

groups, the ovary showed negligible Vg mRNA expression, confirming that although eyestalk ablation accelerates ovarian maturation, it does not alter the dynamics of Vg gene expression.

**30.3** JEFFERY, J.E.\*; BININDA-EMONDS, O.R.P., COATES, M.I., RICHARDSON, M.K.; *Leiden University, University of Chicago*. Using Heterochrony to Reconstruct Phylogeny.

Numerous studies have shown that change in the sequence of development is a widespread phenomenon in vertebrate evolution. However, these heterochronies are usually examined on pre-existing phylogenies, rather than used as data for phylogenetic reconstruction. Before such data can be used in reconstruction, some serious methodological difficulties must be overcome: heterochrony can alter sequences to such an extent that simple timing comparisons are impossible. Practical difficulties in observing development means that there are likely to be missing data. Also, vertebrate development seldom produces fully resolved sequences - two or more developmental events may occur simultaneously. This simultaneity may be real ('hard') or may be an artefact caused by insufficient observations ('soft'). Most existing methods of sequence comparison cannot be applied in these circumstances. Therefore, we have adapted a method originally used for phylogenetic analysis of mitochondrial gene-order. 'Breakpoint' analysis produces a distance metric for two sequences (A and B), based on the minimum number of changes (breaks) needed to make A match B. By calculating the distances between all the sequences under study, a distance matrix can be built up. This can be subjected to a phylogenetic analysis using standard techniques. If data are missing from one or more sequences, comparisons can be 'rescaled' to account for the reduced number of events. Hard simultaneities may be included using a similar process. Soft simultaneities are more difficult to include, but we are currently researching possible techniques.

**P1.86** JENKINS, J.L., BUCK, C.L.; *University of South Dakota*. Metabolic rate reduction during entry into torpor: a consequence of body temperature effects or metabolic suppression?

During hibernation, animals conserve endogenous fuels by entering torpor, a condition characterized by profound reduction of metabolism and body temperature. The mechanisms by which animals achieve and maintain extended periods of hypometabolism and hypothermia are unclear. Some investigators conclude that low metabolic rates are a consequence of low body temperature (i.e., Q10 effects on metabolism) while others have demonstrated that hibernators can significantly reduce metabolism with only minimal decreases in body temperature (i.e., temperature-independent metabolic

suppression). In order to differentiate among the potential mechanisms affording hypometabolism in 13-lined ground squirrels, we made simultaneous measures of body and brain temperature and metabolism during arousal and subsequent entry into torpor. Preliminary data suggest that the reduction in metabolism is a consequence of decreasing body temperature and temperature-independent inhibition of metabolism is not necessary for entry into torpor in this species.

**S14.2** JENNER, R.A.; *University of Amsterdam*. Tending the phylogenetic garden of the Metazoa: a guide for weeding, pruning, and cultivating morphological trees.

The application of cladistics to comparative morphology has yielded a considerable diversity of phylogenetic hypotheses for the animal kingdom during the last decade. However, despite some undisputable advances in our understanding, this flourish of recent publications has not yet been accompanied by the emergence of a robust and reliable consensus on the phylogenetic signal inherent in morphological data. Current progress in morphological phylogenetics of the Metazoa is more accurately described as a succession of largely independent efforts (based in separate laboratories), rather than as a concerted effort aimed at yielding a consensus. This makes it a challenge to distinguish mere change of opinion from genuine progress in understanding, and the profusion of different trees bewilders both phylogeneticists and biologists alike in search of a phylogenetic framework. I will argue that it is opportune to shift our attention away from advocating particular phylogenies, and towards the comprehensive testing of available alternative phylogenetic hypotheses. I will outline several criteria that can be used to evaluate the relative merit of conflicting phylogenies, and illustrate these by a variety of examples.

**P3.65** JENNINGS, D.H.\*; RUYLS, J.D., MOORE, M.C., ORCHINIK, M.; *Arizona State University, Tempe*. Corticosterone regulation of plasma steroid-binding globulin levels and free steroid hormone levels in Tree lizards, *Urosaurus ornatus*.

In vertebrates, steroids circulate bound to specific plasma steroid-binding globulins. Binding globulins potentially regulate steroid actions at a number of levels including steroid metabolism, availability of free steroids, and tissue-specific delivery of steroids. The affinity and capacity of steroid-binding globulins changes seasonally, and under different social conditions, suggesting that binding globulins may play an active role in mediating the effects of circulating steroids. In tree lizards, *Urosaurus ornatus*, the capacity of steroid-binding globulins is greater in territorial males than in nonterritorial males. This difference results in territorial males having