TAXONOMY OF *ERIGERON CONCINNUS* (ASTERACEAE) AND ITS SEPARATION FROM *E. PUMILUS*

GUY L. NESOM

Department of Biology, Memphis State University, Memphis, TN 38152

ABSTRACT

Erigeron concinnus appears to be a distinct species rather than a subspecies of *E. pumilus*. Detailed study of *E. concinnus* and *E. pumilus* subsp. *intermedius* in Nevada and adjacent areas shows them to be allopatric and morphologically non-intergrading. Further, previous literature has reported that *E. concinnus* does not intergrade with *E. pumilus* subsp. *pumilus* where their ranges approach each other in Colorado. A new combination is proposed: *E. concinnus* var. *subglaber* (Cronq.) Nesom.

Cronquist (1947) regarded *Erigeron pumilus* Nutt. as comprising three subspecies, each with a fairly well-defined geographic range (Fig. 1) but with substantial amounts of morphological intergradation among them. Besides the recognition of subsp. *intermedius* Cronq., of particular significance was his lowering of the rank of *E. concinnus* (Hook. & Arn.) Torr. & Gray to subsp. *concinnoides* Cronq. "Subspecies *typicus* [*pumilus*] becomes difficult to separate from subspecies *intermedius* in western Montana. Subspecies *intermedius*, in turn, passes readily into subspecies *concinnoides* where their ranges overlap. Subspecies *concinnoides* and subspecies *typicus* [*pumilus*], however, behave almost if not quite as distinct species, where their ranges meet."

Cronquist's judgement has been accepted by a number of contemporary taxonomists who have dealt with these taxa; exceptions are Kearney and Peebles (1969), followed by Lehr (1978) in Arizona, and Welsh and Moore (1973) in Utah, who referred to the population systems in their areas as *E. concinnus* rather than *E. pumilus* subsp. *concinnoides*. These latter authors, however, presented no rationale for their difference of opinion. In connection with contributing to the developing Flora of Nevada by John Kartesz, I have had an opportunity to study Nevada *Erigeron* and to evaluate an important part of the basis of Cronquist's taxonomy with regard to *E. pumilus* subsp. *intermedius* and subsp. *concinnoides*, each of which occurs over a large portion of the state.

METHODS

The larger-scale distribution map (Fig. 1) was constructed using information from Cronquist (1947), Kearney and Peebles (1969), Martin and

SIDA 10(2): 159–166. 1983.

Hutchins (1981), Harrington (1964), Barkley (1977), and Munz (1959), as well as from label data of specimens studied. Kearney and Peebles (1969) reported *Erigeron concinnus* from Cochise and Pima counties, Arizona, but I have not confirmed these records. Morphological data and distributions of the taxa in Nevada (Fig. 2) were derived from a study of 160 collections. Plants from southwestern Wyoming, southern Idaho, and northern Utah also were studied in detail, as were geographic samples representing the remainder of the range of *E. concinnus*.

RESULTS AND DISCUSSION

The results are partly summarized in Fig. 2. In Nevada no intermediates were found and the two taxa appear to be completely allopatric (or at least parapatric). These remarkable geographic and morphologic discontinuities also are found in California and south-central Idaho (Fig. 1), where both

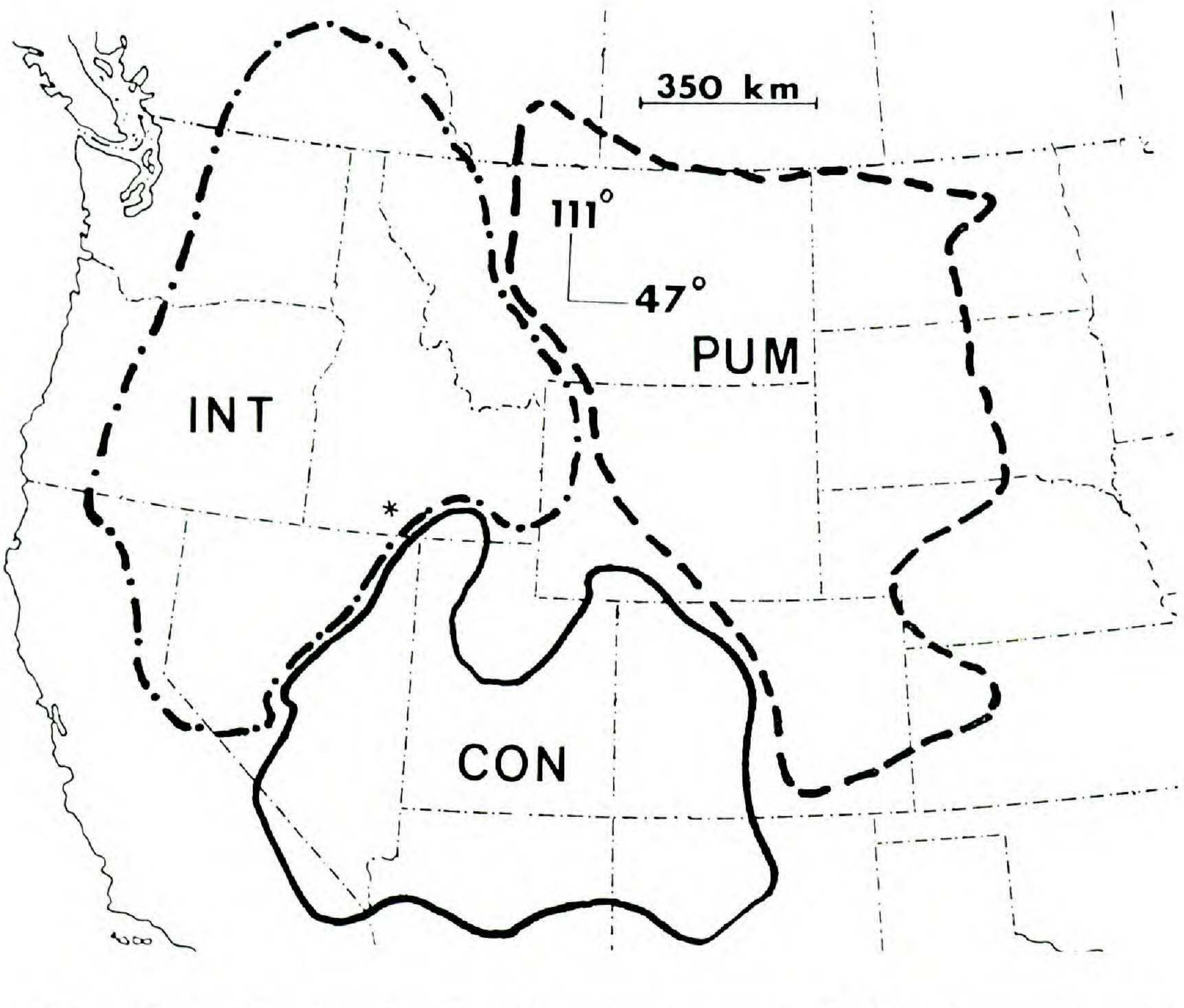

Fig. 1. Generalized distributions of *Erigeron concinnus* (CON), *E. pumilus* subsp. *pumilus* (PUM), and *E. pumilus* subsp. *intermedius* (INT). A collection of *E. pumilus* subsp. *pumilus* also has been reported (Cronquist, 1947) from northeastern Arizona. The asterisk in southern Idaho represents the approximate, probable collection locality of the type of *E. concinnus* (see discussion under Taxonomy).

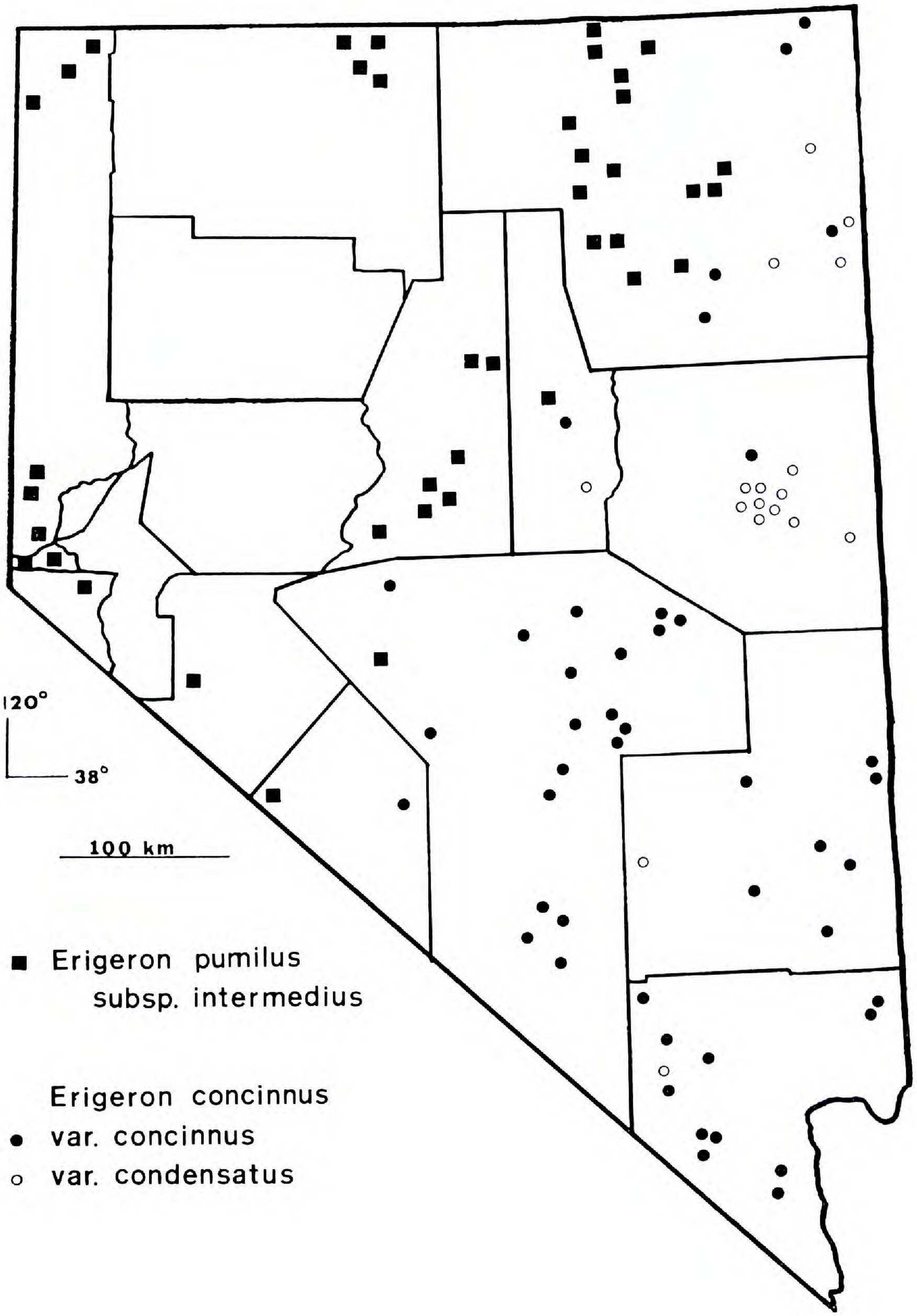

Fig. 2. Distribution of *Erigeron concinnus* and *E. pumilus* subsp. *intermedius* in Nevada.

taxa occur. Because this area includes nearly all of that where *E. pumilus* subsp. *intermedius* and subsp. *concinnoides* might have been expected by Cronquist to "overlap", this critically weakens the force of his argument for including *E. concinnus* within *E. pumilus*, and I believe they are best regarded as distinct species.

The northern-most known populations of *Erigeron concinnus* have been collected in Cassia and Power counties, Idaho, where they are distinct from *E. pumilus* subsp. *intermedius* (but see comment under *E. concinnus* in the Taxonomy section). One collection from Cassia Co. (Holmgren *3506*—UTC) appears to be somewhat intermediate, but there is no evidence of intergradation between the two taxa. Two specimens of *E. pumilus* subsp. *intermedius* were cited from Utah by Cronquist (1947). I have studied a duplicate of one of them (*Hobson and Gierisch 13818*, Cache Co.—UTC) and it is typical *E. engelmannii* A. Nels.; the other is from Salt Lake Co., an area where *E. engelmannii* is very common. In fact, I have seen no collections of *E. pumilus* from Utah.

In the range of *Erigeron concinnus* where it approaches that of *E. pumilus* subsp. *pumilus* (in Wyoming and Colorado), Cronquist himself (1947, 1955) apparently found no evidence of intermediacy that would indicate intergradation expected between conspecific subspecies. I have not made a detailed study of plants from this boundary area, but judging from the comments by Harrington (1964), the two taxa may even be allopatric in part of this area.

Erigeron concinnus is most easily distinguished from *E. pumilus* by its conspicuous outer pappus of very broad scales or squamellae; the outer pappus of *E. pumilus* consists of bristles, narrow squamellae, or a combination of the two. The inner pappus of *E. concinnus* has 5–15 bristles; that of *E. pumilus* has 12–22 bristles. Another feature that has been used in keys to separate these two taxa is the pubescence of the disc corollas—that of *E. concinnus* described as scabrous-puberulent, that of *E. pumilus* as glabrous to slightly puberulent or pubescent. At the microscopic level this can be seen as a qualitative difference. The corolla pubescence of *E. pumilus* is more typical of the majority of *Erigeron* species, being composed of scattered, relatively long, blunt-tipped, biseriate trichomes that often tend to be glandular near the apex (Type C trichomes, see Nesom 1976, 1980). The scabrous-puberulent appearance of *E. concinnus* is due to the presence of very numerous, short, sharp-pointed, three-celled (less commonly four- or five-celled) trichomes that have traditionally been called Zwillingshaare and that normally are found only on the achene surface. Type C trichomes are also common on the corollas of *E. concinnus*, but they usually are shorter than those of *E. pumilus* and the cell outlines tend to be very distorted; in contrast, I have not observed Zwillingshaare on any disc corollas of *E. pumilus*.

In agreement with Cronquist (1947), I have encountered a few collec-

tions of *Erigeron concinnus* (from west-central Colorado) consisting of plants with appressed or ascending stem pubescence, at least on the upper half or the stems; otherwise, they appear to be typical of the species. Although an explanation for the origin of this variation admittedly is speculative, I would suggest the hypothesis that hybridization with *E. engelmannii*, which typically has appressed pubescence, may be involved. Plants of *E. engelmannii* with somewhat spreading pubescence occur sporadically in the same region. In fact, it is likely that confusion in the identification of *E. concinnus* has been more due to its similarity and possible hybridization with *E. engelmannii* than with *E. pumilus*. I fully agree with Cronquist (1947), however, that *E. engelmannii* is a distinctive species. Any future taxonomic study of broader scope should include all three species.

I have annotated as *Erigeron concinnus* a series of collections from Sweetwater Co., Wyoming, that are among the few plants so identified that are not typical of the species as it is found over the main part of its range. This population system is fairly uniform in morphology; it apparently is the only form in Sweetwater Co. and is what Nelson called *E. wyomingensis* A. Nels. The Wyoming plants have noticeably narrower squamellae and the disc corollas must be examined microscopically to verify the presence of the few and small Zwillingshaare. Conceivably, this population system might be regarded as intermediate between *E. concinnus* and *E. pumilus* subsp. *intermedius*, but alternatively, it may simply represent variation such as sometimes occurs on the periphery of a species' range. Even if the former were true, however, the small amount and area of overlap would not justify the specific merger of *E. concinnus* with *E. pumilus*.

According to Cronquist (1947), "The varieties within the subspecies [of *Erigeron pumilus*, including *E. concinnus*] are very poorly defined, yet show geographic restriction and have such pronounced morphological differences as to demand taxonomic recognition." The form of *E. concinnus* (var. *condensatus* D. C. Eat.) that is monocephalous, subscapose, and usually less than ten centimeters tall occurs in Nevada in Clark, Lincoln, Elko, and White Pine counties but is particularly abundant in the latter (Fig. 2). Elsewhere, enclaves of this form occur throughout the range of the species, but intermediates sometimes can be found even within samples of single populations. However, because populations composed primarily of these monocephalous plants are easily recognizable and tend to be geographically clustered (on a small scale) within the range of *E. concinnus*, I believe it is useful to retain the formal taxonomic status of variety for them. Most of the plants of var. *condensatus* I have seen are white-rayed, but the ray color varies to pink and purple.

A sparsely pubescent to glabrous form occurs primarily in west-central and southwestern Colorado, northwestern New Mexico, and the LáSal Mountains of eastern Utah. Several collections of this form include plants with appressed or ascending pubescence on the upper part of the stems. In

order that these plants may be recognized taxonomically, I am transferring Cronquist's name for them (var. *subglaber*), at the same rank, to *E. concinnus* (see Taxonomy). A completely glabrous plant of *E. concinnus* was named *E. perglaber* S. F. Blake, based on a specimen collected by Palmer in 1869. It was treated as a distinct species in the Arizona flora by Kearney and Peebles (1969) and maintained as a doubtful record by Lehr (1978); Cronquist (1947) considered it to be a possible heterotypic synonym of his var. *subglaber*. Having studied the type, I concur with Cronquist and consider *E. perglaber* a form of *E. concinnus*, typical in every way except for the complete lack of long, uniseriate trichomes on the stems, leaves, and phyllaries. In this respect it is at the extreme of variability in plants recognized as var. *subglaber*. Further, whether this collection actually was made in Arizona is open to doubt—as stated by Blake (1940), "The data for Edward Palmer's 'Arizona' specimens of 1869 are so uncertain that this plant is ascribed to the State with some hesitation."

Erigeron aphanactis (A. Gray) Greene was first named as *E. concinnus* var. *aphanactis* A. Gray. It has been treated as the latter in the Arizona flora (Kearney and Peebles, 1969; Lehr, 1978), but Cronquist (1947) and other floristicians, with whom I agree, have regarded it as a distinct species. In Nevada it is fully sympatric with *E. concinnus*, but there are no intermediates and the two have different overall geographic ranges, *E. aphanactis* growing to the northwest into northeastern California and southeastern Oregon.

TAXONOMY

1a. ERIGERON CONCINNUS (Hook. & Arn.) Torr. & Gray var. CONCINNUS, Fl. N. Amer. 2: 174. 1841.

Distasis concinna Hook. & Arn., Bot. Beechey Voy. 350. 1839. TYPE: [IDAHO]. Snake River, below the Salmon Falls, Snake County, [summer 1837], *Mr. Tolmie s.n.* (HOLOTYPE: GL-E!). According to the discussion by Hooker and Arnott, their set of specimens from the "Snake Country" actually was collected by "a friend of Mr. Tolmie." From the discussion and geographic coordinates that they furnished it is possible to surmise with some certainty that the collection of *Distasis concinna* was made in southern Idaho; the Salmon Falls of the Snake River are in the northwestern corner of Twin Falls Co. about 20 kilometers northwest of the confluence of Salmon Falls Creek with the Snake River. This locality appears to be slightly northwest of what, based on other specimens I have studied (Fig. 1), is the northwestern tip of the range of *Erigeron concinnus*. Unfortunately, however, due to extreme insect damage the diagnostic portions of the flowers and achenes of the type collection are completely missing and it is not possible to certainly identify the plants as *E. concinnus* rather than *E. pumilus*. It is not implausible that the specimen is *E. concinnus*; because the original publication clearly describes a scaly outer pappus and because a guess that the type might actually be *E. pumilus* would necessitate several nomenclatural changes, I see no reason why the Tolmie collection should not continue to be associated with *E. concinnus*. At least the plants are similar in habit to what tradition has recognized as var. *concinnus*, in contrast to var. *condensatus*.

Cronquist (pers. comm.) has indicated that he examined a type specimen of *Distasis concinna* at Kew, but the staff there was unable to relocate a specimen with collection data similar to that cited by Hooker and Arnott.

E. pumilus Nutt. subsp. *concinnoides* Cronq. Brittonia 6: 181. 1947. TYPE: NEVADA. Clark Co.: Charleston Mountains, Kyle Canyon, brushy hillside, juniper belt, 1350 m, 15 May 1937, *I. W. Clokey 7743* (HOLOTYPE: NY; ISOTYPES: MIN, MO!, POM, RENO-3 sheets!, RM, US!, WS, WTU).

1b. ERIGERON CONCINNUS var. CONDENSATUS D. C. Eaton in S. Wats., U. S. Geol. Expl. 40th Parallel, Bot. 151. 1871. TYPE: [NEVADA. Elko Co.:], East Humboldt Mts., 8000 ft, July 1868, *S. Watson 543* (HOLOTYPE: YU; ISOTYPES: NY, US!).

E. condensatus (D. C. Eaton) E. Greene, Bull. Torrey Bot. Club 24: 511. 1897.

Two collections were cited by Eaton after the description of var. *condensatus*, followed by the single Watson collection number "543." Judging from the format used for other taxa in the same treatment, the cited collection number clearly is the one meant to be associated with the new name; the YU specimen is marked as var. *condensatus, Watson 543*, from the second locality cited by Eaton and is the holotype.

Erigeron wyomingensis A. Nels., Bull. Torrey Bot. Club 26: 248–249. 1899. TYPE: WYOMING. [Sweetwater Co.]: Point of Rocks, 1 Jun 1897, *A. Nelson 3088* (HOLOTYPE: RM!).

E. setulosus E. Greene, Pittonia 4: 319. 1901. TYPE: NEW MEXICO. [San Juan Co.]: Aztec, 28 Apr 1899, *C. F. Baker 664* (HOLOTYPE: ND; ISOTYPES: RM!, US). Although it was not specifically cited by Greene, the ND sheet is clearly the one referred to in the original description. In Greene's own handwriting it was first identified as *Erigeron concinnus* then changed to *E. setulosus*, which is consistent with his published comment that it was "inadvertently referred by me, in Baker's distribution, to *E. concinnus*, from which it is now seen to be most distinct. . . ." Greene's sheet also lacks a specific Baker collection number, which also is consistent with the publication, but the RM and US duplicates are marked as *Baker 664*.

E. concinnus var. *cremicus* Jeps., Man. Fl. Pl. Calif. 1057–1058. 1925. TYPE: CALIFORNIA. San Bernadino Co.: *W. L. Jepson 5464* (HOLOTYPE: UC).

1c. ERIGERON CONCINNUS var. **subglaber** (Cronq.) Nesom, comb. nov.

Erigeron pumilus subsp. *concinnoides* var. *subglaber* Cronq., Brittonia 6: 183. 1947. TYPE: UTAH. San Juan Co.: meadow S of Monticello, 2100 m, 24 Jul 1911, *Rydberg and Garrett 9141* (HOLOTYPE: NY; ISOTYPES: RM, UC, US!).

E. perglaber S. F. Blake, J. Wash. Acad. Sci. 30: 471. 1940. TYPE: ARIZONA [?], without definite locality, 1869, *E. Palmer s.n.* (HOLOTYPE: US!).

ACKNOWLEDGEMENTS

I thank curators of E, ND, NSMC, RENO, RM, UC, US, and UTC for loans of specimens and the staff of MO for their hospitality during my study there, I am particularly grateful to Dave Boufford (GH), W. D. Clayton (K), Barbara Hellenthal (ND), Harold Robinson (US), and Jim Rodman (YU) for their essential assistance in supplying details regarding type collections and to Barney Lipscomb (SMU) for his expert help with literature. Susan Jackson's assistance with the preparation of Fig. 2 and the careful typing by Gloria Cox are greatly appreciated.

REFERENCES

BARKLEY, T. M. (ed.). 1977. Atlas of the flora of the Great Plains. Iowa State Univ. Press, Ames.

BLAKE, S. F. 1940. New species and new names among Arizona Asteraceae. J. Wash. Acad. Sci. 30: 467–472.

CRONQUIST, A. 1947. Revision of the North American species of *Erigeron*, north of Mexico. Brittonia 6: 121–302.

———. 1955. Vascular plants of the Pacific Northwest. Part 5: Compositae. Univ. Washington Press, Seattle.

HARRINGTON, H. D. 1964. Manual of the plants of Colorado (rev. ed.). Swallow Press, Denver.

KEARNEY, T. H. and R. H. PEEBLES. 1969. Arizona flora (2nd ed. with suppl., by J. T. Howell, E. McClintock, and collaborators). Univ. California Press, Berkeley.

LEHR, J. H. 1978. A catalogue of the flora of Arizona. Desert Botanical Garden, Phoenix.

MARTIN, W. C. and C. R. HUTCHINS. 1981. A flora of New Mexico. J. Cramer Press, Vaduz, Liechtenstein.

MUNZ, P. A. 1959. A California flora. Univ. California Press, Berkeley.

NESOM, G. L. 1976. A new species of *Erigeron* (Asteraceae) and its relatives in southwestern Utah. Brittonia 28: 263–272.

———. 1980. A revision of the epappose species of *Erigeron* (Asteraceae-Astereae). Ph.D. dissertation, Univ. North Carolina, Chapel Hill.

WELSH, S. L. and G. MOORE. 1973. Utah plants: tracheophytes (3rd ed.). Brigham Young Univ. Press, Provo, Utah.