

Exploring species boundaries in the *Mimulus palmeri* clade (Phrymaceae)

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M. androsaceus



M. barbatus



M. diffusus (CNPS 4.3)



M. discolor



M. gracilipes (CNPS 1B. 2)



M. montioides



M. palmeri



M. purpureus (CNPS 1B.2)



M. shevockii (CNPS 1B.2)



M. suksdorfii

Introduction

Species in the genus *Mimulus* are ecologically and morphologically diverse (Beardsley et al. 2004, Thompson 2005). There are 91 species worldwide; however ca. 75% of the species occur in western North America (Grant 1924, Beardsley et al. 2004). *Mimulus* is particularly diverse in California with 67 taxa currently recognized in the Jepson Manual, 33 of which are currently listed on the California Native Plant Society's (CNPS) list of rare and endangered plants, making this a group of conservation concern (CNPS Inventory 2008). Taxonomic relationships in the genus have been controversial, and several taxa recognized as rare by CNPS exhibit taxonomic problems, with many previously recognized rare species lumped in with more common species (Thompson 1993). Uncertainty in taxonomic status of rare plant species is common and typically needs to be resolved before conservation measures can be established (Skinner et al. 1995). My research focuses on ten *Mimulus* species, referred to here as the *Mimulus palmeri* clade.

Preliminary Data

Species delimitation within the *M. palmeri* clade has been problematic, especially with respect to those taxa allied with *M. montioides*. There are three described species placed in synonymy with *M. montioides* in the most recent treatment (Thompson 1993). My field research indicates that at least two of these may be worthy of recognition at the species level.

To date, I have visited over 40 populations, and have collected at least one population for eleven of the twelve in-group taxa, in addition to six out-group taxa. A pilot study is currently underway to explore the most informative molecular markers for the species phylogeny. Rapidly evolving chloroplast markers (e.g. *rpl32-trnL*, *trnQ-5'rps16*, *3'trnV-ndhC*), and low copy nuclear markers (e.g. CYCLOIDIA) are currently being screened.



Mimulus discolor

Scale
1cm



Mimulus barbatus

Mimulus discolor and *M. barbatus* are currently placed in synonymy with *M. montioides*. Field research has revealed that distinctive floral traits are often obscured by the act of pressing plants for preservation as a herbarium specimen.

Objectives of this study

1. Investigate species boundaries and identify taxa worthy of conservation.
2. Investigate species relationships and biogeographic patterns.
3. Investigate pollinator preference and reproductive isolation.

Currently recognized taxa	Synonym
<i>Mimulus androsaceus</i>	<i>Mimulus palmeri</i> var. <i>androsaceus</i>
<i>Mimulus gracilipes</i>	none
<i>Mimulus montioides</i>	<i>M. barbatus</i> , <i>M. deflexus</i> , <i>M. discolor</i>
<i>Mimulus palmeri</i>	<i>M. diffusus</i>
<i>Mimulus purpureus</i>	none
<i>Mimulus shevockii</i>	none
<i>Mimulus suksdorfii</i>	none

Floral Diversity

The *Mimulus palmeri* clade mirrors the range of floral diversity found within the genus as whole. These species vary greatly with respect to floral symmetry and color; however, little is known about their pollination biology. The evolution of floral form has long been a major focus of evolutionary ecology, with pollinator-mediated selection considered a critical factor in the evolution of floral diversity. Study of the reproductive biology in the *Mimulus palmeri* clade will improve our understanding of the role that breeding systems play on floral form.

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