SPECIES AND POTENTIAL RELATIONSHIPS WITHIN *ERYTHRANTHE* SECT. *SIMIOLUS*

An informal infrasectional classification of sect. *Simiola* is outlined here. The current version is published in Nesom (2014b), modified from the original presented in the revision of sect. *Simiola* (Nesom 2012d). The associated phylogram also is from Nesom 2014c), modified from the one shown as part of a commentary (Nesom 2013h) which noted that assumptions regarding patterns of relationships within sect. *Simiola* should have an objective basis and be considered in context of the larger group of species.

The arrangement of species is primarily based on morphological similarities (the main characters emphasized in defining the groups are listed), geography, and chromosome number.

Informal Infrasectional Classification of Sect. *Simiolus*

1. **Madrensis group**

Subgroup A (*E. madrensis*, *E. pallens*, *E. calciphila**[A], *E. pennellii*, *E. visibilis**[A]). Perennial or annual; calyces 5-lobed or mostly 3-lobed; flowers small (allogamous or autogamous); western Mexico into southwestern USA. Base chromosome number = 16 (or 8).

Subgroup B (*E. chinatiensis**, *E. dentiloba*, *E. diminuens**, *E. parvula**). Perennial, mat-forming; calyces 5-lobed or with tendency toward 3-lobed; flowers relatively small, allogamous or autogamous; corolla lobes laciniate to fimbriate; southwestern USA and northwestern Mexico. Base chromosome number = 16 (or 8).

2. **Glabrata group**

Subgroup A - North American (*E. michiganensis*, *E. geyeri**, *E. inamoena**, *E. cordata**[A], *E. regni**[A], *E. utahensis*). Perennial and annual, rhizomatous or rooting at proximal nodes, annual and without rhizomes in *E. regni*; calyces not closing; flowers small and autogamous or (*E. michiganensis*) larger, chasmogamous and allogamous; central USA, Mexico. Base chromosome number = 15

Subgroup B - South American (*E. acaulis*, *E. andicola*, *E. cuprea*, *E. depressa*, *E. glabrata*, *E. lacerata*, *E. lutea*, *E. naiandina*, *E. parviflora*, *E. pilosiuscula*, and perhaps others). Perennial and annual, rhizomatous or rooting at proximal nodes; calyces not closing; flowers chasmogamous and allogamous; South America (*E. glabrata* ranges into North America). Base chromosome number = 15.

3. **Guttata group**

Subgroup A, the Guttata subgroup (*E. corallina*, *E. grandis*, *E. arenicola*[A], *E. guttata*, *E. thermalis**[A], *E. glaucescens*[A], *E. unimaculata*[A], *E. lagunensis*[A]). Perennial and annual; leaves oblong or elliptic to obovate, margins remotely toothed; flowers relatively large and chasmogamous and allogamous; western USA and northwestern Mexico. Base chromosome number = 14 (7), perhaps 16 (8). Reports for *E. corallina* are 2*n* = 48 and 56; these need to be restudied. Placement of *E. corallina* in the Guttata group rather than the Tilingii group is based on unpublished observations by Megan Peterson and John Willis.

Subgroup B, the Microphylla subgroup (*E. microphylla*[A], *E. marmorata*[A]). Annual; flowers large or variable in size, chasmogamous and allogamous; basal and proximal cauline leaves often purplish on one or both surfaces; central California (*E. marmorata*) and broader (*E. microphylla*). Base chromosome number = 14 (7).

Subgroup C, the Nasuta subgroup (*E. nasuta**[A], *E. brevinasuta**[A], *E. laciniata**[A], *E. pardalis**[A]). Annual; flowers small (cleistogamous or slightly open, autogamous; basal and proximal cauline leaves often purplish (*E. nasuta*, *E. laciniata*); flowers often produced at all nodes, proximal to distal; Sierra Nevada of USA (*E. laciniata*, *E. pardalis*) and broader (*E. nasuta*). Base chromosome number = 14 (7).

Subgroup D, the Arvensis subgroup (*E. arvensis**[A], *E. brachystylis**[A], *E. charlestonensis**[A], *E. hallii*[A]). Annual, sometimes rooting at lower nodes (*E. arvensis*) but not rhizomatous; flowers often cleistogamous, all autogamous, produced from distal nodes; western USA. Base chromosome number = 14; *E. hallii* is

reported as n = 16, perhaps through dysploidy. The Arvensis subgroup may constitute a single variable and widespread species (*E. arvensis*) with several peripheral isolates.

Subgroup E, the Nudata subgroup (*E. nudata*[A], *E. filicifolia*[A], *E. percaulis*[A]). Annual; leaf blades of reduced surface area; flowers produced mostly from distal nodes, chasmogamous, small and autogamous in *E. filicifolia* and *E. percaulis*; California. Base chromosome number = unknown.

Subgroup F, the Tilingii subgroup

Series 1 (*E. tilingii*, *E. minor*, *E. caespitosa*). Perennial; flowers large, chasmogamous and allogamous; filiform rhizomes profusely produced; mostly high elevation; western USA. Base chromosome number = 14 (7) (*E. tilingii*: 2*n* = 28, 56).

Series 2 (*E. decora*, *E. scouleri*). Perennial; flowers large; rhizomes numerous; leaf margins closely toothed; styles densely hairy; Washington and Oregon. Base chromosome number = unknown.

Infrasectional classification of *Erythranthe* sect. *Simiolus*. Modified from Nesom (2012). Plants are allogamous and perennial unless otherwise noted: * = autogamous; [A] = annual duration.

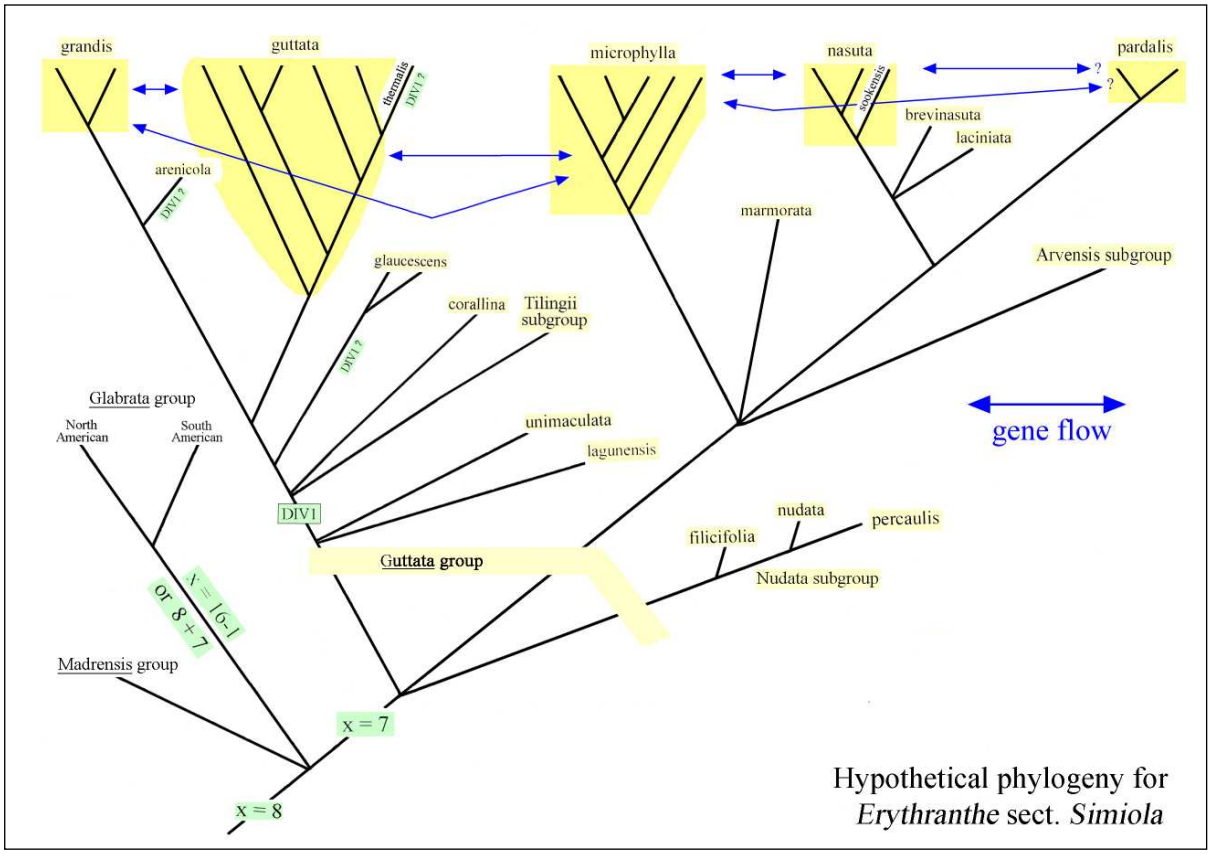

Figure 1. Hypothetical phylogeny of *Erythranthe* sect. *Simiolus* (Nesom 2014). The 51 species are divided into 3 main groups: Madrensis (x = 8), Glabrata (x =15), and Guttata (x = 7). Taxa of the Guttata group are highlighted in yellow. Gene flow is inferred from morphological patterns. Extra branches within *E. grandis*, *E. guttata*, *E. microphylla*, *E. nasuta*, and *E. pardalis* indicate the existence of regional variants. Rhizomatous perennials *E. corallina* and the *E. tilingii* subgroup are hypothesized to share the derived sequence of the DIV1 inversion with *E. grandis* and *E. guttata*. In this hypothesis, the rhizomatous habit arose only once in sect. *Simiolus* and is correlated with the derived DIV1 sequence. Annuals *E. arenicola* and *E. thermalis* are hypothesized to be secondarily derived from perennials; annual duration in *E. glaucescens* also is hypothesized to be secondarily derived, but at least one population within the species has reverted to a rhizomatous habit.