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NEW RECORDS TO THE ANIMAS MOUNTAIN FLORA, NEW MEXICO

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ABSTRACT. Floristic work in 1975 in the Animas Mountains of southwestern New Mexico has revealed the presence of populations of plant taxa previously unrecorded in New Mexico. These populations reflect three distinct distributional patterns. Most of the taxa are endemic to the montane floras of the northern Sierra Madre Biotic Province. The Animas Mountain populations represent the northeastern end of the ranges of these taxa. Two winter annual taxa represent disjunct populations of far western United States taxa. Finally, two other taxa represent geographically isolated and marginal populations of taxa from regions to the south and east of the Animas Mountains. Explanations for known geographical patterns are offered for some of the taxa. The endemic taxa are *Brickellia simplex* Gray, *Castilleja patriotica* Fern., *Delphinium andesicola* Ewan subsp. *andesicola*, *Plummera ambigens* Blake, *Silene thurberi* Wats., *Bidens lemmoni* Gray, *Cheilanthes pringlei* Davenp., and *Gnaphalium pringlei* Gray. The disjunct taxa from far western United States are *Calandrinia ciliata* (Ruiz & Pav.) DC. var. *menziesii* (Hook.) J. F. Macbride and *Caucalis microcarpa* Hook. & Arn., and the disjuncts from the south and east are *Cyclanthera dissecta* (Torr. & Gray) Arn. and *Tillandsia recurvata* L.

Collections representing significant range extensions were obtained during a floristic inventory and phytogeographical analysis of the Animas Mountains of southwestern New Mexico (Wagner 1977). These new records reflect three general types of distributional patterns encountered for many taxa of the flora. The largest number of new records are endemic taxa to the floras of the Animas and other basin and range mountains of southeastern Arizona and northern Mexico. The Animas Mountains are the recorded northeastern geographical limit for these taxa. Their ranges extend from the Animas Mountains southward to the isolated mountains of the northern section of the Central Plateau of Mexico or to the north end of the Sierra Madre Occidental, west to the Chiricahua and Huachuca Mountains, with several also occurring farther west or north in the Santa Rita, Santa Catalina, or Pinaleno Mountains of southeastern Arizona. The other two patterns are represented by two new records each. All are short-

range disjunct populations of widely distributed taxa. Populations of *Calandrinia ciliata* and *Caucalis microcarpa*, both winter annuals, apparently represent a disjunction of approximately 160 km to the east of their respective ranges. *Tillandsia recurvata* and *Cyclanthera dissecta* are isolated populations along the northern geographical margin of their ranges.

The distributional data were obtained from Kearney and Peebles (1960) supplemented by Lesueur (1945), Knobloch and Correll (1962), Whittaker and Niering (1964), and others cited below. All of these taxa are uncommon in the Animas Mountains. Voucher specimens have been deposited in the herbarium of the University of New Mexico (UNM). All records are from the Animas Mountains, Hidalgo County, New Mexico (T31S, R19W).

Endemics.—The following taxa, which are endemic to the northern Sierra Madrean Province, are members of moderately large genera, each with many representatives in western North America. This suggests rapid and recent divergence within these genera. The distributional patterns of the taxa listed below cannot be adequately explained without further information regarding the phylogenetic relationships of the various taxa within their respective genera and ecological relationships, especially dispersibility, habitat requirements, and pollination.

Brickellia simplex Gray (Compositae). Lower Indian Creek Canyon, Sec. 16, T31S, R19W, 1800 m, lower encinal, 13 Sep. 1975, *Wagner 1502*. Previously reported from Chiricahua, Huachuca, and Patagonia mountains of southeastern Arizona, northern Sonora, and Chihuahua.

Castilleja patriotica Fern. (Scrophulariaceae). Upper Indian Creek Canyon, Sec. 33, T31S, R19W, 2200 m, north-facing slope, pine forest, 4 Oct. 1975, *Wagner 1766*. Previously reported by Holmgren (1976) from southeastern Arizona to Durango.

Delphinium andesicola Ewan in Kearney and Peebles subsp. **andesicola** (Ranunculaceae). Lower Indian Creek Canyon, Sec. 16, T31S, R19W, 1850 m, lower encinal, 13 Sep. 1975, *Wagner 1509*; and upper Indian Creek Canyon, Sec. 31, 2150 m, pine forest, 4 Oct. 1975, *Wagner 1732*. Previously reported by Ewan (1945) from the Chiricahua, Huachuca, and Santa Rita mountains of southeastern Arizona.

Plummera ambigens Blake (Compositae). Lower Indian Creek Canyon, Sec. 16, T31S, R19W, 1850 m, lower encinal 22 Jul. 1975, *Wagner 1170*; and west fork of Indian Creek Canyon, Sec. 28, T31S, R19W, 2200 m, north-facing slope, pine forest, 4 Oct. 1975, *Wagner 1792*. Previously reported from the Pinaleno Mountains of southeast-

ern Arizona. The Animas populations differ from the Pinaleno plants in that the ray achenes have 4–6 squamellae rather than 2–4. This feature places the Animas Mountain populations in an intermediate position between *P. ambigens* and *P. floribunda* Gray, the only other species in the genus. *P. floribunda* tends to be epappose but apparently occasionally has two squamellae. The Animas Mountain plants tend to have four squamellae and strongly erose inner phyllaries, which places them closer to *P. ambigens*. It is doubtful that the rank of species should be retained for *P. ambigens* in view of the variable and overlapping nature of morphological characters of each of these isolated populations. These populations of the genus *Plummera* are most probably geographically isolated races of one species, restricted to the mountains of southeastern Arizona and southwestern New Mexico. This taxon could easily become one of southwestern North America's threatened organisms because of its restricted distribution. Although no recognizable danger currently exists to these montane plant populations in New Mexico, it perhaps deserves protection by law.

The genus *Plummera*, according to Blake (1929), is separated from *Hymenoxys* by the disk flowers which are few in number, highly sterile, and devoid of pappus. These are the only characters which segregate *Plummera* from *Hymenoxys* (Rydberg 1915). Blake (1929) was somewhat skeptical regarding the retention of *Plummera* as a genus because of the discovery of *P. ambigens* in the Pinaleno Mountains with a pappus present and occasionally fertile disk flowers. These intermediate characters weaken the separation of *Plummera* from *Hymenoxys*. The presence of 5–9 disk flowers in the Animas Mountain populations further weakens the integrity of this small, probably monotypic, genus. Upon further study *Plummera* will most likely be merged into *Hymenoxys*.

The populations on the Pinaleno Mountains occur in different habitats from those of the Animas Mountains. According to Kearney and Peebles (1960: 931), the Pinaleno Mountain populations occur "on stony sterile slopes where it is abundant," while the Animas populations are small and are situated along intermittent streamsides in lower encinal vegetation zones or on north-facing slopes and canyon bottoms in the forest zones. These striking ecological differences, coupled with the known geographical variation in morphology, suggest the need for further investigation.

Silene thurberi S. Wats. (Carophyllaceae). Lower Indian Creek Canyon, Sec. 21, T31S, R19W, 1850 m, lower encinal, 22 Jul. 1975,

Wagner 1218. Previously reported from the Swisshelm and Chiricahua mountains of southeastern Arizona, Sonora, and Chihuahua.

The distributional patterns of the following taxa are similar to those discussed above but have a wider geographical range. Most are known to occur on the west side of the Mogollon escarpment, Gila County, Arizona, and range farther south in Mexico.

Bidens lemmoni Gray (Compositae). Upper Indian Creek Canyon, ridge, Sec. 33, T31S, R19W, 2200 m, upper encinal, 4 Oct. 1975. *Wagner 1730*. Previously reported by Sherff (1937) from the mountains of southeastern Arizona, Baja California, and northern Mexico.

Cheilanthes pringlei Davenp. (Polypodiaceae). Lower Indian Creek Canyon, Sec. 16, T31S, R19W, 1750 m, rocky west-facing slope, 21 May 1975, *Wagner 785*. Previously reported from the mountains of southeastern Arizona, Chihuahua, and Sonora.

Gnaphalium pringlei Gray (Compositae). Ridge above Indian Creek Canyon, 27 Oct. 1960, *Martin 4630*. This specimen was undetermined in the collection at the University of New Mexico (UNM). Upper Indian Canyon, Turkey Spring, Sec. 33, T31S, R19W, 2150 m, pine forest, 4 Oct. 1975, *Wagner 1729*. Previously reported from central and southeastern Arizona and Chihuahua.

Disjunctions.—Climatic considerations appear to account for the presence of far western United States taxa in the Animas Mountains. The Southwest has a biseasonal precipitation pattern. In extreme southwestern Arizona, only 35–40% of the yearly moisture total is received during the late summer season—July through October. The ratio of summer-to-winter moisture increases progressively eastward, with over 70% of the annual precipitation total falling during the summer season in eastern New Mexico. The Animas Mountains are centrally situated in this large climatic region, receiving approximately 60% of their yearly moisture in the period of July through September (Environmental Data Service, Animas Station, 1973*a*). One of the prominent characteristics of the northern Sierra Madre Province is the variability of the precipitation throughout the area (Shreve 1915, Martin 1963, Brady and Bonham 1976). Especially variable is the winter precipitation. In some years the amounts of winter moisture—January to March—in the Animas Mountain area have been similar to winter patterns much farther west. For example, the precipitation during January–March in 1973 amounted to 50% of the yearly total (Environmental Data Service, Animas Station, 1973*b*). In that year the spring flora was exceptionally rich. Many species which had not

been seen for several years were abundant. These species included some disjunct populations of more western species.

Support of the hypothesis stated above does not rule out the possibility of range expansions due to man's influence in the Southwest. Both taxa reported here were collected in habitats which have been subjected to cattle grazing during the last quarter century. The following two collections are both small winter annuals representing disjunctions of about 150 km east of other known localities.

Calandrinia ciliata (Ruiz. & Pav.) DC. var. **menziesii** (Hook.) J. F. Macbride (Portulacaceae). Grassy foothills, Sec. 7, T31S, R19W, 1650 m, 20 Apr. 1975, *Wagner 619*. Previously reported by Wiggins (Shreve and Wiggins 1964) from British Columbia, to central Baja California, central Arizona, and Sonora.

Caucalis microcarpa Hook. & Arn. (Umbelliferae). Lower Indian Creek Canyon, Sec. 16, T31S, R19W, 1850 m, lower encinal, 20 May 1975, *Wagner 734*. Previously reported by Wiggins (Shreve and Wiggins 1964) from eastern British Columbia to Idaho, Utah, central Arizona, and Baja California. This collection was made about 450 m above its usual occurrence farther west.

The final two taxa are northwestern disjunctions.

Cyclanthera dissecta (Torr. & Gray) Arn. (Cucurbitaceae). Lower Indian Creek Canyon, Sec. 21, T31S, R19W, 1850 m, 13 Sep. 1975, *Wagner 1519* and *1570*. Previously reported by Wiggins (Shreve and Wiggins 1964) from Kansas to Louisiana, Texas, southeastern Arizona, and northern Mexico.

Tillandsia recurvata L. (Bromeliaceae). Lower Indian Creek Canyon, Sec. 16, T31S, R19W, 1750 m, on *Rhus trilobata* Nutt., 20 May 1975, *Wagner and Duke 720*. This collection adds a new angiosperm family to the New Mexico flora. Moreover, it is the only epiphytic angiosperm known from New Mexico. Previously reported from Florida to Texas, southeastern Arizona, and southward to tropical America.

Tillandsia recurvata does not appear to be an established member of the Animas flora. It is more probable that it is an infrequent colonist of this area situated to the north of localities where established breeding populations presently occur. The seeds of *T. recurvata* bear a plumose basal appendage making them highly dispersable. In addition, only one individual was located during the 38 field days on the mountain. Moreover this individual, of which only a fragment was collected for the voucher, could not be relocated after its initial discovery and perhaps no longer exists.

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