**Supplementary file 4.**

#Nexus

Begin Trees;

Translate

1 Frog\_alpha,

2 Frog\_beta,

3 Frog\_delta,

4 Frog\_gamma,

5 Alungfish\_alpha,

6 Alungfish\_beta,

7 Alungfish\_gamma,

8 BCod\_ASIC1,

9 Arowana\_g\_like,

10 Lancelet\_a\_like,

11 Catfish\_alpha,

12 Chicken\_alpha,

13 Chicken\_beta,

14 Chicken\_delta,

15 Chicken\_gamma,

16 Coelacanth\_ASIC1,

17 Coelacanth\_alpha,

18 Coelacanth\_beta,

19 Coelacanth\_delta,

20 Coelacanth\_gamma,

21 Cow\_alpha,

22 Cow\_beta,

23 Cow\_delta,

24 Cow\_gamma,

25 Eshark\_alpha,

26 Eshark\_ASIC1,

27 Eshark\_beta,

28 Eshark\_gamma,

29 Elamprey\_ASIC1,

30 Human\_alpha,

31 Human\_beta,

32 Human\_delta,

33 Human\_gamma,

34 JLamprey\_alpha,

35 JLamprey\_beta,

36 JLamprey\_gamma,

37 JMedaka\_ASIC1,

38 Lancelet\_g\_like,

39 Ropefish\_beta,

40 Ropefish\_gamma,

41 Ropefish\_alpha,

42 SLamprey\_alpha,

43 SLamprey\_beta,

44 SLamprey\_gamma,

45 Salamander\_alpha,

46 SpottedGar\_g\_like,

47 WLungfish\_alpha,

48 WLungfish\_beta,

49 WLungfish\_gamma,

50 Turtle\_alpha,

51 Turtle\_beta,

52 Turtle\_delta,

53 Turtle\_gamma

;

Tree tree\_1 = ((((10:0.240154,38:0.400628):0.26525,(9:0.332645,46:0.205856):0.672235):0.132642,(29:0.024507,

((8:0.020914,37:0.026452):0.020569,(26:0.041216,(11:0.054532,16:0.022955):0.024701):1E-06):0.059287):

0.917353):0.065548,(((34:0.004582,42:0.050101):0.445435,((19:0.339745,(3:0.354015,((52:0.082886,14:

0.103927):0.085846,(32:0.199417,23:0.044511):0.204):0.090769):0.102711):0.154028,(25:0.80082,(41:

0.214639,((5:0.090541,47:0.111692):0.0775,(17:0.249053,(1:0.178596,(45:0.221607,((50:0.067304,12:

0.056789):0.076495,(30:0.021723,21:0.082526):0.142622):0.057806):0.056807):0.093321):0.04201):0.04742):

0.02314):0.039558):0.032187):0.182706,(((36:0.007161,44:0.030747):0.356102,((28:0.247241,40:0.284502):

0.040389,(20:0.138309,((7:0.113037,49:0.120798):0.151714,(4:0.176153,((53:0.029715,15:0.054405):

0.057263,(33:0.014233,24:0.049296):0.128043):0.069185):0.046522):0.012495):0.042939):0.250399):0.186618,((35:0.037746,43:1E-06):0.193114,(39:0.259873,((18:0.135812,(27:0.296282,(6:0.093056,48:0.073352):

0.216967):0.012272):0.028046,(2:0.20256,((51:0.013166,13:0.029852):0.064836,(31:0.037238,22:0.057629):

0.087265):0.073248):0.067358):0.038976):0.116599):0.130724):0.134782):0.147799);

End;