

**BEAST xml input: C-mos + RAG-1 combined data with lognormal calibration priors.**

```
<!-- Generated by BEAUTi v1.3 -->
<!-- Alexei Drummond and Andrew Rambaut -->
<!-- Department of Zoology, University of Oxford -->
<!-- http://evolve.zoo.ox.ac.uk/beast/ -->
<beast>

  <!-- The list of taxa analyse (can also include dates/ages). -->
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    <taxon id="Dibamus"></taxon>
    <taxon id="GeochIndo"></taxon>
    <taxon id="Gallus"></taxon>
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    <taxon id="Rattus"></taxon>
    <taxon id="Mus"></taxon>
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CAGAA??GACGCAA????????????????????ACCGAGTGGAGGGGGGAGGTCATT  
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CGCCA?????CTGGGAATGTGAGTAACTATTAGTTTTACAGTTATATAACCATTTGA  
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TACTGTCTGATCCGATCACGACAATAACTTCAATGCAG?ACTTCCCTCGACTAAA  
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GGGAGGCGGCCCCCGGCGG??GGGCGG?CTTTGCGGGACGGCGCCACGAG?ACG  
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GGC??????GGCTCCCGCGCGCATGGCGAAGCCGCACCCCTTCCCGGGGCCGGGT  
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</sequence>

<sequence>

<taxon idref="Mus"></taxon>

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ACTT???.CAGCTATACATCAATACAGACGAACTAACGTGATGGTGGAGTAGAGA  
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CAGTGAACCTTCCTTATAAATTAGTGCAATAAATAGCTCTTTAACGAGTGATGA  
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GATACCGCGACAGGAGACAGGATTTGAACTCAAAGGCTTGGCCTGCTGGGGTA  
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TTGAAATGATGATGGCAATATTGGG?????ACCCAATGGCACAACCATTAGATCC  
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CCCCATGTGTCCGCGCACCCCATCACGGTGCCGTACACCCTCCCAGG?????TCCC  
AAAGTGGGCGGTCATTTCCGTTCCAACCTGCGCGGAGCTGCTGACTTGCTCCCCCG  
GGGTGGCG?????GGCTCCAGCGCGCATGGCGAAGTCGCATCCCTTACCGGGGCC  
GGGTCCCATGCGGTAGTCCTGCCAGAAGGCCCCCGTAGAGGCCCGCCGGCCCGG  
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</sequence>

</alignment>

<patterns from="1" id="patternsRag12" to="2106">

<alignment idref="alignment"></alignment>

</patterns>

<patterns from="2107" id="patternsRag3" to="3159">

<alignment idref="alignment"></alignment>

</patterns>

<patterns from="3160" id="patternsCmos12" to="3897">

<alignment idref="alignment"></alignment>

</patterns>

<patterns from="3898" id="patternsCmos3" to="4266">

<alignment idref="alignment"></alignment>

```

</patterns>

<!-- This is a simple constant population size coalescent model      -->
<!-- that is used to generate an initial tree for the chain.      -->
<constantSize id="initialDemo" units="substitutions">
  <populationSize>
    <parameter id="initialDemo.popSize" value="100.0"></parameter>
  </populationSize>
</constantSize>

<!-- A prior on the distribution node heights defined given      -->
<!-- a Yule speciation process (a pure birth process).          -->
<yuleModel id="yule" units="substitutions">
  <birthRate>
    <parameter id="yule.birthRate" lower="0.0" upper="1000000.0"
value="1.0"></parameter>
  </birthRate>
</yuleModel>

<newick id="startingTree">
(Xenopus:360.0,((((Xenosaurus:168.0,CtenoSapro:168.0):29.0,Dibamus:200.0):29.0,Sphen
odon:226.0):29.0,((GeochIndo:200.0,Elseya:200.0):52.5,((Gallus:125.0,StruthioEmu:125.0):
125.0,(Gavialis:125.0,Caiman:125.0):125.0):2.5):2.5):58.0,((Vombatus:156.5,(Sus:84.25,(R
attus:0.0,Mus:0.0):8.25):78.25):78.25,Ornithorhynchus:234.75):78.25):42.0);
</newick>

  <treeModel id="treeModel">
<newick idref="startingTree"></newick>
  <rootHeight>
    <parameter id="treeModel.rootHeight"></parameter>
  </rootHeight>
  <nodeHeights internalNodes="true">
    <parameter id="treeModel.internalNodeHeights"></parameter>
  </nodeHeights>
  <nodeHeights internalNodes="true" rootNode="true">
    <parameter id="treeModel.allInternalNodeHeights"></parameter>
  </nodeHeights>
</treeModel>

<monophylyStatistic id="ingroupMonophyly" name="ingroupMonophyly">
  <mrca>
    <taxa idref="ingroup"></taxa>
  </mrca>
  <treeModel idref="treeModel"></treeModel>
</monophylyStatistic>

```

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<booleanLikelihood id="boolean1">
  <monophylyStatistic idref="ingroupMonophyly"></monophylyStatistic>
</booleanLikelihood>

  <tmrcaStatistic id="tmrca_ingroup" name="ingroup">
<mrca>
  <taxa idref="ingroup"></taxa>
</mrca>
<treeModel idref="treeModel"></treeModel>
</tmrcaStatistic>

  <tmrcaStatistic id="tmrca_rodents" name="rodents">
<mrca>
  <taxa idref="rodents"></taxa>
</mrca>
<treeModel idref="treeModel"></treeModel>
</tmrcaStatistic>

<tmrcaStatistic id="tmrca_crypto-pleuro" name="crypto-pleuro">
  <mrca>
    <taxa idref="crypto-pleuro"></taxa>
  </mrca>
  <treeModel idref="treeModel"></treeModel>
</tmrcaStatistic>

<tmrcaStatistic id="tmrca_anguimorph-scinco" name="anguimorph-scinco">
  <mrca>
    <taxa idref="anguimorph-scinco"></taxa>
  </mrca>
  <treeModel idref="treeModel"></treeModel>
</tmrcaStatistic>

<tmrcaStatistic id="tmrca_bird-lizard" name="bird-lizard">
  <mrca>
    <taxa idref="bird-lizard"></taxa>
  </mrca>
  <treeModel idref="treeModel"></treeModel>
</tmrcaStatistic>

<tmrcaStatistic id="tmrca_bird-croc" name="bird-croc">
  <mrca>
    <taxa idref="bird-croc"></taxa>
  </mrca>
  <treeModel idref="treeModel"></treeModel>
</tmrcaStatistic>
```

```

<speciationLikelihood id="speciation">
  <model>
    <yuleModel idref="yule"></yuleModel>
  </model>
  <speciesTree>
    <treeModel idref="treeModel"></treeModel>
  </speciesTree>
</speciationLikelihood>

<!-- The uncorrelated relaxed clock (Drummond, Ho, Phillips & Rambaut, 2005) -->
<discretizedBranchRates id="branchRates">
  <treeModel idref="treeModel"></treeModel>
  <distribution>
    <logNormalDistributionModel meanInRealSpace="true">
      <mean>
        <parameter id="uclid.mean" lower="0.0"
upper="100.0" value="0.042"></parameter>
      </mean>
      <stdev>
        <parameter id="uclid.stdev" lower="0.0" upper="10.0"
value="0.1"></parameter>
      </stdev>
    </logNormalDistributionModel>
  </distribution>
  <rateCategories>
    <parameter dimension="30"
id="branchRates.categories"></parameter>
  </rateCategories>
</discretizedBranchRates>

  <rateStatistic external="true" id="meanRate" internal="true" mode="mean"
name="meanRate">
    <treeModel idref="treeModel"></treeModel>
    <discretizedBranchRates idref="branchRates"></discretizedBranchRates>
  </rateStatistic>

  <rateStatistic external="true" id="coefficientOfVariation" internal="true"
mode="coefficientOfVariation" name="coefficientOfVariation">
    <treeModel idref="treeModel"></treeModel>
    <discretizedBranchRates idref="branchRates"></discretizedBranchRates>
  </rateStatistic>

  <rateCovarianceStatistic id="covariance" name="covariance">
    <treeModel idref="treeModel"></treeModel>
    <discretizedBranchRates idref="branchRates"></discretizedBranchRates>
  </rateCovarianceStatistic>

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```

    <gtrModel id="gtrRag12">
      <frequencies>
        <frequencyModel dataType="nucleotide">
          <alignment idref="alignment"></alignment>
          <frequencies>
            <parameter dimension="4"
id="gtrRag12.frequencies"></parameter>
          </frequencies>
        </frequencyModel>
      </frequencies>
      <rateAC>
        <parameter id="gtrRag12.ac" lower="0.0" upper="100.0"
value="1.0"></parameter>
      </rateAC>
      <rateAG>
        <parameter id="gtrRag12.ag" lower="0.0" upper="100.0"
value="1.0"></parameter>
      </rateAG>
      <rateAT>
        <parameter id="gtrRag12.at" lower="0.0" upper="100.0"
value="1.0"></parameter>
      </rateAT>
      <rateCG>
        <parameter id="gtrRag12.cg" lower="0.0" upper="100.0"
value="1.0"></parameter>
      </rateCG>
      <rateGT>
        <parameter id="gtrRag12.gt" lower="0.0" upper="100.0"
value="1.0"></parameter>
      </rateGT>
    </gtrModel>

```

```

    <gtrModel id="gtrRag3">
      <frequencies>
        <frequencyModel dataType="nucleotide">
          <alignment idref="alignment"></alignment>
          <frequencies>
            <parameter dimension="4"
id="gtrRag3.frequencies"></parameter>
          </frequencies>
        </frequencyModel>
      </frequencies>
      <rateAC>
        <parameter id="gtrRag3.ac" lower="0.0" upper="100.0"
value="1.0"></parameter>
      </rateAC>
      <rateAG>

```

```

        <parameter id="gtrRag3.ag" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateAG>
        <rateAT>
        <parameter id="gtrRag3.at" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateAT>
        <rateCG>
        <parameter id="gtrRag3.cg" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateCG>
        <rateGT>
        <parameter id="gtrRag3.gt" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateGT>
</gtrModel>

```

```

<gtrModel id="gtrCmos12">
<frequencies>
    <frequencyModel dataType="nucleotide">
        <alignment idref="alignment"></alignment>
        <frequencies>
            <parameter dimension="4"
id="gtrCmos12.frequencies"></parameter>
            </frequencies>
        </frequencyModel>
    </frequencies>
    <rateAC>
        <parameter id="gtrCmos12.ac" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateAC>
    <rateAG>
        <parameter id="gtrCmos12.ag" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateAG>
    <rateAT>
        <parameter id="gtrCmos12.at" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateAT>
    <rateCG>
        <parameter id="gtrCmos12.cg" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateCG>
    <rateGT>
        <parameter id="gtrCmos12.gt" lower="0.0" upper="100.0"
value="1.0"></parameter>

```

```

        </rateGT>
    </gtrModel>

    <gtrModel id="gtrCmos3">
        <frequencies>
            <frequencyModel dataType="nucleotide">
                <alignment idref="alignment"></alignment>
                <frequencies>
                    <parameter dimension="4"
id="gtrCmos3.frequencies"></parameter>
                </frequencies>
            </frequencyModel>
        </frequencies>
        <rateAC>
            <parameter id="gtrCmos3.ac" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateAC>
        <rateAG>
            <parameter id="gtrCmos3.ag" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateAG>
        <rateAT>
            <parameter id="gtrCmos3.at" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateAT>
        <rateCG>
            <parameter id="gtrCmos3.cg" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateCG>
        <rateGT>
            <parameter id="gtrCmos3.gt" lower="0.0" upper="100.0"
value="1.0"></parameter>
        </rateGT>
    </gtrModel>

    <siteModel id="siteModelRag12">
        <substitutionModel>
            <gtrModel idref="gtrRag12"></gtrModel>
        </substitutionModel>
        <relativeRate>
            <parameter id="siteModelRag12.relRate" lower="0.0" upper="100"
value="1.0"></parameter>
        </relativeRate>
        <gammaShape gammaCategories="6">
            <parameter id="siteModelRag12.alpha" lower="0.0" upper="100.0"
value="0.5"></parameter>

```

```
        </gammaShape>
        <proportionInvariant>
            <parameter id="siteModelRag12.pInv" lower="0.0" upper="1.0"
value="0.5"></parameter>
        </proportionInvariant>
    </siteModel>
```

```
    <siteModel id="siteModelRag3">
        <substitutionModel>
            <gtrModel idref="gtrRag3"></gtrModel>
        </substitutionModel>
        <relativeRate>
            <parameter id="siteModelRag3.relRate" lower="0.0" upper="100"
value="1.0"></parameter>
        </relativeRate>
        <gammaShape gammaCategories="6">
            <parameter id="siteModelRag3.alpha" lower="0.0" upper="100.0"
value="0.5"></parameter>
        </gammaShape>
    </siteModel>
```

```
        <siteModel id="siteModelCmos12">
            <substitutionModel>
                <gtrModel idref="gtrCmos12"></gtrModel>
            </substitutionModel>
            <relativeRate>
                <parameter id="siteModelCmos12.relRate" lower="0.0" upper="100"
value="1.0"></parameter>
            </relativeRate>
            <gammaShape gammaCategories="6">
                <parameter id="siteModelCmos12.alpha" lower="0.0" upper="100.0"
value="0.5"></parameter>
            </gammaShape>
        </siteModel>
```

```
        <siteModel id="siteModelCmos3">
            <substitutionModel>
                <gtrModel idref="gtrCmos3"></gtrModel>
            </substitutionModel>
            <relativeRate>
                <parameter id="siteModelCmos3.relRate" lower="0.0" upper="100"
value="1.0"></parameter>
            </relativeRate>
            <gammaShape gammaCategories="6">
                <parameter id="siteModelCmos3.alpha" lower="0.0" upper="100.0"
value="0.5"></parameter>
```

```
</gammaShape>
</siteModel>
```

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  <compoundParameter id="allRelativeRates">
    <parameter idref="siteModelRag12.relRate"></parameter>
    <parameter idref="siteModelRag3.relRate"></parameter>
    <parameter idref="siteModelCmos12.relRate"></parameter>
    <parameter idref="siteModelCmos3.relRate"></parameter>
  </compoundParameter>
```

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<treeLikelihood id="treeLikelihoodRag12">
  <patterns idref="patternsRag12"></patterns>
  <treeModel idref="treeModel"></treeModel>
  <siteModel idref="siteModelRag12"></siteModel>
  <discretizedBranchRates idref="branchRates"></discretizedBranchRates>
</treeLikelihood>
```

```
<treeLikelihood id="treeLikelihoodRag3">
  <patterns idref="patternsRag3"></patterns>
  <treeModel idref="treeModel"></treeModel>
  <siteModel idref="siteModelRag3"></siteModel>
  <discretizedBranchRates idref="branchRates"></discretizedBranchRates>
</treeLikelihood>
```

```
<treeLikelihood id="treeLikelihoodCmos12">
  <patterns idref="patternsCmos12"></patterns>
  <treeModel idref="treeModel"></treeModel>
  <siteModel idref="siteModelCmos12"></siteModel>
  <discretizedBranchRates idref="branchRates"></discretizedBranchRates>
</treeLikelihood>
```

```
<treeLikelihood id="treeLikelihoodCmos3">
  <patterns idref="patternsCmos3"></patterns>
  <treeModel idref="treeModel"></treeModel>
  <siteModel idref="siteModelCmos3"></siteModel>
  <discretizedBranchRates idref="branchRates"></discretizedBranchRates>
</treeLikelihood>
```

```
<operators id="operators">
```

```
  <scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrRag12.ac"></parameter>
  </scaleOperator>
  <scaleOperator scaleFactor="0.75" weight="1">
```

```
        <parameter idref="gtrRag12.ag"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrRag12.at"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrRag12.cg"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrRag12.gt"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="siteModelRag12.alpha"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="siteModelRag12.pInv"></parameter>
</scaleOperator>

<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrRag3.ac"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrRag3.ag"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrRag3.at"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrRag3.cg"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrRag3.gt"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="siteModelRag3.alpha"></parameter>
</scaleOperator>

        <scaleOperator scaleFactor="0.75" weight="1">
            <parameter idref="gtrCmos12.ac"></parameter>
        </scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrCmos12.ag"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
    <parameter idref="gtrCmos12.at"></parameter>
</scaleOperator>
<scaleOperator scaleFactor="0.75" weight="1">
```

```

        <parameter idref="gtrCmos12.cg"></parameter>
    </scaleOperator>
    <scaleOperator scaleFactor="0.75" weight="1">
        <parameter idref="gtrCmos12.gt"></parameter>
    </scaleOperator>
    <scaleOperator scaleFactor="0.75" weight="1">
        <parameter idref="siteModelCmos12.alpha"></parameter>
    </scaleOperator>

    <scaleOperator scaleFactor="0.75" weight="1">
        <parameter idref="gtrCmos3.ac"></parameter>
    </scaleOperator>
    <scaleOperator scaleFactor="0.75" weight="1">
        <parameter idref="gtrCmos3.ag"></parameter>
    </scaleOperator>
    <scaleOperator scaleFactor="0.75" weight="1">
        <parameter idref="gtrCmos3.at"></parameter>
    </scaleOperator>
    <scaleOperator scaleFactor="0.75" weight="1">
        <parameter idref="gtrCmos3.cg"></parameter>
    </scaleOperator>
    <scaleOperator scaleFactor="0.75" weight="1">
        <parameter idref="gtrCmos3.gt"></parameter>
    </scaleOperator>
    <scaleOperator scaleFactor="0.75" weight="1">
        <parameter idref="siteModelCmos3.alpha"></parameter>
    </scaleOperator>

    <scaleOperator scaleFactor="0.75" weight="3">
        <parameter idref="ucl.d.mean"></parameter>
    </scaleOperator>
    <scaleOperator scaleFactor="0.75" weight="3">
        <parameter idref="ucl.d.stdev"></parameter>
    </scaleOperator>
    <upDownOperator scaleFactor="0.75" weight="3">
        <up>
            <parameter idref="ucl.d.mean"></parameter>
        </up>
        <down>
            <parameter
idref="treeModel.allInternalNodeHeights"></parameter>
        </down>
    </upDownOperator>
    <swapOperator autoOptimize="false" size="1" weight="30">
        <parameter idref="branchRates.categories"></parameter>
    </swapOperator>

```

```

</swapOperator>
<scaleOperator scaleFactor="0.75" weight="3">
  <parameter idref="yule.birthRate"></parameter>
</scaleOperator>

  <centeredScale scaleFactor="0.75" weight="5">
    <parameter idref="allRelativeRates"></parameter>
  </centeredScale>
<deltaExchange delta="0.75" weight="5">
  <parameter idref="allRelativeRates"></parameter>
</deltaExchange>

<scaleOperator scaleFactor="0.75" weight="3">
  <parameter idref="treeModel.rootHeight"></parameter>
</scaleOperator>
<uniformOperator weight="30">
  <parameter idref="treeModel.internalNodeHeights"></parameter>
</uniformOperator>
<subtreeSlide gaussian="true" size="1.0" weight="15">
  <treeModel idref="treeModel"></treeModel>
</subtreeSlide>
<narrowExchange weight="15">
  <treeModel idref="treeModel"></treeModel>
</narrowExchange>
<wideExchange weight="3">
  <treeModel idref="treeModel"></treeModel>
</wideExchange>
<wilsonBalding weight="3">
  <treeModel idref="treeModel"></treeModel>
</wilsonBalding>
</operators>

<mcmc autoOptimize="true" chainLength="4000000" id="mcmc">
  <posterior id="posterior">
    <prior id="prior">
      <speciationLikelihood
idref="speciation"></speciationLikelihood>
      <booleanLikelihood
idref="boolean1"></booleanLikelihood>
    </prior>

    <uniformPrior lower="320.0" upper="380.0">
      <parameter
idref="treeModel.rootHeight"></parameter>
    </uniformPrior>

```



```
<distributionLikelihood id="ingroup-Cal" offset="295">
  <distribution>
    <logNormalDistributionModel meanInRealSpace="false" offset="295">
      <mean> <parameter value="3.2958"></parameter> </mean>
      <stdev> <parameter value="0.5306"></parameter> </stdev>
    </logNormalDistributionModel>
  </distribution>
  <data> <tmrcaStatistic idref="tmrca_ingroup"></tmrcaStatistic> </data>
</distributionLikelihood>

<distributionLikelihood id="rodent-Cal" offset="9">
  <distribution>
    <logNormalDistributionModel meanInRealSpace="false" offset="9">
      <mean> <parameter value="1.6094"></parameter> </mean>
      <stdev> <parameter value="0.5306"></parameter> </stdev>
    </logNormalDistributionModel>
  </distribution>
  <data> <tmrcaStatistic idref="tmrca_rodents"></tmrcaStatistic> </data>
</distributionLikelihood>

<distributionLikelihood id="anguimorph-scinco-Cal" offset="155">
  <distribution>
    <logNormalDistributionModel meanInRealSpace="false" offset="155">
      <mean> <parameter value="2.7081"></parameter> </mean>
      <stdev> <parameter value="0.3365"></parameter> </stdev>
    </logNormalDistributionModel>
  </distribution>
  <data> <tmrcaStatistic idref="tmrca_anguimorph-scinco"></tmrcaStatistic> </data>
</distributionLikelihood>

<distributionLikelihood id="bird-croc-Cal" offset="228">
  <distribution>
    <logNormalDistributionModel meanInRealSpace="false" offset="228">
      <mean> <parameter value="3.0910"></parameter> </mean>
      <stdev> <parameter value="0.3436"></parameter> </stdev>
    </logNormalDistributionModel>
  </distribution>
  <data> <tmrcaStatistic idref="tmrca_bird-croc"></tmrcaStatistic> </data>
</distributionLikelihood>

<distributionLikelihood id="bird-lizard-Cal" offset="237">
  <distribution>
    <logNormalDistributionModel meanInRealSpace="false" offset="237">
      <mean> <parameter value="2.9957"></parameter> </mean>
```

```

    <stdev> <parameter value="0.3853"></parameter> </stdev>
  </logNormalDistributionModel>
</distribution>
<data> <tmrcaStatistic idref="tmrca_bird-lizard"></tmrcaStatistic> </data>
</distributionLikelihood>

<distributionLikelihood id="crypto-pleuro-Cal" offset="190">
  <distribution>
    <logNormalDistributionModel meanInRealSpace="false" offset="190">
      <mean> <parameter value="3.4657"></parameter> </mean>
      <stdev> <parameter value="0.6419"></parameter> </stdev>
    </logNormalDistributionModel>
  </distribution>
  <data> <tmrcaStatistic idref="tmrca_crypto-pleuro"></tmrcaStatistic> </data>
</distributionLikelihood>

    <likelihood id="likelihood">
      <treeLikelihood
idref="treeLikelihoodRag12"></treeLikelihood>
      <treeLikelihood
idref="treeLikelihoodRag3"></treeLikelihood>
      <treeLikelihood
idref="treeLikelihoodCmos12"></treeLikelihood>
      <treeLikelihood
idref="treeLikelihoodCmos3"></treeLikelihood>
    </likelihood>
  </posterior>
  <operators idref="operators"></operators>
  <log id="screenLog" logEvery="100">
    <column dp="4" label="Posterior" width="12">
      <posterior idref="posterior"></posterior>
    </column>
    <column label="Root Height" sf="6" width="12">
      <parameter idref="treeModel.rootHeight"></parameter>
    </column>
    <column dp="4" label="L(tree)" width="12">
      <treeLikelihood
idref="treeLikelihoodRag12"></treeLikelihood>
    </column>
    <column dp="4" label="L(tree)" width="12">
      <treeLikelihood
idref="treeLikelihoodRag3"></treeLikelihood>
    </column>
    <column dp="4" label="L(tree)" width="12">
      <treeLikelihood
idref="treeLikelihoodCmos12"></treeLikelihood>

```

```

        </column>
        <column dp="4" label="L(tree)" width="12">
            <treeLikelihood
idref="treeLikelihoodCmos3"></treeLikelihood>
        </column>
                                <column dp="4" label="L(speciation)"
width="12">
                <speciationLikelihood
idref="speciation"></speciationLikelihood>
            </column>
            <column label="ingroup Root Height" sf="6" width="12">
                <parameter idref="treeModel.rootHeight"></parameter>
                <tmrcaStatistic idref="tmrca_ingroup"></tmrcaStatistic>
            </column>
                                <column label="rodents Root Height" sf="6"
width="12">
                <parameter idref="treeModel.rootHeight"></parameter>
                <tmrcaStatistic idref="tmrca_rodents"></tmrcaStatistic>
            </column>
            <column label="crypto-pleuro Root Height" sf="6" width="12">
                <parameter idref="treeModel.rootHeight"></parameter>
                <tmrcaStatistic idref="tmrca_crypto-pleuro"></tmrcaStatistic>
            </column>
            <column label="anguimorph-scinco Root Height" sf="6" width="12">
                <parameter idref="treeModel.rootHeight"></parameter>
                <tmrcaStatistic idref="tmrca_anguimorph-scinco"></tmrcaStatistic>
            </column>
            <column label="bird-lizard Root Height" sf="6" width="12">
                <parameter idref="treeModel.rootHeight"></parameter>
                <tmrcaStatistic idref="tmrca_bird-lizard"></tmrcaStatistic>
            </column>
            <column label="bird-croc Root Height" sf="6" width="12">
                <parameter idref="treeModel.rootHeight"></parameter>
                <tmrcaStatistic idref="tmrca_bird-croc"></tmrcaStatistic>
            </column>
        </log>
        <log fileName="TETRAPODS_lognormal.txt.log" id="fileLog"
logEvery="100">
            <posterior idref="posterior"></posterior>
            <parameter idref="siteModelRag12.alpha"></parameter>
            <parameter idref="siteModelRag3.alpha"></parameter>
            <parameter idref="siteModelRag12.pInv"></parameter>
            <parameter idref="siteModelRag12.relRate"></parameter>
            <parameter idref="siteModelRag3.relRate"></parameter>
            <parameter idref="siteModelCmos12.alpha"></parameter>
            <parameter idref="siteModelCmos3.alpha"></parameter>
            <parameter idref="siteModelCmos12.relRate"></parameter>

```

```

    <parameter idref="siteModelCmos3.relRate"></parameter>
    <parameter idref="ucl.d.mean"></parameter>
    <parameter idref="ucl.d.stdev"></parameter>
    <rateStatistic idref="meanRate"></rateStatistic>
    <rateStatistic idref="coefficientOfVariation"></rateStatistic>
    <rateCovarianceStatistic
idref="covariance"></rateCovarianceStatistic>
    <parameter idref="yule.birthRate"></parameter>
    <parameter idref="gtrRag12.ac"></parameter>
    <parameter idref="gtrRag12.ag"></parameter>
    <parameter idref="gtrRag12.at"></parameter>
    <parameter idref="gtrRag12.cg"></parameter>
    <parameter idref="gtrRag12.gt"></parameter>
    <parameter idref="gtrRag3.ac"></parameter>
    <parameter idref="gtrRag3.ag"></parameter>
    <parameter idref="gtrRag3.at"></parameter>
    <parameter idref="gtrRag3.cg"></parameter>
    <parameter idref="gtrRag3.gt"></parameter>
    <parameter idref="gtrCmos12.ac"></parameter>
    <parameter idref="gtrCmos12.ag"></parameter>
    <parameter idref="gtrCmos12.at"></parameter>
    <parameter idref="gtrCmos12.cg"></parameter>
    <parameter idref="gtrCmos12.gt"></parameter>
    <parameter idref="gtrCmos3.ac"></parameter>
    <parameter idref="gtrCmos3.ag"></parameter>
    <parameter idref="gtrCmos3.at"></parameter>
    <parameter idref="gtrCmos3.cg"></parameter>
    <parameter idref="gtrCmos3.gt"></parameter>
    <parameter idref="treeModel.rootHeight"></parameter>
    <tmrcaStatistic idref="tmrca_ingroup"></tmrcaStatistic>
    <tmrcaStatistic idref="tmrca_rodents"></tmrcaStatistic>
    <tmrcaStatistic idref="tmrca_crypto-pleuro"></tmrcaStatistic>
    <tmrcaStatistic idref="tmrca_anguimorph-scinco"></tmrcaStatistic>
    <tmrcaStatistic idref="tmrca_bird-lizard"></tmrcaStatistic>
    <tmrcaStatistic idref="tmrca_bird-croc"></tmrcaStatistic>
    <treeLikelihood idref="treeLikelihoodRag12"></treeLikelihood>
    <treeLikelihood idref="treeLikelihoodRag3"></treeLikelihood>
    <treeLikelihood idref="treeLikelihoodCmos12"></treeLikelihood>
    <treeLikelihood idref="treeLikelihoodCmos3"></treeLikelihood>
    <speciationLikelihood idref="speciation"></speciationLikelihood>
  </log>

  <logTree fileName="TETRAPODS_lognormal.txt.trees" id="treeFileLog" logEvery="100"
nexusFormat="true">
    <treeModel idref="treeModel"></treeModel>
  </logTree>

```

```
        <logTree fileName="TETRAPODS_lognormal.txt(subst).trees"
id="substTreeFileLog" logEvery="100" nexusFormat="true">
            <treeModel idref="treeModel"></treeModel>
            <discretizedBranchRates
idref="branchRates"></discretizedBranchRates>
            </logTree>
        </mcmc>

        <report>
            <property name="timer">
                <object idref="mcmc"></object>
            </property>
        </report>

</beast>
```