

CHROMOSOME COUNTS OF ANGIOSPERMS
OF WESTERN NORTH AMERICA

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This report contains chromosome counts from 132 populations of angiosperms mainly from southwestern North America, including first counts for one genus, 12 species, and 4 subspecies. New counts for taxa are marked with (**) and new ploidy-level reports are marked with (++) preceding the relevant epithet. It also contains reports on 3 cytologically variable, or taxonomically difficult, taxa, namely Dalea formosa, Leucelene ericoides, and the genus Solidago. The other entries in this compilation confirm earlier published chromosome count determinations from elsewhere in those taxa's ranges. Methods used are described in Ward (1983). Vouchers are at NMC with some duplicates at NY, RSA, TEX, and MO. The following codes for principal collectors are used in the listing: RJS = Robert Soreng, RWS = Richard Spellenberg, W = Darrell Ward.

AMARANTHACEAE: Amaranthus (**) fimbriatus (Torr.) Benth. n=17. NM, Dona Ana Co., 8 km E of Las Cruces, RWS 7865.

APIACEAE: Pseudocymopterus montanus (Gray) Coult. & Rose. n=11. AZ, Cochise Co., Chiricahua Mts., Victorio Campgrd., W 83-063; NM, Lincoln Co., White Mts., 6 km WNW of Alto, W 81-152; Sierra Co., Black Range, Diamond Cr., W 81-177.

ASTERACEAE: Artemisia campestris L. subsp. (**) pacifica (Nutt.) H. & C. n=9. NM, Valencia Co., E edge of Grant Malpais, W 81-507. Previous chromosome counts reported for this species are n = 9 and n = 18, but none specifically indicate this variety. Artemisia frigida Willd. n=9. NM, Lincoln Co., Sacramento Mts., NM-24, 12 km E of Cloudcroft, W 81-462.

Artemisia ludoviciana Nutt. subsp. mexicana (Willd.) Keck. n=9. NM, Lincoln Co., White Mts., Eagle Cr., W 81-527.

Aster (++) commutatus (T & G) Gray var. commutatus. n=10. NM, Otero Co., E edge of High Rolls, W 84-033. Morphological variation in this widespread species of western North America may be better understood after considerable cytological study. Ward (1983) reports n = 15 for this variety from extreme northwestern New Mexico. Keil and Pinkava (1976) report n = 5 for the variety polycephalus (Rydb.) Blake from Gila Co., AZ.

Brickellia grandiflora (Hook.) Nutt. var. grandiflora. n=9. NM, Otero Co., Sacramento Mts., 8 km S of Cloudcroft, W 81-412.

- Centaurea melitensis L. n = 12. TX, Hudspeth Co., US-62/180, 25 km S of Del City, W 85-003.
- Chaetopappa (**) hershheyi Blake. n=8. TX, Guadalupe Mts. Nat. Park, Pine Springs Canyon, RWS 6476.
- Erigeron divergens T & G. 2n=ca. 27. NM, Hidalgo Co., Peloncillo Mts., Clanton Draw on USFS-63, W 83-069. Since only Metaphase I meiotic configurations were seen in this cytological material, it must be assumed that this is a triploid count similar to the counts reported in Keil and Pinkava (1976), Pinkava and Keil (1977), Keil (1981) and other publications.
- Erigeron oreophilus Greenm. n=9. AZ, Cochise Co., Chiricahua Mts., Barfoot Peak, W 83-053.
- Erigeron (**) rhizomatus Cronq. n=9. NM, McKinley Co., Zuni Mts., 13 km S of I-40 on NM-400, RWS 7135.
- Erigeron rybius Nesom. n=9. NM, Otero Co., Sacramento Mts., 8 km S of Cloudcroft, W 81-413.
- Erigeron superbus Greene ex. Rydb. n=9. NM, McKinley Co., NM-400, 3 km S of Ft. Wingate, W 81-500.
- Galinsoga semicalva (Gray) St. John & White. n=16. AZ, Cochise Co., Chiricahua Mts., Victorio Campgrd., W 83-065.
- Heliopsis helianthoides (L.) Sweet subsp. occidentalis. n=14. NM, Otero Co., 2.5 km S of Cloudcroft, W 81-408.
- Leucelene ericoides (Torr.) Greene. n=8 and n=16 as follows: n=8. AZ, Apache Co., 8 km N of Ft. Defiance, RWS 7134; TX, Culberson Co., TX-54, 38 km S of intersection with US-62/180, W 85-004; n=16. AZ, Cochise Co., 0.8 km E of Pima county line, S of IH-10, RWS 7011; NM, Bernalillo Co., Albuquerque, W base of Sandia Mts., RWS 7077; Chaves Co., US-82, 25 km W of Eddy Co. line, W 84-002b; Colfax Co., 3 km N of Springer, RWS 7019; Curry Co., US-60, Clovis, W 84-006; Dona Ana Co., 16 km NNW of Las Cruces, Robledo Mt., W 83-015; Eddy Co., Guadalupe Mts. Nat. Park, Pine Canyon Campgrd., RWS 7004; S edge of Carlsbad, US-285, RWS 7005; Grant Co., City of Rocks State Park, 30 km NW of Deming, RJS 2153; Grant Co., 2 km W of Luna Co. line on IH-10, RWS 7014; Lincoln Co., US-54, 2 km SW of Corona, W 84-020; Rio Arriba Co., 1 km N of Medanales, RWS 7751; Roosevelt Co., US-70, 9 km E of Kenna, W 84-005; San Juan Co., Navajo Coal Mine, RWS 7078; Union Co., US-56, 32 km W of Clayton, RWS 7049; Valencia Co., I-25, 6 km S of Bernalillo Co. line, RWS 7018; Mt. Taylor, Coal Mine Canyon Campgrd., 17 km N of Grants, RWS 7141; TX, Carson Co., TX-152, 2 km SE of Skellytown, W 84-012; Culberson Co., US-90, 2 km S of Van Horn, W 85-006; El Paso Co., Hueco Tanks, 30 km E of El Paso, W 85-001; Hansford Co., 10 km N of 2.5 km W of Spearman, Palo Duro Cr., W 84-016; Hudspeth Co., US-180, 80 km E of El Paso, RWS 7006; Jeff Davis Co., US-90, 8 km S of Culberson Co. line, W 85-007; 40 km W of Ft. Davis, intersection of TX-166 and TX-505, W 85-009; Ochiltree Co., US-83, 15 km S of Perryton, W 84-015; Parmer Co., US-60, 8 km NE of Bovina, W 84-007; Randall Co., Buffalo Lake Wildlife Refuge, W 84-009; Roberts Co., US-60, Miami, W 84-013; Sherman Co., US-54, 3 km SW of Stratford, W 84-018; MEXICO, Chihuahua, 45 km NW of Cd. Guerrero, 1

km W of Matachic on road to Tonasachic, RWS 7673; Hwy-45 16 km S of El Sueco, RWS 7728; 15 km SE of Cd. Guerrero, 5 km SW of La Junta, RWS 7702.

This information indicates that nearly all of the occurrences of this species in the United States north of the Mexican are polyploid. Information is still needed from populations in southwestern New Mexico, Mexico and the rest of the western third of this plant's distribution.

Machaeranthera bigelovii (Gray) Greene. $n=4$. NM, Sierra Co., Black Range, Emory Pass on NM-90, W 83-083.

Machaeranthera gracilis (Nutt.) Shinnars. $n=2$. AZ, Cochise Co., Chiricahua Mts., Cave Cr. Campgrd., W 83-031.

Machaeranthera tanacetifolia (H.B.K.) Nees. $n=4$. NM, Valencia Co., NM-117, Grant Malpais, W 81-512.

Pericome caudata Gray var. caudata. $n=18$. AZ, Cochise Co., Chiricahua Mts., Barfoot Peak, W 83-045. The count of $2n = 26$ referenced in Bolkhoviskikh, et al. (1969) is a typographical error, misrepresenting the count of $n = 18$ reported in Turner and Flyr (1966).

Solidago canadensis L. var. canadensis. $n=9 + 4b$ and $n=9$ as follows: $n=9 + 4b$. KS, Wyandotte Co., W Kansas City, KS, W 81-598; $n=9$. WY, Sublette Co., 8 km WSW of Moran, RJS 1239.

Solidago canadensis L. var. salebrosa (Piper) Jones. $n=9$. MEXICO, Nuevo Leon, 11 km S of Montemorelos, W 80-057. A previous count is listed in Bolkhovskikh, et al. (1969) as .elongata.

Solidago canadensis L. var. scabra T & G. $n=27$. NM, Dona Ana Co., 3 km N of Dona Ana, W 83-081; Eddy Co, Guadalupe Mts., Rattlesnake Springs, W 84-027; Otero Co, Tularosa, W 81-208. Many reports of $n = 27$ for this taxon have been published as Solidago altissima.

Solidago missouriensis Nutt. var. ~~(**)~~extraria Gray. $n=18$. WY, Dark Co., Rockefeller Memorial Hwy near Ashton, ID, RWS 5742. Diploid and tetraploid counts for S. missouriensis are in Morton (1981). However, there are no varieties specified.

Solidago missouriensis Nutt. var. fasciculata Holz. $n=9$. NM, Grant Co., 2 km N of Silver City, W 80-043.

Solidago multiradiata Ait. var. scopulorum Gray. $n=18$. WY, Sublette Co., 43 air km N of Pinedale, RWS 5779; MT, Deer Lodge Co., 24 air km SW of Anaconda, RWS 5723.

Solidago parryi (Gray) Greene. $n=9$. CO, Colfax Co., US-50, 8 km E of Monarch Pass, RWS 5804. Similar counts for this species have been previously reported as Haplopappus parryi Gray. This author, however, agrees with the discussion in Anderson, et al. (1974) suggesting that this plant has closer affinities to the genus Solidago than to the woodier species of Haplopappus, both with a base chromosome number of $n = 9$.

Solidago spathulata DC. var. neomexicana (Gray) Cronq. $n=9$. NM, Lincoln Co., 1 km NE of Capitan, RJS 1493; Taos Co., Wheeler Peak, RWS 5822.

Solidago ulmifolia Muhl. var. ulmifolia. $n=9$. MO, Jackson Co., Swope Park, S Kansas City, W 81-595.

Solidago velutina DC. var. nevadensis (Gray) C. & J. Taylor (= S. sparsiflora Gray). n=9 and n=18 as follows: n=9. AZ, Cochise Co., Chiricahua Mts., 8 km SW of Portal, W 83-027; Peloncillo Mts., 3 km E of NM border, USFS-63 (Geronimo Trail Road), W 83-067; CO, Garfield Co., CO-13, 18 km NW of Rifle, RWS 5798; Pitkin Co., US-82, 5 km SE of Aspen, RWS 5802; NM, Grant Co., 13 km NW of Silver City, W 80-013; 11 km NNE of Bayard, W 81-586; 10 air km SW of Emory Pass, W 80-023; NM-61, 11 km S of Catron Co. line, W 80-047; 21 km N of Silver City, W 80-045; Hidalgo Co., Peloncillo Mts., Skeleton Canyon, RWS 6312b; McKinley Co., NM-400, 3 km S of Ft. Wingate, W 81-492; Otero Co., NM-37, 2 km N of Ruidoso, W 80-033; Karr Canyon, 3 km SE of High Rolls, W 81-576; San Juan Co., 6 km N of La Plata, W 83-083; MEXICO, San Luis Potosi, MEX-49, 75 and 76 km NW of Cd. San Luis Potosi, W 80-059 and W 80-060; Zacatecas, road to Fresnillo, 5 km E of MEX-45, W 80-061; n=18. NM, Grant Co., Mimbres Mts., Emory Pass, W 80-028; Lincoln Co., Jicarilla Mts., 4 km SSE of Jicarilla, W 81-585; Gallinas Peak, 11 km N of Corona, W 81-581.

In Anderson, et al. (1974), both diploid and tetraploid counts are reported as Solidago sparsiflora Gray. Use of S. velutina instead of the name S. sparsiflora is suggested by Taylor and Taylor (1983).

Solidago wrightii Gray var. (**) adenophora Blake. n=9. AZ, Cochise Co., Chiricahua Mts., 8 km SW of Portal, W 83-026; Peloncillo Mts., Skeleton Canyon, W 81-569; NM, Grant Co., NM-90, 1 km W of Emory Pass, W 80-025; Luna Co., Florida Mts., above Mahoney Park, RWS 6231; Cooke Range, E base of Cooke Peak, W 81-555.

There are many counts that have been published for S. wrightii, nearly all of which have not specified a varietal epithet. Some question has been expressed about the morphological definition of varieties in this species. In Taylor and Taylor (1983), a novel recognition of inflorescence characters instead of glandularity would make previous reports to the varietal level questionable, anyway. Both of these varieties have probably been counted, regardless of the interpretation.

Solidago wrightii var. wrightii. n=9. NM, Grant Co., 17 km NNE of Silver City, W 80-044; Bear Mt., 8 air km NW of Silver City, W 80-042; Hidalgo Co., Peloncillo Mts., Clanton Draw, W 83-070; TX, Jeff Davis Co., center of Davis Mts., W 81-290.

Tagetes micrantha Cav. n=12. NM, Peloncillo Mts., Clanton Draw, W 83-078.

CAPPARACEAE: Cleome (**) multicaulis Sesse & Moq. n=20. CO, Alamosa Co., 16 km E of Mosca, RWS 7850.

Polanisia trachysperma T. & G. var. trachysperma. n=10. TX, Jeff Davis Co., Davis Mts., W 81-296.

FABACEAE: Astragalus lentiginosus Doug. ex Hook. var. diphysus (Gray) Jones. n=11. NM, San Juan Co., 6 km N of La Plata, 1 km E of NM-17, RWS 6166.

Astragalus racemosus Pursh var. (**) longisetus Jones. $n=11$. NM, Mora Co., NM-120, 10 km E of Wagon Mound, W 81-270. CORRECTION: This was incorrectly reported in Ward, 1984 as A. prae-longus. The proper identification was provided by R. Barneby.

Dalea formosa Torr. $n=7$ and $n=21$ as follows: $n=7$. AZ, Cochise Co., Tombstone, RWS 7016, 7997; TX, Hutchinson Co., Lake Meredith, N of Amarillo, W 84-010; $n=21$. NM, Harding Co., near junction of NM-39 and NM-65, RWS 7070; OK, Cimarron Co., 9 km N of Kenton, RWS 7054. Spellenberg (1981) reported on the distribution of the ploidy levels in this species, and predicted through stepwise discriminant analysis (SDA) the ploidy levels of specimens from throughout the range of the species. Voucher 7054 comes from very near the northern-most populations known for this species. 7070 is from an area in northeastern New Mexico for which no specimens were then available. The former contradicts the SDA prediction of $2n$ for the northern-most specimens; the latter helps clarify a situation since plants to the south were predicted to be $6n$, but those the west were predicted to be $2n$. The $6n$ races were considered to be a Chihuahuan element of the Madro-Tertiary flora, and Weber (1980) proposed that this element is expanding northward into the southern Rocky Mts. In this region the $6n$ races apparently form the northern-most populations in this morphologically variable but taxonomically monotypic species. 7054 also reiterates the need for cytological study of the eastern populations of the plant where $2n$ and $6n$ races are in contact. 84-010 supports the $2n$ prediction for the eastern range of the species.

Dalea grayi (Vail) L.Q. Wms. $n=7$. AZ, Cochise Co., Peloncillo Mts., Skeleton Canyon, W 81-565.

Desmodium (**) ambiguum Hemsl. $n=11$. MEXICO, Jalisco, ca. 24 km S of Puerto Vallarta, RWS 6442.

Lupinus (**) laetus Watson. $n=24$. NM, Otero Co., Tularosa Canyon, 10 km S of Mescalero, W 83-024.

LAMIACEAE: Salvia (**) subincisa Benth. $n=9$. NM, Valencia Co., E edge of Grant Malpais, W 81-511.

LILIACEAE: Asphodelus fistulosus L. $n=28$, 28 + fragment. NM, Luna Co., IH-10, 34 km W of Deming, RWS 5975.

NYCTAGINACEAE: Mirabilis (++) linearis (Pursh) Heim. $n=20$. NM, San Juan Co., 8 km N of La Plata, 5 km E of NM-17, RWS 6169. Taylor and Brockman (1966) report a chromosome complement of 26 bivalents with normal meiosis for this widespread and morphologically variable species and propose a base number of 13 for the genus. They note, however, earlier reports of $n = 29$. Clear meiotic configurations in the Nyctaginaceae are often very difficult to obtain. The chromosomes are small and sticky with the homologues not remaining in tightly associated bivalents prior to metaphase I, even though anaphase is usually

regular. This difficulty is exacerbated by the low number of pollen mother cells that are produced, and counts reported, therefore, are probably 'best estimates'. Spellenberg (pers. obs.) notes that *Mirabilis* species which have been placed in the genus *Oxybaphus* are commonly self-pollinating and quite likely autogamous. Low, spindly phenes of *M. linearis* and *M. oblongifolia* (see following) in New Mexico are commonly cleistogamous. Such a breeding system may facilitate the fixation of various chromosome numbers throughout the range of the species. A similar situation is also apparently present in tropical, perennial *Boerhavia*.

Mirabilis (**) *oblongifolia* (Gray) Heimerl. $n=ca.25$. AZ, Cochise Co., Chiricahua Mts., Barfoot Peak, Victorio Campgrd., W 83-052.

POACEAE: *Bothriochloa saccharoides* (Schwartz) Rydb. var. *torreyana* (Steud.) Gould. $n=30$. NM, San Miguel Co., 2.5 km E of Varadero, W 81-218.

Poa bigelovii Vasey & Scribn. $n=14$. NM, Dona Ana Co., Robledo Mt., 19 km NNW of Las Cruces, W 83-005.

POLEMONIACEAE: *Gilia flavocincta* A. Nels. subsp. *australis* (A. & V. Grant) Day and V. Grant. $n=9$. AZ, Pima Co., IH-10, 1 km W of Cochise Co. line, RWS 7012.

Gilia (**) *haydenii* A. Gray. $n=8$. NM, Sandoval Co., 18 km E of Cuba, RWS 8184.

Gilia mexicana A. & V. Grant. $n=9$. AZ, Cochise Co., IH-10, 19 km E of Benson, RWS 7013.

Gilia rigidula Benth. subsp. *acerosa* (Gray) Wherry. $n=9$. NM, Dona Ana Co., Robledo Mountain, 16 km NNW of Las Cruces, W 83-013.

POLYGONACEAE: *Eriogonum* (**) *scabrellum* Reveal. $n=20$. NM, San Juan Co., 32 km SW of Fruitland, RWS 7587.

PORTULACAE: *Talinum parviflorum* Nutt. $n=24$. NM, Valencia Co., E edge of Grant Malpais, 15 km S of I-40, W 81-508; Harding Co., Kiowa Nat. Grasslands, 8 km W of Mills, W 81-260.

Talinum (**) *pulchellum* Wooton & Standl. $n=12$. NM, Harding Co., 16 km NNW of Mills, RWS 6036.

RANUNCULACEAE: *Clematis* (**) *drummondii* T. & G. $n=8$. NM, Dona Ana Co., 6 km N of Organ, W 86-001.

Clematis ligusticifolia Nutt. $n=8$. NM, Otero Co., Sacramento Mts., 2 km SE of High Rolls, W 81-480.

Ranunculus cymbalaria Pursh var. *saximontanus* Fern. $n=8$. NM, Otero Co., Tularosa Canyon, 15 km S of Mescalero, W 83-023.

ROSACEAE: (**) *Petrophytum caespitosum* (Nutt.) Rydb. $n=9$. NM, Eddy Co., Guadalupe Mts., Slaughter Canyon, W 84-022. This apparently represents the first chromosome report for this

small genus, the number being consistent with that of closely allied genera (as reviewed by Henrickson, 1985).

Potentilla norvegica L. $n=28$. NM, Lincoln Co., White Mts., Eagle Cr. Canyon, 5.5 km WNW of Alto, W 81-206.

SCROPHULARIACEAE: Castilleja patriotica Fern. $n=12$. AZ, Cochise Co., Chiricahua Mts., Barfoot Peak, Victorio Campgrd., W 83-040.

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