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Loran C. Anderson

Florida State University, Tallahassee, Florida

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## A NEW SPECIES OF FOSSIL *CHRYSOTHAMNUS* (ASTERACEAE) FROM NEW MEXICO

Loran C. Anderson

**ABSTRACT.**— The new, presumably extinct species, *Chrysothamnus pulchelloides*, is formally described and illustrated. The plant materials came from Holocene packrat middens. Anatomical and phyletic relationships of the fossil species to extant taxa are discussed.

Study of Holocene environments through packrat (*Neotoma* sp.) middens in Chaco Canyon, New Mexico, by J. L. Betancourt and T. R. Van Devender (1980) provided many samples of *Chrysothamnus* plant remains. Most materials proved to be *C. nauseosus* ssp. *bigelovii*, a frequent constituent of the present-day flora. Several involucre from a midden (referenced as Mockingbird Canyon No. 2) represent an undescribed, extinct species of *Chrysothamnus*.

The plant materials of the new species were in excellent condition; some were subjected to anatomical study. One might question using the term *fossil* for such material, but precedent has been set by Spilman (1976) in his description of a new species of beetle from packrat middens. Spilman defined fossil as "a specimen, a replacement of a specimen, or the work or evidence of a specimen that lived in the past and was naturally preserved rather than buried by man." Since this new *Chrysothamnus* is apparently extinct, I choose to describe it as a fossil.

### *Chrysothamnus pulchelloides* L. C. Anderson, sp. nov.

Vegetatively unknown; involucre cylindrical, 7–8 mm long, phyllaries strongly graduated in five series in distinct vertical rows, chartaceous-coriaceous, carinate with enlarged subapical costa, hyaline margined below apex, acuminate-cuspidate; disk flowers 4–6, corollas presumably yellow (tawny, as in dried flowers of extant yellow-flowered species), 4.3–4.6 mm long, corolla lobes lanceolate, erect, ca 0.5 mm long; stigmatic lines shorter than appendages (ca 40 percent of total style branch length); achenes cylindric,

1–2 mm long (probably immature), glabrous, pappus of capillary bristles, nearly as long as corolla.

**TYPE:** New Mexico, San Juan Co., Chaco Canyon National Monument, shallow lenticular rock shelter in sandstone of small alcove at head of minor tributary of Mockingbird Canyon, 36° 3' 15" N, 107° 55' W, elev. 1927 m, J. L. Betancourt & T. R. Van Devender s. n. in 1979 (Fig. 1; involucres at FSU!).

Midden material from Mockingbird Canyon No. 2 was dated at 1910±90 B.P. on *Juniperus monosperma* twigs (A-2111); other fossils in the midden included *Pinus edulis*, *Rhus aromatica*, *Cowania mexicana*, and *Artemisia* cf. *tridentata*. Present-day plants growing on the talus immediately below the midden include *Artemisia ludoviciana*, *Cirsium pulchellus*, and *Stanleya pinnata*; only a few spindly *Juniperus monosperma* are found in the vicinity.

*Chrysothamnus pulchelloides* is particularly distinctive in its phyllaries that are acuminate-cuspidate with subapical thickened spots (Fig. 1). It is related to members of section Pulchelli (see Anderson and Fisher, 1970, for sectional composition of the genus) with its strongly ranked phyllaries and glabrous achenes with long pappus; it resembles *C. pulchellus* in its short corolla lobes and *C. molestus* in its hyaline margined phyllaries.

Two intact heads of *C. pulchelloides* were revived and sectioned as in Anderson (1970). The phyllaries have prominent secretory canals and sclerenchyma distribution as in section Pulchelli. Apical portions of the phyllaries are covered adaxially with glandular trichomes. Ovarian vasculature is abundant

<sup>1</sup>Department of Biological Science, Florida State University, Tallahassee, Florida 32306.

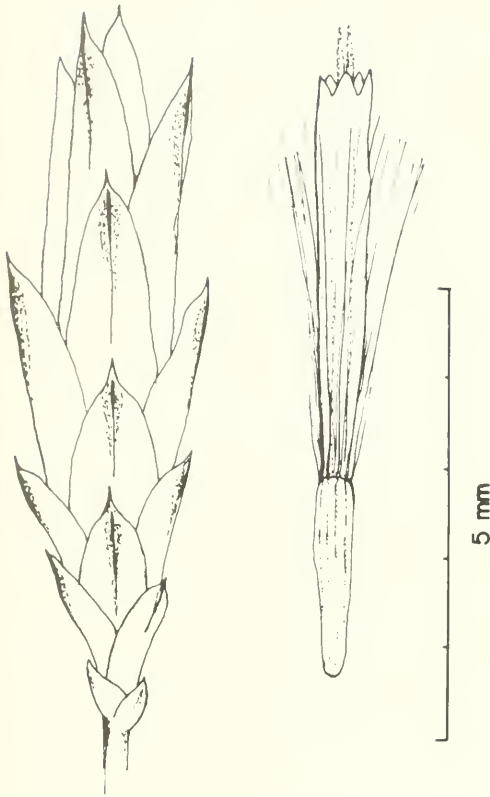


Fig. 1. Camera lucida drawings of involucre and flower of *C. pulchelloides*. Note style branches are largely included in corolla (stamens withered). Pappus bristles average 97 percent of corolla length, shortened here to show corolla lobes more clearly.

with 8–10(12) bundles. The vascular pattern of the achene-corolla transition follows patterns “a” and “c” (Anderson, 1970) wherein the additional ovarian bundles end blindly distally and the style bundles are derived from the ventral and dorsal corolla bundles. Secretory canals associated with the bundles are abundant in the corolla, less frequent in the achene, and absent in the style.

Anatomically, the fossil species relates well to section Pulchelli, but it is less specialized in vasculature and secretory canal abundance and also has less pronounced stigmatic lines. A phylogenetic index of specialization was

developed for *Chrysothamnus* taxa from floral data in Anderson and Fisher (1970). Extant members of section Pulchelli have indices of 4.2–7.1; *C. pulchelloides* would have an index of specialization of 3.5—lower than all extant *Chrysothamni* except the least specialized subspecies of *C. parryi* and *C. nauseosus* of section Nauseosi (which is considered the basal section of the genus). The fossil species may well be ancestral to some of the present members of section Pulchelli.

To my knowledge, this report represents the only record of a plant species extinction documented for the Holocene in this region. Drastic reduction of the tree species, *Pinus edulis* and *Juniperus monosperma*, in the Chaco Canyon area occurred during the Holocene in relation to fuel demands of the Anasazi culture (Van Devender and Betancourt, pers. comm.). Desertification probably continued with Navajo grazing activities. These phenomena may have contributed toward the extinction of *C. pulchelloides*.

#### ACKNOWLEDGMENTS

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