

*Reading assignment on Molecular Clocks:*

Read one of the papers (or select another one, please check it with me).

As you read, consider all of the following questions:

What is the main question?

What is the study showing that is new (or was new at the time)?

*For the new data analyses:*

What was the purpose of estimating dates of divergence?

How many genes were used and why were they selected?

How did authors address the issue of rate heterogeneity?

How did the authors incorporate paleontological data or other means for establishing absolute dates?

Was generation time an issue and was there evidence for a generation time effect?

Is there a conflict between paleontological data and the results?

What were the main results?

What are the broader implications?

Prepare a presentation for the class on Thursday April 11 that uses 1-2 overheads and is 5-7 min in length.

Some studies using molecular clocks:

- Aris-Brosou S, Yang ZH. 2002. Effects of models of rate evolution on estimation of divergence dates with special reference to the metazoan 18S ribosomal RNA phylogeny. *Syst. Biol.* 51: 703-714
- Blanc G, Hokamp K, Wolfe KH. 2003. A recent polyploidy superimposed on older large-scale duplications in the *Arabidopsis* genome. *Genome Research* 13:137-144.
- Bromham LD, Henny MD. 2000. Can fast early rates reconcile molecular dates with the Cambrian explosion? *Proc. R. Soc. Lond. B.* 267:1041-1047
- Gaunt MW, Miles MA. 2002. An insect molecular clock dates the origin of the insects and accords with palaeontological and biogeographic landmarks. *Mol Biol Evol* 19: 748-761
- Glazko GV, Nei M. 2003. Estimation of divergence times for major lineages of primate species. *Mol Biol Evol* 20:424-434.
- Li WH, Ellsworth DL, Krushkal J, Chang BHJ, HewettEmmett D 1996. Rates of nucleotide substitution in primates and rodents and the generation time effect hypothesis. *Mol. Phylogenet. Evol* 5: 182-187
- Marko PB. 2002. Fossil calibration of molecular clocks and the divergence times of geminate species pairs separated by the Isthmus of Panama. *Mol Biol Evol* 19: 2005-2021.
- Masta SE. 2000. Phylogeography of the jumping spider *Habronattus pugillis* (Araneae : Salticidae): Recent vicariance of sky island populations? *Evolution* 54: 1699-1711
- van Tuinen M, Hedges SB. 2001. Calibration of avian molecular clocks. *Mol Biol Evol* 18: 206-213
- Whitfield JB. 2002. Estimating the age of the polydnavirus/braconid wasp symbiosis. *Proc Natl. Acad Sci USA* 99: 7508-7513
- Whittle CA, Johnston MO. 2003. Broad-scale analysis contradicts the theory that generation time affects molecular evolutionary rates in plants. *J. Mol. Evol.* 56: 223-233
- Wray GA, Levinton JS, Shapiro LH 1996. Molecular evidence for deep precambrian divergences among metazoan phyla. *Science* 274: 568-573
- Xiang QY, Soltis DE, Soltis PS, et al. 2000. Timing the eastern Asian-Eastern North American floristic disjunction: Molecular clock corroborates paleontological estimates. *Mol. Phylogenet. Evol.* 15: 462-472
- Yi SJ, Ellsworth DL, Li WH. 2002. Slow molecular clocks in Old World monkeys, apes, and humans. *Mol Biol Evol* 19: 2191-2198