

# 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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### **Systematics of Malesian-Pacific *Piper* (Piperaceae)**

Date: December 11, 2018  
Time: 2:00 p.m. to 4:00 p.m.  
Place: 103 Benton Hall

#### **Abstract**

Comprised of ~2400 spp., *Piper* is a major clade in the magnoliid angiosperms. Three major groups are recognized in *Piper*, i.e., the Neotropical, Asian and South Pacific. Unlike Neotropical *Piper*, relationships in the Paleotropical *Piper* remain enigmatic. This study focused on the Paleotropical *Piper* with emphasize on the Malesian-Pacific *Piper*, Malesia being the center of diversity of the genus in the Paleotropics. The goals are to evaluate relationships within Paleotropical *Piper* (chapter 1), to evaluate characters, morphological (chapter 1) and stem anatomical (chapter 2), that may distinguish clades, and to investigate the species boundaries focusing on the well-supported Muldera clade emphasizing the Malay Peninsula species (chapter 3). I used eleven out of 14 infrageneric groups in Paleotropical *Piper* and 14% of the species and inferred their phylogenetic relationships based on nuclear (ITS, *g3pdh*) and chloroplast (*trnL-F*) regions. Within the Asian clade, species predominantly distributed west of Wallace's Line (WWL) form a moderately/strongly supported clade in the ITS phylogeny, embedded within a grade of species from east of Wallace's Line (EWL). The ITS phylogeny also resolves 12 and 5 clades in the WWL clade and the EWL grade, respectively. *G3pdh* and *trnL-F* phylogenies resolve some of the same clades, but some relationships among and within clades are incongruent. Almost no currently recognized infrageneric groups in Asian *Piper* are monophyletic. Most of the morphological characters previously used to delimit infrageneric groups are homoplasious, and I also found that there is much parallelism in the stem anatomical characters. Characters that may distinguish clade include cupular bracts and a ring of sclereids surrounding sclerenchymatous cap of peripheral vascular bundles of the stems for Muldera clade, angular stems for *Sarcostemon* s.l. clade, very broad primary medullary rays in the stems for *Pseudochavica* sensu Ridley s.str. clade, spherical stigmas for core E2 clade, and peripheral mucilage canals interior to the large vascular bundles in the stems of E1 clade. The species limits within Muldera clade remains unclear, there are some shared characters between morphospecies and common occurrence of parphyly, suggesting hybridization or lateral transfer among species of Muldera clade.

#### **Defense of Dissertation Committee**

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