Introduction to Phylogenetic Analysis

Friday 24 July, 2014

Overview

This workshop will provide an introduction to the principles and practice of molecular phylogenetic analysis. The workshop is suitable for beginners and will comprise a series of lectures and practical exercises. Using two popular packages for phylogenetic analysis, *MEGA* and *BEAST*, participants will learn how to select models, infer phylogenies, and estimate timescales from DNA sequence data.

The workshop will be held in the Robert Brown Computing Lab in the Macleay Building at the University of Sydney. It will be run by A/Prof Simon Ho (simon.ho@sydney.edu.au). The workshop will involve a series of lectures and practicals. The practical exercises will involve basic analyses of a prepared data sets using desktop Macs. We will be using free phylogenetic software that can be installed on PC, Mac, and UNIX platforms.

Programme

09.30 – 09.45	Arrival, set-up, and introduction
09.45 – 10.15	Lecture: Principles of phylogenetic analysis
10.15 – 10.30	Practical: Sequence alignment
10.30 – 11.15	Lecture: Phylogenetic methods and models
11.15 – 12.30	Practical: Parsimony, distance methods, and likelihood
	Break
13.30 – 14.30	Lecture: Bayesian phylogenetic analysis
14.30 – 16.30	Practical: Bayesian analysis and molecular clocks

Useful references

Introductory books on phylogenetics

- *The Phylogenetic Handbook*
  Lemey, Salemi, & Vandamme (2009) Cambridge University Press.
- *Reading the Story in DNA*
  Bromham (2008) Oxford University Press.
- *Inferring Phylogenies*
  Felsenstein (2003) Sinauer Associates.
- *Molecular Evolution: A Phylogenetic Approach*
  Page & Holmes (1998) Wiley-Blackwell.

Bayesian phylogenetic analysis

- *Bayesian inference of phylogeny: a non-technical primer*
  Archibald, Mort, & Crawford (2003) Taxon 52: 187-191.
- *Bayesian phylogenetics with BEAUti and the BEAST 1.7*
  Drummond, Suchard, Xie, & Rambaut (2012) *Mol Biol Evol* 29:1969-1973.
- *BEAST: Bayesian evolutionary analysis by sampling trees*
  Drummond & Rambaut (2007) *BMC Evol Biol* 7: 214.

Molecular clocks and calibrations

- *Molecular-clock models for estimating evolutionary rates and timescales*
  Ho & Duchêne (2014) *Mol Ecol*, 23: 5947–5965.
- *The changing face of the molecular clock*
  Ho (2014) *Trends Ecol Evol*, 29: 496–503.
- *Accounting for calibration uncertainty in phylogenetic estimation of evolutionary divergence times*
  Ho & Phillips (2009) *Syst Biol* 58: 367-380.