BODEGA APPLIED PHYLO 2013

Statistical Estimation of Phylogeny: An Outline

Statistical paradigm

pose substantive question

develop stochastic model with parameters that, if known, would answer the question.

collect observations that are informative about model parameters.

find the best estimate of parameters conditioned on the observations at hand using some criterion.

Statistical phylogenetic paradigm
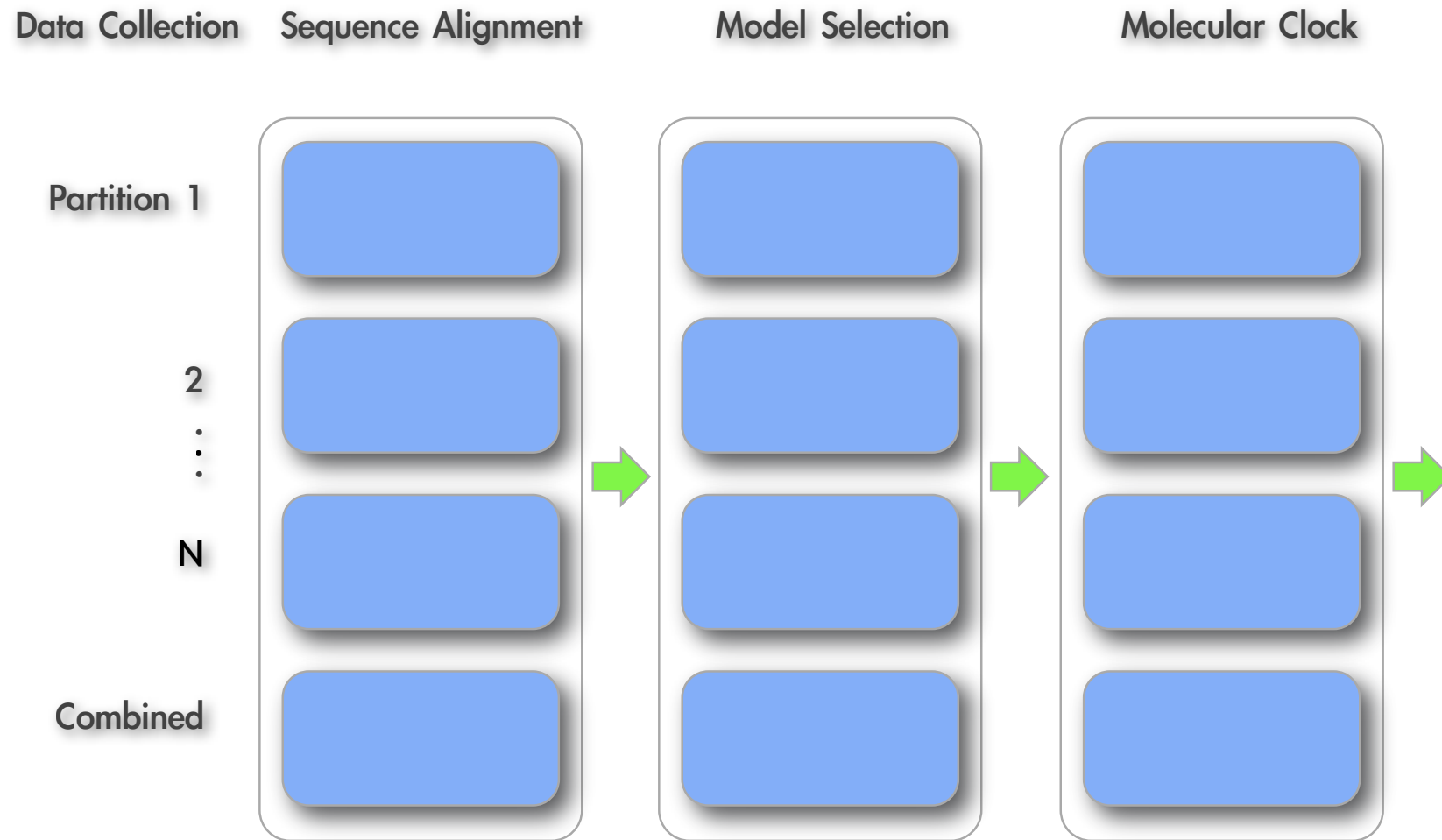
what if the phylogeny of a group of organisms?

develop phylogenetic model with tree (and branch lengths) and a Markov model describing how traits change over tree.

construct a data matrix (e.g., of DNA sequences) sampled from the group of organisms.

find the best estimate of phylogeny using maximum likelihood criterion or Bayesian inference criterion.

from the Huelsenbook

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A slightly more detailed cartoon of model-based inference of phylogeny

from Moore & Donoghue (2007)

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Preliminary Analyses

Phylogeny Estimation

MrBayes
4 paired-MC3 chains
partition-specific model

Divergence Time Estimation

BEAST
6 chains
UCLN relaxed-clock

	TOPOLOGY	CHRONOGRAM
Discrete Trait Evolution	BayesTraits	BayesTraits
Continuous Trait Evolution	misc. R	misc. R
Rates of Trait Evolution	misc R	misc R
Rates of Lineage Diversification	symmeTREE	misc. R