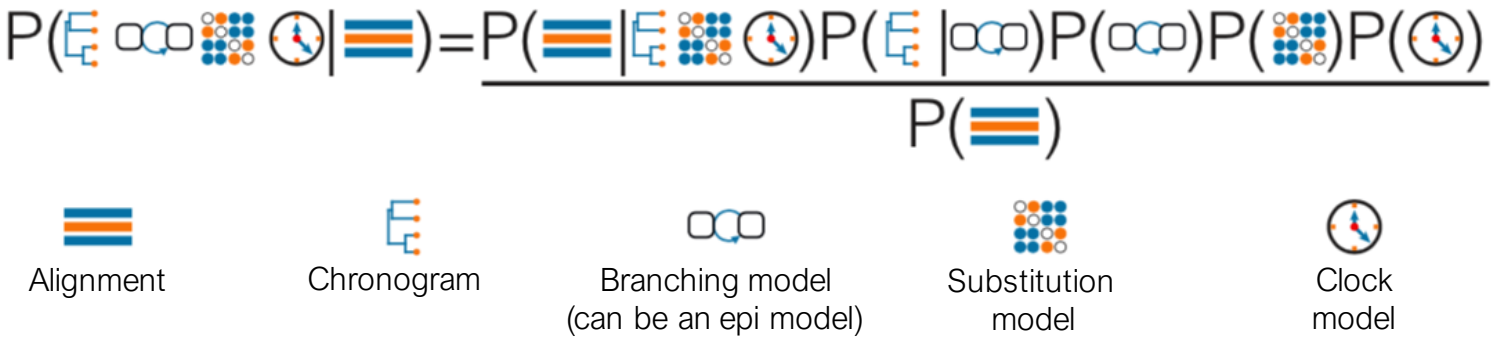
Putting it all together

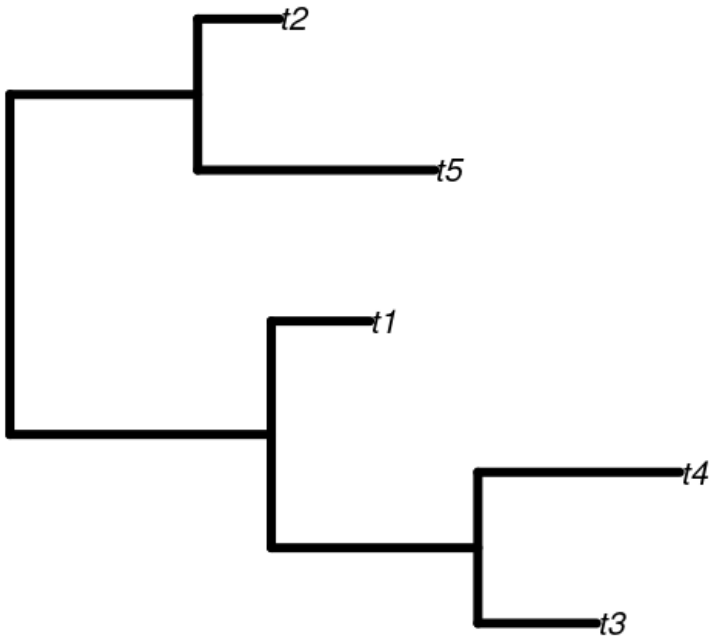


- HKY+G: 2 parameters (kappa, shape)
- Coalescent exponential: 2 parameters (growthRate, ePopSize)
- UCLN clock model: 2 parameters (ucldMean, ucldStdev)*

From: Du Plessis and Stadler 2015

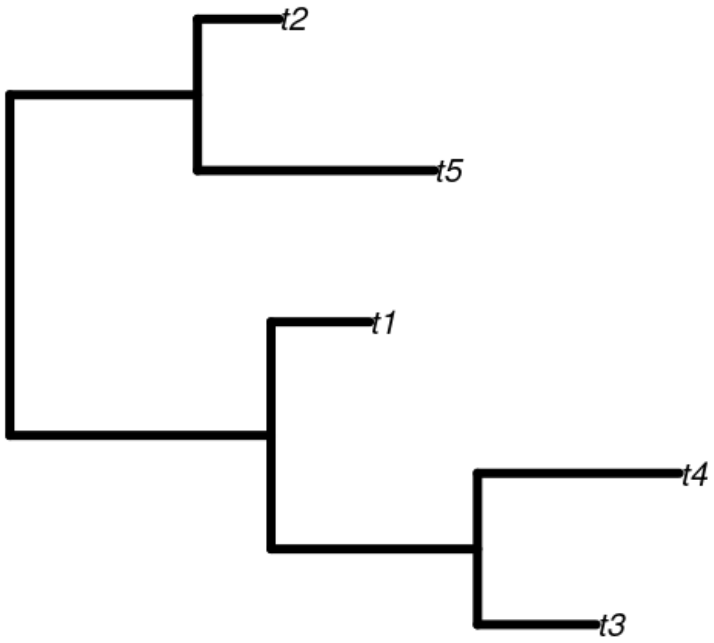
* arguably the branch lengths are also parameters, but they are much less tractable.

Exp. Coalescent:
growthRate, ePopSize



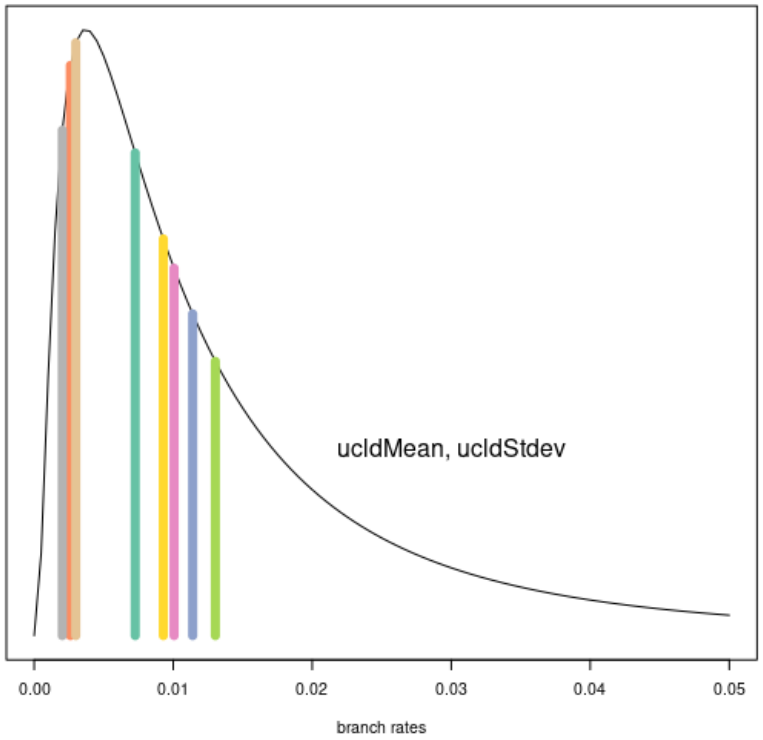
Chronogram or time tree

Exp. Coalescent:
growthRate, ePopSize



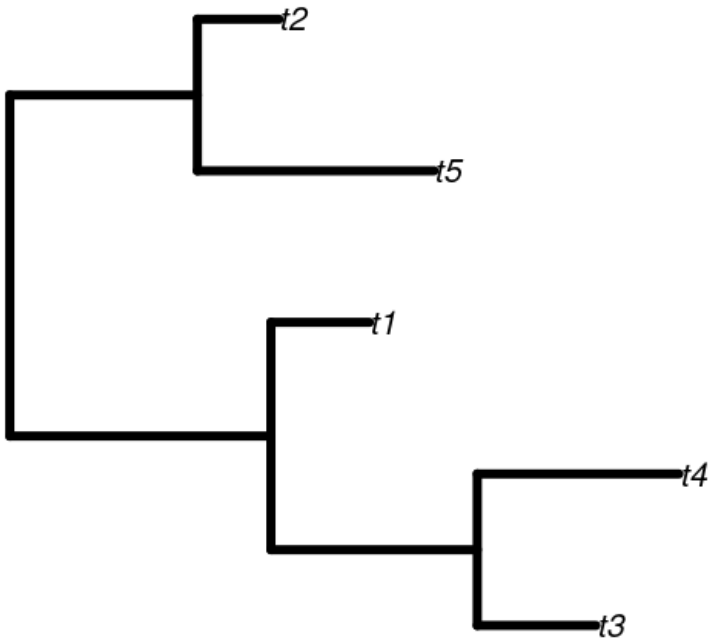
Chronogram or time tree

UCLN clock model:
ucldMean, ucldStdev



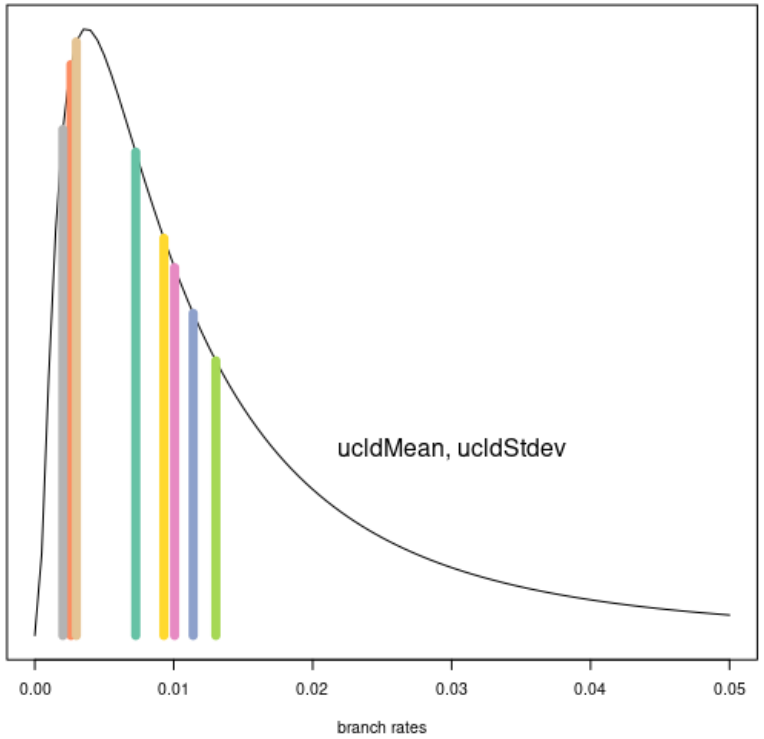
Branch rates

Exp. Coalescent:
growthRate, ePopSize



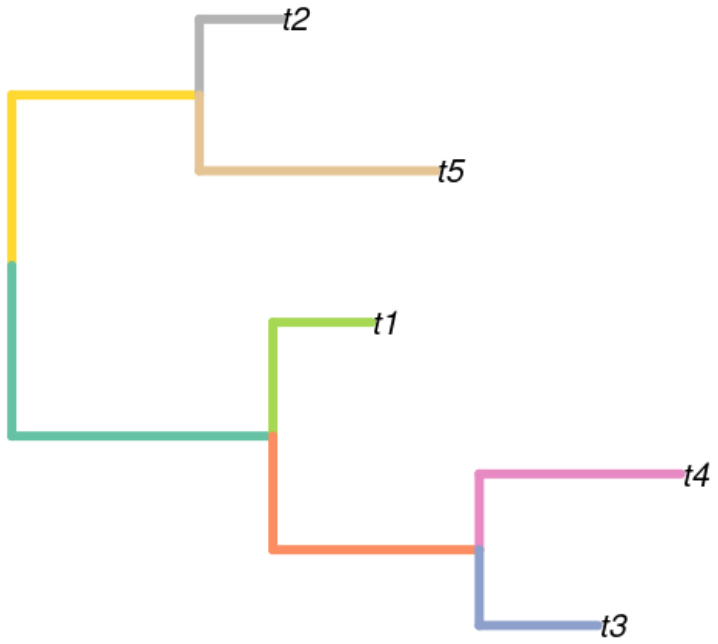
Chronogram or time tree

UCLN clock model:
ucldMean, ucldStdev



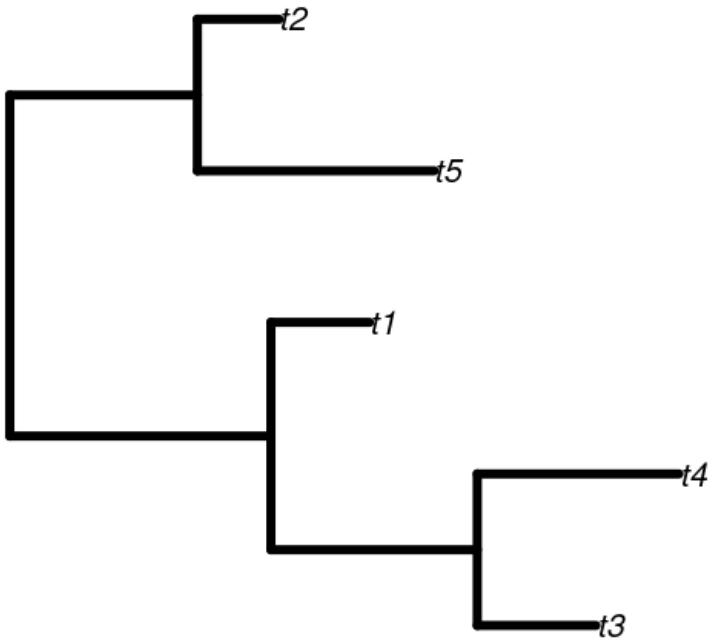
Branch rates

Branch rates * times



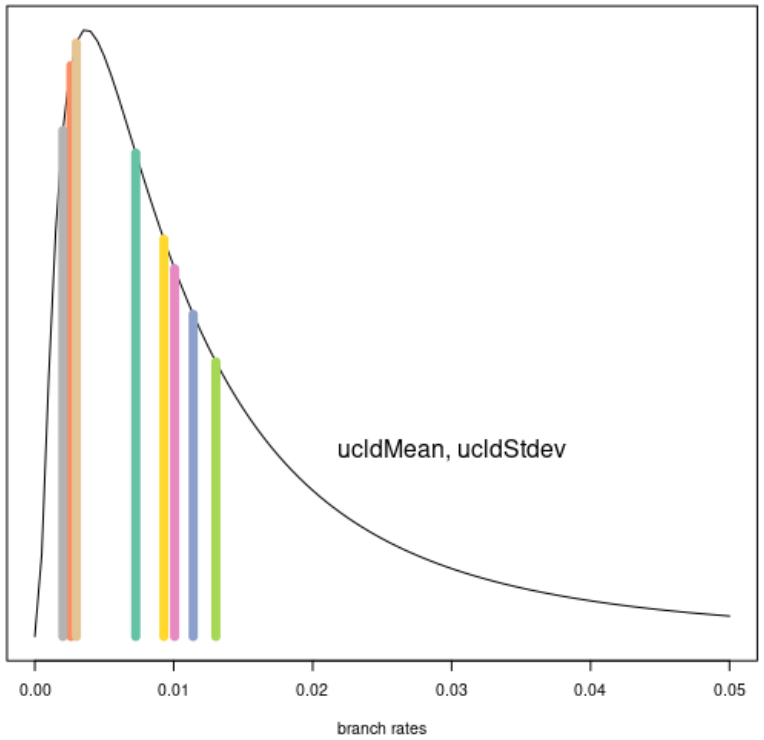
Phylogram

Exp. Coalescent:
growthRate, ePopSize



Chronogram or time tree

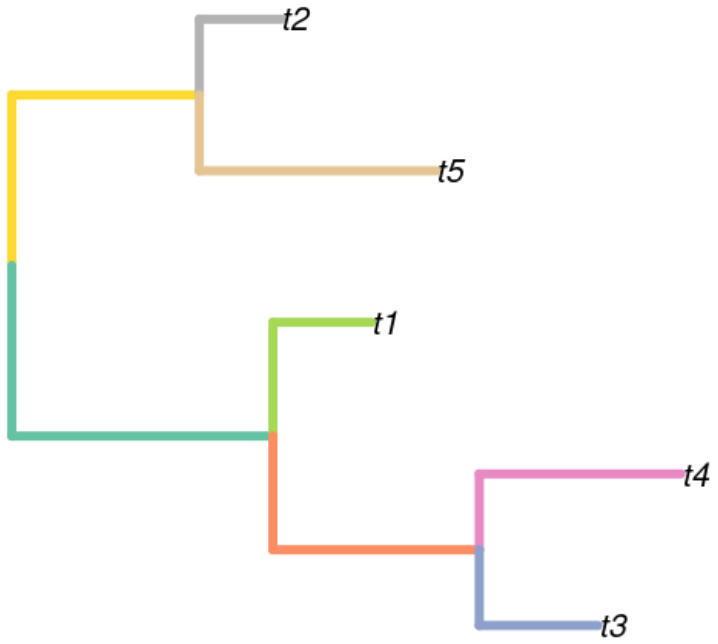
UCLN clock model:
ucldMean, ucldStdev



Branch rates

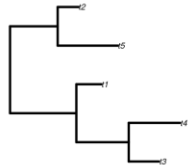
Kappa, gammaShape

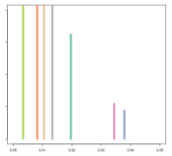
Branch rates * times



Phylogram

treeLikelihood or likelihood: P(alignment | kappa, gammaShape, )

coalescentExponential: P( | growthRate, ePopSize)

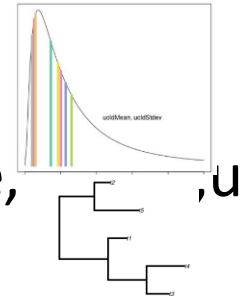
Density of branch rates: P( | ucldMean, ucldStdev)

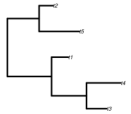
Prior on subst model: parameters — P(kappa) * P(gammaShape)

(hyper)prior on clock model: parameters — P(ucldMean)*P(ucldStdev)

(hyper)prior on tree prior: parameters — P(growthRate)*P(ePopSize)

We do not typically log these prior probabilities individually, but we can inspect the indvidual parameters

treeLikelihood or likelihood: P(alignment |kappa, gammaShape,  ,ucldMean,ucldStdev)

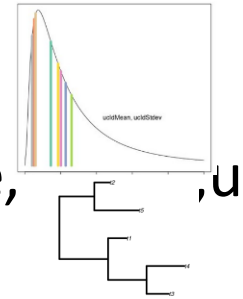
coalescentExponential: P( | growthRate, ePopSize)

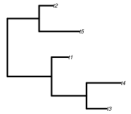
Prior on clock parameters: P(ucldMean)*P(ucldStdev)

Prior on subst model: parameters P(kappa) * P(gammaShape)

(hyper)prior on tree prior: parameters P(growthRate)*P(ePopSize)

We do not typically log these prior probabilities individually, but we can inspect the indvidual parameters

treeLikelihood or likelihood: P(alignment |kappa, gammaShape,  ,ucldMean,ucldStdev)

coalescentExponential: P( | growthRate, ePopSize)

Prior on clock parameters: P(ucldMean)*P(ucldStdev)

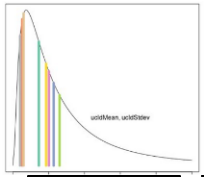
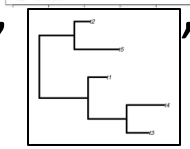
Prior on subst model: parameters P(kappa) * P(gammaShape)

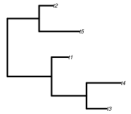
(hyper)prior on tree prior: parameters P(growthRate)*P(ePopSize)

Prior densities

This is the 'prior'

This is the 'posterior' or joint

treeLikelihood or likelihood: P(alignment |kappa, gammaShape,   ,ucldMean,ucldStdev)

coalescentExponential: P( | growthRate, ePopSize)

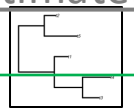
Prior on clock parameters: P(ucldMean)*P(ucldStdev)

Prior on subst model: parameters: P(kappa) * P(gammaShape)

(hyper)prior on tree prior: parameters: P(growthRate)*P(ePopSize)

Prior densities

This is the 'prior'

Parameters we can estimate:kappa, gammaShape, ucldMean, ucldStdev, growthRate, PopSize, 

This is the 'posterior' or joint

Concept summary

- The 'likelihood model' is that which includes the data directly.
- The prior model has an impact on the likelihood model, via the tree, but its parameters are not in the likelihood function.
- We can estimate parameters in the model formulation.