*Phytologia* (July 1990) 68(6):40-46.

# INFRAGENERIC TAXONOMY OF NORTH AND CENTRAL AMERICAN *BACCHARIS* (ASTERACEAE: ASTEREAE)

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## ABSTRACT

The 43 *Baccharis* species of the United States, México, and Central America are placed into six sections, based on morphology: sect. *Baccharis* (13 species), sect. *Sergilae* (3 species), sect. **Glandulocarpae** *sect. nov.* (10 species), sect. **Aristidentes** *sect. nov.* (12 species), sect. *Baccharidastrum* (1 species), and sect. *Molinae* (4 species). Taxa with paleate receptacles, previously placed in sect. *Trinervatae*, are here included with the epaleate taxa of sect. *Molinae*. Long disjunctions between North and South America are noted among the species of sect. *Sergilae* and sect. *Baccharidastrum*.

KEY WORDS: *Baccharis*, taxonomy, Astereae, Asteraceae, North America, South America.

The genus *Baccharis* is one of the largest in the Astereae, with approximately 450-500 species, all of which are native to the New World. It is most highly speciose in South America, where about 90% of the species occur and where a great amount of morphological diversity is found. Additional taxa are endemic to the West Indies. Cuatrecasas (1967) outlined the composition of sections named up to that time, and clarified the typification for many of them. Recent taxonomic treatments are available for species of a number of regions of South America, *e.g.*, Colombia (Cuatrecasas 1969), central Argentina (Espinar 1973), and Brazil (Barroso 1976). The author of each of these presented a summary of the relationships among the species in the geographic area under consideration. Espinar, in particular, provided significant information regarding morphological variation among the species groups. Zdero, *et al.* (1986) studied the chemistry of nine Argentinian species, and in a broader view, identified eleven sections in the genus based on the distribution of secondary chemical compounds. An overview of various aspects of the taxonomy and biology of the genus has recently been published (Boldt 1989), but a modern taxonomic summary of the entire genus is lacking.

During the preparation of a taxonomic treatment of the *Baccharis* species of México, it has become clear that they can be placed into relatively few natural groups, based on morphology. The following sectional synopsis accounts for all known North and Central American species: only four species occur in the United States that are not also found in México, and all of the Central American species also occur in México. About fifteen other sections have been identified among the South American species.

*Baccharis* L., *Sp. Pl.* 860. 1753. Type species: *Baccharis halimifolia* L., *typ. cons. prop.* (Hellwig 1989).

1. Section *Baccharis*. Type species: *Baccharis halimifolia* L., *typ. cons. prop.* (Hellwig 1989).

Sect. *Cuneifoliae* DC., *Prodr.* 5:405. 1836. Type species: *Baccharis cuneifolia* (Lam.) DC.

Sect. *Involucratae* Heering *in* Reiche, *Fl. Chile* 4:17. 1903. Lectotype species (Cuatrecasas 1967): *Baccharis conferta* Kunth, *Nov. Gen. & Sp. Pl.* 4 [folio]:43. 1818; 4 [quarto]:55. 1820. TYPE: MÉXICO. [Morelos]: near Cuernavaca, Apr [1803], *Humboldt & Bonpland s.n.* (P fiche!, B-WILLD [photo TEX!]).

Sect. *Glomeruliflorae* Heering, Jahrb. Hamburg. Wiss. Anst. 21:32. 1904. Type species: *Baccharis glomeruliflora* Pers.

Glabrous shrubs or small trees: leaves cuneate to obovate oblong, punctate, not papillate, glutinous, uni- or trinerved, entire or with a few coarse, blunt teeth near the apex; heads sessile to subsessile in terminal or axillary glomerules, sometimes racemoid; receptacles epaleate; achenes glabrous, 1.0-1.8(-2.0) mm long, with 8-11 thin nerves; pappus bristles in 2(-3) series. Widespread in North and South America, apparently including many more species, and perhaps more sectional synonyms as well, than those listed below. *Baccharis angustifolia* and *B. glomeruliflora*, both of the southeastern United States, do not occur in México.

Species included: *Baccharis angustifolia* Michaux, *B. conferta* Kunth, *B. confertoides* Nesom, *B. dioica* Vahl, *B. emoryi* A. Gray, *B. glandulifera* Nesom, *B. glomeruliflora* Pers., *B. halimifolia* L., *B. heterophylla* Kunth, *B. lancifolia* Schlecht., *B. neglecta* Britt., *B. pilularis* DC., and *B. salicina* Torrey & A. Gray.

Additional representative species of South America: *Baccharis caespitosa* (Ruíz & Pavon) Pers., *B. chilco* Kunth, *B. macrantha* Kunth, *B. petiolata* DC., *B. spicata* (Lam.) Baill., *B. tricuneata* (L. *f.*) Pers., and *B. tridentata* Vahl.

Cuatrecasas (1967) chose *Baccharis tridentata* Vahl as the lectotype of sect. *Cylindricae* Heering, highly polyphyletic as constituted by Heering, with the

intention of synonymizing this name with that of sect. *Baccharis*. Espinar (1973) disagreed with this lectotypification and suggested that *B. santiagensis* Heering was a better choice. As defined by Espinar, the two sections apparently are not particularly closely related.

2. Sect. *Sergilae* DC., *Prodr.* 5:424. 1836. Lectotype species (Cuatrecasas 1967): *Baccharis scoparia* (L.) Pers.

   Sect. *Aphyllae* Baker, *Fl. Bras.* 6(3):45. 1884. Type species: *Baccharis aphylla* DC.

Glabrous shrubs; leaves linear to linear oblanceolate, punctate, not papillate, glutinous, uninerved, entire; heads mostly solitary, sometimes in few headed, terminal glomerules; receptacles epaleate; achenes glabrous, 1.0-1.8 mm long, with 8-11 thin nerves; pappus bristles in 2(-3) series. Southwestern United States and adjacent México, South America.

Species included: *Baccharis sarothroides* A. Gray, *B. sergiloides* A. Gray, and *B. vanessae* Beauchamp.

Additional representative species of South America: *Baccharis genistifolia* DC., and *B. notosergila* Griseb.

These species are remarkable in their broomlike habit with narrow leaves and essentially solitary heads, but they appear to be closely related to sect. *Baccharis* on the basis of other features. I originally thought that sect. *Baccharis* would be paraphyletic without the inclusion of at least the North American sergiloid taxa but the resemblance between the North and South American species with this morphology is so close that they should be considered monophyletic, at least as a null hypothesis. The chemical data of Zdero, *et al.* (1986) also suggest that they are closely related.

3. Sect. Aristidentes Nesom, *sect. nov.* Type species: *Baccharis multiflora* Kunth, *Nov. Gen. & Sp. Pl.* 4 [folio]:46. 1818; 4 [quarto]:59. 1820. TYPE: MÉXICO. [Edo. México]: Tianguillo, [Sep-Oct, 1803], *Humboldt & Bonpland [4372]* (P fiche!). Kunth also cited a collection from near Toluca but only the plant from Tianguillo is represented on the fiche showing the P specimens.

   Capitulis pedicellatis in capitulescentiis corymboideis et foliis papillati punctatis serraturis brevi-aristatis diagnoscenda.

Glabrous to puberulent shrubs or small trees; leaves oval to linear lanceolate, uni- or trinerved, often serrate with numerous, shallow teeth with aristate apices, punctate, each punctation usually with a minute but definitely extruded papilla, glutinous or not; heads pedicellate, in a corymboid capitulescence; phyllaries fringed ciliate; receptacles epaleate; achenes glabrous,

(1-)2-3 mm long, with 5-6(-8) relatively thick ribs; pappus bristles in (1-)2-3 series. Southwestern United States, México, and Central America. *Baccharis plummerae* A. Gray is known only from California.

Species included: *Baccharis bigelovii* A. Gray, *B. havardii* A. Gray, *B. mexicana* J. Cuatrecasas, *B. multiflora* Kunth, *B. palmeri* Greenm., *B. potosina* A. Gray, *B. plummerae*, *B. serraefolia* DC., *B. sordescens* DC., *B. sulcata* DC., *B. thesioides* Kunth, and *B. zamorensis* Rzedowski.

These taxa are somewhat similar to those of sect. *Molinae* but different in their leaves with papillate punctations and aristate serrate margins, their tendency to produce a vestiture of puberulent trichomes, and their pappus bristles mostly in 2-3 series. A study of the *Baccharis thesioides-bigelovii-sulcata* complex is in progress (Nesom, in prep.).

4. Sect. **Glandulocarpae** Nesom, *sect. nov.* Type species: *Baccharis wrightii* A. Gray, *Pl. Wright.* 1:101. 1852. TYPE: UNITED STATES. Texas: Jeff Davis Co., valley of the Limpia, Aug [1849], *C. Wright s.n.* (HOLOTYPE: GH).

   Capitulis pedicellatis in capitulescentiis corymboideis et acheniis grandibus trichomatibus papillati-glandulosis imprimis diagnoscenda.

Glabrous to minutely hispidulous shrubs or small trees; leaves mostly linear lanceolate, uninerved, entire or with a few shallow, blunt, subapical teeth, punctate, not papillate, usually glutinous; heads solitary or in racemoid paniculate to corymboid capitulescences; receptacles epaleate; achenes (1.5-)2.0-4.5 mm long, with 5-6(-10) relatively thick ribs, sparsely to densely invested with thick, viscid, multicellular, often recurved or slightly coiled trichomes; pappus bristles in 3-5 series. Apparently restricted to México and the United States.

Species included: *Baccharis brachyphylla* A. Gray, *B. erosoricola* Rzedowski, *B. macrocephala* Schultz-Bip. *ex* Greenm., *B. occidentalis* S.F. Blake, *B. pteronioides* DC., *B. pyramidata* (B.L. Robins. & Greenm.) Rzedowski, *B. ramiflora* A. Gray, *B. squarrosa* Kunth, *B. texana* A. Gray, and *B. wrightii* A. Gray.

This group of species is highly diverse vegetatively. *Baccharis occidentalis* and *B. squarrosa* produce stems with solitary heads and greatly reduced leaves. Other species produce solitary heads on densely leafy stems or heads in racemoid paniculate capitulescences. The large and distinctly pubescent achenes are found in all of the species. *Baccharis pyramidata* is tentatively included here, largely on the basis of its similarity in habit and capitulescence to *B. pteronioides*, but its stiffly strigose achenes and peculiar ericoid leaf morphology are anomalous among the Mexican species. The species of the South American sect. *Discolores* DC. are similar in leaf morphology but have a different capitulescence as well as details of the phyllaries and achenes.

5. Sect. *Baccharidastrum* (Cabrera) Nesom, Phytologia 65:170. 1988. BASIONYM: *Baccharidastrum* Cabrera, Not. Mus. La Plata Bot. 2:175. 1937. Type species: *Conyza triplinervia* Less. (≡ *Baccharis vulnearia* Baker).

Glabrous, perennial herbs; leaves nearly linear to broadly lanceolate, strongly trinerved, shallowly serrate with numerous, nonaristate teeth, punctate, usually glutinous; heads pedicellate, in a tightly compact, corymboid capitulescence; receptacles epaleate: achenes densely and minutely hispidulous, 0.7-1.0 mm long, with 4(-6) thin ribs; pappus bristles in a single series. South America, with a single species in California and Baja California.

Species included: *Baccharis douglasii* DC.

Additional species of South America: *Baccharis breviseta* DC., *B. pingraea* DC., and *B. vulnearia* Baker.

Section *Baccharidastrum* previously included one dioecious species (*Baccharis pingraea*) and two monoecious ones (Nesom 1988). *Baccharis douglasii*, which is here added to the section, also is dioecious. It is so similar to some forms of *B. pingraea* that the two must be considered extremely closely related if not conspecific. *Baccharis pingraea*, however, is highly variable and a more detailed study is needed before an understanding of the overall pattern of variation can be reached. The plants of these species are recognized by their trinerved, closely serrulate leaves, small, minutely hispidulous achenes, and uniseriate pappus. These species were included in sect. *Molinae* by Espinar (1973), but because of their extremely distinctive achenial vestiture, I think they are best regarded as a separate group.

6. Sect. *Molinae* (Ruíz & Pavon) Pers., *Syn. Pl.* 2:424. 1807. BASIONYM: *Molina* Ruíz & Pavon, *Prodr.* 111, t. 24. 1794. Type species: *Baccharis latifolia* (Ruíz & Pavon) Pers.

Sect. *Trinervatae* DC., *Prodr.* 5:399. 1836. Type species: *Baccharis trinervis* Pers.

Sect. *Corymbosae* Heering *in* Reiche, *Fl. Chile* 4:5. 1903. Lectotype species (Cuatrecasas 1967), *Baccharis marginalis* DC.

Shrubs, small trees, sometimes sprawling or subscandent, glabrous or less commonly puberulent; leaves linear lanceolate to broadly ovate lanceolate or elliptic, trinerved, shallowly serrate with numerous, nonaristate teeth, less commonly entire, punctate, papillate, usually glutinous; heads pedicellate, in a corymboid capitulescence; phyllaries ovate and usually distinctly yellowish; pistillate receptacles epaleate or paleate; achenes glabrous, less commonly sparsely strigose, 1.0-1.8 mm long, with 4-6(-8) thin nerves; pappus bristles in a single series. México and Central America to South America; *Baccharis*

*salicifolia*, the most widespread species in the genus, extends from the southwestern United States to the southern tip of South America.

Species included (epaleate): *Baccharis monoica* Nesom, *B. salicifolia* (Ruíz & Pavon) Pers. (≡ *B. glutinosa* Pers.); (paleate): *B. pedunculata* (Mill.) Cabrera, and *B. trinervis* Pers. (including *B. rhexioides* Kunth).

Additional representative species of South America (epaleate): *Baccharis prunifolia* Kunth; (paleate): *B. brachylaenoides* DC., and *B. cotinifolia* (Willd.) Urban (distinct from *B. pedunculata*, in contrast to the view of Cuatrecasas [1968]).

These species with paleate and epaleate receptacles have not previously been regarded as closely related, but I can find no other differences among what is otherwise a group of species with an easily recognizable set of morphological similarities. The species with paleate receptacles were included by Cabrera (1955) in a broad and highly heterogeneous genus *Psila*, united only by the paleate receptacles of the pistillate heads. More recently, Cuatrecasas (1982) considered these all to be species of *Baccharis*, formally dividing them into three different sections: sect. *Trinervatae*, sect. *Psila* (Phil.) J. Cuatrecasas, and sect. *Pseudobaccharis* (Cabrera) J. Cuatrecasas. A situation analogous to that in sect. *Molinae* is found in the "paleate" species of the genus *Heterothalamus* and a number of the "epaleate" species included in sect. *Pseudobaccharis*, where no other difference in morphology can be found to separate them.

## ACKNOWLEDGMENTS

I thank Drs. Billie Turner and Tom Wendt for their review and comments on the manuscript.

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