



Departmental Seminars 2018
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HW Pearson Lecture Theatre 1



**Phylogenetics, biogeography, and organellar
genome evolution in the plant family Lobeliaceae**



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Abstract

The 3,800+ base-pairs of DNA sequence data from the plastid genes *atpB*, *rbcl*, and their intergenic spacer provided an initial estimate of phylogenetic relationships and biogeographic history of the *Lobelia* family, but the data were not sufficient to resolve relationships when organismal diversification occurred rapidly. The 125,000+ bp of completely sequenced plastid genomes provide much greater phylogenetic resolution, but do not provide unambiguous resolution in all cases. Comparison of results from parsimony, maximum likelihood, and Bayesian inference illustrate the underlying problems. Next-generation sequencing of plastid genomes provides the cost-effective taxon sampling needed to study events such as the rapid cosmopolitan radiation of *Lobelia*. In some cases, the phylogenetic relationships of extant species provide a clear indication of the biogeographic history, but in other cases, the most plausible biogeographic scenario includes inferred extinction. The molecular phylogenetic framework also provides an opportunity to study unusual features of plastid genome evolution (with foreign genes that have invaded the plastid genome and frequently caused genome inversions) and mitochondrial genome evolution (involving dramatic fluctuations in mutation rate, vastly increased genome size, and fragmentation into many circular chromosomes).

Biography

Dr. Knox received his B.S. degree from the University of Illinois, M.S. degree from the University of Wisconsin, and Ph.D. from the University of Michigan. After completing his dissertation on the evolution of giant senecios and giant lobelias on the mountains of eastern Africa, he continued working in Africa as a Senior Scientific Officer for the Royal Botanic Gardens, Kew, United Kingdom. Dr. Knox returned to the U.S. as an Assistant Professor and then Associate Professor at Rutgers University, but in 2002 moved to Indiana University to become Director of the Indiana University Herbarium. In addition to his phylogenetic and biogeographic research, Dr. Knox has been actively involved in herbarium digitization.