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An Unusual New *Chaetopappa* (Asteraceae-Astereae) from New Mexico

ROBERT J. SORENG and RICHARD W. SPELLENBERG

Department of Biology, New Mexico State University,
Las Cruces, New Mexico 88003

ABSTRACT. *Chaetopappa elegans*, a narrow endemic from the White Mountains of south-central New Mexico, is unusual in *Chaetopappa* because of its double pappus of numerous bristles and narrow scales, comparatively long, lanceolate stylar appendages, crinkled stem pubescence, alveolate receptacle, faint cypsela nerves, long ligules, and occurrence on granitic rock. Its chromosome number is $2n = 9n$. In habit it resembles *C. hersheyi* from the nearby Guadalupe Mountains, but characteristics of the head are more like those of *C. bellioides* and *C. pulchella* from north-central Mexico and the Big Bend region of Texas, and *Leucelene ericoides*, widespread in arid southwestern North America. In its alveolate receptacle it resembles some species of *Aster* and the West Coast genus *Pentachaeta*, whereas its double pappus is reminiscent of some species of *Erigeron* and *Aster* (sect. *Ionactis*). The crinkly stem hairs are like those of some *Erigeron* species.

A portion of the front ranges of southcentral New Mexico, the White and Sacramento mountains, form a continuous north-south oriented chain about 130 km long. The northern, primarily igneous portion, the White Mountains, rises to about 3660 m on Sierra Blanca, the southernmost glaciated peak in North America. The southern portion of the chain, the Sacramento Mountains, are primarily limestone and are considerably lower, barely exceeding 2740 m. This small mountain chain is isolated from other mountain ranges in the Southwest by fairly broad low gaps of arid grassland or desert, gaps that serve as barriers to migration of montane vegetation. To the north and south these gaps are relatively small and not particularly low (cf. map on p. 34 in Patterson 1980). During elevational fluctuation of vegetation in the late Pleistocene (Van Devender and Spaulding 1979) these gaps were narrowed even more and were, therefore, even less of a barrier to vegetation migration. On the one hand, the isolation of these mountains has produced an area of comparatively high endemism for New Mexico, while on the other the isolation has not been so complete that the vegetation has sharply differentiated. Plants from the higher elevations are mostly conspecific with those to the north; plants from lower elevations find their congeners mostly to the south. Most endemics in these mountains apparently have diverged but slightly from ancestral stock and show patterns of relationship similar to that of

the general composition of the vegetation with which they are associated.

The new species described herein adds one more endemic element to the White Mountains, one that is associated with a small genus of more southern affinity. Species of *Chaetopappa* are found in the mountains, hills, and plains in and surrounding the arid grassland regions of the northern portion of the Mexican Plateau, extending onto the southern Great Plains as far north as Kansas. This new *Chaetopappa* is unusual in that it occurs on granitic rocks at relatively high elevations, whereas its closest relatives all occur well to the south and then on limestone.

It is also unusual in a number of morphological features. Shinnery (1946a) redefined *Chaetopappa* to include a number of smaller genera previously distinguished by pappus differences. The publication of *C. plomoensis* B. Turner (Turner 1977) added a new kind of pappus to the genus. Our new species, with its pappus of numerous bristles and scales, further adds to pappus types known in the genus. In addition, it has stylar appendages, stem hairs, and a receptacle unique in *Chaetopappa* but similar in these characteristics to at least some species in *Pentachaeta*, *Aster*, and *Erigeron*. The faint nerves of the cypsela of *C. elegans* contrast to the prominent nerves on all other *Chaetopappa*.

***Chaetopappa elegans* Soreng & Spellenberg, sp. nov.** (fig. 1).—TYPE: U.S.A., New Mexico,

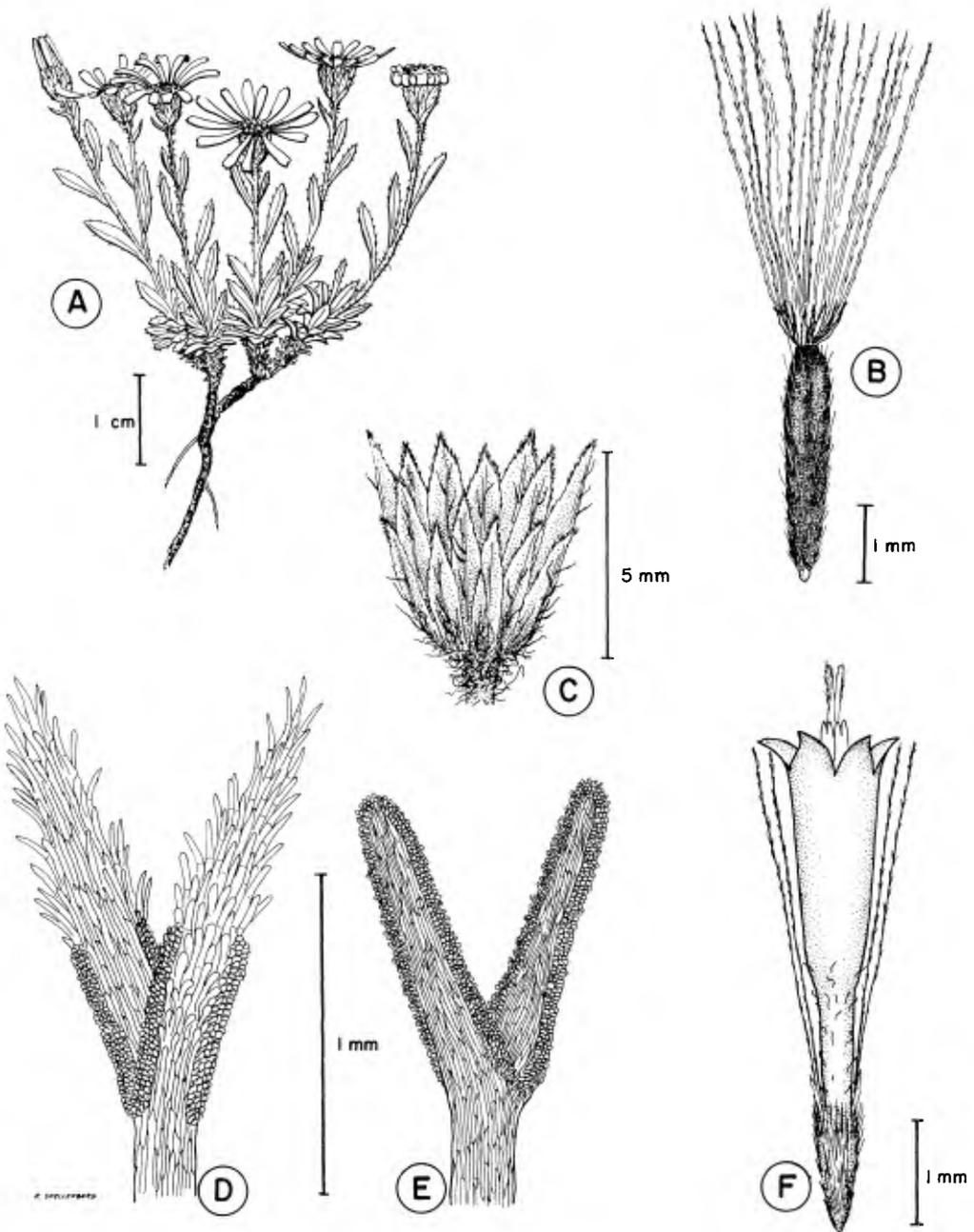


FIG. 1. *Chaetopappa elegans*. A. Habit. B. Cypsela and pappus. C. Involucre. D–E. Style branches from disk and ray florets, respectively. F. Disk flower, portion of pappus removed. (A, C–F from *Spellenberg 6478*; B from *Soreng et al. 2026*.)

Lincoln Co., Eagle Creek Canyon, on the NE flank of Sierra Blanca, 105°45'W, 33°25'N, T10S, R12E, E edge Sec. 26, 2500 m, 11 Jul 1982, R. Soreng, R. Spellenberg, and D. Ward 2026 (holotype: NY; isotypes: K, NMC, TEX; this collection is also the cytological voucher).

Plantae perennes dense caespitosae; caules erecti vel adscendentes saepius 3-5 (sed usque 9) cm longi 1-2-ramiferi villosi, pube infra involucrem densiore; folia spatulata obtusa apiculata 3-17 mm longa, 1-2.5 mm lata, internodiis multo longiora ciliata, nervo 1 prominulo; capitula terminalia solitaria, involucre 4-8 mm alto; phyllaria imbricatis 3-4-seriatis pubescentibus, marginibus praecipue apicem versus scariosa et eroso-fimbriata; ligulae 10-24 roseae vel pallide lilacinae 5-9 mm longae; flosculi discorum 15-45, 3.8-6 mm longis, in parte basalis constrictis parce pubescentibus; cypselae complanatae 2.5-3 mm longae sericeae, pappi duplicis setis interioribus capillaceis 13-19, squamis exterioribus brevissimis angustis minus numerosis; chromosomatum numerus $2n = 9_{II}$.

Densely caespitose perennial, probably from a taproot, the perennating stems from the crown slightly woody, vertically or obliquely much-forked, often subrhizomatous. Stems spreading or ascending, slightly sinuous, up to 9 cm long, mostly 3-5 cm high, simple or with a few branches arising about the middle, the internodes up to 9 mm long, much shorter than the leaves, sparsely pubescent with crinkled, ascending or loosely appressed, many-celled hairs, the cells tending to collapse, the cross-walls white, prominent. Leaves somewhat thick, oblanceolate or spatulate, obtuse to acute, the nerve prominent beneath and slightly impressed above, the leaf tip often with a translucent mucro, the margins pectinate-ciliate with multicellular, forward-curved hairs from mound-like bases, the hairs reduced in size toward the apex of the blade, both surfaces either glabrous or sparsely short-pubescent; basal leaves in a rosette-like cluster, mostly shorter and narrower than the cauline ones, 3-15 mm long, 1-2 mm wide, the base expanded; cauline leaves 5-25, gradually reduced upward, nearly equally spaced, overlapping, 5-17 mm long, 1-3 mm wide, the uppermost often abruptly reduced. Heads solitary at the end of the stem (or the occasional branch), the stem leafy to the base of the head, or nearly naked for up to

about 12 mm except for one or two minute bracts, the uppermost bract often closely subtending the involucre. Involucre 4.5-6.5 mm high, the phyllaries imbricate in 3-4 series, widely spreading after release of cypselas, the outermost about half the length of the inner, oblong-lanceolate, acute to acuminate, erose-fimbriate on at least the upper margins and tips, only slightly arched across the back, purplish to brownish, the inner ones with white scarious margins, at least the outer ones finely pubescent and with stout hairs medially, less commonly nearly glabrous. Receptacle slightly convex, up to 2 mm broad, glabrous, alveolate, the point of attachment of each cypselae marked by minute knob. Ray florets 10-24, pistillate, ligules curling back in age, when fresh pale to deep pinkish-lavender, fading to nearly white in the field (but drying bluish in herbarium specimens), 5-9 mm long, 1-2.6 mm wide; the tubular portion pale green, 2-2.5 mm long, sparsely pubescent with short multicellular, biseriate hairs. Disk florets 15-45, corollas 3.8-5 mm long, mostly pale yellow (often drying with a rosy tinge in the upper $\frac{1}{3}$), the lower portion constricted, pale green, ca. 1 mm long, pubescent as in the tubes of the ray florets, the lobes of the limb triangular, tipped with minute glandular hairs. Anthers with lanceolate terminal appendages about 0.5 mm long. Style branches of the disk florets about 1.5 mm long, the stigmatic lines ca. 0.8 mm long, the appendages narrowly lanceolate, from slightly shorter to slightly longer than the stigmatic region, covered adaxially with long collecting hairs. Style branches of the ray florets lacking appendages. Cypselas 2-2.5 mm long, narrowly oblanceolate, slightly compressed, about 0.4 mm wide and $\frac{1}{2}$ - $\frac{2}{3}$ as thick, shouldered at the top, with two faint marginal ribs (a weak third rib often evident on ray cypselas), sericeous with ascending-spreading biseriate hairs that are minutely bifid at the tip. Pappus double, of about 13-19 pale, tawny, scabrous bristles approximately equalling the corolla tube, alternating with an outer series of narrowly lanceolate or setose, minutely lacerate scales 0.5-0.8 mm long. $2n = 9_{II}$.

The specific epithet refers to the attractive heads, which are exceptionally showy for the genus. This new species was discovered in the spring of 1981, growing on granite outcrops with *Potentilla sierra-blancae* Wooton & Rydb.

and *Valeriana texana* Steyerm., both rare and under consideration for Federal "threatened" or "endangered" status. We returned in 1982 to collect more material and noted that the number of rock outcrops in the canyon would provide habitat for perhaps no more than a few thousand individuals. As far as is now known *C. elegans* is restricted to granitic outcrops in this one canyon.

Additional collections from the immediate vicinity of the type locality: *R. Soreng and L. Soreng* 1589 (WAT), 1590 (LE), 22 May 1981; *R. Soreng and D. Ward* 1603 (ILL, UNM), 17 Jun 1981; *R. Spellenberg* 6478 (COLO, MEM, NMC, UC), 23 May 1982.

Assigning this new species to genus gave us some difficulty. Even though this new species has an imbricate involucre and we considered *Chaetopappa* to be its proper affiliation, our first inclination, based primarily on the double pappus of a fairly large number of bristles and the multicellular, crinkly stem hairs, was that we had discovered a species of *Erigeron*. The cespitose, rock-inhabiting nature of the species, the multicellular trichomes with cells that collapse at right angles to one another, and the chromosome number of $n = 9$ also are characteristic of many erigerons. However, Dr. Guy Nesom examined our material and excluded it from that genus because of its linear-lanceolate stylar appendages with long, flexuous collecting hairs, the comparatively low number of disk flowers per head, and the microscopic, glandular, biseriate trichomes on the cypsela surface.

In its phyllaries and the number of pappus bristles (13–19) *C. elegans* resembles the monotypic *Leucelene* (usually 25 bristles), a genus Shinners (1946b), G. Nesom, and B. L. Turner (pers. comms.) have noted to be closely allied with *Chaetopappa*, if not congeneric with it. Phyllaries of *C. bellioides* (A. Gray) Shinn. and *C. pulchella* Shinn. are strikingly similar to the aforementioned two species. However, *Chaetopappa* species known prior to 1977 differ in having, among other characters, a low number (0–6, exceptionally to 9 in *C. pulchella* and *C. bellioides*) of relatively short stout pappus bristles or awns, with an outer series of squamellae, or have no pappus at all. Our new species, which also has an outer series of scales, and the recently described *C. plomoensis* (Turner 1977)

with its uniseriate pappus of about 25 bristles, may serve to bridge the gap between the two genera. *Chaetopappa plomoensis*, however, has the keeled phyllaries that are characteristic of most *Chaetopappa* and rather unlike those of the other species referred to above. *Leucelene* is known only to have $x = 8$ chromosomes, and to have short, blunt stigma appendages, characteristics of many species of *Chaetopappa*, but differing in these respects from ours.

In number of chromosomes, leaf arrangement and form, double pappus, number and coarseness of pappus bristles, alveolate receptacles, showy flowers, and long, lanceolate stylar appendages, *C. elegans* is difficult to exclude from *Aster* sect. *Ionactis* (Semple and Brouillet 1980) or *Aster* subg. *Ianthé* (Jones 1980). However, habit, absence of rhizomes, reduced inflorescence, nature of the chlorophyllous zone of the phyllaries, and the absence of fine scabrous pubescence would make the new species anomalous in either group of asters. We therefore return to the heterogeneous *Chaetopappa*.

In *Chaetopappa* this new species is most similar in habit to the geographically adjacent chasmophile *C. hersheyi* S. F. Blake from the Guadalupe Mountains of Texas and New Mexico. Shinners (1946a) placed *C. hersheyi* in the monotypic sect. *Hersheyanae*. Van Horn (1973) also reviewed a number of features of *C. hersheyi* that differ from other members of the genus. *Chaetopappa hersheyi* also has comparatively long, pointed stylar appendages, although they are proportionally shorter than in *C. elegans*. However, *C. hersheyi* strongly differs in its smaller heads with glabrous, keeled phyllaries, its more numerous nerves on the cypsela, its reduced pappus of few setae and scales, and in its having hirsute stems.

In several significant respects *C. elegans* exhibits stronger affinity with *C. bellioides* and *C. pulchella*, and we tentatively ally the new species with these in the series *Bellioidae* (Shinners (1946a), noting it may warrant its own monotypic series. These three species, as noted above, have similar phyllaries, two nerves on the cypsela, acute stylar appendages, and comparatively large heads. In addition, *C. pulchella* and *C. bellioides* occasionally exhibit weakly alveolate receptacles. In Correll and Johnston (1970) and in Shinners (1946a) *C. elegans* "keys" under the first lead "involucre campanulate or hemi-

spherical in flower . . .," placing the species near *C. bellioides* and *C. pulchella*, although in *C. elegans* the heads sometimes have too few flowers to meet all the requirements of this lead. It is immediately distinguished from these species by its cespitose habit, long rays, crinkly peduncle hairs, and its pappus of many bristles and scales. *Chaetopappa bellioides* and *C. pulchella* also have reported chromosome numbers of both $2n = 8$ or 9 pairs, although 8 is more frequent (Fedorov 1969; Moore 1977, where the count for *C. bellioides* reported as $n = 9$ has been changed on the voucher specimen to $n = 8$ by B. L. Turner, the specimen annotated by D. Pinkava, and also Turner, to *C. pulchella*). Other than in these two species $n = 9$ is known in *Chaetopappa* only from our new species and from the rather dissimilar *C. effusa* (A. Gray) Shinn.

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