

costense, despite concerted evolution and recombination, retain traces of both parents. The GAPDH and MIPS trees show incongruence in the relationships among individuals. Given the recently divergent evolution of *Symphytotrichum*, this conflict could have resulted from incomplete lineage sorting of alleles with respect to speciation events. Nonetheless, alleles from both parents are detected in the allopolyploid. This is not definite proof, however, of the parentage of the allopolyploid because of incomplete lineage sorting within the genus and the ploidy level of the presumed parents. The relationships shown by these markers are complex but raise the possibility of multiple geographic origins for *S. anticostense*.

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P59044 CLEVINGER, JENNIFER A.*¹ and CLEVINGER, CURTIS C.²

Phylogenetic Analysis of *Berlandiera* (Asteraceae: Heliantheae) based on ITS and ETS Sequence Data

Berlandiera, commonly known as green-eyes, belongs to the sunflower family (Asteraceae) and is found throughout the southern United States and northern Mexico. Currently eight species, including three hybrids, are recognized by Donald Pinkava in the Flora of North America treatment. The relationships of these eight species were examined using DNA sequence data from the internal transcribed spacer (ITS) region and the external transcribed spacer (ETS) region. Of particular interest is *Berlandiera pumila*, which is a disjunct found in the southeastern and the southwestern United States. The southeastern populations overlap with *B. subcaulis* and produce a hybrid called *B. x humilis*. The southwestern populations of *B. pumila* overlap with *B. texana* and produce a hybrid called *B. x betonicifolia*. Preliminary phylogenetic analysis suggests that the disjunct populations of *B. pumila* form a monophyletic group with *B. subcaulis* and *B. x humilis*. Analysis also indicates that the southwestern species *B. lyrata* is basal to the other members of the genus.

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P59045 SHULTZ, LEILA M.

Artemisia Subgenus *Tridentatae*: how many species of sagebrush are there?

Artemisia, with approximately 450 species, is a large and phylogenetically complex group. A particularly vexing problem is the circumscription of 'natural' subgeneric groups within genus, including whether or not to subsume other genera in the *Artemisiinae* alliance. As traditionally defined, members of *Artemisia* Subgenus *Tridentatae* McArthur have homogamous flowering heads with bisexual discoid florets, constituting about 20 taxa. While this is a small subset of the genus, it comprises a group of species with more biomass and occupying more land surface than any other group of shrubs in North America, making the group of particular interest. Recent molecular phylogenies (Watson et al. 2002, Valles et al. 2003, Riggins and Seigler 2006) call the traditional circumscription of what we call 'sagebrush' into question. These phylogenies suggest that homogamous, discoid capitula may have arisen more than once within the subtribe Artemisiinae of the Anthemideae, and that several species with heterogamous capitula could be included within the Subgenus *Tridentatae*. Based on structural as well as other chemical similarities, I propose the inclusion of *Artemisia filifolia*, *A. californica*, and *A. nesiotica* in the subgenus *Tridentatae*. The genus *Sphaeromeria* may also be part of this clade.

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P59046 VARGAS, OSCAR* and MADRIÑAN, SANTIAGO

Monophyly and relationships of the Series of *Diplostegium* based on molecules and morphology: an adaptive radiation in the high Andes

Diplostegium is a genus of trees and shrubs with ca. 111 species. It is distributed along the Andes at high elevations from Venezuela to Chile, with two species also found in Costa Rica, and 12 in the *Sierra Nevada de Santa Marta* (Colombia), in what constitute the paramo and puna ecosystems. A phylogenetic analysis of the genus was performed based on molecules and

morphology. The results show that the possible center of diversification was the Oriental Cordillera of the Andes in Colombia. In addition, mapping of morphological characters on the phylogeny shows a general pattern of reduction of the size of the whole plant, the leaves, and the number of capitula per inflorescence. After an initial radiation of the genus in the paramos of the Northern Andes, a second radiation may have occurred in the punas after crossing the dry paramos of Ecuador as evidenced by the monophyly of the *Lavandulifolia*, *Rupestria* and *Anactinota* series. The results reveal that some of the series proposed by Cuatrecasas are polyphyletic and/or paraphyletic, but forming a grade that shows a sequential progression of morphological characters in strong agreement Cuatrecasas' evolutionary hypothesis.

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P59047 LUKAS, LAURA E.¹, PETERS, MELINDA*¹, MACKLIN, JAMES A.² and DAVIS, III, CHARLES C.³

Identifying a putative hybrid species of Himalayan *Gentiana* (Gentianaceae)

Gentiana (Gentianaceae) is a lineage of ~362 species principally distributed in temperate Asia, Europe, and North America. *Gentiana szechenyii*, *G. hexaphylla*, and *G. veitchiorum* are herbaceous perennials that occur in alpine meadows in the Himalayan region of China and Bhutan, between 3000-4400 meters. *Gentiana veitchiorum* exhibits intermediate vegetative and reproductive morphologies between *G. szechenyii* and *G. hexaphylla*, suggesting that the former may be of hybrid origin. We tested this hypothesis using principle component analysis (PCA) of morphological data, in addition to molecular data obtained from the nuclear and plastid genomes of these species.

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P59048 KOTARSKI, MICHAEL*¹, CARO, SARAH¹, SWEENEY, CAROL², GREENE, MICHAEL¹, STAMPFLE, JESSICA¹ and LEONARD, DEBORAH¹

Placement of Three Problematic Genera of Gesneriaceae based on *Chalcone Synthase* (*CHS*) a Duplicated Nuclear Gene

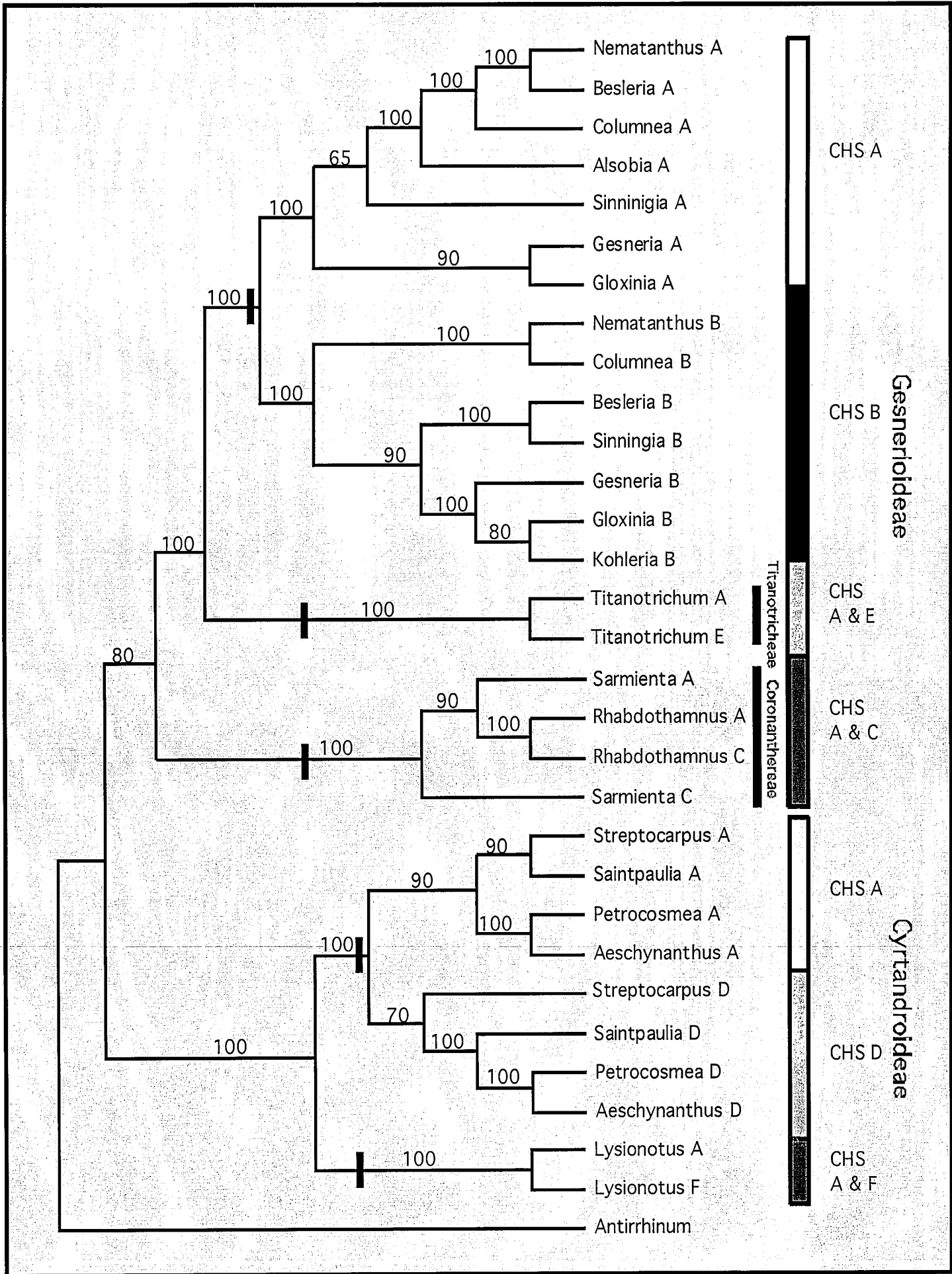
The duplicated nuclear gene *CHS* was used to position three problematic genera within Gesneriaceae. *CHS* is duplicated in all lineages and forms extensive orthologous-paralogous trees making the placement of genera within the family distinct. Two genera of the tribe Coronanthereae (*Sarmienta* and *Rhabdosthamnus*) are a monophyletic group within the Gesnerioideae subfamily and this clade is sister to a large orthologous-paralogous subtree containing the majority of new world genera. This placement suggests that Coronanthereae does not merit standing as a subfamily but is a tribe circumscribed within Gesnerioideae. The monotoxic tribe Titanotricheae (*Titanotrichum*) lies between the Coronanthereae and sister to the rest of the new world genera.

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P59049 CLARK, JOHN R.¹, ALFARO, MICHAEL², WAGNER, WARREN L.³ and ROALSON, ERIC*¹

Exploring area-cladogram, event-based and model-based methods for lineage geohistory reconstruction: an island biogeography comparative study

Biogeography, in simplest terms, is the study of the geographical distribution of life. Historical biogeography can be considered a sub-discipline of biogeography that is concerned with inferring the evolutionary histories from these current distributions. In recent years, several distinct approaches to dealing with factors affecting historical lineage diversifications (here after, *lineage geohistory*) have been developed. These can be classified as 1) area-cladogram, 2) event-based, and 3) model-based methods. These methods differ in what data is utilized – as simple as geographic area-taxon cladogram correla-



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