Analysing Evolutionary Patterns in Amniote Embryonic Development (Additional Data)

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Corrected stage scores of developmental events for each species

In the following tables, we list the stages ('Stage') at which different developmental events occur in different species. The events are defined in Table 1. The stage numbers allocated by some authors of Normal Tables are more or less arbitrary (being numbered, for example: 15, 16, 17a, 17b, 18, 19, 19a, 19b, 19c, etc.). However, these number do not infer the existence of 'substages', as similar amounts of change occur at each stage, regardless of the numbering system. For convenience, where this occurs we have allocated a unique integer, or corrected stage number, to each of these stages. In such cases the original stage allocation is given in parentheses.

Abbreviations used for species — *Squ*. = *Squalus acanthias*; *And*. = *Andrias japonicus*; *Nect.* = *Necturus maculosus*; *Trit.* = *Triturus vulgaris*; Xenop. = *Xenopus laevis*; *Lac.* = *Lacerta agilis*; *Gallus* = *Gallus gallus*; *Vanell.* = *Vanellus vanellus*; *Melop.* = *Melopsittacus undulatus*; *Rat* = *Rattus norvegicus*; *Sus* = *Sus scrofa*; *Capr.* = *Capreolus capreolus*; *Tars.* = *Tarsius spectrum*; *Homo* = *Homo sapiens*.

Abbreviations used for events — Axi = Axial; Car = Cardiovascular; Int = Intestinal; Kid = Kidney; Lim = Limb; Neu = Neural; Olf = Olfactory; Opt = Optic; Oti = Otic; Pha= Pharyngeal.

	Stage													
Event	***Squ.***	***And.***	***Nect.***	***Trit.***	***Xenop.***	***Lacerta***	***Gallus***	***Vanell.***	***Melop.***	***Rat.***	***Sus***	***Capr.***	***Tars.***	***Homo***
1. Axi A	7	?	?	16	24 (18)	36 (35)	6 (4)	5 (4)	5	27 (27)	1 (1)	9	1	3
2. Car A	16	21	21 (20)	24	34 (28)	48 (47)	13 (10)	6 (4.1)	5	29 (29)	1 (1)	11	?	3
3. Car B	17	21	23 (22)	26	34 (28)	49 (48)	24 (20)	12 (7.2)	7	35 (35)	30 (29)	13	1	4
4. Car C	18	21	24 (23)	28	38 (33)	55 (54)	28 (23.1)	16 (10)	12	37 (37)	33 (32)	13	5	4
5. Car D	22	22	23 (22)	29	39 (35)	50 (49)	?	21 (12)	?	40 (40)	55 (54)	21	13	10
6. Car E	18	?	24 (23)	26	36 (31)	54 (53)	45 (37.1)	15 (9)	15	29 (29)	?	13	2	3
7. Car F	?	26	?	35	46 (44)	86 (85)	66 (49)	27 (17)	21	69 (68)	64 (60)	22	17	11
8. Car G	27	25	30 (29)	40	43 (41)	86 (85)	85 (59.2)	27 (17)	24	71 (70)	66 (62)	23	?	20
9. Car H	27	25	36 (35)	37	43 (41)	86 (85)	85 (59.2)	27 (17)	24	80 (79)	66 (62)	28	19	25
10. Car I	29	30	31 (30)	38	43 (41)	117 (116)	?	29 (18)	?	43 (43)	56 (55)	23	13	10
11. Car J	28	28	44 (43)	40	43 (41)	124 (123)	?	38 (27)	?	111 (110)	?	39	27	27
12. Int A	9	18	12 (12)	17	26 (20)	37 (36)	6 (4)	5 (4)	5	28 (28)	2 (2)	9	1	3
13. Int B	19	19	22 (21)	20	19 (13.5)	62 (61)	41 (34)	21 (12)	15	44 (44)	57 (56)	16	7	6
14. Int C	21	23	26 (25)	32	39 (35)	74 (73)	60 (46)	25 (15)	21	55 (54)	68 (64)	22	14	11
15. Int D	22	27	26 (25)	30	42 (40)	78 (77)	93 (66.1)	29 (18)	?	?	69 (65)	?	13	9
16. Int E	26	25	29 (28)	33	40 (37)	72 (71)	60 (46)	22 (12.1)	?	63 (62)	66 (62)	20	11	7
17. Int F	?	23	33 (32)	35	40 (37)	87 (86)	61 (47)	29 (18)	21	70 (69)	68 (64)	22	16	11
18. Int G	27	25	28 (27)	43	45 (43)	103 (102)	?	31 (20)	?	?	?	40	?	21
19. Kid A	17	22	21 (20)	23	29 (23)	50 (49)	22 (18)	16 (10)	7	51 (51)	24 (23)	11	4	7
20. Kid B	29	32	?	52	67 (64)	109 (108)	96 (67.1)	33 (22)	25	102 (101)	85 (81)	45	22	45
21. Kid C	33	30	24 (23)	29	40 (37)	78 (77)	74 (54.2)	28 (17.1)	21	70 (69)	69 (65)	20	14	15
22. Lim A	24	23	24 (23)	29	48 (46)	75 (74)	58 (44)	25 (15)	19	54 (53)	64 (60)	23	11	10
23. Neu A	11	12	16 (16)	14	26 (20)	41 (40)	17 (14)	12 (7.2)	7	37 (37)	27 (26)	12	2	4
24. Olf A	18	19	21 (20)	20	29 (23)	48 (47)	56 (42)	22 (12.1)	16	55 (54)	68 (64)	27	12	10
25. Olf B	20	21	23 (22)	24	36 (31)	58 (57)	65 (48.1)	25 (15)	21	69 (68)	73 (69)	35	19	24
26. Opt A	9	18	16 (16)	18	23 (17)	43 (42)	16 (13)	11 (7.1)	6	36 (36)	31 (30)	15	4	6
27. Opt B	19	22	21 (20)	25	33 (27)	57 (56)	37 (31)	18 (10.2)	15	58 (57)	71 (67)	32	14	10
28. Opt C	19	21	22 (21)	22	32 (26)	62 (61)	44 (37)	25 (15)	15	67 (66)	72 (68)	27	16	13
29. Opt D	21	24	?	27	?	62 (61)	37 (31)	22 (12.1)	17	69 (68)	73 (69)	34	16	18
30. Opt E	24	25	25 (24)	29	38 (33)	71 (70)	61 (47)	26 (16)	22	85 (84)	79 (75)	39	?	33
31. Opt F	30	27	30 (29)	28	37 (32)	92 (91)	77 (56)	31 (20)	25	?	78 (74)	39	20	28
32. Oti A	14	19	?	19	27 (21)	48 (47)	23 (19)	16 (10)	8	40 (40)	31 (30)	17	5	4
33. Oti B	17	21	19 (19)	21	29 (23)	50 (49)	41 (34)	16 (10)	9	46 (46)	40 (39)	19	9	6
34. Oti C	22	22	21 (20)	23	33 (27)	72 (71)	60 (46)	27 (17)	20	68 (67)	65 (61)	24	13	8
35. Oti D	23	22	23 (22)	25	34 (28)	80 (79)	77 (56)	27 (17)	24	71 (70)	70 (66)	29	14	12
36. Oti E	24	23	23 (22)	24	37 (32)	73 (72)	69 (51.1)	30 (19)	21	67 (66)	74 (70)	32	14	10
37. Pha A	16	21	22 (21)	25	32 (26)	56 (55)	36 (30)	19 (10.3)	15	47 (47)	33 (32)	20	7	6
38. Pha B	17	23	21 (20)	30	38 (33)	63 (62)	57 (43)	24 (14)	16	35 (35)	66 (62)	20	11	7
39. Pha C	19	24	24 (23)	25	33 (27)	65 (64)	47 (38)	22 (12.1)	17	69 (68)	64 (60)	23	11	7
40. Pha D	21	22	21 (20)	23	34 (28)	62 (61)	38 (32)	20 (11)	15	56 (55)	61 (59.1)	26	9	6
41. Pha E	?	27	30 (29)	32	37 (32)	84 (83)	60 (46)	25 (15)	17	68 (67)	68 (64)	24	20	7

Results of pairwise comparisons

820 event-pairs were generated for each species. These data were used in the phylogenetic analyses. Three event-pair scores were defined as follows: **0** (event A occurs before event B), **1** (A and B simultaneous), **2** (A after B). A question mark indicates missing data (i.e. data was not available for one or both constituent events).

i) *Squalus acanthias*
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2222222222?????22222?22222?122222?2222222?22022210?000020000?0000022220?00002222220?000022222221?0000222222222?000
022222????????????????22222?1100222222?22100?000020000?022222?221222222?2222222?2222222222?2222222?000022222?0
20020000?0000020000?0000022210?0000120000?02000222220?0000222000?020002220000?000010000?0000000022220?0000221000?
020002202222220?0000221000?020002202122220?0000222100?0200022222222222?0000222220?0200122222222222?2222222222?2220
2222222222220000?000020000?0000020020000022100?0000020000?01000200200000222221?0000222210?0200022222220022222222?000
0222220?020002222222002222222?0000222220?02001222222210222221000?0000020000?00000200200000200022100?000002000?0
1000200200000210002222220?0000221000?020002202110002200002222220?0000222100?0200022222210022000222????????????????
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ii) *Andrias japonicus*
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??1?11?222?2222?22220?222201?2222222?2222220??????????000000000??000000000?2?222200000?22?222222200?222?22220110
0?2220?222200000?22100?222201100?222012?222100000?2200000?222222222?22222222?22222212?22222220?222200000?2210010
200?000000000?00000000000?000000000?2100000000002?111000000?2200000000022?000000000?1000000000200?222100000?220000
010002222?111000000?220000000000022120?222200000?22200202002222222?222201100?22201212002222222?22222200?2221222200
222222222?000000000?21000000000210200000?111000000?2200000000002212010002?222100000?2200000100022221200022?22210000
0?22000001000222212000221?222200000?22100102001222222000222?111000000?220000000000221201000021000?222200000?2210010
200122222200022212?222200000?22200202002222222100222222?222100000?22000001000222212000221102000?222222200?2221222
2002222222221222222222
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iii) *Necturus maculosus*
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???2?22?210?????2222??2222?2?2222?20?2222?222?2212?0000?0000?00000?2000?000002?2222?0000222?2222?00002221?2222?000
022222?2222?2020222222?2222?00002222200?1000?00000200000??????????????????????2212?00001220000002??2212?0000122000000
2?1?0000?000002000000?00?1000?000002000001?002?2101?000002200000002?0022?0000?000002000000?00100?1000?00000200000
01?002102?2000?000002100000002?0022022????????????????????????????????????2222?0000222000002?22222222??2222?10002222202??2
2222222?2?????????????????????????????????0000?000002000000?00200200?00??1000?000002000001?00210210?00?2?2101?000
002200000002?00221222?00?22?2101?000002200000002?00221222?00?221?2000?0000021000002?00220221?00?2200?1000?000002000000
1?00210210?00?21000?2212?000012200000002?11222222?00?222222?1000?000002000001?00210210?00?2100010?2222?100022222202
2?22222222?21?22222222
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iv) *Triturus vulgaris*
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22222222222222222222222222220222222022222221222210000000200000000000200000000002222220000022222222000002220222220000
0222222222221000022222222222222222222222200000000000220000022222222222222222222100000222000000202222100000022200000
2010000000000000000000000020000000000021000000000022100000000002200000200022200000000000020000000000200220000000000220000
020002222200000000000220000000000220202220000000022200000200022222222222100000222000000201122222222222100000002220000000200
02222222020000000000020000000000200200000200000000000022000000000022020000022000000000002200000100022020200022220000000
002200000200022221200022221000000000022000002000221202000222022000000000022000002000222212000222122222220000022201000
20222222222222222222200000000002200000200022221200022212102000000000002200000100022020200022100000222220000022212000
2022222222222222222222
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v) *Xenopus laevis*
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2212222222222222222202222201222222011?????????222000000?200000000?0000000000?0022221000?22222222000?2222222220000
?22220222220000?2222012222202222?222222220000000?02200000222222222?22222222222222220000?22220110202222222222?22222222
2022000000000?012000000000020000000?022000001000222200000?12200000200022000000000?00200000000000200000000?0220000
020002202200000000?022000002000220220????????????????????????????2221000000?22200000200022222?222000000?22200000200
0222222?02000000000?022000000000200200?002000000000?02200000100021020000?00220000000000?02200000200022021 2?002221100000
?02200000200022022 2?002222222000000?22200000200022222222?0122222000000000?02200000200022020 1?00220002221000000?22200000
2000222222?1222222200000000?022000002000220212?002210020211000000?02200000200022022 2?002221020222200000?22200000
2000222222?01222212022
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vi) *Lacerta agilis*
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22222222202222222222212222211222222222222222222222020000020000000000002222200000222222220000022222222200000222222222220000
022200222222222002222222222222200222222222222010000002000000222222222200222222222222222220000022221200202222200000022220200
20020000000000020000000000021000000000002000000000000222222000002200000020002220000000000000200000000002002222200000022000000
02000220222222200000221000002000222222222200000022100000200022222122222200000022200000020002222222222222222002222222220202
2222222222210000000000200000000000210200000222010000000200000010002202000000222222000000222001002000222222222220222222220000
02222220020222222222222022222222220000002220020020002222222222022202222220000022000000020002202000000220002222200000022200000
20002222222200220002222220000022200000200022222222002200022222222200000022100000200022222110022000200222222000000222222200
202222222222022222222
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vii) *Gallus gallus*
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222222????2222?2222?22222?21????????????????????2222?000??1000?000??02222?000??022222?000??2222222?222??2222222?000?
?222102222?000??222202????????????????????2200?000??0200000?2222?222??2222222?22222?200??2222022?202222?000??2220000?
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?20002002222?000??0220000?20002002222 2?000??0200000?20002002102222?000??2222021?2002220222222222?200??2222022?202
222222222200?000??0200000?20002002000002222?000??0210000?2000200220200022222?000??2221010?20022202222002222222?200?
?2222022?20222222222222122222222?200??2222022?2002222222220222202222?000??0200000?2000200200000200002222?000??2220000?
2000220222200220002222?000??2220000?20002002222002200020222?000??0200000?2000200220200200002002222?000??2221010?
2002220222200221002222
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viii) *Vanellus vanellus*
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22222222222222222222122222112222222222222222222220000000100000000002222100000222222220000022222222222210222222222220000
02220022222222102222122222222222022222222221000000220000002222222222022222222222222222220022222020020222222000000222210200
200221000000000200000000000222220000002220010020002222220000002221020020012222000000000002000000000000002222000000002200000
0200020022222200000222102002001221222222220000002220010020002102202222220000002222020020022222222222222222222022222221202
2222222222221000000220000000100020020000002221000000220000000100020020000001222221110022220200200222222222222022222221110
0222202002002222222222022122222222220222222220202222222222220222222222000000220000000200020022000002200022222000000222200200
2000220220200220002222222000002220010020002102201002200020222200000002200000002000200220000022000200222222000000222210200
200122122120022000222
```

ix) *Melopsittacus undulatus*
122222????2222?2222?22222?21??????????????????2222?000??1100?000??02222?000??122222?100??2222????????????????????????
??????2222?100??2221????????????????????2210?000??0200??0?2222?222??2222??2?22222?100??2221??1?202222?000??2220??0?
2002210?000??0200??0?10002222?000??2220??0?20002222?100??2221??1?2012222200?000??0200??0?00000002222?000??1210??0
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2222222222220?000??0200??0?20002002000002220?000??0200??0?20002002000002222?000??2220??0?200222022220022222?211?
?2222??2?20222222222220222222?100??2221??1?2012221222002220222?000??1210??0?200020021100022000222?000??2220??0?
20002102220002200022222?000??2220??0?20002202221002200022222?000??1210??0?20002002110002200010022?000??2220??0?
2000220222100220002212

x) *Rattus norvegicus*
22222222222222222222222222222222000222222222221000000002000000000022222000202222222000202222??????????????????222220002
02222?2222220020222?2?????????????????22222000202220?00?22222222202222?22?22222220020222?21?202222000202220?00?
200222100000022000?00?00000222200020222?1?00?200222222221002022222?20?20022222200000002200?00?000000022220002022222?00
?200222022222200020222?20?20022202222222100202222?20?20022212222222222220222?22?2022222222??????????????????
?????????22221000002200?00?0000200200000?222220002022220?00?00002002000000?2222220002022222?20?200222022200?2222222102
02222?22?202222222220?22222222000202222?20?200222022100?220022222000202220?00?0000200200000?220002210000000200?00?
00000000000?000000222221002022222?20?200222122210?22202222222220002022222?00?200222020000?22000220222220002022222?20?
200222022200?221022202

xi) *Sus scrofa*
12222222222222222222222222222122222000?????????????????220000000??22222002??2222222222??22222222222??22222222112
??22002222222222??22102?????????????????220000000??200000?222222222??222222?22222222222??222122?20222221002??220000?
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20022002000000222002222221002??220000?200120020000022000202222220002??220000?20002002000002200020022222222??221021?
20022102000002222002222

xii) *Capreolus capreolus*
2222212222222222222222222222222210222222222222110000001000000000002222000000222222210000222????????????????222200000
02220?22222100002221?2222222222222222?2221000000000200?00022222222222222?2222222220000002220?10020222222101022222?220
2022200000000200?000200022222220202222?22020222222222220222?220202222222200000002200?00020002002222222220202222?22
020222202222222202022222?22020222102022222222220222?2202022220222222222222212222?2202022222222222222222212222?220202
22222222122220000000002220?000200020020000002222000000002220?0002000200200000222222222020222?22020222002000002222222222
02222?22020222202020002222222222222202222?22020222202120002222222220000002220?1002010200200000022000222200000002220?100
20102002000000220001222222101022222?2202021200200000022000222222222020222?2202022200200000022200222222222202022222?220
202220020000022100222

xiii) *Tarsius spectrum*
?1?2?22?222?222??????2?2222?2?2210?02?2222?222?2000?0001?1000?00002?2200?000222?2220?0202222?2210?0102220?2200?00
0222002?2220?020222222?????????????????2?2000?0002200000?2?2222?220222222?22?2220?020222120?202?2200?0002220010?
2002?2000?0001200000?00002?2200?0002220020?200222?2222?1202222222?2022222?2000?0002200000?10002002?2220?0202221220
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0222120?20122202100?02222?2220?0202221220?20122202100?022212?2200?0002210000?20002002000?0200002?2200?0002220010?
20012002000?0220002?2200?0002220010?20012002000?02200021?2200?0002220000?20002002000?0210002002?2222?2202222222?
2022222222?1222222222

xiv) *Homo sapiens*
12222122222222222222222222222221000222222222211000000001100000000122220000000222222210020222222220000000222022220000
0222002222210020222122222222220202222222222220000000222001002222222222222222222222222220020222222202022221000102220220
2002211000000220000000000222210001022202200200122222222020222222222202222222220000002210000000002002222100010222020
0200121022222222002022222220200222022222222200202222222202022220222222222222222222220222222222222222222222222202
22222222022110000000220000000001000000000222200000002210000000000200100000222220000000220020020002002000002222222222002
02222222020022202200002222222100010222022002001210210000222022220000000221000000000020010000002100022220000000022200100
10002002000000220002222200000002220010010002002000000220002122220000000221000000000200100000021000100222200000000222001000
100020020000022000211

Changes on each branch

Trees

Trees 1 & 2 are the two reference trees, based on current consensus opinion of vertebrate phylogeny. The two trees differed from each other in the position of the rat (*Rattus norvegicus*). In Tree 1 primates formed a clade with artiodactyls, to the exclusion of the rat; in Tree 2 the rat formed a clade with primates, to the exclusion of artiodactyls. MPT is the most parsimonious tree yielded by a our analysis.

Shifts

For each event which has shifted, we give the direction of the shift ('Advance' or 'Delay') and its magnitude (in terms of the number of other events it changed its timing relationship with). See Methods for an explanation of how the shifting events were identified, and their direction and magnitude determined. Two events did not occur in the spiny dogfish *Squalus acanthias* (Cardiovascular F and Pharyngeal E). Because of the way the data were encoded, it is possible that some of the inferred changes of these two events (particularly those near the base of the tree) may be artefactual. We have therefore highlighted these inferred changes in yellow.

Amniota

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Olf B	*Delay*	Int C, Optic D			
Optic C	*Delay*	Optic B, Phar D			
Optic F	*Delay*	Int F, Kid C			
Otic D	*Delay*	Int F, Kid C			Limb A, Otic E
Phar A	*Delay*				Card C, Card E
Card A	*Advance*	Neur A, Optic A, Otic A			
Card D	*Advance*	Int B, Optic B, Phar D			Optic B, Olf B
Card F	*Advance*	Card G, Card H, Int F, Int G, Kid C			Card G, Card H, Int F
Int E	*Advance*	Int C, Optic E			Int C, Limb A, Otic E

Diapsida – No coherent changes

Lacerta agilis

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Olf A	*Advance*	Card C, Card E, Card B, Otic A, Otic B, Phar A			Card A, Otic A
Olf B	*Advance*	Int C, Int E, Optic D, Optic C, Otic C, Phar B, Phar C			
Optic D	*Advance*				Optic C, Phar C
Optic E	*Advance*	Int E, Int C, Otic C			Int C, Otic C
Phar D	*Delay*	Optic C, Optic D			
Phar E	*Delay*	Int D, Kid C			
Card A	*Delay*	Neur A, Optic A, Otic A			
Card D	*Advance*	Card C, Card E, Otic B, Phar A			Card C, Card E, Kid A, Otic B, Phar A
Card F	*Delay*	Kid C, Card G, Card H			
Card I	*Delay*	Int G, Kid B, Optic F			
Kid C	*Advance*				Int D, Phar E
Int B	*Delay*	Optic C, Optic D			
Int F	*Delay*	Card G, Card H, Int D			Card G, Card H
Limb A	*Delay*	Int C, Otic C			

[[*Gallus gallus* + *Vanellus vanellus*] + [*Melopsittacus undulatus* + Mammalia]]

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Olf A	*Delay*				Card D, Card E, Int B, Optic B, Otic B, Phar A
Olf B	*Delay*				Phar B, Phar C, Optic D
Otic D	*Delay*				Card G, Int F
Card F	*Advance*				Card G, Card H, Kid C
Card I	*Advance*				Int F, Optic F, Int G
Int E	*Advance*				Phar C, Optic C

Aves

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Phar E	*Advance*	Otic C, Int C			
Card D	*Delay*			Phar D, Int B	
Int D	*Delay*	Card G, Card H, Kid C, Otic D			

Gallus gallus

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Optic D	*Advance*	Int B, Optic B, Phar D			Int B, Optic B, Phar C, Phar D
Optic F	*Advance*	Card G, Card H, Int D, Otic D			Card H, Otic D
Otic B	*Delay*	Card C, Int B, Optic B, Phar D			Int B, Optic B, Phar D
Card B	*Delay*				Neur A, Otic A, Kid A
Card E	*Delay*	Int B, Optic B, Optic C, Phar D			Card C, Int B, Optic B, Phar D
Int E	*Delay*	Limb A, Phar E			Limb A, Phar C, Phar E
Int F	*Advance*	Card F, Kid C, Optic E			Card F, Kid C, Optic E

Vanellus vanellus

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Olf B	*Advance*	Limb A, Phar E			
Optic C	*Delay*	Olf A, Limb A, Phar B, Phar E			Phar B, Phar C, Phar E
Int E	*Advance*				Olf A, Phar B

[*Gallus gallus* + *Vanellus vanellus*] — No coherent changes

[*Vanellus vanellus* + *Melopsittacus undulatus*]

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Otic D	*Delay*	Card G, Card H			
Int E	*Advance*	Olf A, Phar C, Optic C, Otic C, Phar B			
Card B	*Advance*	Neur A, Otic A			

Melopsittacus undulatus

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Optic C	*Advance*				Int B, Olf A, Phar D
Otic E	*Delay*				Olf B, Card F
Phar E	*Advance*				Optic D, Limb A, Phar C
Card A	*Advance*	Axial A, Int A			
Card E	*Delay*				Card C, Int B, Phar D
Kid A	*Advance*	Card B, Neur A			Card B, Neur A
Kid C	*Advance*				Card F, Olf B

[*Melopsittacus undulatus* + Mammalia]

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Optic D	*Delay*				Int E, Phar E
Optic E	*Delay*				Card F, Kid C
Card I	*Advance*				Card F, Card G, Card H, Kid C, Otic C, Otic D, Phar E
Int F	*Advance*				Card F, Kid C

Mammalia

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Olf A	*Delay*			Phar B, Phar C	
Olf B	*Delay*			Card G, Kid C, Otic D, Otic E	
Optic B	*Delay*			Otic C, Phar B, Phar C, Phar D	
Optic C	*Delay*			Otic C, Phar B, Phar C	
Optic D	*Delay*			Kid C, Phar E	
Optic E	*Delay*	Card G, Card H, Kid C, Optic F	Int F		Card H, Optic F, Otic D
Otic A	*Delay*	Card C, Card B			
Card E	*Advance*	Card B, Optic A, Otic B	Card A, Kid A, Neur A		Card B, Card A, Kid A
Card I	*Advance*	Card G, Card H, Kid C, Otic C, Phar D, Otic D, Phar E	Int F	Phar C	
Int E	*Advance*			Phar B, Otic C, Phar C	
Limb A	*Advance*				Phar C, Olf A

[*Rattus norvegicus* + Primates]

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Kid A	*Delay*			Int B, Otic B, Phar A	
Int D	*Advance*			Card D, Int C, Int F, Kid C	
Int G	*Advance*			Card H, Olf B, Optic E, Optic F	

Rattus norvegicus

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Olf B	*Advance*			Card G, Int F, Card F	
Optic C	*Advance*			Int F, Otic E	
Optic D	*Advance*			Int F, Card F	
Otic C	*Delay*			Otic E, Phar E	
Phar B	*Advance*	Card B, Card C, Int B, Optic A	Neur A, Otic A		Card B, Int B, Optic A
Phar C	*Delay*			Limb A, Otic E, Phar E	Otic C, Otic E, Phar E
Card I	*Advance*			Limb A, Int B	
Kid A	*Delay*		Card C, Int B		
Int C	*Advance*				Olf A, Otic C
Axial A	*Advance*				Card A, Int A

[*Tarsius spectrum* + *Homo sapiens* + Artiodactyla]

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Otic B	*Delay*				Phar A, Phar D
Card D	*Delay*				Int B, Card I

[Primates + Artiodactyla]

		Moved against			
	Direction	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Card J	*Advance*		Optic E, Kid B		
Axial A	*Delay*		Card A, Int A		

Primates

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Otic D	*Advance*			Kid C, Optic C	
Phar C	*Advance*	Int E, Phar B	Card F		
Card D	*Delay*			Int B, Limb A, Int E	
Int G	*Advance*		Card H, Olf B, Optic F		

Tarsius spectrum

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Otic C	*Delay*	Card I, Int D			
Otic D	*Advance*				Int F, Optic B, Otic E
Phar E	*Delay*	Int D, Olf B, Optic F			
Card B	*Advance*	Axial A, Int A			Axial A, Int A
Kid A	*Advance*			Int B, Otic B, Phar A, Optic A, Otic A	
Kid C	*Advance*			Int C, Optic C	Optic B, Otic E
Int C	*Delay*				Optic B, Otic E
Limb A	*Advance*	Card I, Int E, Phar B			Int E, Phar B

Homo sapiens

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Olf A	*Delay*			Card D, Otic C	
Optic A	*Delay*	Int B, Phar A			Int B, Phar A
Otic B	*Advance*	Int B, Phar A			Int B, Phar A
Neur A	*Delay*				Card B, Card C
Phar D	*Advance*	Int B, Phar A			Int B, Phar A
Phar E	*Advance*	Card D, Int E, Otic C, Phar B, Phar C	Card F, Int F, Int C		Card F, Int F, Otic C, Int E, Phar B, Phar C
Card D	*Delay*				Olf A, Otic C
Card E	*Advance*	Axial A, Int A			
Card I	*Delay*				Otic C, Olf A
Card J	*Advance*			Kid B, Optic F	
Kid A	*Delay*	Int E, Phar B, Phar C	Int B, Phar A		Card C, Int B, Int E, Phar A, Phar B, Phar C
Kid C	*Delay*		Int F, Optic C		
Int D	*Advance*				Card G, Olf A
Int G	*Advance*				Card H, Optic F, Olf B, Optic E
Limb A	*Delay*	Card D, Phar C, Otic C			Phar C, Olf A, Otic C

[*Homo sapiens* +Artiodactyla] — No coherent changes

Artiodactyla

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Olf A	*Delay*			Otic C, Phar E	
Optic B	*Delay*			Otic D, Phar E	
Otic E	*Delay*			Otic D, Phar E	Optic C, Otic D
Kid A	*Advance*	Card B, Neur A, Optic A		Otic A	Card B, Neur A, Optic A
Card E	*Delay*	Card B, Card C	Card A, Neur A		Card B, Card C, Card A, Neur A
Card F	*Advance*	Limb A, Otic C		Phar E	Limb A, Phar C, Otic C
Card G	*Advance*	Otic D, Phar E	Optic C		Otic D, Optic C, Phar E
Card H	*Advance*	Olf B, Otic D			Olf B, Otic D
Card J	*Advance*	Optic F, Int G		Optic E, Kid B	

Sus scrofa

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Otic E	*Delay*		Optic B, Optic D		Optic B, Optic D
Card A	*Advance*			Axial A, Int A	
Card C	*Delay*				Card B, Optic A, Phar A
Card H	*Advance*	Olf A, Phar E	Optic C	Int F	Olf A, Optic C, Phar E
Card I	*Advance*				Phar C, Limb A
Phar B	*Delay*			Card D, Limb A	
Int A	*Delay*		Axial A, Card A		Axial A, Card A

Capreolus capreolus

		Moved against			
Event	**Direction**	**Shared Trees 1 & 2**	**Tree 1 only**	**Tree 2 only**	**On MPT**
Optic C	*Advance*		Optic B, Otic D		Optic B, Otic D
Phar A	*Delay*		Otic B, Int E, Phar B		
Phar D	*Delay*	Phar B, Phar E	Int E		
Card A	*Delay*		Axial A, Kid A		Axial A, Kid A
Card C	*Advance*	Card B, Optic A			
Kid C	*Advance*	Phar B, Phar E	Card D, Int E		Card D, Phar E