# Introduction to Phylogenetic Analysis

**Sunday 1 July, 2018**

## Overview

This half-day workshop will provide an introduction to phylogenetic analysis. It will comprise a series of lectures and practical exercises that will cover the interpretation of phylogenetic trees, data types, sequence alignment, evolutionary models, maximum likelihood, Bayesian phylogenetics, and molecular dating. Prior knowledge of basic phylogenetics is helpful but not essential.

## Instructors

The workshop will be run by Simon Ho and David Duchêne from the **Molecular Ecology, Evolution, and Phylogenetics Laboratory** in the School of Life and Environmental Sciences, University of Sydney.

## Venue

The workshop will be held in Building 6 at the University of Canberra, at the northern end of the Concourse (see the map at the end of this document). Morning tea and lunch will be provided.

## Computing

The practical exercises will involve basic analyses of prepared data sets. Please bring your own laptop to the workshop, with the following software installed: *MEGA* 7 (https://www.megasoftware.net), *BEAST* 1.8+ (http://beast.community/#downloading-beast), *Tracer* (http://tree.bio.ed.ac.uk/software/tracer/), and *FigTree* (http://tree.bio.ed.ac.uk/software/figtree/).

## Schedule

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|---|---|
| 09.00 – 09.10 | Welcome |
| 09.10 – 09.50 | Lecture 1: Molecular phylogenetics |
| 09.50 – 10.30 | Practical 1: Model selection and maximum-likelihood analysis using *MEGA* |
| | *--- Morning tea ---* |
| 10.45 – 11.30 | Lecture 2: Bayesian phylogenetics |
| 11.30 – 12.30 | Practical 2: Bayesian molecular dating using *BEAST* |
| | *--- Lunch ---* |
| 13.10 – 14.00 | Practical 2 continued (optional) |

# Useful Readings

**Reference books**

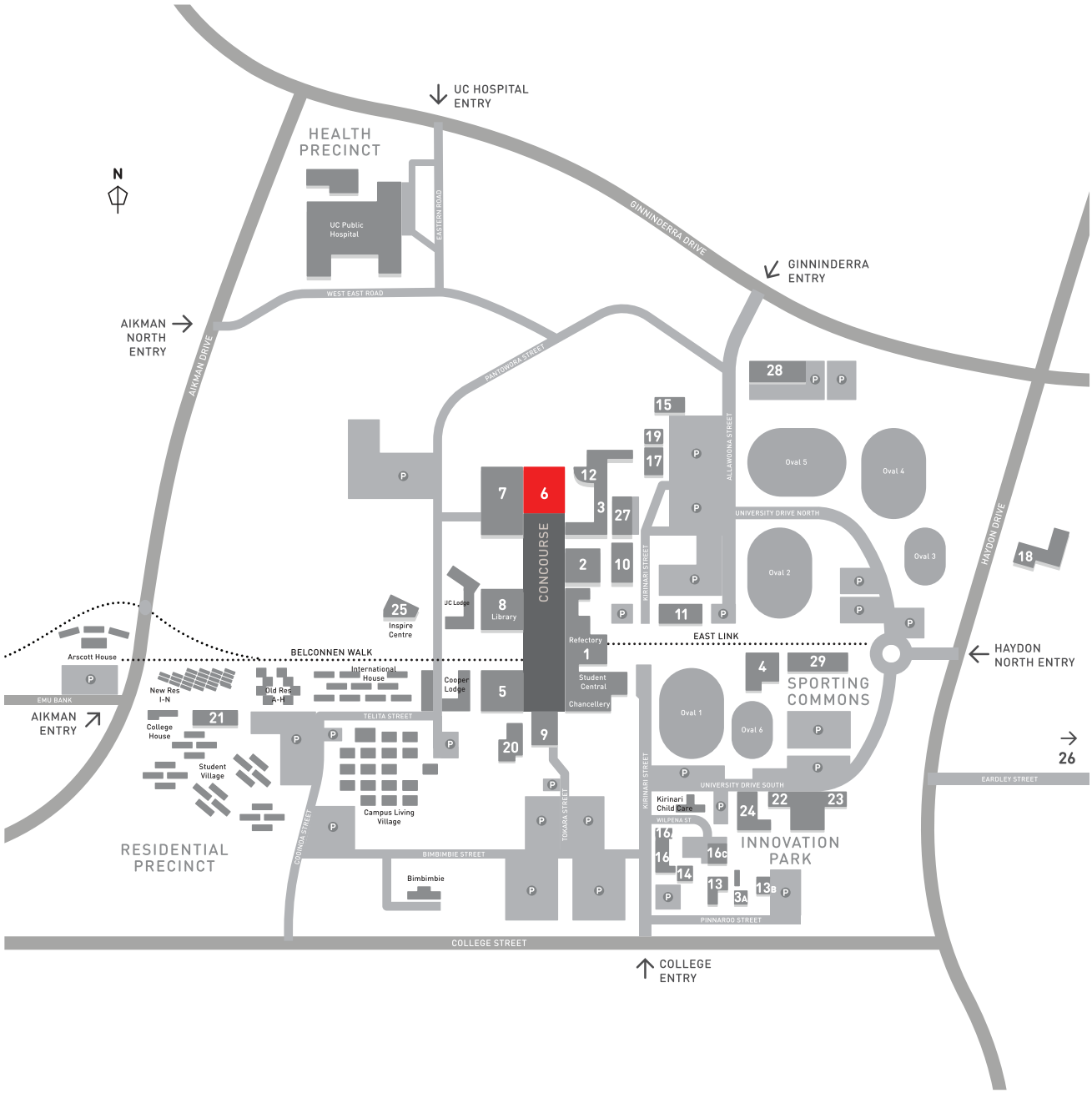
- *An Introduction to Molecular Evolution and Phylogenetics*
  Bromham (2016) Oxford University Press.
- *Molecular Evolution: A Statistical Approach*
  Yang (2014) Oxford University Press.
- *The Phylogenetic Handbook*
  Lemey, Salemi, & Vandamme (2009) Cambridge University Press.
- *Bayesian Phylogenetics: Methods, Algorithms, and Applications*
  Chen, Kuo, & Lewis (2014) Chapman & Hall / CRC.

**Molecular phylogenetics and Bayesian inference**

- *Molecular phylogenetics: principles and practice*
  Yang & Rannala (2012) *Nat Rev Genet* 13: 303–314.
- State-of-the-art methodologies dictate new standards for phylogenetic analysis
  Anisimova et al. (2013) *BMC Evol Biol*, 13: 161.
- *Bayesian phylogenetics with BEAUti and the BEAST 1.7*
  Drummond et al. (2012) *Mol Biol Evol* 29: 1969–1973.
- *Bayesian phylogenetic and phylodynamic data integration using BEAST 1.10*
  Suchard et al. (2018) *Virus Evol* 4: vey016.

**Molecular dating**

- *A practical guide to molecular dating*
  Sauquet (2013) *C R Palevol*, 12: 355–367.
- *Bayesian molecular clock dating of species divergences in the genomics era*
  dos Reis, Donoghue, & Yang (2016) *Nat Rev Genet* 17: 71–80.
- *Bayesian molecular dating: opening up the black box*
  Bromham et al. (2018) *Biol Rev*, 93: 1165–1191.


UC HOSPITAL ENTRY
HEALTH PRECINCT
N
UC Public Hospital
EASTERN ROAD
GINNINDERRA DRIVE
GINNINDERRA ENTRY
WEST EAST ROAD
AIKMAN NORTH ENTRY
AIKMAN DRIVE
PANTHONDRA STREET
28
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ALLAWONNA STREET
Oval 5
Oval 4
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6
12
3
27
CONCOURSE
UNIVERSITY DRIVE NORTH
2
10
KIRINARI STREET
Oval 2
Oval 3
HAYDON DRIVE
18
25
Inspire Centre
UC Lodge
8
Library
11
Refectory
1
EAST LINK
Arscott House
BELCONNEN WALK
HAYDON NORTH ENTRY
4
29
SPORTING COMMONS
International House
Cooper Lodge
5
Student Central
Chancellery
Oval 1
Oval 6
EMU BANK
New Res I-N
Old Res A-H
AIKMAN ENTRY
TELITA STREET
College House
21
20
9
26
Student Village
Campus Living Village
UNIVERSITY DRIVE SOUTH
EARDLEY STREET
Kirinari Child Care
WILPENA ST
22
23
24
16
16
16c
14
13
13a
3A
INNOVATION PARK
RESIDENTIAL PRECINCT
COORINDI STREET
TOKARA STREET
BIMBIMBIE STREET
Bimbimbie
PINNAROO STREET
COLLEGE STREET
COLLEGE ENTRY