

NOTES ON VARIATION IN THE *MACHAERANTHERA PINNATIFIDA*
COMPLEX (ASTERACEAE) IN MÉXICO WITH A NEW COMBINATION

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ABSTRACT

Four varieties of *Machaeranthera pinnatifida* (Hook.) Shinn. are accepted for the Mexican plants of that species, although the taxa are here characterized somewhat differently from the 1976 study by Turner & Hartman. The var. *incisifolia* (I.M. Johnston) Turner & Hartman is elevated to specific status as *M. incisifolia* comb. nov.; it is a morphologically distinctive and nonintergrading taxon geographically isolated on islands of the Baja Californian Gulf, and situated roughly at the juncture between the ranges of *M. pinnatifida* var. *gooddingii* (A. Nels.) Turner & Hartman and var. *scabrella* (E. Greene) Turner & Hartman.

KEY WORDS: *Machaeranthera*, Asteraceae, Astereae, México.

Turner & Hartman (1976) summarized their observations on infraspecific variation in the widespread *Machaeranthera pinnatifida* (Hook.) Shinn. as an "abbreviated overview." With the benefit of their initial study, as well as additional collections from northern México, I have come to a slightly different view of some aspects of the patterns of variability. The 1976 treatment was not radically different in biology from that of Hall (1928), and the present observations can be viewed as an extension of the study of Turner & Hartman. Further information regarding typification and nomenclature can be found in both of these earlier studies.

My observations have primarily involved plants from México, in connection with a treatment of the Asteraceae from that country (Turner & Nesom, in prep.). The morphological delimitation and geographic ranges of two problematic taxonomic groups of the *Machaeranthera pinnatifida* complex have been investigated, (1) var. *pinnatifida* and var. *chihuahuana* Turner & Hartman, and (2) the taxa of Baja California, var. *scabrella* (E. Greene) Turner & Hartman, var. *gooddingii* (A. Nels.) Turner & Hartman, and var. *incisifolia* (I.M. Johnston) Turner & Hartman.

I. *Machaeranthera pinnatifida* varieties *pinnatifida* and *chihuahuana*

In its initial description, *Machaeranthera pinnatifida* var. *chihuahuana* was contrasted with var. *pinnatifida* as having a woodier base and somewhat larger heads on longer, less leafy peduncles. The map provided by Turner & Hartman indicated that the range of var. *chihuahuana* extended from Arizona and Sonora to eastern Durango and northwestern Zacatecas, and annotations of more recent accessions in LL and TEX have further extended its range to Nuevo León and San Luis Potosí, making it nearly completely sympatric in México with var. *pinnatifida*.

Turner & Hartman noted that plants most similar to the type specimen of *Machaeranthera pinnatifida* var. *chihuahuana* are found primarily in northeastern Chihuahua. Even in this area, however, the stem morphology, leaf distribution, and head size are variable, and arbitrary identifications using these features must be made for many specimens over the entire range of the species. Among the plants of *M. pinnatifida* in north central México, however, two taxa do appear to be present, essentially as outlined by Turner & Hartman, but I believe their identifications incorporated an aspect of morphology not explicitly acknowledged in their key or discussion. In the key below, the contrast between var. *pinnatifida* and var. *chihuahuana*, which is based on vestiture, should allow identifications to be made more objectively than in the previous study.

When the collections *Machaeranthera pinnatifida* at LL and TEX are mapped on the basis of this separation, the var. *pinnatifida* is more restricted in México (Figure 1) and the var. *chihuahuana* is more widespread (Figure 2) than previously recognized. Using either the criteria as presented here, or those of Turner & Hartman however, the two taxa appear to be broadly sympatric. Although intermediates appear to be common, there does not appear to be a complete range of intermediacy in vestiture. Rather, most specimens are usually clearly referable to one or the other taxon, implying either that a significant degree of genetic isolation exists between the two or that in plants with a genotype intermediate between glandular and eglandular, one or the other of the vestiture types is produced by rather simple genetic mechanisms. The same degree of broad geographical overlap of the glandular and nonglandular forms occurs in Texas, but the pattern appears more complex there, and detailed evaluation of the infraspecific variation within *M. pinnatifida* north of México awaits future study. The single record of var. *pinnatifida* from Chihuahua (Figure 1) is continuous in distribution with the other similar Mexican plants, through populations that extend from Coahuila northward into trans-Pecos Texas.

Morgan (1990) studied restriction sites in chloroplast DNA in four populations of *Machaeranthera pinnatifida* (two identified as var. *chihuahuana* and

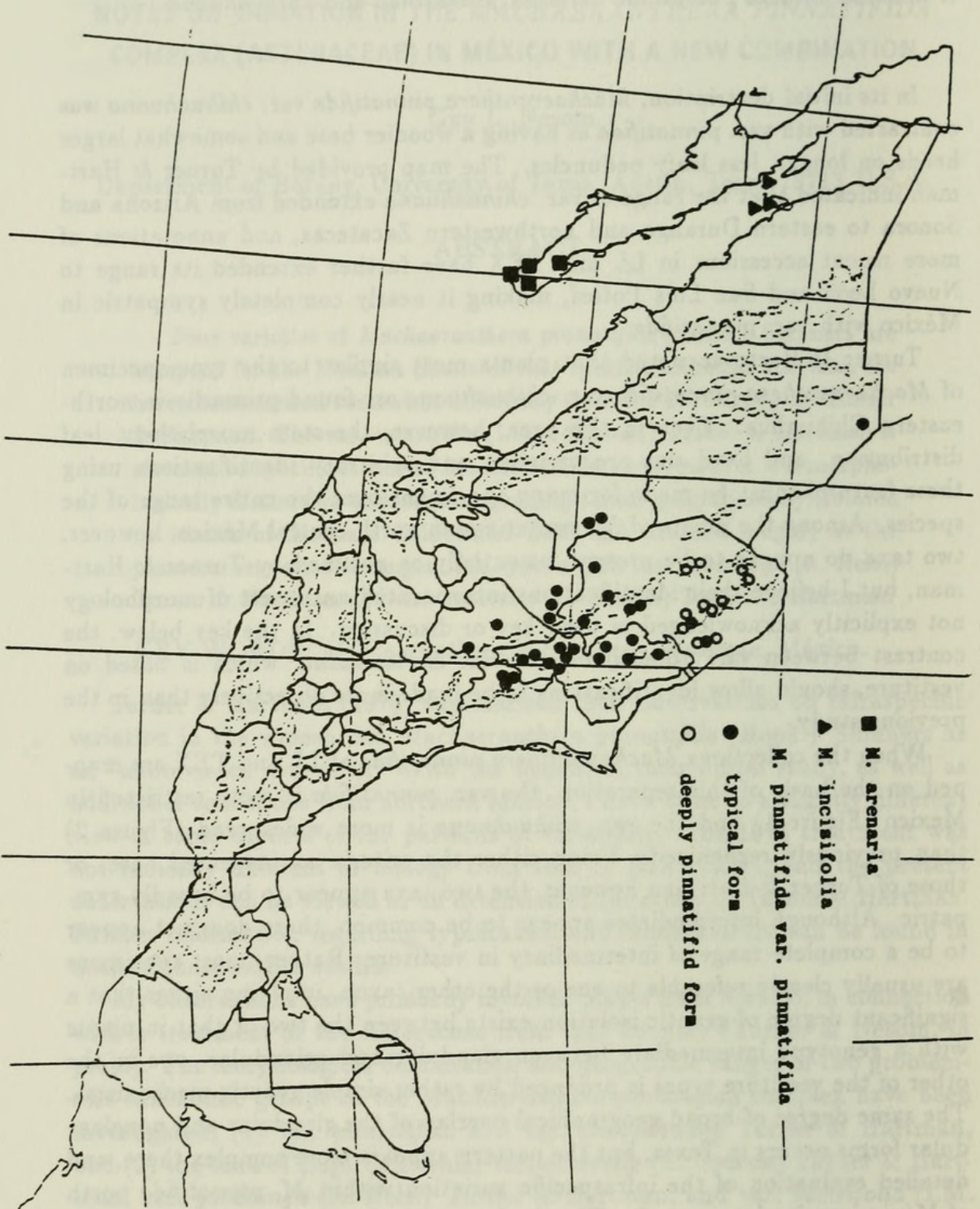


Figure 1. Distribution of *Machaeranthera arenaria*, *M. incisifolia* and *M. pinnatifida* var. *pinnatifida*.

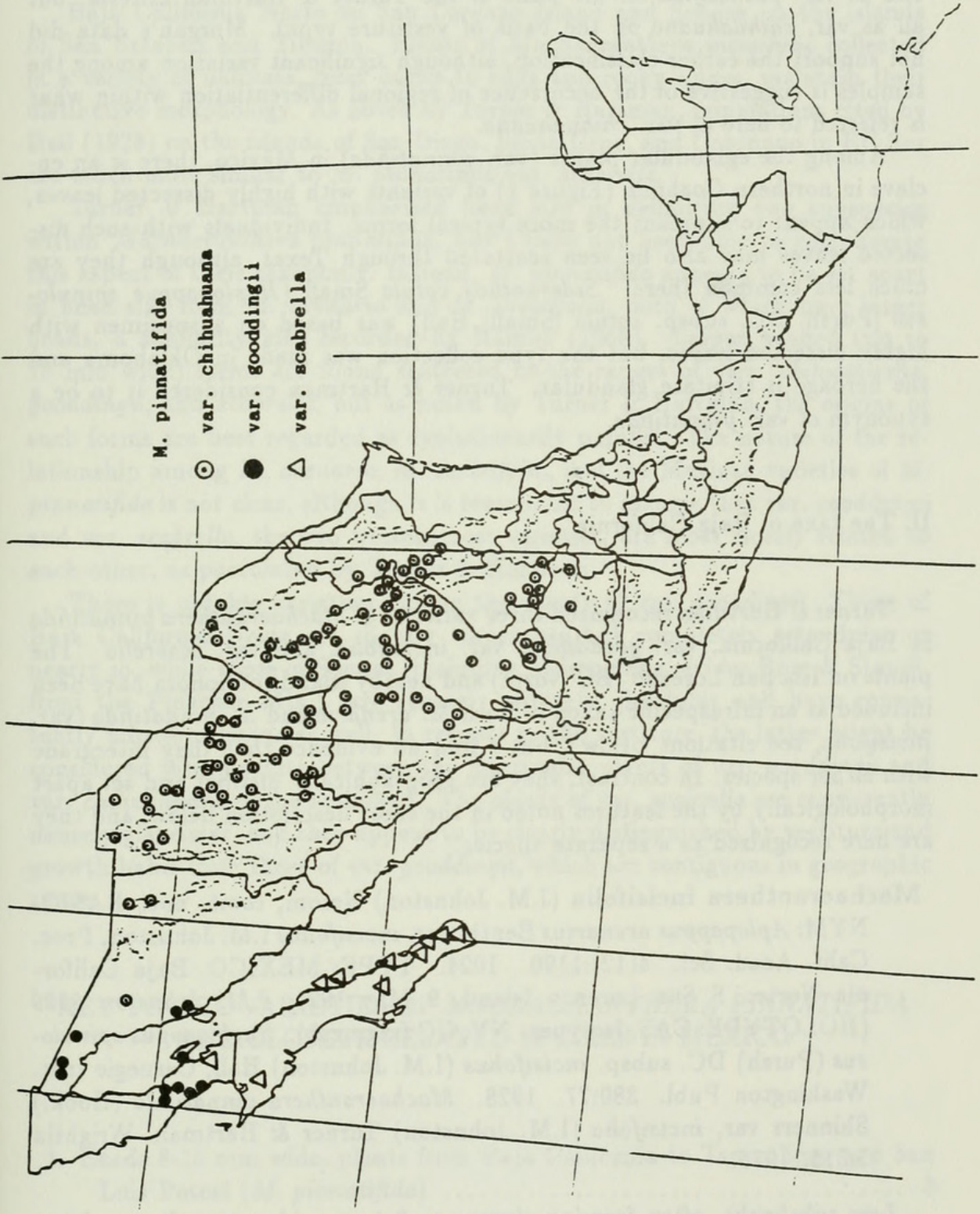


Figure 2. Distribution of *Machaeranthera pinnatifida* vars. *chihuahuana*, *gooddingii*, and *scabrella*.

two as var. *pinnatifida* on the basis of the Turner & Hartman criteria, but all as var. *chihuahuana* on the basis of vestiture type). Morgan's data did not support the earlier classification, although significant variation among the samples is suggestive of the occurrence of regional differentiation within what is referred to here as var. *chihuahuana*.

Among the eglandular plants (var. *pinnatifida*) in México, there is an enclave in northern Coahuila (Figure 1) of variants with highly dissected leaves, which appear to supplant the more typical forms. Individuals with such dissected leaves may also be seen scattered through Texas, although they are much less common there. *Sideranthus cotula* Small (*Haplopappus spinulosus* [Pursh] DC. subsp. *cotula* [Small] Hall) was based on a specimen with highly dissected leaves, but the type collection was made in Oklahoma and the herbage is stipitate glandular. Turner & Hartman considered it to be a synonym of var. *pinnatifida*.

II. The taxa of Baja California

Turner & Hartman recognized three varieties of *Machaeranthera pinnatifida* in Baja California, var. *gooddingii*, var. *incisifolia*, and var. *scabrella*. The plants on Isla San Lorenzo (BC Norte) and nearby islands of Sonora have been included as an infraspecific taxon of both *M. arenaria* and *M. pinnatifida* (var. *incisifolia*, see citations below), but I find no evidence that they intergrade with either species. In contrast, they are geographically distinct and set apart morphologically by the features noted in the short description below, and they are here recognized as a separate species.

Machaeranthera incisifolia (I.M. Johnston) Nesom, *comb. nov.* BASIONYM: *Aplopappus arenarius* Benth. var. *incisifolius* I.M. Johnston. Proc. Calif. Acad. Sci. 4(12):1190. 1924. TYPE: MÉXICO. Baja California Norte: S San Lorenzo Island, 9 May 1921, I.M. Johnston 3529 (HOLOTYPE: CAS; Isotypes: NY, UC fragment). *Haplopappus spinulosus* (Pursh) DC. subsp. *incisifolius* (I.M. Johnston) Hall, Carnegie Inst. Washington Publ. 389:77. 1928. *Machaeranthera pinnatifida* (Hook.) Shinnars var. *incisifolia* (I.M. Johnston) Turner & Hartman, Wrightia 5:315. 1975.

Low subshrubs, often forming clumps to 0.4 m wide, strongly woody at the base, with slender, ascending, caudexlike branches, sparsely and minutely stipitate glandular, sometimes slightly villous tomentose; leaves mostly basally disposed, obovate in outline, at least the lowermost pinnately lobed, often bipinnatifid; heads 15-20 mm wide, held barely above the level of the leaves, on short, strictly erect, bracteate peduncles.

Baja California Norte on San Lorenzo Island and Sonora on the islands of San Esteban and Tiburón. Plants of *Machaeranthera incisifolia* collected in a variety of habitats, from dunes to cliffs and rocky ridges, maintain their distinctive morphology. As noted by Turner & Hartman, populations cited by Hall (1928) on the islands of San Diego, Santa Cruz, and Coronado in BC Sur are much more similar to *M. pinnatifida* var. *scabrella*.

Turner & Hartman emphasized head size in delimiting two subspecies within *Machaeranthera pinnatifida*, but I have not been able to corroborate this aspect of their taxonomy. Instead, *M. pinnatifida* appears to be set apart in head size from *M. arenaria* and *M. incisifolia*, both of which have larger heads, a similarity also recorded by Ramon (1968). Larger headed (up to 15 mm wide) forms are found scattered in the ranges of vars. *chihuahuana*, *gooddingii*, and *scabrella*, but as noted by Turner & Hartman, the origins of such forms are best regarded as evolutionarily parallel. The nature of the relationship among *M. arenaria*, *M. incisifolia*, and the Mexican varieties of *M. pinnatifida* is not clear, although it is reasonable to assume that var. *gooddingii* and var. *scabrella*, the two westernmost varieties, are most closely related to each other, as postulated by Turner & Hartman.

There is notable variation among the plants of var. *gooddingii*. Those of Baja California Norte are slightly tomentose but completely eglandular or nearly so, while those of Sonora (including *Sideranthus viridus* Rose & Standl. from the Pinacate Mts.) are sparsely stipitate glandular and have consistently narrower leaves as well. In respect to the vestiture, the latter might be considered intermediate between the peninsular plants of var. *gooddingii* and var. *chihuahuana* of the mainland. The plants of var. *scabrella* are consistently densely glandular, and they appear to be clearly distinguished by vestiture and growth habit from those of var. *gooddingii*, which are contiguous in geographic range.

KEY TO THE VARIETIES OF *MACHAERANTHERA PINNATIFIDA*
AND CLOSELY RELATED SPECIES IN MÉXICO

- 1. Heads 8-15 mm wide, plants from Baja California to Tamaulipas and San Luis Potosí (*M. pinnatifida*) 3
- 1' Heads mostly 15-20 mm wide, plants from Baja California and Sonora . 2
- 2. Leaves mostly basal, lobed, commonly bipinnatifid, sparsely to densely invested with minute stipitate glandular hairs; heads barely above the level of the leaves, on short, strictly erect, bracteate peduncles *M. incisifolia*

- 2' Leaves evenly arranged along the stems, shallowly toothed, densely invested with long, stipitate glandular hairs; heads at the ends of ascending to erect ascending peduncles, peduncles leafy to the base of the heads *M. arenaria*
3. Plants eglandular, Coahuila and Nuevo León var. *pinnatifida*
- 3' Plants stipitate glandular, widespread, or if eglandular, from Baja California Norte 4
4. Plants densely glandular, stems stiffly erect, branches stiffly spreading-ascending, with leaves even sized and evenly arranged to immediately below the heads, Baja California Sur to Baja California Norte var. *scabrella*
- 4' Plants sparsely to densely glandular, stems usually at least slightly arcuate, with leaves reduced in size near the heads, Baja California Norte and Sonora eastward 5
5. Leaf surfaces with a definite shiny texture, sparsely glandular to eglandular, Baja California Norte and western Sonora var. *gooddingii*
- 5' Leaf surfaces dull textured, glandular, Sonora to Nuevo León and San Luis Potosí var. *chihuahuana*

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