

Oral Defense Announcement

University of Missouri – St. Louis Graduate School

An oral examination in defense of the dissertation for the degree
Doctor of Philosophy in Biology with an emphasis in Ecology, Evolution, and Systematics

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MS in Biology, April, 2010, San Francisco State University

Systematics, biogeography and species delimitation of the Malagasy *Psorospermum* (Hypericaceae)

Date: May 19, 2017
Time: 9:00 a.m. to 12:00 p.m.
Place: Research Building R121

Abstract

Psorospermum belongs to the tribe Vismieae (Hypericaceae). Morphologically, *Psorospermum* is very similar to *Harungana*, which also belongs to Vismieae along with another genus, *Vismia*. Interestingly, *Harungana* occurs in Madagascar and mainland Africa, as does *Psorospermum*; *Vismia* occurs in both mainland Africa and the New World. However, the phylogeny of the tribe and the relationship between the three genera are uncertain. Using freshly collected specimens from my fieldwork as well as herbarium specimens, I aimed first, to generate a phylogeny of *Psorospermum*; second, to investigate its biogeography; and third, to investigate species boundaries within Malagasy *Psorospermum*.

The results of my molecular phylogenetic work, based on a combined analysis of chloroplast DNA (*ndhF*; *trnL-trnF*) and nuclear DNA (ITS), strongly support *Harungana* and *Psorospermum* as two genera: *Harungana* also includes one African species of *Vismia*, *V. rubescens*, and *Psorospermum* includes the other African *Vismia* and *Psorospermum*. My results also show that Malagasy *Psorospermum* are paraphyletic, some African species being nested within the clade of Malagasy *Psorospermum* suggesting dispersal of the genus westwards back to Africa. I conducted ancestral area reconstruction studies to test this hypothesis. *Psorospermum* may have reached Madagascar by a single dispersal event from Africa during the Oligocene (ca. 34-22 Ma), followed by diversification on Madagascar after ca. 20-19 Ma. However, two recent dispersal events appear to have occurred out of Madagascar back to Africa in the late Miocene (ca. 5.5 and 5.7 Ma).

Malagasy *Psorospermum* has not had a taxonomic revision in 60 years and the total number of species is uncertain. I undertook a novel approach to investigate the species boundaries in *Psorospermum* by integrating species hypotheses delimited by both molecular and morphometric analyses. Herbarium specimens of the putative taxa in each well supported clade in the molecular phylogeny of Malagasy *Psorospermum* were subjected to morphometric analyses using general mixture models. I identified 29 species of *Psorospermum* of which 11 are new. The results are being used in a new taxonomic revision of the Malagasy *Psorospermum*.

Defense of Dissertation Committee

Peter F. Stevens, Ph.D. - Chairperson
Elizabeth Kellogg, Ph.D.
Peter Hoch, Ph.D.
Brad Ruhfel, Ph.D.