?00010101??1001???0??1??
?1???1010?0??0000??????10???100??0001111001????00?01?01????0??????1?1111011??1?0?1????0?1011000100 0????????0?????????10?0
????000?0??01?01??1???0???1???0000??01?00010?0???0???1??0?0??????????0??0?0?000?????0?11?11?01?01?0?00?1?01??111???0000?0?0
10?????????0???????0???01?11010101??100?????00??????????0????00??????01???????0?????100?0?00??11??????????0?1011??0010?????0
00?????????????????????????????0???1?????000????000??01??????0?01??0000?0??011?1???011?10????01???????001?0??011??001?0001?1?1
0??00??0???000?00?000?00????????0??0?00?0???0?0????????011??100010?00????????????00????010?0?????0?0?0?1??????1?0??0??0????0?0??
1??0?0?????????????0??100000???1?????????0?????00010????????0?0?0?????0???0??0?????????001??111000000?????????????00????00?00?
0??0???001000000?0??0??0?0?????0010?0??00?0??

Megalosaurus
????????????????????????1?0??????00?001?0?????0?????????????????????????011???
????????????????????????000000000?000?001??000???????0????????00??0??100?????????????1??1?0????????0?001010??00?00?00???1???0?
?1111001 0?010??0??00??00001??0001010??0???1?100?010?0??0110??0?0?100??0
?0?01?11?1?001000011010010?10?101001100??011??11?010?11?0110010??111000?11?????????????????1??1?????????0???0000???0?11??????
????????????????????????0?0??????0???0?0??????0????0?????0?????0101?????0?0?0?????????1?0??0?????????????1?0?????????????????????
???????1???????0???0?????0????1?????0??0??0?????????????????1?00?????0?????????0????0???0???0????????1??10??00?00???????????1
?000?????1???01?11?????????????0??0?????????0?0?0???????0?0???0??00????11?1????????1?????????????????0?????????????????????0?????1??1
01?????????????????????0100????1????????1?0?1??0?0?000?????1??0?0?1?????????????0????00??01?0??0?????????0?????????1?????????????????0?
????????????????????0?1?????????1???0?????????0?00??????0????0?????????1?????????????????????0??0?????????????????1?0?????????????????????
0????0???000?????????????1??0??0?????????1?????0????0?0000?0?0?????0011????1??11001?00??0??1???0??0?00????????1???????0??0?
00?0????????0????????0??????????001???0???????0?????????????????????????????1????0?????????????????????????1?????????0??000??????????0?
???????0???0???0???00?????0??0?00???1???01????????0?????????????0001???????0??01????0
????????????????????????0000?????????0??0?????0??0?0?????????????01?011?????????????????????????????1?0??0??1?0??????000?????0??0?1?0?
?????????????????????0?????????????0?????????????0?????????????????????????1?????01????????0?????????????????11000000?????????????0???0??0??
????????????????????????0?????????????????????????????

Megaraptor
?00000?1?0?0?0010?001101010100 00?0100?10000???01000?????????????????????????11??0?????0?????????????????????????????????????0????00??0???
?1?0?????????????????????????????00??00000?0?0?????????????????????????????????????1?????????????101101001100001??0?0?00110??0??????1???????0
?0??10010??1000100110 00???0??000?010?00?00?1?0110101001100011000 1?0010111111010011100 1?????????????1???0???001?0???0??101??1
?0?????????????????????????????????????101???1000?????????????????1???001??????1???1?0?????0?00?????????????????00??0001??????01100?10
???1???0?????????????????00?0?1????0??01??10?1??0????1???0?????0?100??????00?0?0?????????????0?0?????????000000????00010????1???0
??0??1??????01???01?0????1?0???0??????000??101?1000?0?00???????0?0?0????????00?????0??0?1??????1???0?0???100??00????????????
??1000?0????????1?1?????????????0??0?0???00??10???01??1?10??0??000????01??0?10?1??0??00100??0????1?0??????1100?1???????0????????
??1?0?????????????????????100?000?????0??11?0?0?0000?0?????????????????01000??00??1?????0?01???0?????????00??1?0??????00??1?0?????00?
?1?????????????001?0110????00????11???1????00???000????0??0?????????01????????01??10??????0??1??00?1???0?00????????1????????
?0???????1?0?0??????00??????0??????10????????01????????1?0?1???????1?00????1?????????????0???????00?0????1???0?01010????????
?????0?????????????????????????????1??????00?????00?00?????????????????????0??0?1??????????1??01??????1?????????????1?????????????0

?0??????????????00??????00????????0?????????????0??0?0?00??1???00????????00??????0?0?1?0?????????????????00?????????10????0?0???
100???0???00?????0000???0????????0?00?????1?0?????0??0?????????1?1?0????1?????1??????01?1?0?????????1??111??1?1?0???00?????0?
?00????????????????????????????????0?????????????????0?00?10?????????0????0??0????0????????0000?????????????0?00????10???00??0????
??0??

Mei
0?1010?100?0??100?0???0?1011??000111?0?001?0000?11?0110000?01111110?11?000?0?0010001??00?????1001????10110100?0??????????0???
????????????????????????00?0?0000011??00?1000???01?11??????00?1????0???0????1?01010?1000?11??010??1?000?????1010??11100?0
001111?01??000010?1?00?0??0?0??1?1???0?000??011????101???01??01?1??????10?0??????10????????011??10001?011010??11?1??0??0000
1?1?10100000000???1?011?1?0101????01??????0?00?0111?0001??1001010????1?0?0?0???1??11?0???0?????111???1?01100?11?????11?01?01
1??110?11?1?????????1?01???1????????0?0?1?1?0???1??00??1??????11??11????10?????????????10?0?????100?01????0?0?00?0?0??01?0?
000?1??1????????00???0?????1??1????1??01??0?????????0?????????????1?????????0?????0?????????????00??????1??????0?0??1????1???
??1?01?0?????0???1?????????0????1?0?1?1?????0?????0001???0110???????0?????????????1101??0???1????????00??0???0??1????????
??0??011???0????00???1???00000??????0?0010??0????0?????000??0?????????????1???00?????????1??????000?????????????1??????0????
?1?01???1??0???00?????0?0?1?????????????0?01?0?0????10?????????????????0?????????0???1?0????0?1?110??01??0000010010??
?01?0??????0?????1??1?????????????0?????????????00?00???1?0?????????????????10?????????????1????????0??????00??0?????0??0?
0????1?????????????????????????00???0????0????0?????????????????????????0?0?????????????00?????0??1?????????????0????????????1?
??0?1?00???0???????010??0????11?00?????????????0?1???0?????0?????1??11??1????00011???1??????0?????0?????????????0?????0???
?????0????????000?11?000000001?0?1?0?0?????????0?0???0?????????????0?1??00????0??0????1?00??1?01???00??????????10?????????
0???????0?????????????0????????1?0?????????????0?????????????????????????????????10?11000????0?11000000??0010001 0??????0???0?
?0?0?????????????????????????1???????0?00????0??

Meleagris
1111?1??01100??00?????0?11010111?001011010000001001?????0????????0????01000110110 0??00?000?10?1?1?0110??1?10011???01??1101
100?????????01100?11????00?1??11???????????100???1?0?0??1100?00??100?01110100 01??1000100000110101110110111101?0?????11010?1
?010111011100101?010101110001110001011 0?101?011?11110100?01?1110010?1???1?0??????1???111101111?01?011?11????001??010?0?011?
???1111000?10101??00????001111100?1010?010?1?1110001000101101100111?110000000110?1?110?0??11????1?0??01110000111?????1?110?0??1?
?11110?001101111100 1???1?0?11??0??0????1101??0000?110?10??10?01???11??101?????10??01?0?0101001 0??11110??0??0?010????0??001?1
100?0?1?????????0????0?????0?1???011001??????11?1????0?0????1??11??01?01????0??11101?????1??110??0???????0?10?0?0?1?11??1?0?
1110?0????0?001?01?010?01??10??0?0??11??10?00?0??000?0001?10?110?????0??000?????110?110?00??0?????????????011000??0?????????
?????0111???1?????1??11????11111110?011?01??0?010?????011??001?110011011??11?0?????????0?000??0?1?????0?0??0?0?????01?0??1?001?11
?101?11?1?1100001 0?0??????0?111???0??11???0?11???111??010011??0??1110???000??10000????0?0?1?????10??00?110?1?001111111???11?0
?0?11?0?0????1??01?0?00??????0???????0??00??1100?00?0???00???01?????????????????01?????1??10?0???1???01?0??0??0??1?01????0???1
00???1??11101111111?????????10?????????01111???110100 0?01111??00?????1?1???00?1?????00001?000??1??????11?0??????0111???????
???1?011111101?????110101?1??1?000??????0?11???1?1?1??0?????????1000?01????????????01?1?110??1??0?????01????????01?0????0?00??
????0???????????011?11?1?0???00?010??????1??0?????1100????110??????????0????????????0????01??1????11????10??0???01??????0???0
0??000??0????????????10??????0??001111001?1?1?1?1?????10??????0????0??0????100????10?01111???0??1111111111???1000101??00??01??0
0000????????????????0???0??1?????????11???0101

Microraptor
100100?10000001?0?001101?000??00??0010?00000000?00?0?10100?11001110?1?????00?????????0????????????0?1?1?000110????????????????
????????????????????????????00?0?0000010?000?1001101??1001?????0?0?0????0?????????????????10?100?????01??0010???00??0010?11?10??0
0010110011100??1??1?0001100000000???00?01000011?????00?0110?01?10?111???0???0????0?????????????10?100?????01??0010???00??0010?11?10??0
1010101000000000011001?001?11?10?11??010000001011 1?0001?01011010?0??1???000???1???0?01??0??1?01111?1110100001101000110011 01
0011001110101111111110?11??0????0?010??01?1?01?01?10?001??????10???1??0??001??00???0?0?010?0?00??10000??000101001?001???1?00
000?1?1110???0?0???000??00??11????00?01?00?001??????00????1????0?111??00?0??00??0000?????1???????000???0?01?0????0??0????1???
????10?10??0?0???11???0????000?0?1?0?011??????00??0110?01?10?111???0???0????0?????011111?00?????0????????00?0?????00?0????00??
???0?0?1?100???0010??1???0010?1000?0000001?0?1?0?0???01000??0???0?????????????1??0??0?0???000???0??000???0??00???1?0????00???
?1?00???1???00??0?????????00?0???0???110????11?0??????0100????1????1?0????0??10??0??0?0?????????00?1?0101?01?0010?0100101?0
?00?00?????0????0??0?0???1??01??0?0????????1?0????00?????0?????????????0??????1?????????????0??0?0??0?0?????????????01????0??0?
????01???1?????????????0?????????????????000?00??0?000????????????0????0?0?000?10???????00???0????????0??????0?100?0???1?0???11
?0??000?0?00??00?1?10?110??0?1?000??????????0????0?1?0000????00??0010101??1??10??1110?0?????00????0?0??0?????????????0?00??
?0?0??0??0?0?0010100000010?10?0??00??????0??????0?????????????1?0???1?????0?0??????01??1?010?00?????????????10????????0???
0??000????0??0????00???0???1?0?????????????00???0?0????????00?????????????1????10?11000?????11?000000?00??010???00111????
???0?0?????????????????1???1????????000???001

Monolophosaurus
1000000100000100?0100?100101100001001000001101110000010110110011011 1?100010?0?100010100001 01?000100000?00100001?00??1111?1???
010?10???0?????1??????1000000000000?0000000001???100110?0100001001 11?0100111110001 1?1?0?01001??0100101000000000101001 0?0?
00???1?0000????????0110?1??0??????0
?1?0111111100100101100?0000100101001 1?0000010010000?0?0???
??????????????????????0??0?00??00??0100000?0??01?0?1?100????0?????1?????0000?1?????????0??0?0?0?0000??0?
??????0????11?0?10??????0???1?00???0?????0?????1?????????1????0????000?00000?1??0??????1????0??100?????0????0011?1??1?????
??00?1?10?01?0?0?11???00010?0???0??1?0??0?1000??????01??000?0??????100?010011??????0????0????00?0????010?000?????1???0?00??
??0?0100?1000??0000?1???000?????????0??????0?100??00?????????????????????0???00?0?1001??1???0101?0?0??00????00????????00????
110??????0??????0?????????????0??????1????0?????????0??????0011??1?????1?????????????1??0?00000?1?????1????0?????????????0??
??????01??00??0????0??????1??0???000?0??????????0??0?0?00??0??????00??0?00?0??0????????0??00??0?0??0????0????010?????00??0?
0??0??????0?0??????????0?000?1001??????00000?????????????????????????00?00?0??00??????110?1?000??1????????000100?0000??????0?
0??0?000?????????????????????100?0??00000??00?0????????????0???0????????0000??0???0011??00??????0??1?????00010?1???00?0????0?
????0?0??0?0?????000??00???1?????0?????????0??10??????????0?10?10?0???00?0?????000?0??0?0?0???110000?0??0?0????????????0000?0
00?????00?0000000000?0?0???????1?????????????1???100001?????????1?00????????????????????????0?1100000000??00?0?????????0????0?
?0?????000100???101???10?01?110?????????????

Neovenator
101000?10000010?010011001011 0?00?001101011100101?000???
?????????????????1??????0000100?00000?011??00????????0?????????????????1?1???111?1??0???11?0?0001??0100001 10?0??001001??10????
00??10010??1??????11???000??00?0000?0?000001????00
10?01?1?10??0???001?0??01??1?11??0110?000000?0?0100111110011 00?1?100101101101100???1??1?????????0?00010?0???10100?0?
1?????0?0?10????????0???10????00??0???0?????0?1??????00??00???01???0????0?0????00?000???00???01?00??00?0???????0????0??????
000???111?????01?????0????????00???????0??1?0?1????????0??101??00???0???0?0?00????0???0?1?0?????00?0??????????001???????1?00
1?0??1?10????0???????0???????0100????0??????????00?0??0?0?0???????10??0????1??1???0????0??0??????????10000??111?1?????00??
?00?00????????000??0?????00????????0??00??0?000????????000?0????????????10??10??010?10???1???0?00????????0????0?0??????0??
????1110??????1?????????0?0?1?00???1?????????????????00?????????1???000?0??0?????????????????????1?????????????????????10?0
?????101111 0?0?1??1?????????00?0?????1??0??0???0????0110101??1?????0?110???101?0000011?????10??0??0?00????0??010???001?0?0?
0??????????0???????0??????????001??????0????0?????????????????????????1??????00?????0???0????????1?????????0?111????0???????0
????????????????????????????0????????011?????00??0?0??????????????01?00??1????1?????????0?00????????0??0?????????????0??0??0??
????????????00????000?00???????0??0?00?????0?????????????????10??1??0??0?????????????????0??????1?1???1??01??001?0???????00????
???00?????????????????0?????????????0?????????????0???1????1?????????100????11?0??????0?????????????????????????00??????00????0??00?
???0?0?????????????????0?1?????????????0??0?0??

Mei
0?1010?100?0??100?0???0?1011??000111?0?001?0000?11?0110000?01111110?11?000?0?0010001??00?????1001????10110100?0??????????0???
????????????????????????00?0?0000011??00?1000???01?11??????00?1????0???0????1?01010?1000?11??010??1?000?????1010??11100?0
001111?01??000010?1?00?0??0?0??1?1???0?000??011????101???01??01?1??????10?0??????10????????011??10001?011010??11?1??0??0000
1?1?10100000000???1?011?1?0101????01??????0?00?0111?0001??1001010????1?0?0?0???1??11?0???0?????111???1?01100?11?????11?01?01
1??110?11?1?????????1?01???1????????0?0?1?1?0???1??00??1??????11??11????10?????????????10?0?????100?01????0?0?00?0?0??01?0?
000?1??1????????00???0?????1??1????1??01??0?????????0?????????????1?????????0?????0?????????????00??????1??????0?0??1????1???
??1?01?0?????0???1?????????0????1?0?1?1?????0?????0001???0110???????0?????????????1101??0???1????????00??0???0??1????????
??0??011???0????00???1???00000??????0?0010??0????0?????000??0?????????????1???00?????????1??????000?????????????1??????0????
?1?01???1??0???00?????0?0?1?????????????0?01?0?0????10?????????????????0?????????0???1?0????0?1?110??01??0000010010??
?01?0??????0?????1??1?????????????0?????????????00?00???1?0?????????????????10?????????????1????????0??????00??0?????0??0?
0????1?????????????????????????00???0????0????0?????????????????????????0?0?????????????00?????0??1?????????????0????????????1?
??0?1?00???0???????010??0????11?00?????????????0?1???0?????0?????1??11??1????00011???1??????0?????0?????????????0?????0???
?????0????????000?11?000000001?0?1?0?0?????????0?0???0?????????????0?1??00????0??0????1?00??1?01???00??????????10?????????
0???????0?????????????0????????1?0?????????????0?????????????????????????????????10?11000????0?11000000??0010001 0??????0???0?
?0?0?????????????????????????1???????0?00????0??

Meleagris
1111?1??01100??00?????0?11010111?001011010000001001?????0????????0????01000110110 0??00?000?10?1?1?0110??1?10011???01??1101
100?????????01100?11????00?1??11???????????100???1?0?0??1100?00??100?01110100 01??1000100000110101110110111101?0?????11010?1
?010111011100101?010101110001110001011 0?101?011?11110100?01?1110010?1???1?0??????1???111101111?01?011?11????001??010?0?011?
???1111000?10101??00????001111100?1010?010?1?1110001000101101100111?110000000110?1?110?0??11????1?0??01110000111?????1?110?0??1?
?11110?001101111100 1???1?0?11??0??0????1101??0000?110?10??10?01???11??101?????10??01?0?0101001 0??11110??0??0?010????0??001?1
100?0?1?????????0????0?????0?1???011001??????11?1????0?0????1??11??01?01????0??11101?????1??110??0???????0?10?0?0?1?11??1?0?
1110?0????0?001?01?010?01??10??0?0??11??10?00?0??000?0001?10?110?????0??000?????110?110?00??0?????????????011000??0?????????
?????0111???1?????1??11????11111110?011?01??0?010?????011??001?110011011??11?0?????????0?000??0?1?????0?0??0?0?????01?0??1?001?11
?101?11?1?1100001 0?0??????0?111???0??11???0?11???111??010011??0??1110???000??10000????0?0?1?????10??00?110?1?001111111???11?0
?0?11?0?0????1??01?0?00??????0???????0??00??1100?00?0???00???01?????????????????01?????1??10?0???1???01?0??0??0??1?01????0???1
00???1??11101111111?????????10?????????01111???110100 0?01111??00?????1?1???00?1?????00001?000??1??????11?0??????0111???????
???1?011111101?????110101?1??1?000??????0?11???1?1?1??0?????????1000?01????????????01?1?110??1??0?????01????????01?0????0?00??
????0???????????011?11?1?0???00?010??????1??0?????1100????110??????????0????????????0????01??1????11????10??0???01??????0???0
0??000??0????????????10??????0??001111001?1?1?1?1?????10??????0????0??0????100????10?01111???0??1111111111???1000101??00??01??0
0000????????????????0???0??1?????????11???0101

Microraptor
100100?10000001?0?001101?000??00??0010?00000000?00?0?10100?11001110?1?????00?????????0????????????0?1?1?000110????????????????
????????????????????????????00?0?0000010?000?1001101??1001?????0?0?0????0?????????????????10?100?????01??0010???00??0010?11?10??0
0010110011100??1??1?0001100000000???00?01000011?????00?0110?01?10?111???0???0????0?????????????10?100?????01??0010???00??0010?11?10??0
1010101000000000011001?001?11?10?11??010000001011 1?0001?01011010?0??1???000???1???0?01??0??1?01111?1110100001101000110011 01
0011001110101111111110?11??0????0?010??01?1?01?01?10?001??????10???1??0??001??00???0?0?010?0?00??10000??000101001?001???1?00
000?1?1110???0?0???000??00??11????00?01?00?001??????00????1????0?111??00?0??00??0000?????1???????000???0?01?0????0??0????1???
????10?10??0?0???11???0????000?0?1?0?011??????00??0110?01?10?111???0???0????0?????011111?00?????0????????00?0?????00?0????00??
???0?0?1?100???0010??1???0010?1000?0000001?0?1?0?0???01000??0???0?????????????1??0??0?0???000???0??000???0??00???1?0????00???
?1?00???1???00??0?????????00?0???0???110????11?0??????0100????1????1?0????0??10??0??0?0?????????00?1?0101?01?0010?0100101?0
?00?00?????0????0??0?0???1??01??0?0????????1?0????00?????0?????????????0??????1?????????????0??0?0??0?0?????????????01????0??0?
????01???1?????????????0?????????????????000?00??0?000????????????0????0?0?000?10???????00???0????????0??????0?100?0???1?0???11
?0??000?0?00??00?1?10?110??0?1?000??????????0????0?1?0000????00??0010101??1??10??1110?0?????00????0?0??0?????????????0?00??
?0?0??0??0?0?0010100000010?10?0??00??????0??????0?????????????1?0???1?????0?0??????01??1?010?00?????????????10????????0???
0??000????0??0????00???0???1?0?????????????00???0?0????????00?????????????1????10?11000?????11?000000?00??010???00111????
???0?0?????????????????1???1????????000???001

Monolophosaurus
1000000100000100?0100?100101100001001000001101110000010110110011011 1?100010?0?100010100001 01?000100000?00100001?00??1111?1???
010?10???0?????1??????1000000000000?0000000001???100110?0100001001 11?0100111110001 1?1?0?01001??0100101000000000101001 0?0?
00???1?0000????????0110?1??0??????0
?1?0111111100100101100?0000100101001 1?0000010010000?0?0???
??????????????????????0??0?00??00??0100000?0??01?0?1?100????0?????1?????0000?1?????????0??0?0?0?0000??0?
??????0????11?0?10??????0???1?00???0?????0?????1?????????1????0????000?00000?1??0??????1????0??100?????0????0011?1??1?????
??00?1?10?01?0?0?11???00010?0???0??1?0??0?1000??????01??000?0??????100?010011??????0????0????00?0????010?000?????1???0?00??
??0?0100?1000??0000?1???000?????????0??????0?100??00?????????????????????0???00?0?1001??1???0101?0?0??00????00????????00????
110??????0??????0?????????????0??????1????0?????????0??????0011??1?????1?????????????1??0?00000?1?????1????0?????????????0??
??????01??00??0????0??????1??0???000?0??????????0??0?0?0?00??0??????00??0?00?0??0????????0??00??0?0??0????0????010?????00??0?
0??0??????0?0??????????0?000?1001??????00000?????????????????????????00?00?0??00??????110?1?000??1????????000100?0000??????0?
0??0?000?????????????????????100?0??00000??00?0????????????0???0????????0000??0???0011??00??????0??1?????00010?1???00?0????0?0?
????0?0??0?0?????000??00???1?????0?????????0??10??????????0?10?10?0???00?0?????000?0??0?0?0???110000?0??0?0????????????0000?0
00?????00?0000000000?0?0???????1?????????????1???100001?????????1?00????????????????????????0?1100000000??00?0?????????0????0?
?0?????000100???101???10?01?110?????????????

Neovenator
101000?10000010?010011001011 0?00?001101011100101?000???
?????????????????1??????0000100?00000?011??00????????0?????????????????1?1???111?1??0???11?0?0001??0100001 10?0??001001??10????
00??10010??1??????11???000??00?0000?0?000001????00
10?01?1?10??0???001?0??01??1?11??0110?000000?0?0100111110011 00?1?100101101101100???1??1?????????0?00010?0???10100?0?
1?????0?0?10????????0???10????00??0???0?????0?1??????00??00???01???0????0?0????00?000???00???01?00??00?0???????0????0??????
000???111?????01?????0????????00???????0??1?0?1????????0??101??00???0???0?0?00????0???0?1?0?????00?0??????????001???????1?00
1?0??1?10????0???????0???????0100????0??????????00?0??0?0?0???????10??0????1??1???0????0??0??????????10000??111?1?????00??
?00?00????????000??0?????00????????0??00??0?000????????000?0????????????10??10??010?10???1???0?00????????0????0?0??????0??
????1110??????1?????????0?0?1?00???1?????????????????00?????????1???000?0??0?????????????????????1?????????????????????10?0
?????101111 0?0?1??1?????????00?0?????1??0??0???0????0110101??1?????0?110???101?0000011?????10??0??0?00????0??010???001?0?0?
0??????????0???????0??????????001??????0????0?????????????????????????1??????00?????0???0????????1?????????0?111????0???????0
????????????????????????????0????????011?????00??0?0??????????????01?00??1????1?????????0?00????????0??0?????????????0??0??0??
????????????00????000?00???????0??0?00?????0?????????????????10??1??0??0?????????????????0??????1?1???1??01??001?0???????00????
???00?????????????????0?????????????0?????????????0???1????1?????????100????11?0??????0?????????????????????????00??????00????0??00?
???0?0?????????????????0?1?????????????0??0?0??

Mei
0?1010?100?0??100?0???0?1011??000111?0?001?0000?11?0110000?01111110?11?000?0?0010001??00?????1001????10110100?0??????????0???
????????????????????????00?0?0000011??00?1000???01?11??????00?1????0???0????1?01010?1000?11??010??1?000?????1010??11100?0
001111?01??000010?1?00?0??0?0??1?1???0?000??011????101???01??01?1??????10?0??????10????????011??10001?011010??11?1??0??0000
1?1?10100000000???1?011?1?0101????01??????0?00?0111?0001??1001010????1?0?0?0???1??11?0???0?????111???1?01100?11?????11?01?01
1??110?11?1?????????1?01???1????????0?0?1?1?0???1??00??1??????11??11????10?????????????10?0?????100?01????0?0?00?0?0??01?0?
000?1??1????????00???0?????1??1????1??01??0?????????0?????????????1?????????0?????0?????????????00??????1??????0?0??1????1???
??1?01?0?????0???1?????????0????1?0?1?1?????0?????0001???0110???????0?????????????1101??0???1????????00??0???0??1????????
??0??011???0????00???1???00000??????0?0010??0????0?????000??0?????????????1???00?????????1??????000?????????????1??????0????
?1?01???1??0???00?????0?0?1?????????????0?01?0?0????10?????????????????0?????????0???1?0????0?1?110??01??0000010010??
?01?0??????0?????1??1?????????????0?????????????00?00???1?0?????????????????10?????????????1????????0??????00??0?????0??0?
0????1?????????????????????????00???0????0????0?????????????????????????0?0?????????????00?????0??1?????????????0????????????1?
??0?1?00???0???????010??0????11?00?????????????0?1???0?????0?????1??11??1????00011???1??????0?????0?????????????0?????0???
?????0????????000?11?000000001?0?1?0?0?????????0?0???0?????????????0?1??00????0??0????1?00??1?01???00??????????10?????????
0???????0?????????????0????????1?0?????????????0?????????????????????????????????10?11000????0?11000000??0010001 0??????0???0?
?0?0?????????????????????????1???????0?00????0??

Meleagris
1111?1??01100??00?????0?11010111?001011010000001001?????0????????0????01000110110 0??00?000?10?1?1?0110??1?10011???01??1101
100?????????01100?11????00?1??11???????????100???1?0?0??1100?00??100?01110100 01??1000100000110101110110111101?0?????11010?1
?010111011100101?010101110001110001011 0?101?011?11110100?01?1110010?1???1?0??????1???111101111?01?011?11????001??010?0?011?
???1111000?10101??00????001111100?1010?010?1?1110001000101101100111?110000000110?1?110?0??11????1?0??01110000111?????1?110?0??1?
?11110?001101111100 1???1?0?11??0??0????1101??0000?110?10??10?01???11??101?????10??01?0?0101001 0??11110??0??0?010????0??001?1
100?0?1?????????0????0?????0?1???011001??????11?1????0?0????1??11??01?01????0??11101?????1??110??0???????0?10?0?0?1?11??1?0?
1110?0????0?001?01?010?01??10??0?0??11??10?00?0??000?0001?10?110?????0??000?????110?110?00??0?????????????011000??0?????????
?????0111???1?????1??11????11111110?011?01??0?010?????011??001?110011011??11?0?????????0?000??0?1?????0?0??0?0?????01?0??1?001?11
?101?11?1?1100001 0?0??????0?111???0??11???0?11???111??010011??0??1110???000??10000????0?0?1?????10??00?110?1?001111111???11?0
?0?11?0?0????1??01?0?00??????0???????0??00??1100?00?0???00???01?????????????????01?????1??10?0???1???01?0??0??0??1?01????0???1
00???1??11101111111?????????10?????????01111???110100 0?01111??00?????1?1???00?1?????00001?000??1??????11?0??????0111???????
???1?011111101?????110101?1??1?000??????0?11???1?1?1??0?????????1000?01????????????01?1?110??1??0?????01????????01?0????0?00??
????0???????????011?11?1?0???00?010??????1??0?????1100????110??????????0????????????0????01??1????11????10??0???01??????0???0
0??000??0????????????10??????0??001111001?1?1?1?1?????10??????0????0??0????100????10?01111???0??1111111111???1000101??00??01??0
0000????????????????0???0??1?????????11???0101

Microraptor
100100?10000001?0?001101?000??00??0010?00000000?00?0?10100?11001110?1?????00?????????0????????????0?1?1?000110????????????????
????????????????????????????00?0?0000010?000?1001101??1001?????0?0?0????0?????????????????10?100?????01??0010???00??0010?11?10??0
0010110011100??1??1?0001100000000???00?01000011?????00?0110?01?10?111???0???0????0?????????????10?100?????01??0010???00??0010?11?10??0
1010101000000000011001?001?11?10?11??010000001011 1?0001?01011010?0??1???000???1???0?01??0??1?01111?1110100001101000110011 01
0011001110101111111110?11??0????0?010??01?1?01?01?10?001??????10???1??0??001??00???0?0?010?0?00??10000??000101001?001???1?00
000?1?1110???0?0???000??00??11????00?01?00?001??????00????1????0?111??00?0??00??0000?????1???????000???0?01?0????0??0????1???
????10?10??0?0???11???0????000?0?1?0?011??????00??0110?01?10?111???0???0????0?????011111?00?????0????????00?0?????00?0????00??
???0?0?1?100???0010??1???0010?1000?0000001?0?1?0?0???01000??0???0?????????????1??0??0?0???000???0??000???0??00???1?0????00???
?1?00???1???00??0?????????00?0???0???110????11?0??????0100????1????1?0????0??10??0??0?0?????????00?1?0101?01?0010?0100101?0
?00?00?????0????0??0?0???1??01??0?0????????1?0????00?????0?????????????0??????1?????????????0??0?0??0?0?????????????01????0??0?
????01???1?????????????0?????????????????000?00??0?000????????????0????0?0?000?10???????00???0????????0??????0?100?0???1?0???11
?0??000?0?00??00?1?10?110??0?1?000??????????0????0?1?0000????00??0010101??1??10??1110?0?????00????0?0??0?????????????0?00??
?0?0??0??0?0?0010100000010?10?0??00??????0??????0?????????????1?0???1?????0?0??????01??1?010?00?????????????10????????0???
0??000????0??0????00???0???1?0?????????????00???0?0????????00?????????????1????10?11000?????11?000000?00??010???00111????
???0?0?????????????????1???1????????000???001

Monolophosaurus
1000000100000100?0100?100101100001001000001101110000010110110011011 1?100010?0?100010100001 01?000100000?00100001?00??1111?1???
010?10???0?????1??????1000000000000?0000000001???100110?0100001001 11?0100111110001 1?1?0?01001??0100101000000000101001 0?0?
00???1?0000????????0110?1??0??????0
?1?0111111100100101100?0000100101001 1?0000010010000?0?0???
??????????????????????0??0?00??00??0100000?0??01?0?1?100????0?????1?????0000?1?????????0??0?0?0?0000??0?
??????0????11?0?10??????0???1?00???0?????0?????1?????????1????0????000?00000?1??0??????1????0??100?????0????0011?1??1?????
??00?1?10?01?0?0?11???00010?0???0??1?0??0?1000??????01??000?0??????100?010011??????0????0????00?0????010?000?????1???0?00??
??0?0100?1000??0000?1???000?????????0??????0?100??00?????????????????????0???00?0?1001??1???0101?0?0??00????00????????00????
110??????0??????0?????????????0??????1????0?????????0??????0011??1?????1?????????????1??0?00000?1?????1????0?????????????0??
??????01??00??0????0??????1??0???000?0??????????0??0?0?0?00??0??????00??0?00?0??0????????0??00??0?0??0????0????010?????00??0?
0??0??????0?0??????????0?000?1001??????00000?????????????????????????00?00?0??00??????110?1?000??1????????000100?0000??????0?
0??0?000?????????????????????100?0??00000??00?0????????????0???0????????0000??0???0011??00??????0??1?????00010?1???00?0????0?0?
????0?0??0?0?????000??00???1?????0?????????0??10??????????0?10?10?0???00?0?????000?0??0?0?0???110000?0??0?0????????????0000?0
00?????00?0000000000?0?0???????1?????????????1???100001?????????1?00????????????????????????0?1100000000??00?0?????????0????0?
?0?????000100???101???10?01?110?????????????

Neovenator
101000?10000010?010011001011 0?00?001101011100101?000???
?????????????????1??????0000100?00000?011??00????????0?????????????????1?1???111?1??0???11?0?0001??0100001 10?0??001001??10????
00??10010??1??????11???000??00?0000?0?000001????00
10?01?1?10??0???001?0??01??1?11??0110?000000?0?0100111110011 00?1?100101101101100???1??1?????????0?00010?0???10100?0?
1?????0?0?10????????0???10????00??0???0?????0?1??????00??00???01???0????0?0????00?000???00???01?00??00?0???????0????0??????
000???111?????01?????0????????00???????0??1?0?1????????0??101??00???0???0?0?00????0???0?1?0?????00?0??????????001???????1?00
1?0??1?10????0???????0???????0100????0??????????00?0??0?0?0???????10??0????1??1???0????0??0??????????10000??111?1?????00??
?00?00????????000??0?????00????????0??00??0?000????????000?0????????????10??10??010?10???1???0?00????????0????0?0??????0??
????1110??????1?????????0?0?1?00???1?????????????????00?????????1???000?0??0?????????????????????1?????????????????????10?0
?????101111 0?0?1??1?????????00?0?????1??0??0???0????0110101??1?????0?110???101?0000011?????10??0??0?00????0??010???001?0?0?
0??????????0???????0??????????001??????0????0?????????????????????????1??????00?????0???0????????1?????????0?111????0???????0
????????????????????????????0????????011?????00??0?0??????????????01?00??1????1?????????0?00????????0??0?????????????0??0??0??
????????????00????000?00???????0??0?00?????0?????????????????10??1??0??0?????????????????0??????1?1???1??01??001?0???????00????
???00?????????????????0?????????????0?????????????0???1????1?????????100????11?0??????0?????????????????????????00??????00????0??00?
???0?0?????????????????0?1?????????????0??0?0??

Nqwebasaurus

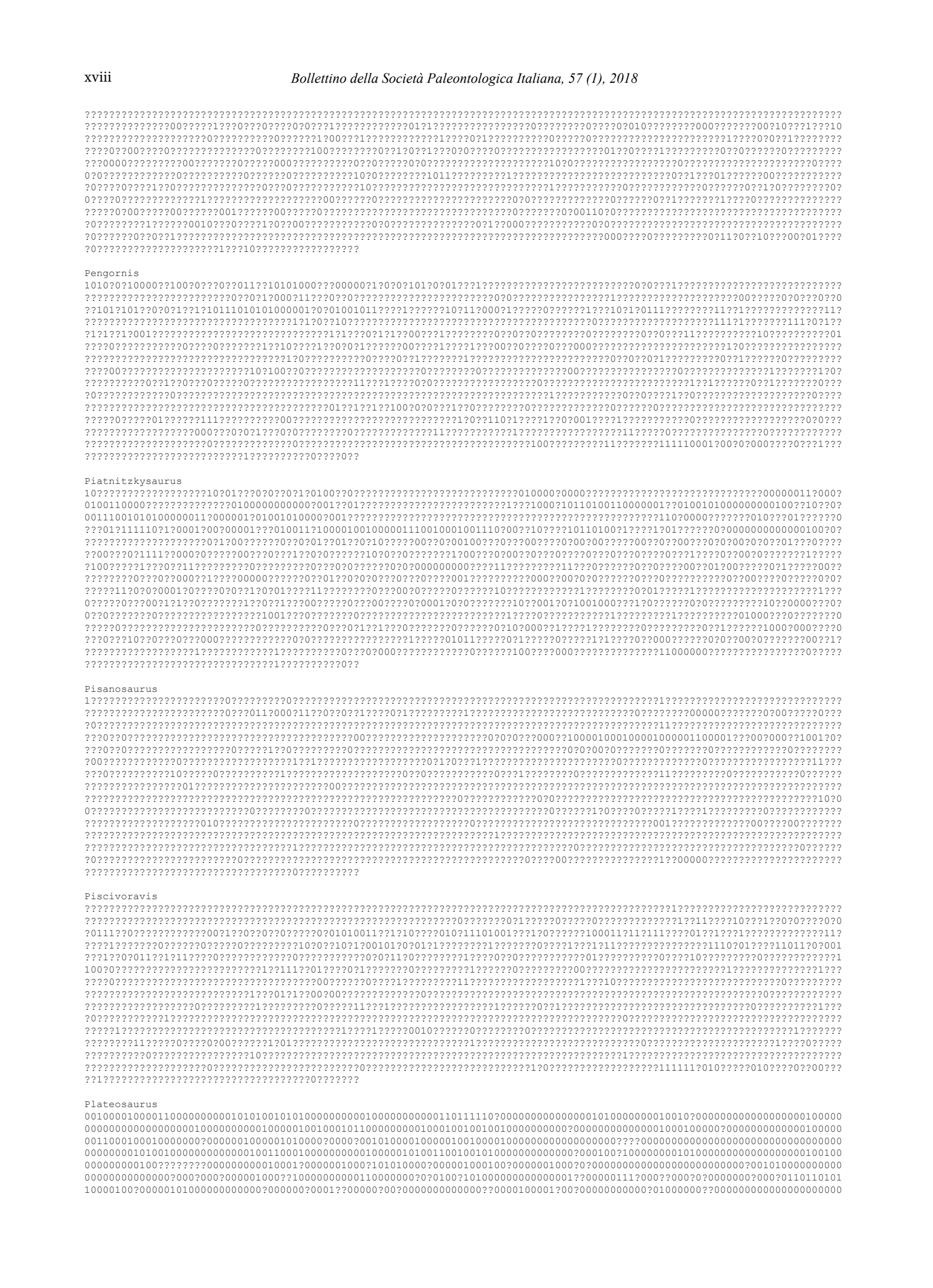
Ornitholestes

Parahongshanornis

Patagonykus

Patagopteryx

Pelecanimimus



Pengornis

Piatnitzkysaurus

Pisanosaurus

Piscivoravis

Plateosaurus

```
000?0001000000000000?0001000000000?000?0?0000?010000?000000?000?0????????0?00000000?00000?0?00???000?000???00000?0??0000000
1100000?0?00000?00000?000?0?0000?0000110000?0?0000000?0000110100???1001?000000000000?00000???0000?100?0000??00?0?0?0??00000
00?0000????00000?0000000??0??00000?000?????0??00?????0?000??00??????0???????0?0000??1?000000?0??00000001000000?00000000?0??00
00???0001?000000000000?00?00000000?0000000000?0000000?0?0????0000000?0?00??00?01?000?000000011?1100000??00000000000????00?
000000000?0???000?0???0000?00?000?0???1??00?0????000?00?0?0??00??0000?00?00?000?0011000000?0??0?????00000??0??0?0?000?1?00?0
?0?00?00??0000000000000000000?000000??00??000??00000??????0?0????1??0??????0??0?0?????????????0???0?100?0???0??00???????0?0??
?00000??0??0???????0?0?????0?0?0?????0????0000?00001?00??????0???0??0??0?0??0000?????????????0?00000000?100001000?00000??0?
?0?0??????????????????0?100010??0??????0??0000?
```

Protarchaeopteryx

```
0????0??0000?0?10?11?????????????10?????????00???????????????????????????????????????????????0???0?????????????????????
??????????????????????????0?0?110001????00?????????????0????????????????0??????????????????0?0????1??0????0?????0????????????????
?0???00?????????????1?0?00??0????00?????0?0001?011?11110??0?010101110110??11?001?0??1??1??????01?????????0???0??????00?0??????0
1??01110?0?0010??010????10?10??????11?0??000?????00??0?????1??1?????????????????????11?0???0???1??1????1?00110???1????011?011??
???1100?011?11??1?0??0????????????0?0?????0?1?0???0?10?11?????????????0????????????????????10????????0?0000??????001???0???????0
?00?0??1???????????????0???????1????1??01?0??001??????0?????0????0?000???????????????00?????????????00???????1????00?????????1???
????0?????????0?????????????????????????00???????0????1??00?????11?????0????????????????0??010?0????1??????????0????????????????????
???????????0?????0??????????????1000??00???0?0???1?0???0?00???????????????????0??0???????????????????????????????????????????????
?????????????????????0?????0???????????????????10?????????0100??????????????????0????????????????????????0????????????????????0???????1????
?0????0?????????????0???????????????????????????????????????????????????????????????0???????????????????????????????????????????
0????0??0?1??????1???????????????????????????0??????0????????0???????????????????0????????????????????????????????????????1???????????????
????????0?????00???0??00????????0?????1???????????????????????????????1???????????0?00??0?????????????????????????????????????????????
??????????????0?????10??00???0??????????????????????????????????????????????????????0?????????0?????????????????????????????????
??????????????????????????????????????????????????????????????????????0?????01?000?????????????????0?00????10???00??1????
???????????????????????1???1????????????0????0??
```

Protopteryx

```
101??0??0010?0??0????1???01?????1???????????00??????????????0???????????????????????????????????00?01??0?0?010??????????????????????
??????????????????????????00?0?101?0?????00??????????????????????????????????????????????00???????101??????????0??0??0?0????1?0
??1011101??0?1?1?01?0001100 1?0100???0?0?0101?011?11110????110101101111??11?01?????1001111100111?????1??11??10??????????????11?
????11??????000???????????1?????0???11?0??10????01?????01?0???1010?????1???0?????????0??????????????????1?111?0????????111?011??
11?1101?011??111???1???????????????0?????1?1???0?0?11?0???????????????1???0???????0???1????0?0??0??111???????????01?????????????1
000?0?????????????????0???????1??101??01?0??0?1??????0?????0??????000?????????????00????????????????0???????1??????????????????????
????0?????????0???????????????????????????????????0????1?0?0?????11????????????????????????10??0??????????????????????????????????????
???????????0????0??????????0101?00??0?????1???????????????0????????10?????????????????0????????????????????????????????????1???????0???
???1??????0??00?????0?????0??????????????????11???1????010??????????????????0??????????????????????????00?????????1??1?11???1???0???
?0????0???????????????????????????????????????????????????0????????????????????????????????????0???????????0??????????????????????????
???????????????????????????????????????????????1?01000?????????0????????0????????????????????????????????????????????????????????????
????????101???00???111????????????0?????????????????????????????1?0???1???????????????0????????????????????????????????????????????????
?????????????0??1??10???0???1??????????????????????????????????????????????????????????10?????0??????????????????0????????????
?????????????????????????????0?????0???????????0????????????????????????????????????????0????10?0111????????11110000 1??????000???00???0???
??0??????????????????????????1????????????0????0??
```

Rahonavis

```
????????????????????????????????????????????????????????????????????????????????????????????????????????????????????????
????????????????????????????????????????????????????????????????0??????????????????????????????????011?110?00?0?0?01??11??1?
00101?101?1??????0??????????????100010??0?010???????????????????????????????????????????????????????1?0110??0?11?1???10010?0??0?00
1010111010000000001100010110 10?1101111?01000?0000111000011 0?0010001???10??00011010110011 1?0?1110111111?101001010 0?01011?01001
1011100110 10??1?????1???1????????0??????????????01?01???????1???0?011?1?0???0????1?0010?00??01?????00?11??????0?1001????????0???1???
000?1?11?0??????0??????????????0?1????1??????????0??01???0????????1???1?0?000??0??????????????????1?????????????????????0??????????0??????1???
??1???????????????11?????????0???0?1???????????????0???0?1?00??10??10???????????????????00????000??????????????????????00?0?0????????
10?????????????????????????001?????????0?0011?0????????????1000????00??????????????0???0??????????0?0????????0????????????????????0??????0?1?
?????10????1010?0??00????1??00????0???1???0??????????????1??????0????1???????0??1???????????????????????0??10?0?01???01?11111000 1??
??0?1???????????????????0?0110??1??????0??????0?1????000000??????????????0??????????????????1?0??1?0????????0???????0??0??????????????
?????????????????????????????????????????0??????1??????00?????????000?????????????????????????????????????1????????????111??????1????????
?0?????????1????????????????????1????????????????????????00????????0??1010??????1??????????00??1??0????????0?0????????????????0???????
?????????????0000?????000??0?1??????????????0??0???????0??????00????1?1???????????????????????1????000?010???????????0??1??????????????
???000??????????????????0???1???????????????0??????????????????????0??????????????00????????????????????11100000????1??0??10??????????
???000???????????????????0????????????0?000??000?
```

Sacisaurus

```
????????????????????10?0???????00?0000???0??0?????????????????????????????????????????????000?0????????????????????????????????
?????????????????????????0??0?1100001 0?10???000????????????????????????????????????????????????????????????????????????????????????
??1?00?100?1????????????????????????????????????????????????????????????????????????????????????????????????????????????????
??????011??????????000??00?1??????0?1???00???0010000?0?0?000001000????0???00?1?01?0101???0????????????????????????????????????????
?????????????????????????00??0????????????0??????0??????????1????????0?1?????????0????????0?????????????????0??00???0???????????0?????????????
????????0???????0?????????????????0????????????????0??????????????1?0???0??????????????1????1????????????????????????????????0??????????????11
1?????????????????????????????????1??????????0????????0????????01?????????????????????????????????????????00?????????????????0???0???0??????
??0?0????????????001??1??????0?????????0??0????????0???????????????????????????????????????0??????????????????????????????????????????1??????
????????????????????????????????????????0???????????????????????????0???????????????????????????????0???????????0??????????????????????????0???
??????????????0?????????????1???????????????????????????????????0??????????????????????????????????0???????1????11?????????????????????????
??????????????????????????????????????????????0???0??????????????????????????????????0??????????????0???????0???0???????????????????0?????????0
??????????????????????????????0?????????0??????????????????????????????????0???????0????1????????????????????????????????????????????
????????????????????00?????????????????????????????????????????????????????????????????????????????????????????????????????????????
??????????????????????????????????????????????????????????????????????????00????????????????????????????????????????????????????????????
?????????????????????????????????????????????????
```

Sanjuansaurus

```
????????????????????10?0???????1???00????0??0????????????????????????????????????????????????????????????????????????????????
???????????????????????????????????????????????????????????????0?????100????110??????0??0????0000?0???10??1??00?????0??
1?1?1001??11???00?1???????????????????0??????????????????????????????????????????????????110?01??????????????????0?????00
????????1?????????????????????????0011?1000???????????????0?00001?100?00?1??0?1??0?000????0?0??0?10???????0???????????????1???????
?????????????????????????0????????0????????????????????????????????00?1??????????0??0???0??0????????????????????????0?????????10?????????
?????????0????????0???????????????????????0??????????????0????????0??01?????????????0????????????1?????????????????????0???0????0????
??????????????1???0???????????????????????????????????0??0???????????0???????????????????????????0????1???????????????1??0???????????0???????
??????????????????????????11?0??????????1?????????1??????0?????????????????????????0??1?????????????????????????????0??0????????????
???????????0????????????????0???????????????????????????????1????????01?1???????????????0??????0??11???????????????????0?0?0??????1???
???????????0?0??????????????????0?????????0???0???????????????????????????????????????????0???????????????0???????????????????????????
????????????????????????????????????????????0????????????????????????????????????????????????????????????1???????????????????????????
```

Sapeornis
1110?0?10000?0100?10000??100????10111??1?0100001?0?0?101?0??1011?1??10?0?????1???00????0?00??????????1?110100?????????????
?????????????????????????00?1110100?11???00100?00???1?000?????0?10???0?????????????0???10??????00??000?0?????00?0
?0101100???0?0010?1?000100000010001000?0101001?11110?0??110111101011???1?00?????1001??????011???001??11??1??0????0??????110
???0111000000000011001011101 1??000111?0101001010 11???01?110?1010?0???00??0?????????0?0?0?????????????101?001?0??00011?0110?
1?01101?011?11101111?00?1??01???0?0?0???0?1??00?0?11?01???????1????1??00?0???000??????010?0??0??11?001?0??0?00?0???0??????1
000?0??1?0???????????0????????1??0?10?01?0??0?1??1???00????0????0?0010???0?0??0?????01?????????0???0??????01?0?000?01????1???
????00?1?????0???1????0????1?????1?0??00??????0????11010??1??11????0?????0??1?????1??101?0?????????????0?1?????0??????????
??????11???0?????????????????01001000??00?????0???0???????00???????0?????????????10?0??0?0??0???????0?0???????0?????1?????000???
?1????????0?000?0???0????10??1???0?????????0?01?0?????100????0????1?????0???0?????????0?0?1?????00?11110??1??10111??110?????
?0??1?0????????0?01????0???1?00???0?????????????????????0?????????????????????1?????????????0?????????1??0?????0??0?????????0??0?
0????1???1?????????????????????????????????00??10?01?0?1001?0?0?0????1?0?00???0????????00???0?0?????????????????????01???????
??????01??1???00???1?000?????1??00?0??1?????????0???00??????10?01010?01??1????001?0?01???0???????0?01?????????????????0?0???
????0?????0??0?01??10?0?0???10??0?????????0?0?????10???????1?????1?????1??????0?0?????????1?000?01?????????????0?????????0???
???00??????0?????????0??0?????????000?0???????0?????????????????0????????????0?1????101111101???1?111100001?001?00101??00??1????
?0?0?????????????????????1???10??????0?00???0001

Saturnalia
0???1??1??1?????????????????????1?????????????????????????????????????0???
???0?????????????????????00??0??000?010?100110?0?0?????????????????????000?????????010?000??????000?00??0??00???00??0??1??0??
00110??1???????0??????00??1??0??0?1???0???0???0??01????????1?????????????
???0000?10?0010??00000?100?1??1100010?000?0?0010000?1010010?0?1100?0000??0?0?1???1000000?1?0??1???100?0000????0?????100???
0??0??????1?????????0???0???????0?????????10???1?????????????01?????????0?00??????0?????1??0?000?00???0??????0?1????0???????
0?0????00??????0???1????0???0??0??0??????????0??1?????????????????0???00?????0????00101
10?????????????????????????????????0?????????????????00???????0??0?????????0?????????????????????0?????????????????0?0??????????00??????
????????????????0000??????0?00????????0??0?00??????0??????????????????????0??
??????????0?????????????????????????????01?????????????????0??????10????1?????????????0????????0????0????0??0??????0?0???????00??
??????????????????0??????0???0???0?????????????00??????????00?????????????0???0??0?
0?????????????????????000?????????????????????????0???0?????011??1???????????00???00???????
??1?????????????0???
??????????????????0?0?0?????????0?????????????0???0??????0???????0?????????????????0????????????
??0??????1?????????????????????????????00?????????????????00000000????0?????????????????
??0???????

Schizooura
1111?1?101?0????0?????0??001??0?1?0100??0100000?10?1?101?0?11010?1????????0??0????0??????????10???0?????????????????????????????
????????????????????????????0??0??11??????????00?0???????10???00?????????0???????1???????
??1001?????0010?0?1?00?1??10?0??0??????????0?10?0??0?????????11011110100 1???11011110100 1??11?0??????1000101?10111????01??1???1?????????????????11?
????1??????0??0????0?????????????????0??????10???1110????0?????????????????????????????????????01?????????????????11100??0??0?011?0?0??
?111??0?011?????1????0?1???1????0?0?0???1?1??0?0?10?01?????????????0??0??0????????0??????0?1????????10???0?1???11?????????????1
100?0?????????????????0???????1??1?11?11????0?1???????0?????????????0?0????????0???100?????????????????????????1?0?????????????0???
????????????0?????????????????????????????00??????0????0?0?0??????11?????????????????????????1???0?????????????????0?????????1?????????
??????1?1?????????1???1????1001?1000?????1?????0???????0?????????????????????????????????????0?????????????????????0?????????????0????
?????????????????0?????????????0?????????????????????11???1????0?0?????????????????????0??1?????????????????????????1??1??????0??1?????????????
?0?????0?????????????????0???0?????????????????????????????????????0?????????????????????????????????
0????1???1??00????????0????????0?????????????????????00?????0?????????1?????????????????0?????
????????11???0?????110?????????????00???0??01?????????????01????1?????????????????????????????????????0???
?????????????????????11???0???1???0???0????????????
????????0?????????????00??????1???10?????????????????1?????11111?001?????010??000??00???
??0???????

Serikornis
10?0?????0????1???00??????1?????10??????????0?????????????????????????????????0???1???
?????????????????????????????0000?1001?10???00??0?0???????1?????????????????0?0?????????????0???00???????10?????????0?????0??00??0???
??101??00??00??1??100??1100??10?0??????00010?11?1011110??11010111?010??11?001?1??1011??????01?????????11101??????1??0????0?
1??010?????0000??111?0001??10?????????0????????1101?010?0???010????0?????11???0??
1?11000?011?1110111100?????????????0?????1?1?100?00?10?00????0??1????0?????????????????????????0?????0?????????????????0?????????0??0
000?00110??????1????00?????0?1????1??01?0??0?????????0????1??1???00?????????????????00????1?????????????0?0??1?0?????????????????
?????????????0?????????????????????????????00??????0????1??????1??10????0???0?????????????0??0?1?0????0?????????????????????????1??????
????????????????00????????1???000??0?0??0?0???0?0???0?0?0?????????????????????1??0????????1?????????????????????0??1?0?????????
????0??0?????0?????0?????????1?????????????0?????0???????????????0?????????????1??0?????????????????????1??1?????????????????0??000?0??????00???
?0????0?????????????????????????1?????????????????????0?????????????????????????????????1?????????????0?????????????0???????0?????01?????????
0????1???0?????????????????????????????????????0??????0????000????????0????????0???0?????????00?0???0?????????????????0?????????????
??????????1????0???00?01????????00?????????????????0?????????????0?????1???1??????0?01?????1????????0?????????????????????????????0??
0?0????????0?00????0?????????1?0?????????1?0???????0?????????????????1??0?????????????????????1??1?????????????????????????0??000?0??????????
?0?????????????????????????????????00???1?????01??00?????????????????0?00??0?101?100?01????
?0??0?????????????????????????1?????0?0?00????001

Shenzhouraptor
1101?0?101??????0???0???101?????10??0???01000??????0????10011???1??????0??????0?0?????0?????????0?0?0?0?????????????????????
????????????????????????00?1110110?01???0?0100?1?????0???0????101?1??0?????????????????10????????10???0?1???00??0??0???0?00??
0?101?101110100?00100001100??10000??000?01011011?1111??0?01101?1101011??10?01100??100101110001 1???001?111110??1??1??0??0000
1?101?100000000000?1001??11?11???000011??10?0?1010?????0?1010111???0?10?????1010????1010?????0????0??????1?0?11?0?11011?1?1???100000??????00011?01000
0011?0???01?11101?01?01?1??1????0?0?????0?1?0??01?11?00???????1????1??00?0????00??10???010?0??0????10?1???01?000????0??00??0
000?0?1100???0??0????0?????0?1?0011??01?0??001??0???0????00???0100000??00??0?????01???1?????????????????1??1?0???10?0?????????
????00???????0???11?????????????1????00??????0????11010??1??11?????????????????000?110100??1?????????0????1?????0??????????
1???00?????0??????0???????01?0?000?0000??1?0???0?0????1000??0??00?????????1??0?????????0???????00????0????????1?0?????0??0?
????0?????????00?0???0?????0?10???0?????0????11???0?0??010?????0????1??????0??1???0?????????????????00?0?010??1??00111??11??0???
00??1?????????????1????0???1?????????????????0?1???????????0???????????0?????????????????????0???????1??0?0?????????????????0??0?
01???1?????????????????????????????????01???1??00?10?0?1?00?00?0????????0????0?????????????0?0??1?????????????11?????????????
???110?00?1???00???11000??0???0000?????????0?????0?????????1???01??????1?0??0?????1???0?????????0???????00????0????????1?0?????0??0
??????????0?00??1??10000??0?1???0?????????0??????0???????0?????????00?????????00????1?0????0?01?????????????10????????????
????0?????????????????0?????????????0000???000????1??111101?????1110000000??1??0101??00??01???
????????????????????????????1???????0?00????0??

Shenzhousaurus
100010?00100????0???010?100010011?0000?000000000101?0??010000010?????????01????000??1??0000?????0?????????????????????????????????
????????????????1?10????00001101????1??00?0??001?1??000?????0???10?0???0??010?0?00??????
?0???0??????????0?????01??011???10?00001??1000????????1???00000??000000???0?0?0??0010?00
10?011101010010001?100???00110?1110111?1?000?00100??11?100???010001???00??1?????????????????1?????????????????????????????????
????????????????????010?1???????0??00??0????00?1????010????0?????????????0??????1????0??10?????1?00??00???00000?11??0???????0
???0?1?1??????00???0?????????0??????1?00??01?????????????00?????????00??0?00????0?????????????00??????0?????0?0??1????????
????00?0?????0??11?????????0??1????00??????0???10?????1?????????????????0????????0???0??????????????????0?00??????0?????????
0?0000????????0??000??????0????0?0??0?0???0???0?0??????000?0?????????????????????????????0??????0?????????????????????????0??
??0??????1?????????????????????????????1???0?0??????????0?????1????1?????????????????????????????0???1?0?????????????????????
????0?0?????????????????????????0????????????????0??????001?????????????????0???????1????????????01??????????0?????????????????0??0?
0?????????0?????????????????????????????1?????????????????????????????0????????????0?????0?????????????????????????????????????
??????????????00??????00????????0?????????????????????????0?????????????????00???1??0??01?????????????????????????????????????
??????????0?00?????1100?0??????????0???????0??????0?????????????????1???000???1?????????0??????000?????????????????????????????
????????????????????????0???
?0?0?????????????????????????1?????????0????????

Silesaurus
100000?0000001?00000??0010000?01?000?01?00??000010?????????????????????00?0?0???00?????0?????00?000?000?0????0?00000001?0?00
??0000??00????10????????00?0111000010?100?0000???00??0???10??010?10??000?000001000110000000000??0000000?0000?000000??10?0??
00110001 0?0100000?1?000000000000010000?000???11000000??0??000??0?0000000?00
?0?000001011010010000000000101100101 0?000010001000000000001001100000000?00?1?01?1101000100000000010?0010000?0000001100110?
1???100?0110????????????1?00??0100??0000?000?0?000?1?????????????????????????????0?????????????0?????0?????0?000?0?0?0?0?0?0?0?
000?00?0??01???000?0?0?0?000??0???1?00?0??????010???0?????1?0?001?00?00?00??0??0?0?000000???0?????????00??0??00??0?0?110011
1110?0??????00101000000?????01??000???0?????00?0??00?0?000001010?0??0?000??0?0????000???00000?000????0??10000?000000010??00??
0?0?????00000??001?0????00000??????00?01?000??00?0????00?00?0?0?????????????0?0?0?0????????0??????0?????????00??0?0????00?0?
??0?100?0?00000?00?00???0????0?????00???0???0?0?0?00??0????10?00?????0?0?0?????????0?00?????????0?????00110?0?1???0?11???1?0
???1??0?0???0?0??????0???1??0??0???00??0?????????????????????0??????0??????0??????0??0??000????1??0?1111?0????0???0???0??0?
00?????????0????????0?????????????0???000?00??0??00?00???0???????0?????????????0?????????00?0?0??00?100?????????000??00???????
?0???0?0?????????????????0???00????????0?????0?????00??????????0??0?1??0??00?00???0??00?0?0?0?????????00??????????0?????0??0??
???0??????????000??00000???0?????0??0?????????00??????01??????????0??????0??????????0??0?0???????0?????????????0???0?????????0????
???000?????????????????????????????????0??????1?????????????????????????0??0????000?????????????????00000000?????????0?????0?????
?????????????????????0?????????????????????0??

Similicaudipteryx
01010??0?0?0?1110?11011??000??0??0001000?1??0?0?00????0?00?1111?11??10?0???0?111???1???0??0?0?????????000110?????????????????
????????????????????????0??1??????11???0??1?1010???0?00??????0011????0?0?????????1??10????1???10??1?01?1?0????0?0??11???0??
0011?0?111??0??10?1????0????????1?1??????0?1?001?10100????00?1?10??0????11?001?0??1101???0??011?0?????11010?0?????0??0??011?
0??0111000?001000010000?10?101?10?01?????0000??000?000101?0?1???1????0??0?????????0?????????1?????00110?0?1???0?11???1?0
?011?000?11???????0?00?????11?????0?????0????00?0??0?00???????1????0?????????????????????10???0???11?001?00????0?0???0???0??0
??0?0??100?????????????0???????1????10?01?0????1??????0?????00???0?00?????????00???00?????????????????00??????1?????00???????1???
????0??1?????0???1????0?????????????0?1?0??????0????1100?1?0?0110?????????????????????100?????????????????0?????????????????0???
?????1110????0?????00???????1???0??00???1???0?1?0???0??0?00?1?0?????????????????100??0??1?????1?????0?????????????????????????1???????0????
01???????????0?????????????0????????????10??0?1?0????????100????1????1??????0?????????0?0???1????????0?000?????0?????????????0???
?0?????????0??0?????????????1??0???0?????????????1?????????????????????????????00?????????????????????00?????????????????0?????????????????0????
01???1???0?????????????????????????????????00????????????????????????0????0???00???0????????00?????????????????????????1??0?????????0?
??????00??????00????0?00???????00??0?????????????????????????0?????????1??????1???0?10???0???
??????????0??0??????00??00?????????????????????0?????????????????????????????0????00?0??????0???????0?????????????????0?????????????
?0?????????0?????????????????????????1???0????1011000??????110000000????0??10????0???????
?0?????????????????????1???1??????????0???????

Sinocalliopteryx
1000?0??0000?00??00000111?0???0100100000??0000100?01?11?1??11??0?????????0??0??0????100000?0?????????????????????????????0???
?0?????????????????????0??????0??0??01000?0????0??????01?0?1???1?00?1??0??00?0?????????0?000????0?????????10???0????0?0
??1110?101?100?10?1?0??0????0??1?1?????0001?011?111101????10101110110??11?10100??1001?????01?????????000000?????0??000000?
10?01110?0?0011??01?00??10?10?????011?????0?0011000??0110?????????????????????????????0?????????????????00110???0?????11?0??0?
1?11??0???1??100010000??1??????00?0????0????00?10110??10??????1?????????00?????00??0????10???00?????????????1???0?0?0?0?????00
0?0?0?11??????0??0??????0???11????1??01?00?001?????????????????????0????????0??00????00??1?????????0????????1????001??1????1???
????01?0????0?01??11???1??1??????0????100???0??0????10??0?????00????????0?????????????0?010?0????00????????0?00???0??0???1?0???
??0?000????????0???????01???00?000?00????0?0??01?00????000??0?????????????????0?0??0?0???0???0?00?0?0???0??????00?0???0?????
???0????0?????????????0?????0??0????????1?????0????0?????10?????1????1?0????0??1???0????0?0??????00??1???0????????0???????????
?0????0?????????????????0???1??0?????????????????0?????????????????????00?????????????????????0???????0??0?????????????????0??0?
0????0?????????????????????????????????????0??????0??0?????????????0??????0?0???01?????????0???0?0?????????????????0????????????00
????0?0???????00???0??00???????00?????????????????0?????0???0???????1??0???10??0?001?????????????????????00?????????????????????
??????????0?00????0000000??0????0????????0?????????????????????????????00?????????????????0??1?????1?????????????????0????????????
??0?????????????????????????????????0?????????????????0?????????0???0???10??000??0????
?0?????????????????????1???1??????????0??????0

Sinornithoides
00?????100???01???0011?????11???11????0??0??0?0????01???0?001?????????0?????????????????0???????????0????1??100????????????????
?0??????1?????????????????00?0?0000001 0?100??000???????1?????????????????0?????????????10??0?0??1??0????1?01????????????01???0?0
??11?0000?1000?1001000??0000000?0?10??0?0001?011?1?110????0101011101?0??10?000?1??1011????????1?????0??01111???10?1??0??0?00
1?1?10??0?????????0??????1??100?01??0??000001010?000011???01010????1???00??1?0???0?01??0??1??111?????0110?0110100011101100?
10111001111?????????10?1??????1???00?????1??100?????10???0????0?????1?????0?1?????0?1?????0?1?00??0??????0?????????00?0??0000001?????0
000?1???0????0?????000???0???1????1??01?0??0?1??????00?0??1????0?010??0?????????????????1?????????????0??1?0??0?0??1????1???
????0?????????0?????????????????????1???100??????00???1??00????0110?????????????????00??000?0?????????????????0?0???????0??????0?
1????0?????????000????????0??00?000???0?0?0???????0?????000????1?????????????????0?????????????????1?00?????????????1??10???????
???0?????????????0???0????100?????0????10????0????0?????1?????????????1??????0??0??????????????????0??0000010?????10??
?0???0?????????????0?????????????1?????????????1?0?????0?????????????????0???????1?????????????0?????????????00?????00????0?????0??0?
0????1??????1?????????????????????????????????0??????0??0?????????????0???????0?????????????????????????????????????00??????1???????
?0????0?0??????00??????00????????0?????????????????????????????????00????1?????????0?????????????????????0?0?????????????????????
????????????0?00?11?????0??01?0?1?????????????????????0??????0????????????00?????????????????0???1???0?????????????????????????
??0???11?000000???1??010???00??1????
????0?????????????????????1?????????????0??0????00?

Sinosauropteryx
100000?10000???00?00?10?10?0????100100?001?000???0101001??0?0?1?????1100??00???????1?000?00?010?1???00000???0?????????????????
????????????????????????????0000?00000000?000?00?0?????????????????????????????0?0??????0??10?00000?0?1000100?0???0?0?010?0?01??00?0
0?111?000?1100??0?10000000?00001?1??01?011??011?11110???0?110000?0110?100?00100??10010?????????????????00000????0?0?000?1000

10001110?0?00101001?00??00?10?????011?0?0?0?0011000?11100110?10011????0??101???101?0?00?????1?01111?1000110?010?000011?01100
1011100?01101100?000???0????0?00?1?????0?1?00?10?10?000??????1??1?0??0??000?1?00??0??001000??0???00000?0?00?00001?0????0?00
000?011??????0???01000??00??11?0??1??01?00?101??????00????1????0?0?0?00??00?00????00???1?????????00??????00?0??000??1????1???
????01?00????0???11??????1???0?????0??100?0??000??10000001??000????0?0?000?00?0????????00101000?0??00??????0?0?01???0??00?????0??
0???000????0???0001??????001?0?000??00??001??1?0?0???0?000??0???0?????????????0?0??????0?0???0000?000?????????????00?0???1000??
?1?0????0?0?00??0???0?????00?0???1???110??0?0????0?0??01001????????1?0????0???0??0????0???0?????0??1???00000?0000?0?0??01000
?0????0????0?0?0??0???0???1??0???0??0????????0?0???00?????0?????????0???????1?????????????0???????0??000???0?00??10??????0??0?
0????0?????00???000?????????????????????1?0000?0??00?000?????????????0????0?0?000?00?0????????0???000?1?????????0??0????000????
?0??000?0?0???00???0??00????01?00?????0?????0?1??0?00??0?????00????1??00?010010?00110?00?1?0?????????00?????????00??????00??
???0??????0?00?0?00000000???0?????00??????0?????????????????????????0?10??0??0?1????????0?????00?1????00?0?????10????????0???
00?????????????????????????????????0?????????????????0????1?????????????????????????0????10?0????????0?100000000?0000?0100?000?00????
?0?0?????????????????????10??1?????0???00????000

Sinovenator
000010?10000??10000?110?1000100??101000000000???0?011?????????????0????0??0??011000??????????1??1?0???0????????11?0?1?110?00
?00010001??1?????????????00?0?000001?0?000??0?10????1?1???0??10???????0?????????????1?10?1000??1???10??0?0???000??1?00???11????
001111?0111000?1?01?00??????00?????????????0??????0???1?????0???1?????????????0????0?????????????1?00000??01??????11???0????00?0
??101010000000??001011?110?101110001?0100001?111?0000????0101010?110?000?0?01???1?0???????1?1?1?????0?1000110101011001001
1????0?11?????????????1???1?????1?0??0?1001????01??1????01??1???11????1?1??10??1?00?????????10????00?????0?100?0??0?0000??0??0????0??0?
0?0?1?11???????0?????????????????0??1?????????????????0?????1?100?1?????0?00??00????0?????1???????00????0?0?????00??0?????????
????01?0?????0???11?????????1??01???10?????????????10?01?1?0??0????????0?0?????????0??0?0?????10????0???000?0??0????0?????????
????001????00??000???0???0010??????00001??00??0??0?????????????????????????0??0?????????????01???0?????????????0????1??????00???
?1??????1?????????????????0??????????1?????????01?0??????00?????????1??1?????????????????????????????0?1?1?0?001?0000001001?1??
??0?000????1???????100?00000?0????0?0?????????0??0?0????0?????????????????1?????????????0??????0??000???????0?????????????0?
0???0??????0??0?????????????????????????00????????00?????????????????1????0????001?????1?
?0?1?00???0?????1??0????010??1????????0?????????????1???0?????0?????10?11????0???001????1?????????????000?????????????????????0???
??????0??????0??0000??0?0???10??0??????0???????01??????0??????010??0?????????????0???1??10?00?????????????1?????????????
?0?????????????????????????0?????????????????????10?????????????????????????????????1??11000??????11000000????1??0?????????????
?0?0?????????????????????????????????0?0?0????0??

Sinraptor_dongi
1000000100001001010011001000000010000010001000100000101111100010011?0000100000000011101001?0000001000100000101100010111 11?0?
0101100000000101101010010000000000000?0000100100??011101000100000011111011001111100110110001011100100101000000011001001000000
0110??010001000000?00?????????????????????????????1???????10????00??????0110110????111001100000??110000?0?????????10?1000??????0
?0?0111111100100001?01000010?10110110?000110010011100111100111100011011001101100011110011111000110001000000010100100
1011000001110????????0?0000?0011000?0100000???0?101?01?0001000?0011101 0??0000110000?0000?000?00000000?100000000??01010000?00?
00000?10?1?01??100??0?100?001101??100001?0????11?0?00000?11?1?001????0000000000110?0?100111000???0001??000?0???00100111111010
1100?1000101?010?110?000010?000000?0?0??0?101000?0??01?000010?0011?110?010011?010??0????0?00?000100000010000000000001100 00??
?10?000000000100000010000100?00??00?000110000010?10??0?????0??????????????00??00?000000011?0?10000000?000?????000?0?0??1?10???
110?111000?0???00?0??00?0??1?0?0??000?1????0??00??000??100110010???11?000000010001?00?00000?01??00?00??00000??00????????1000
0???000000000001??00000???1??0?000000000001100???0??100?0000??01????00100100??001001001?0?000??0?00?00??0??0?010???0110?00?
00?0??????0???????0???00000?0001?0?010?000000?00?00???0??????00???00000?00?00?0?0??0110000000?11000??01?00?101100000????001
00?0?0001?0???000????????01?100000?00000?00010?0000??00??00?00000??000010100010 1?00011?00001?00000?01??00001100?01000?10?10000
??0?0?0100?0?0000?0000??000?0000??0?0?00???00?1000?000???0010011?101?0?10?00000??01101????1??0?1???11001???0000??0???0000001
000000?000000100010?0???0?0?0?0?????00???10?00000011????????0?000???11?000????0????????0000011000000??000000???????00??000
00?000000010000101?0?1000?00?001?0000?00?0??

Sinusonasus
0000?0?100?0????0?0?110?1000??00110000?0010000?1?0?0??0100001??1???
????????????????????????00?0?000000?0?000?0?????????1???
??
10?????????????????????????????????????1??????????0100??001?110?10??????1?????????????0?01?????1?????????0110??11?10??11?1?00?
101110011?1?????????1?????????????00???0????00?0???0??010??????1?1?1?????000?1?????????0??????11??0?????????0??????1?0?
000?1?1?0?????????0???????1?0??10?0???0??0?????????????0?1????1?????????00?????0?????????????00?????????????000??1????1???
?????1?0???0?0????????0??????1?????????????????????????0?1?????????0???0????????0???0?????????????0??0??????0?????0??1
1?0?00??????????000?????????????????????????0?????0?0??????00?????????????????????0?????????????????1???0????0?????????????????
????????????????????????????0?0????????10?????????????????0?????????????????0?????????????????????????1?00?????????????????????
??????0?????????????????????01???0?????????????0????????????0?
0???0???00?????????????????????????????????1??
???0?????????????????0??????????1??01????????001???0?????????????000?????????????????????0???
?????0?????00?01?000?000?0?0??0??0?????????????????????????????????????01?????????????????1?????????????????????0?????????????????
?0???0?11000000??00?0?????????????????
?0???????????????????????????????????0???????

Staurikosaurus
1???
????????????????????????0??????0??????0??00?0?????????????0??0?0????0??????????1000??????00???000?00?0?001???0??00????????
00??1??1???00?0100?000?0??000??0??00000
1??000101 0?001000010 01?0?0000?010001????0100010000?1000010?0000100?00????001?00?000?00?0?0??0?????????????????????????????????
????????????????????0?????????????0?????????????????1?????????0??00?0????0?????0??00?00?00??0?????0?????????????????????????0??????
???????110?????????????????????????????????????1?????????????0??0?????00?????????????????1?????????????????0?????????????100?01
1???0?????????????0?????????????????1?????????????????0??????1?????0???????
????????????????00???????001?????????0?0???0????00???????0???
??0???
??????????1???0??0?????????????????????0???1????????
???0????????0???0???1??0??????00?????????????
??0?????????????????????????????0???????????
????????????????????0???0??????0?????????????????????????????
1???0??????1?????????????????????????????00???
??

Sulcavis
10???????00??011??00?????????????10?1???????00????0?????????????????????????????1?????????????000?1?????????????????????1??????????
????????????????????????????0?0?10000?11??00??0?????????1?????????????????????????????????1??0?????????????????????????????????????0
??101???1????0?1????01?1100?????0?????0?0101001 1?11110???0101111101001??11?0??????1001?0????1?1????01??1???1?????????????11?
????1?1?????0??????0????1??10????0?????????????????????????0?????????????????????????????1?????1?????????11?????111?000?0??00111?0111?
?101001111 10?????????0?1????1?????0?????1?1???0?0?11?0????????1????1?????????????1?????????????1??????00?0?0?????000??????0??1
100?1?????????????????0????????1??1?1?001????0?1??????00????0??????000????????????????01???1????0?????????1??110????0??????????
????0????????0?????????????????????????????00?????000??0???0?????11????0???0?????????0???00????????0?????????????????????0????0?????

?????0?????????????????????????????100????????1?????????????100???????1?????????????0?0????????0?????????????????????0??????????0?????
??1?????????????1????1?????????????????????0?01?????????0?????????????????????1??1????????????0
?0????0???????0???????0?????1?????????????????????????????0?????????????????????????????????????0???????1?????????????????0??????????
0????1?????????????????????????????????????00?????11??1?01?????????0????????0?????????????00?0????????1????????????????????????????
????????????????0???01110????????00????0?????????????0?0?????????????0?1????????????01?????????????????????01?????????????????1?????
??????????0?????0???0???????1?????0????????0???1?????????????????????0????????????
???1?0?????????????????0?????????????????????????????1?????????????????????????????0?????????????????????????1111?0001?00??0000???00???0???
????????????????????????1???1?????????????0????0??

Syntarsus_kayentakatae
1010?0?100000010000011011011??000101001000000000000?0????01100?01?10???1???0100000001?0?0?000?0?0000????000010????????0?100??
??0?????????????????????????0?0000000000??0?0100000?000100????10000000??0???0000???0?1?????0???0??????1????????1?????????0????????
??1?0?????????????000?????????????????????????????0?????????????????????????0??????????001?????????01?????????????????????????0????????
???1?????0?0?????????????????????????0????0?0??010??????????10?10?0110100??00??0???????11?100??1??0?1001111?111??????1????????????
???1?????????????????????????0?0001??1??0???0?????????0??0??????1????1??????00???1????0011??0???00??000??000?0???1??00??0?0??0??
??0??????0??1?????????????0?1?1??0???0?00??0????10?????????????0??????0?????000100??0?0?1?1??????000?????????????111?01????1000
11??00?0?000111?0111111?00??1??????0??????1?000??00??1?00???0?0?0??00??0??001??????000????01??00?000?0010??1???0?010??0?00??
??1?00?1000?????000????01??0????0???10?0?00??00????1??00????????0?????????0??0??0100????1?0??????0????00??????????1???01????
110?1??10?????????0?????????????0???0????1?????????????00??111?????????1?????????????????????0??0?????????0?????????????????????1???
?0???00???????0??0?????????????0??00?????????0??0?????????00??00?????0?????00?00?0100101?0?1?0??00???00??0??0??1???0??????0?
0?????????????????????????0000000?100?1010?0?????????????????????????????0?00000?00?????????00?0?000??0??0??0??1????0000?1?????0?
?00??000?????000?1?10????????000?0?00??0??0???1?????????????????0???001????10?00?11??0??0?0?????????0??????????0????0??00?0?
???????0?????????????00???00????0???0????????0?????????01?????????0??0?????00?0?????????????????????0?0?????????????????????0???
?0??????0?????????????????????0?????????????????????????????????????0?????????????????0?????????????????0??????????00?0????????????????
?0?????0010000??000???1????0?00?1?????????0??

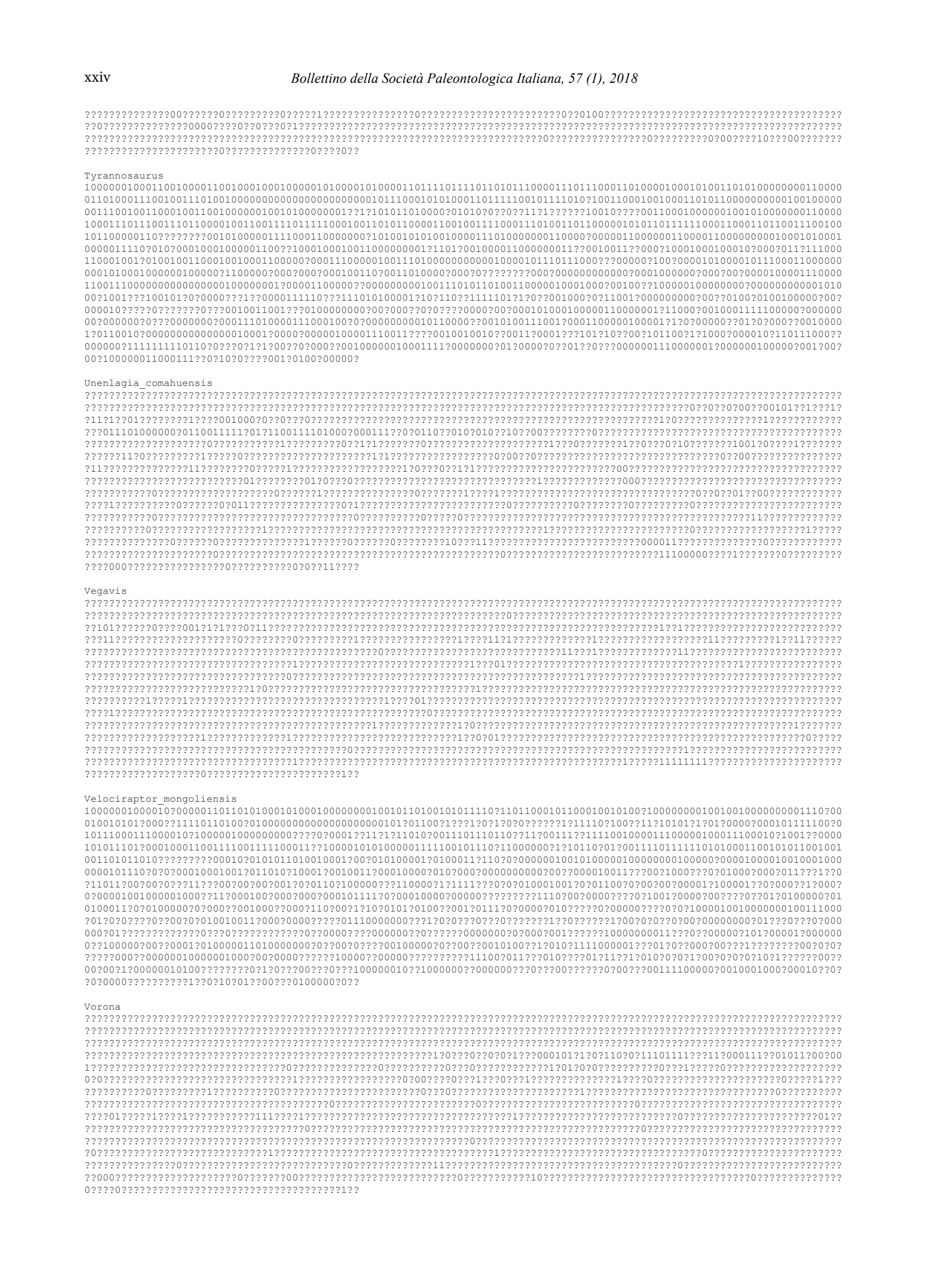
Tanycolagreus
??0?????0001?0?1??00??????0?????????????????0?00????0??001?1?10?1?????????????????????????0?01????100?0010??1010?????????????????
????????????????????????????????0?????????????????0?????11???????1?????????????????0??????0?????????????????0?????0??00?0000?0?1?????
0?1110010?1100010?100000000000001010?00?000??0110?01101???0111011101101011111?10?111001?????????????0?????????????????0?1????00
1?????????????????????????????????????0?111???01?????????????0110110??1?000?0101?001?110?000?11011?111111??011000?00000011101100?
1?1110000110?????????0???01???1?010?0?????0?????0?10?0?????0?0?00??0??0???0?1?0000?000?0?0?0??0?000??0?0?????00?1?1????0??0
000?0?0??10???1?0???0001000?0?1????1?000?00?10110???00?0????1???1000????0?0????????0???11???????00???????1000???0?01??11?00
110?01?0???0??101????01?1?00???0?00???10?0????00?00?0?00???0?11?0???0?????0?1?????0?101?00?0????1???????00??001000?0????????
?????0?????000?????????????01?0100?000???0?0001?????0?????000???????0??000?0????0?10?0???????0?0?????????0?0??0????0?0??0??0?0?
????111???00000?00000?????0??0??110??1?????0???0?????001?????????????1?011??0??10?????????????????00??0?00?0???00?0?????0?10?0
?0????0????1???00??????0??????0?00??00??????1??000?????100??10?1??????????0????0??000001?0??0?????????0?????0?????1?????????
?????0?1??0????????????????????????????0??00???????0?00??????????0???????00???0001?????????????????1??0??????0???0??????0???????
?0?????????????00??????00???????0?0?0????????????0?????000???????0??000?0????0?1?0?????????000?0????0?????0??????????????00?0???
?0?0??????0????000?????0??0?0???0??0???????00????0?????????????????1?0???0???0?0?????0???0??1????01?????0??0?000010?1????1?????
?0?000??????0?????1??????0?0???0???0?????????????????????????0??????0???00??????0?10?00?????????????????0?000?0010???00??0????
????110?????????????????1????????????0??0??0?00?

Tawa
1010?0?000?0?01?0?0000001?1???10001100?010?0000?0??00?0001110110?1???00?1??0??0?????1010000?000????0???011000????????0100???
?1????????0?????????????????0?00?00001000?0??0?0??00???1????????0?0?0????00??????????11??00????0????01?0??00???0?????0????1?????
??111??10?????????????00??0?0??1?00??????00?001?0??0011??000?0?0?011?0??01000?0101001????????00??0??0??0?????????0??0??0???
1??000?01?1????0??1001?00??10?1000111?010???00??????????0?1?010?1????0????001??0?0?0?0????01??000?11?00001????0???011?01?0?
10?0??????1?????????0?????0001?0???0???0?10????0?0??10???????10??1?????10?????????????????0?0?0?0?00??0??0?????000?00???0??00
0?0?????1???????0?????????????10????10??0?00?00111????00??0?1????01??0????????00????0????011????????0?????????0??000?01??1?1??1
11??00?1?????0????00010?0??0??00??0??00?00??????001?0?0???0?1????????00???11??????0?0??0?????0??????????0?0??????0???0?????
??0??00????0???0000????????1????0???0??????????0???0??0?????????????????????????0??0???0?????????????????????????0??????????0?????
?1??0???0?0????0??????00?????????????1?????????????????????011??00????1?????????0????????0?0???????0??1????10??????0???????????
?0?1??0????????0?????????0??0???0????????0?????????????????????????????????????0????????0?001?????0??0?000000????0??1??????0?
?????????????????????????0?????????????????0??????0?????????????????0?????????????0????????00?????0010101?????????00?????0?????0?
?0???001?????????0?????????????0??????0?????????????????????????????????0??00??0??0??0011??0?????????????????0?????????????????0???
??????????0????????00???0????0?????????????????0???0?????????????????1?0??0?1?????0???????00??????0?1?????????????????????????
????????0??0???0000?????????????????????????????0???0?0000000000???????10????0???????
???????0?1000?00??????0????0?00?0????0????0??

Teleocrater
????????????????????00????????10?00110?0?????????????????????????????????????01??0????00???
????????????????????????????????????000?0?????????????????????????????????????0?0?????????????10?00000?0?0??1000000?0?00??000???10??0?
?11?00?10?????????????????00000000?0100?0???00??0010??0????0????00????0?00
???00?0001?00?00001001????1????0?????????????????10?00?010?000000000????0????0??0?0?000??0?????????????00?????????????????????????
????????????????????????0?????????????????????0??0?0??????0????00?0?????????????0?????????????0?????????00?????0010101?????????00?????0?????0?
?0???001?????????0?????????????0??????0?????????????????????????????????0??00??0??0??0011??0?????????????????0?????????????????????0???
??????????0????????00???0????0?????????????????0???0?????????????????????1?0??0?1?????0???????00??????0?1?????????????????????????
????????0??0???0000?????????????????????????????0???0?0000000000???????10????0???????
???????0?1000?00??????0????0?00?0????0????0??

Teleocrater
????????????????????00????????10?00110?0?????????????????????????????????????01??0????00???
????????????????????????????????????000?0?????????????????????????????????????0?0?????????????10?00000?0?0??1000000?0?00??000???10??0?
?11?00?10?????????????????00000000?0100?0???00??0010??0????0????00????0?00
???00?0001?00?00001001????1????0?????????????????10?00?010?000000000????0????0??0?0?000??0?????????????00?????????????????????????
????????????????????????0?????????????????????0??0?0??????0????00?0?????????????0?????????????0?????????00?????0010101?????????00?????0?????0?
?0???001?????????0?????????????0??????0?????????????????????????????????0??00??0??0??0011??0?????????????????0?????????????????????0???
??????????0????????00???0????0?????????????????0???0?????????????????????1?0??0?1?????0???????00??????0?1?????????????????????????
????????0??0???0000?????????????????????????????0???0?0000000000???????10????0???????
???????0?1000?00??????0????0?00?0????0????0??

Tianyulong
??10?0?001?000101?1?00?10000??0?000000?0?000000??1??1?0000?00011??0?????????????????????????????0?????????????????????????????????
????????????????????????????01?0?1000111???1001??0010????00?????1?1?0?0???
??????????1??????1?0??0??0??0??10????0?00?0???1???000????0000010?0010??10?10000???0?0?????????????????????11???????0?????0?00
????????????????????????????????????010?0?????1?10000?0?0?????????????10??0????????1??????????????????????1???010???0????011?0????
?010?0??001?01??0?0??0?????0??????0?????1?1?0???0?01001??????0?????0?????0?????????????????0??????????00??00????001?????????00
?00?0?????????????????????0????0?0??1??00?00?001?????00????0??????0?0??0?????0?????1????1?????????0??????0?????0???0????1???
???????0?????0????????0?????????????????0??????00???1???0????00????0???0??????????0??0????0?????1?????????0?????????????????????
??????0?????????????0????????????000??????0?????????????0?0?????????????????????????0??0?0??????????????????0?????????????????????
????????????????????????????0?????????????????????????0?????1?1?????????0?????????00?????0?0?????????0?????????????????????0???????
?0????0?????????????????????????????0???00???????1?????????????0????????????0?
0????0?????????????????????????????????????00?????????????????????????????????????0?????????????????0?????0?????????????????????0????10?1???



Tyrannosaurus

Unenlagia_comahuensis

Vegavis

Velociraptor_mongoliensis

Vorona

Xiaotingia

1111???1?0?0????0?0?11???00???1?1000??10?10?0?0?1?????00?0??1???1???1?????????????????????????????0??0?????????????????????
????????????????????????0??0??0000?1???0??1??0??0?11010?????001?00??0?0?????????????????????11???10?????????0???1????0????0??
00100??001?00??????????1????????0?0?????0101??11???11?????101?111?11???10?01?11??1111??????011?????11?????????1????????????
????10??1??0000??110001?1??101?0??1?????????????????1???0?????????????????????0??????????1?????????????????1?????????????????
?011?1?0011??11???1????????01??????0????1????0?00?10?001??????11???0?????0?????????????????1?????????????1?????0?0?0???0???1?00
???00?1?????????0???10??????1??1?1??01????0?0??????00????0??1?????????????????????00?????????????????????1??1?????????????????
????1?????????0?0?1?????????0?????????11??????0?????10??0?1???1?????????????????????10?????????????????????????????0?????0???
????????????????????01??1?????1????0?????0??1???1?0??????00?????????????????????????????????0????0?????????????????????????00???
1?????????????????????????????00?????????1?????0??0?1??????0?00?????????????????1????????0??????????0?0?111?0???00?????????0???
???????????0?????????0???1?????????????????????????????????1?????????????????????????????0?????????0?????????????????????????
0????1?????????????????????????????????????0?????????????0200?????????????0???0?????????????00?????0?????????????????1?????????111
???????0?????????????00?1?????????????????????????????????????0?????????????1??11??1?????001?????????????????????????????????????
?????????????????1????10???0???1?100??????????0?????????????????????????????0???????0?????????????0?????????????????????????????
??0?????????????????????1???????1?????????????????????110000000???10?000???10??1????
?0??0?????????????????????????1?????????00????0??

Yanornis

101??1?10110??100?00?????01?????1010???????00????????10??001??111??????0????????0?0??????????10???1?????????????????????????
????????????????????????00?0?100?0?11??0??10?????????????????????????0?????????????????????????1????01????????00??00?0?????0??0
?0101?101?100101001?0011101?0100?1?110?010?1011?111100???110101101001??11?0??????100111111?111??1?011?????????????????????1??
????1???0?0?????????????????1?????????????11??1?10?10??100?????0?????????????????????????????????1?????????????????1110?0??0??1?011?0110?
??11?00?011??1????0??1?????????????0?????1?1?0?000?11?00???????1????0??00?0????10??0????0?0?0??0??11100?????0??00?????????????1
100?0?????????????????0????????1??111??01?0??0?1??1????00????1????0?0000?0?????????111?????????????00????0??1?0????0????????????
?????0????????0????1?????????????????????00??????0?????1???0?????11?????????????????????1???10??0?????????????????????1??????0?????????
??????1?1???????00????????010?1110100????1?????0???????0?0?????????????????????0?0?????????????????????????????????????1????????0???
???1????1???000?0???0?????0?????????????????????11???????010?????????????1??????0?????????????????????????00?1?????????0??1?1?????????
?0????0?????????????1????0?????????????????????????????????????0?????????????????????1?????????????0?????????????0?????????????????????00
0???0??????1??1?0??1???????0????????0?????????????????0????0?0?????????1?????????????1???????
???1?0??11??0?00???00???????????01?????????????????????????????1?1????1?????????????01?????????????????????1?????????????????????0???
????????????????????????0?0?????1???11?????0?????????????????0????????????
????????????????????0???????0???00????1??01111??????111111001?????0010???00??00???
??0?????????????????????????1?????????00???????

Yi

0111?????0?1????1?10?????01?????10???????0?01???1?????????????????????0?????0?????????????????????????????????1?????????????????
????????????????????????????0?01??010?????????????????1?????????????????1?1?????????????????????????????1????0?????????????????????????0
??101?????????????????????1??0??1??0?0???0??000???1???1100???0101??1????0??10?001?0??1?01???
??
????????????110???00?1?????1?????????????0?0???????0???0?1??????????0
??1????0?????????????????1??????0?????????????????????00?????????????????00??????1?????????????????1???
????1?????????????????????????????????????0?????????????1?????????10?????????????????????????10?????????????????????0?????????????????
????????????????????000?????????????????00?????????????????????????????0???0?????????????????0????
????????1?????????????????????0?????????????????????????????????????10???0????????????????0???
?0????0???
0???00?????????????????????????????0?????????????????????????????0?????????????????????????
??????0?????????00??????00?????????0?????0???0????????1?????????????????????????????
??????????0????????1???
??
?0????????????????????????????1?????????????????0

Yixianornis

1????1?1?11??01?????????????????????1???0???0???000?????????????????1???1?????????????????????
1?????????????????????????0??0?100?0?11?????100?????????????????????????????0?????????????????????????????????????1??????00?????0?1???01?0
0?101?101??00101001?0011??1??0??0?1??10?00011011?111100???110111101001??11?0??????10011??11?111??1?????????????????????????11?
???110?????0000?????????10?10??0??010?0??10?1010101??00?0???01?0??0??1?????????1???1?1?0?????????????????1110????1?11?011?0?00?
??11?00?011?111?1?0????????1???00?0????????1??0000?1??00???????1????0??00??????1????1????1?????0??1110?1???10??00????0??????1
110?0?????????????????0?????????????0111?01?0??0?1?1??0?????????????0?000????0?????????11?????????00??00??????01?0????0?1?????????
????0????????0????1????????1?????????????00??????0????1???0??1??111?????????????????????0?110??0?????????????????????1??????0?????????
???????????0?????????1???
??
?0????????????????????????????1?????????????????0

Yixianornis

1????1?1?11??01?????????????????????1???0???0???000?????????????????1???1?????????????????????
1?????????????????????????0??0?100?0?11?????100?????????????????????????????0?????????????????????????????????????1??????00?????0?1???01?0
0?101?101??00101001?0011??1??0??0?1??10?00011011?111100???110111101001??11?0??????10011??11?111??1?????????????????????????11?
???110?????0000?????????10?10??0??010?0??10?1010101??00?0???01?0??0??1?????????1???1?1?0?????????????????1110????1?11?011?0?00?
??11?00?011?111?1?0????????1???00?0????????1??0000?1??00???????1????0??00??????1????1????1?????0??1110?1???10??00????0??????1
110?0?????????????????0?????????????0111?01?0??0?1?1??0?????????????0?000????0?????????11?????????00??00??????01?0????0?1?????????
????0????????0????1????????1?????????????00??????0????1???0??1??111?????????????????????0?110??0?????????????????????1??????0?????????
???????????0?????????????????00100111101?0?1000?????0?????0?0?0??????1?????????????0?0?????????????????????????????????????1???????0?0?
????????1?1??00?????0?????0?11???0????1?????11???1????0?0??????????1??????0??1?????????????????????????1??????1??0??1?1?11?0????
?0????0?????????????0????0?????0?????????????????????????????0?????????????????????????1???????1???0?????????0?????????????????????0?00
0????1?????????????????????????????????????0???10?1?0100?0?00?01000????????0?????????????0??????0?????????????????????????1???????
??????1?11????00???00?????????????01?????????????????0?????????????1?1???10?1????????001????1?????????????0?????????????????????0???
????????????????????1????0??0?0?????1???????0??0??????1????????0?????????????????????1?????????11????????10?????????????0????????????
?????0?????????????????0???????0?????1?1?????????1?????????????????????????????????00?????????????1?????111111100?????0101??00??00???
??0?0?????????????????0??1???1?????????00???????

Zanabazar

?00010?10000001?00??010?1001100?110100?0000001010100?1???0?01?1?1?0???000001101100010?0100?0?????????????????010?0?10111111
000???1100?1?????????????00?01000000010?100?0010???????110???1???
??
??
??
????????????????????????0??0?0?1?0???00?100???0??1??11????010??????1??1????1?1???
????????0?????????????000??00?1???10??0???
??0?????1???????0?????????????1??0???0?????????????????????????????1??11?????????????00????0????1?????????0?0?????????0?0?????????
?????0?10?0??0?????????10???00??0??0????1??0?0???????0?11???0??????0???000?11??????0?????????10??000??????1?????000??1?0?0?
????001?????????01???11?1?????????????????1??1?0??????1?????????????????????????????0?0??????00010?1?0?00?1?00??????????10????
?1?????1?????????????00????0001?????????????????0???00???00??0??
??????0???????0???????0???????0???????1?00?????????????????????????????????????0???1?????????????????0??0?0??0??10?????????????????
00??0?????????????????????????????????????00?????????????????????????????????0??0?????0?1?0??010000?00?????????0?0?????????011????1??
?????00?????????????????????????????0?????????0?????????????????????????????????1??00???????????0011???1?????????????????????????????????????0???
???????0?????????????000??00?1???10??0???00????0?????????????????????????0?1?????????????0????????????
????????0???00?????????????????????0?????????????????????????????11100000??00??????????00?????
?????????????????????????????1?????????????????????????

Zhongjianornis

1011?0??0100????0?????????????????????????????????000?11??0?????0?????????????????????0????00???
0?????????????????????1?????00?0??11?????????110???0???????0???1?????????0???????1???????
??101??????0?0????1?00?11??1?0100?10?00?010?1??1????1?????1?011?101101??1??0??????1000??????01?????????1???1?????????????????1?

???011?????000?????0????11?10??????1??????????10?10??00?01?????????????????????????0?1????????0???????111??01?1?????11???1??
??0??01?101?????????????????1??????0???????0?00?00?11?011???????????1??0?????????????11???????1???????00?????1???11?????????1
100?0?????????????????0???????1??0?0?001?0??0?1??0???00???????????000?????????????????0?????????????????0????????0????????????1???
????0????????0?????????????????????????00??????0????0???0??1??11?????????????????0???0???0?????????????????????????0????????
?????0?????????????0?????????0100????0???0?????????????0??????0?????????????????0???0?
????????1??0?0?????????????0???0???????0?????????1?????1?????????????????????1????????0?????????????0????????0??1???????0???
?0???0?????????????????????????????????
??1??????1????????????????????????????0?????????????????????????????????????
????????????????????10????????????0?????????????????????????????????????1??1??????????01?????????????????????????????????????0???
????????????????????11???0???1?????????????????????????????????????0????????????????????1?????????????????????1?????????????0????????????
????????????????????????0?????????????????????????0????????0???1???????10????0??00???
????????????????????????????1??????????0????0??

Zhouornis
0?00?0?1?0?0?0??0?00?10???1???00101100??0?10???1???0???????01?????????????0?????????????????????1?????????????????1????1??0???
?1??10?????????????????????00?0110001?????0??00?????????1?????????????????0???0????1?0??10?1000?1????100?????????0?????1?1??????0
??101??010?000111?1?00?1100?011?00??110?0101101?11110000?010111100001??10?01?????100111110111?00??1?????????????????????1??
?????????????????????????????1??????????11?0??10?????????????????????????1?????????????????????0?1?????????????????111?000?0??01111?0111?
?001001?1110?1???????0?????1?????000????1?1???0?0?11?00???????1????1???110??????1?01?????0?0???????001??0?????0?0?????????11
100?0????1?1?????0???0??0????1??111??01?00?0?1???????0????0???111010????????00?10101??????????0?????????110??00????????1???
????0????????0?????????????0?01????????00??1???0????0?0?0?????11?????????????1????000100?00??1?????????????????1??????1??0??0???
??0?0?????????????????????1???????100??0?????0???1?0????????0????????0?????????????0?0??0?????????????1?????????????????0?????????????????
????????1??0?1?????????????00?????????????????11???1????01??1?????????????????0??1??????0?0?????????0??1??1??????1??1???????0???
?0????0?0??0????1???0?????????10????????1?????????????????
0?????????????????????????????1?0?????????????0??11??1?001?1??????0????????0?????????????????0?????????????????????????????????0?????
??????1?11?00?00??????10??????100?????1?????????????????00?????1?0??????10???0????011?????0?????????????0?????????????????????0???
????????????0????00??10?????0?001?????????????0???0?0???1?????0???1?????????????0???????00???
???0000???1?????????????????0???1111000010??????00???00??00???
????????????????????????1???1??????????0???????

Zuolong
1000?0?100?0100101001101??000?00?0000???0?00??????????0????0?10??????????1000??111011?0?0?000????010?0100?1000????????????????
?????????????????????????1???????0?????000?0?0?????????????????????????????????0?0?0????1??111000?0??1001??0?0??0????0?????????????????
???1?????????????????????0??0??00010??????000???01????????1?0000010?0????010?000???00??0
?0????101?10?1???01??0001??10?1???01??0?0001?????????????0110010?110?000??1001?01???1?????????1?????????0??0?110000101?0?1?0?
????????????????????????0???0??0?1?0??00??0??0?????0?????????1?0??????????0?0?01??????????0?0??1000?00??0000??0???0??00??00????
??0??0?1?0?????100?????00???1??0?????????0??0????????0?0?????1??01??0?0??0????0?????????????????????????????0?0??????00??0????????00
011???????00??1??????1?0010??0???????0????0?????000????0???0?00????1??1??0?1??????00????00?????????????0??00??0001??0?????0??0
0?1?0????100???0??0??00?????????????????00?01??0?0?00?????0??0?????????????????????????00??00?????????????????????0?????????????????0???0?
???????00??1?00????00??????0???????00????000????0??0?????0?????????1??1????????0???00???0?0?????0??1??1?????????000?????10??
?????0?????00001?????????????000????0????????1?????1??1??????????0?0??0?1???0?0?0??000???10?0????0??00???????000??????????
????????????????????????00?????00?0????0???00?????????????????????0???????0????1000???
????????????????????????????????10?????????????????????????????0??????????0??????????1???0?????????????????????????????????????0???
????????????????????00???10?????010??0???????0?0??????0?????????????000??0????????????
??0?????????????????????????????0?1100000??00?????????????????
?????000011000011100???1?????????????????????
;
end;