

## COMMENTS ON THE ANNUAL SPECIES OF *XANTHOCEPHALUM* (COMPOSITAE: ASTEREAEE) WITH A NEW COMBINATION

Guy L. Nesom

Department of Botany, University of Texas, Austin, TX 78713 U.S.A.

### ABSTRACT

I recognize three species among the annual plants of *Xanthocephalum*: *X. gymnospermoides* (A. Gray) Benth. (with no infraspecific taxa), *X. benthamianum* Hemsl. and *X. eradiatum* (M. Lane) Nesom, comb. nov. A discussion of their morphological variation and geographic range and a key for their identification are presented.

KEY WORDS: *Xanthocephalum*, Asteraceae, México, systematics.

Lane's revision of *Xanthocephalum* (1983) and her transfer of taxa to *Gutierrezia* (1980a) were perceptive and timely. Additional collections and observations made since her study make it possible to offer a few refinements in taxonomy.

Lane recognized three varieties of *Xanthocephalum gymnospermoides*. She separated var. *intermedium* Lane from southern Chihuahua from the typical variety by its longer peduncles and monomorphic, completely epappose achenes. I find, however, that the differences in neither peduncle lengths nor achenial features are consistent enough to maintain var. *intermedium*. In *X. gymnospermoides* from southern to central Chihuahua, these characters are morphologically variable and intergrading, Lane herself noted that *X. gymnospermoides* (var. *gymnospermoides*) is a "highly variable taxon, with populations polymorphic for several characters," including achene morphology and peduncle length. The epithet of var. *intermedium* was coined to reflect her observation that it is "seemingly intermediate between *X. benthamianum* and *X. gymnospermoides* and could be associated with either" ... although "its characters grade more smoothly" into *X. gymnospermoides*. The plants from southern Chihuahua, however, are sharply differentiated in their glabrous leaves and certainly belong with the latter.

*Xanthocephalum benthamianum* was distinguished by Lane from *X. gymnospermoides* by its longer peduncles, "often auriculate-clasping leaves" (vs

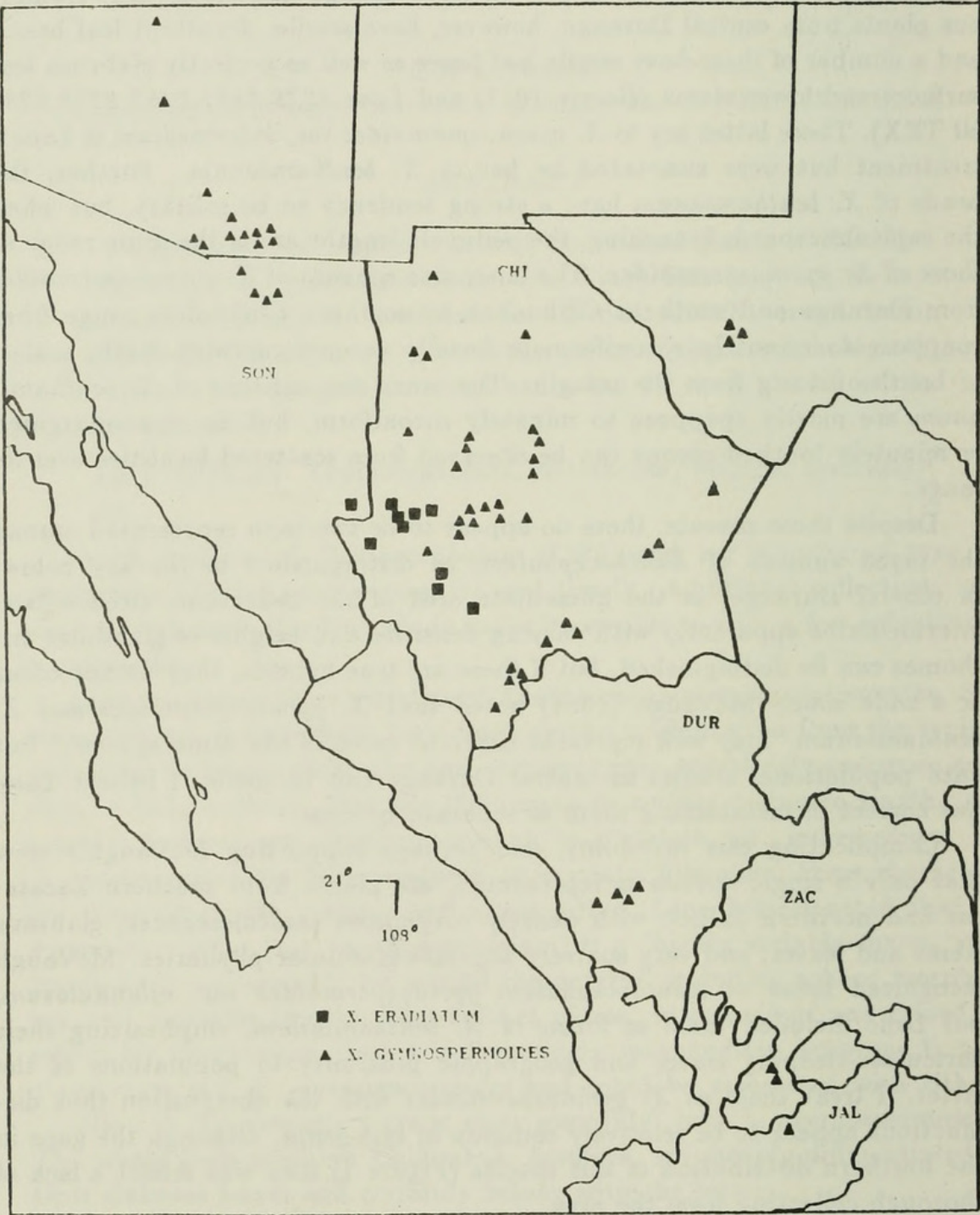
"decurrent"), and the stems and leaf surfaces stipitate-glandular (vs glabrous) like the peduncles and phyllaries. She mapped the species as having distinct and allopatric geographic ranges, *X. gymnospermoides* restricted to Chihuahua and northward, the other to central Durango and southward. Numerous plants from central Durango, however, have sessile, decurrent leaf bases, and a number of them have sessile leaf bases as well as perfectly glabrous leaf surfaces and lower stems (Barrie 1017) and Lane 2272, 2461, 2463, 2722, 2731 all TEX). These latter key to *X. gymnospermoides* var. *intermedium* in Lane's treatment but were annotated by her as *X. benthamianum*. Further, the heads of *X. benthamianum* have a strong tendency to be solitary, but when the capitulescence is branching, the peduncle lengths are in the same range as those of *X. gymnospermoides*. The inner disc achenes of *X. gymnospermoides* from Durango and southern Chihuahua to northern Chihuahua range from epappose to minutely coroniform to basally coroniform with teeth, scales, or bristles arising from the margin. The inner disc achenes of *X. benthamianum* are mostly epappose to minutely coroniform, but an erose-margined or minutely toothed corona can be observed from scattered localities over its range.

Despite these caveats, there do appear to be two taxa represented among the rayed annuals of *Xanthocephalum*, as distinguished in the key below. In central Durango, in the immediate area of the collections cited above, intermediates apparently with varying densities and heights of glandular trichomes can be distinguished, but if these are true hybrids, they do not occur in a wide zone. McVaugh (1984) noted that *X. gymnospermoides* and *X. benthamianum* "may well represent different races of the same species," but until populational studies in central Durango can be made, I believe Lane was correct in maintaining them as separate species.

Complicating this taxonomy, and perhaps supporting McVaugh's view that only a single species is represented, are plants from southern Zacatecas and northern Jalisco with densely corymbose capitulescences, glabrous stems and leaves, and very sparsely stipitate-glandular phyllaries. McVaugh recognized these as *Xanthocephalum gymnospermoides* var. *eglandulosum*, but Lane included them as forms of *X. benthamianum*, emphasizing their auriculate-clasping leaves and geographic proximity to populations of the latter. I treat them as *X. gymnospermoides* with the observation that disjunctions appear to be relatively common in this genus, although the gaps in the southern distribution of this species (Figure 1) may also reflect a lack of thorough collecting from the area.

Similar variation in the nature of leaf glandularity is known in species of genera related to *Xanthocephalum*. For example, in *Isocoma wrightii*, the leaves may be densely stipitate-glandular or the glands may be sunken so the leaf appears punctate with the resin spreading over its surface, although

Figure 1. Distribution of *Xanthocephalum gymnospermoides* and *X. eradiatum*.



these forms are not geographically segregated.

The pappus in species of *Xanthocephalum* is mostly absent or represented by a short corona, this sometimes with an erose or toothed margin. In contrast, a ring of 15-20 true, persistent, antrorsely ciliate, pappus bristles 0.8-1.4 mm high can be observed in scattered populations of *X. gymnospermoides* from Chihuahua (e.g., Lane 2494-TEX; Valdes R. 18-LL). I believe these represent vestigial occurrences of the primitive type of pappus for the genus and reflect its close relationship with *Grindelia* and *Isocoma* (see Nesom, Suh, & Simpson [submitted] for further comments and a phylogenetic summary). It is interesting to note that Steyermark, who had only recently monographed *Grindelia*, described a similar specimen from Chihuahua as *G. confusa* Steyerm. with the comment that "it actually combines the habit, pubescence and involucral bracts of some of the Mexican species [of *Grindelia*] with the leaves and pappus awns of some southwestern United States species" (Steyermark 1938). Lane correctly recognized these plants (annotations in herb.) as conspecific with *X. gymnospermoides*, although she did not list the synonym as such in her revision of the genus (1983).

*Xanthocephalum gymnospermoides* var. *eradiatum* Lane is a taxon sharply distinguished by its lack of ray florets, although it is obviously related to and perhaps derived from typical *X. gymnospermoides*. Their geographic ranges are allopatric (Figure 1), however, and no intermediates have been observed between the two. Lane's analyses of flavonoid chemistry (1980b) showed that plants of var. *eradiatum* also have a strongly reduced number of flavonoid compounds compared to those of both typical *X. gymnospermoides* and *X. benthamianum*. She also noted that it has fewer disc florets and smaller involucres than *X. gymnospermoides*, although the two taxa are overlapping in these characteristics. No chromosome count for the eradiate plants has been made. The primary difference between var. *eradiatum* and *X. gymnospermoides* may rest on a simple genetic character, but the biological difference is at least potentially profound, and the eradiate plants are strongly differentiated geographically. The difference between var. *eradiatum* and *X. gymnospermoides* is as great as that between the latter and *X. benthamianum*, and I believe that the annual plants are best represented as three, separate though closely related species.

***Xanthocephalum eradiatum* (M. Lane) Nesom, comb. nov.** Based on *X. gymnospermoides* var. *eradiatum* M.A. Lane, Syst. Bot. 8:315. 1983.

Southwestern Chihuahua and adjacent Sonora; floodplains, meadows, fencerows, dry slopes, bases of bluffs, areas of pine-juniper or pine-oak woodlands; 1900-2400 m; Aug-Oct(-Nov).

*Xanthocephalum gymnospermoides* (A. Gray) Benth. in Benth. & Hook. f., Gen. Pl. 2:249. 1873. *Gutierrezia gymnospermoides* A. Gray, Smithsonian. Contr. Knowl. 5(Pl. Wright):79. 1853. *Grindelia gymnospermoides* (Gray) Ruffin, Rhodora 79:583. 1977.

*Grindelia confusa* Steyerf., Field Mus. Nat. Hist., Bot. Ser. 17:442. 1938.

*X. gymnospermoides* var. *eglandulosum* McVaugh, Contr. Univ. Michigan Herb. 9:367. 1972.

*X. gymnospermoides* var. *intermedium* Lane, Syst. Bot. 8:314. 1983.

Sonora, Chihuahua, central Durango, southern Zacatecas and northern Jalisco, Arizona and Texas; meadows, roadsides, ditches, river bottoms, grasslands or areas of oak scrub, oak-pine, or pine woodlands; 1150-2700 m; (Jul-)Aug-Oct.

*Xanthocephalum benthamianum* Hemsley, Biol. Centr. Amer., Bot. 2:110. 1881.

Durango, Zacatecas, Aguascalientes, Jalisco, Michoacán, [collections from Guanajuato, San Luis Potosí and México cited by McVaugh (1984)]; wet meadows, roadside depressions, swales, usually at least near standing water, commonly in areas of oak-pine or pine; 1900-2900 m; Jul-Sep(-Oct).

#### KEY TO THE ANNUAL SPECIES OF *XANTHOCEPHALUM*

1. Heads without ray florets ..... *X. eradiatum*
1. Heads with prominent rays ..... (2)
  2. Leaves and stems stipitate-glandular, auriculate-clasping to sessile and narrowly decurrent; heads often solitary but more commonly in corymbose clusters, the ultimate peduncles 10-59 cm long ..... *X. benthamianum*
  2. Leaves and lower stems glabrous, the leaves usually with glutinous surfaces, sessile and narrowly decurrent; heads very rarely solitary, usually in corymbose clusters, the ultimate peduncles 1-40 cm long ..... *X. gymnospermoides*

In conclusion, I view *Xanthocephalum* as comprising six species in two lineages, in each the taxa closely related among themselves but the whole genus clearly a monophyletic unit, as recognized by Lane (1982). The perennial line comprises *X. humile*, *X. durangense* M. Lane and *X. centauroides*; the annual line comprises *X. benthamianum*, *X. gymnospermoides* and *X. eradiatum*.

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