

## OBSERVATIONS ON MENTZELIA IN SOUTHERN CALIFORNIA

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Our work on Mentzelia section Trachyphytum (Loasaceae) has disclosed a number of new species and indicated the necessity for several nomenclatural changes. Some of these are presented here so that they may be included in our contribution of the Loasaceae in the new Manual of Southern California Botany being prepared by Philip Munz. In addition, some new chromosome numbers in Mentzelia are reported in the cited specimens. All chromosome analyses are from microsporocytes, and at least two individuals from each population were counted.

### MENTZELIA CALIFORNICA Thompson & Roberts, sp. nov.

Herba erecta; folia rosulae irregulariter lobata lobis longis acutis, superiores ovato-lanceolatae; petala 5, lutea basi macula crocea, ovata, 6-11 mm longa; stamina 5-6 mm longa; stylus 5-6 mm longus; capsulae recurvae, 1.5-3.5 cm longae; semina irregulariter angulata, leviter tessellata, papillis rotundatis vel subacutis.

Plant erect, branching habit spreading, stems stout, 2-4 dm tall; leaves linear-lanceolate, rosette leaves irregularly lobed with long, pointed lobes, upper leaves ovate-lanceolate, fewer lobed or rarely entire; flowers solitary in the axils and terminal, opening in the morning; bracts entire, ovate-lanceolate, not white at base; calyx lobes 4-6 mm long, petals 5, 6-11 mm long, yellow with an orange spot at base, ovate, apex acute or rounded; stamens 5-6 mm long; style 5-6 mm long; capsules narrowed at the base, recurved to 180°, 1.5-3.5 cm long, about 1.5 mm wide; seeds irregularly angled, slightly tessellate, the surface with medium, rounded to slightly pointed papillae;  $n=27$ . Holotype: California, San Bernardino Co., 6.3 mi. south of Salt Wells, Thompson 1644 (US; isotype LA).

Mentzelia californica can occur in mixed colonies with M. albicaulis ( $n=36$ ), M. veatchiana ( $n=27$ ), M. mojaviensis ( $n=27$ ), and M. obscura ( $n=18$ ). This

1. Publications and collections prior to 1970 as Joyce Zavortink.



species hybridizes with M. mojavnensis, but the hybrids show reduced fertility with an average of 52% good pollen. Hybrids between M. californica and M. veatchiana are completely sterile. Mentzelia californica has usually been identified in herbaria as M. albicaulis and has not been recognized as a distinct species. Although it is similar to M. albicaulis, M. californica differs in having larger flowers, M. albicaulis has petals 2-6 mm long; longer styles, those of M. albicaulis are 3-5 mm long; much less pronounced papillae on the seed surface; ovate-lanceolate bracts, while M. albicaulis has bracts that are linear or lanceolate. Mentzelia californica is also somewhat similar to M. jonesii (n=18) but the two species do not occur together; M. californica has a more northern distribution while M. jonesii occurs in the more southern portions of the Mojave Desert, the Colorado Desert, and north along the Colorado River. Mentzelia californica is found on desert plains and roadside embankments with Larrea, Dalea, and Lycium, below 3000 ft., in the northern Mojave Desert, eastward into Nevada. Flowering period is March through April.

CALIFORNIA: Inyo Co., 1.1 mi. east of Salsbury Pass, Thompson 3164, chromosome voucher, n=27 (LA); 4.3 mi. east of Salsbury Pass, Thompson 3156, chromosome voucher, n=27 (LA); Homewood Canyon, Zavortink 2812, chromosome voucher, n=27 (LA); 1.2 mi. west of Salsbury Pass, Zavortink 2479, chromosome voucher, n=27 (LA); 1 mi. east of Salsbury Pass, Zavortink 2482, chromosome voucher, n=27 (LA). Kern Co., corner of Inyokern Rd. and Kay Ave., Zavortink 2475, chromosome voucher, n=27 (LA); Searles Station, Wheeler & Richardson in 1930 (LA). San Bernardino Co., 1.5 mi. south of Red Mt., Thompson 1601, chromosome voucher, n=27 (LA); along U.S. 395 at Red Mt. Road, Zavortink 2541, chromosome voucher, n=27 (LA). NEVADA: Lincoln Co., 1 mi. east of Panaca, Thompson 3277, chromosome voucher, n=27 (LA).

MENTZELIA DESERTORUM (Davidson) Thompson & Roberts, comb. nov.

Acrolasia desertorum Davidson. Bull. So. Calif. Acad. Sci. 5: 16. 1906. Holotype: Signal Mts., Colorado Desert near boundary, 30 Mar. 1901, T. G. Brandege (LAM!; isotype UC!).

Mentzelia desertorum occurs on fine, sandy desert flats below 2000 ft. with Larrea, Encelia, and Abronia. It is common throughout the Sonoran Desert northward sporadically to extreme southern Inyo Co. It is very similar to M. obscura, described below,



and often occurs in mixed colonies with M. albicaulis (n=36) and M. obscura (n=18). Mentzelia desertorum can easily be distinguished from M. albicaulis by seed characters; M. obscura has smooth seeds, not tessellate, while seeds of M. albicaulis are very papillose and tessellate. When growing with M. obscura, it can most easily be differentiated by its very short, rounded leaf lobes, which are long and pointed in M. obscura. Also, where the two species grow together, M. obscura always has larger flowers than M. desertorum. We have counted eighteen populations and are here reporting the chromosome number as n=9. Voucher specimens are in the US and LA herbaria; representative specimens of which are:

CALIFORNIA: San Bernardino Co., 2.8 mi. west of Cronise Valley along U.S. 466-91, Thompson 3143, chromosome voucher, n=9 (LA). Riverside Co., along U.S. 60, 20.1 mi. east of Desert Center, Zavortink 2672, chromosome voucher, n=9 (LA); along the road to Willis Palms, 3.4 mi. east of U.S. 99, Thompson 3014, chromosome voucher, n=9 (LA). San Diego Co., just east of Ocotillo Wells, Raven 16891, chromosome voucher, n=9 (LA). Imperial Co., at Ogilby, Zavortink 2682, chromosome voucher, n=9 (LA).

ARIZONA: Mohave Co., 5.2 mi. east of Topock along U.S. 66, Zavortink 2721, chromosome voucher, n=9 (LA).

MENTZELIA EREMOPHILA (Jepson) Thompson & Roberts, comb. nov.

Mentzelia lindleyi Torrey & Gray var. eremophila Jepson. Man. Fl. Pl. Calif. 650. 1925. Lectotype: Kern Co., Randsburg, Hall & Chandler 6880 (JEPS!). The type specimen cited by Jepson is "Hall & Chandler 6680", but this specimen is a Scirpus, not a Mentzelia. There is a Hall & Chandler 6880 from Randsburg which fits the description given by Jepson, and we are assuming the specimen number originally cited by Jepson is probably a typographical error.

Mentzelia eremophila is very common along canyon slopes of the eastern margins of Kern Co. and the northwestern corner of San Bernardino Co., in association with Larrea, Yucca brevifolia, and Dalea, mostly below 4000 ft. Although it has not previously been recognized as a distinct species, it is nonetheless readily distinguished from all other species of Mentzelia. It has large flowers with petals over 1.5 cm in length, a long style over 1 cm, and very deeply and sharply lobed leaves, which has caused it to be identified in many herbaria as M. lindleyi. However, its entire bracts and recurved capsules, together with its distinctive seeds (rounded with a pronounced hilum) are very different from the lobed



bracts and erect capsules of M. lindleyi. Also, M. lindleyi occurs only on serpentine slopes of Foothill Wd. communities, while M. eremophila is strictly a desert species. Chromosome numbers have been ascertained from eight populations, with voucher specimens in the US and LA herbaria, and the number is reported here as  $n=9$ . Representative specimens are:

CALIFORNIA: Kern Co., 5.7 mi. northeast of U.S. 6 on road to Randsburg, Thompson 1599, chromosome voucher,  $n=9$  (LA); 1 mi. north of Atolia, Lewis in 1950, chromosome voucher,  $n=9$  (LA); Last Chance Canyon, Zavortink 2652, chromosome voucher,  $n=9$  (LA); Red Rock Canyon, Zavortink 2653, chromosome voucher,  $n=9$  (LA); Mesquite Canyon, Zavortink 2656,  $n=9$  (LA).

MENTZELIA JONESII (Urban & Gilg) Thompson & Roberts, comb. nov.

Mentzelia albicaulis (Hooker) Torrey & Gray var. jonesii Urban & Gilg. Nova Acta Akad. Leop.-Carol. 76: 29. 1900. Lectotype: Yucca, Arizona, Jones 3900 (POM!). Mentzelia albicaulis (Hooker) Torrey & Gray var. spectabilis Jones. Contr. West. Bot. 12: 16. 1908. No type cited with original description. Mentzelia nitens Greene var. jonesii (Urban & Gilg) Darlington. Ann. Missouri Bot. Gard. 21: 198. 1934. Mentzelia nitens Greene var. leptocaulis darlington. Ann. Missouri Bot. Gard. 21: 199. 1934. Type: Williams Fork, Arizona, Palmer 157 (M).

Mentzelia jonesii is found in rather coarse soil on desert plains and slopes with Larrea, Yucca brevifolia, Coleogyne, and Opuntia, often growing up through desert shrubs, below 4000 ft., from south-central Inyo Co. south throughout the Mojave Desert and eastward to southern Nevada and western Arizona along the Colorado River. This species often occurs in mixed populations with M. obscura ( $n=18$ ) and M. albicaulis ( $n=36$ ), but is easily distinguished by its larger flowers and longer styles; M. jonesii has petals longer than 8 mm, those of M. albicaulis and M. obscura are less than 8 mm; the styles of M. jonesii are 6-10 mm while those of M. albicaulis and M. obscura are 3-5 mm long. It differs from M. obscura also in that the seeds of M. obscura are smaller, not tessellate, and have small pointed papillae, while those of M. jonesii are tessellate and have moderately sized papillae. Chromosome numbers have been determined from eight populations and the number is reported here as  $n=18$ . Although artificial hybrids have been made in the laboratory between M. jonesii and M. obscura, also  $n=18$ , they



are sterile with less than 2% good pollen. Voucher specimens are in the US and LA herbaria; representative specimens are:

CALIFORNIA: Inyo Co., Sheppard Canyon, Zavortink 2800, chromosome voucher,  $n=18$  (LA). San Bernardino Co., along the road to Excelsior Mine, 19.4 mi. north of Interstate 10, Zavortink 2776, chromosome voucher,  $n=18$  (LA). ARIZONA: Mohave Co., 11.1 mi. south of Hoover Dam along U.S. 466-93, Thompson 3050, chromosome voucher,  $n=18$  (LA).

MENTZELIA MOJAVENSIS Thompson & Roberts, sp. nov.

Herba erecta; folia rosulae rhache normale et lobis brevibus rotundatis, superiores late ovato-lanceolatae, lobata; bracteae late ovatae, integrae vel 3-5 lobatae, raro base macula dilute albae; petala 5, 6-8 mm longa, lutea basi macula crocea, obovata vel ovata, apice acuto vel rotundato, raro retuse; stamina 4-5 mm longa; stylus 4-5 mm longus; capsulae erectae vel recurvae, 1.2-2.5 cm longae; semina parce tessellata, papillis aliquantum acutis.

Plant erect, the branching pattern moderately spreading, the stems stout, 2-4 dm tall; rosette leaves linear-lanceolate, medium in width, with short to medium, rounded lobes, upper leaves broadly ovate-lanceolate and rather sharply lobed, sometimes slightly clasping at base; flowers solitary in the axils and terminal, opening in the morning; bracts broadly ovate, entire or 3-5 lobed, rarely with a faint white area at base; calyx lobes 2-5 mm long; petals 5, 6-8 mm long, yellow with an orange spot at the base, obovate or broadly ovate, apex acute or rounded, rarely retuse; stamens 4-5 mm long; style 4-5 mm long; capsules narrowed at base, erect or recurved to  $90^\circ$ , 1.2-2.5 cm long, about 2-3 mm wide; seeds irregularly angled, slightly or moderately tessellate, the surface with somewhat pointed papillae;  $n=27$ . Holotype: California, Los Angeles Co., 15 mi. east of Lancaster on East Ave. J, Zavortink 2520, chromosome voucher,  $n=27$  (US; isotype LA).

Mentzelia mojavensis occurs on desert plains and roadside embankments along the western margins of the Mojave Desert in Los Angeles and Kern counties, below 3500 ft., with Larrea and Yucca brevifolia. It is often found in mixed populations with M. veatchiana ( $n=27$ ), M. californica ( $n=27$ ), M. obscura ( $n=18$ ), and M. albicaulis ( $n=36$ ). Hybrids between M. mojavensis and M. californica do occur, although the hybrids show lessened pollen fertility of around 53% good pollen. Hybrids between M. mojavensis and M.



veatchiana are completely sterile with less than 3% good pollen. Hybrids between M. californica and M. veatchiana produced in the laboratory are very similar morphologically to M. mojavenensis, and it is conceivable that M. mojavenensis has arisen from hybridization between M. californica and M. veatchiana. Hybrid swarms are very common where M. mojavenensis occurs with M. californica and M. veatchiana. Flowering period is March through April.

CALIFORNIA: Kern Co., 2.7 mi. west of U.S. 14 on the Walker Pass Road, Zavortink 2552, chromosome voucher, n=27 (LA); north of Rosamond, Zavortink 2555, chromosome voucher, n=27 (LA); 1 mi. west of Randsburg, Thompson 1727 (LA). Los Angeles Co., 1.2 mi. south of Hi Vista, Zavortink 2526, chromosome voucher, n=27 (LA); 3 mi. east of Palmdale, corner of Palmdale Blvd. and 40th St. E, Thompson 1596 (LA). San Bernardino Co., along U.S. 395 at Red Mountain, Zavortink 2543, chromosome voucher, n=27 (LA).

MENTZELIA OBSCURA Thompson & Roberts, sp. nov.

Herba ramosissima; folia rosulae lobis longis acutis, superiores ovata vel ovato-lanceolata, plerumque integra; bracteae ovatae integraeque; petala 5, 4-8 mm longa, lutea basi macula crocea, ovata vel obovata, apice acuto; stamina 3-6 mm longa; stylus 3-6 mm longus; capsulae recurvae, 1.3-3 cm longae; semina parva, rotundata, non tessellata, papillis parvis acutis.

Plant erect or spreading, many branched from base, often compact and rounded; rosette leaves linear-lanceolate with long, pointed lobes, irregularly lobed, the upper leaves ovate-lanceolate, usually entire; flowers solitary in the axils and terminal, opening in the morning; bracts entire, often appressed or cupped, ovate or ovate-lanceolate, not white at base; calyx lobes 2-5 mm long; petals 5, 4-8 mm long, yellow with an orange spot at base, ovate or occasionally obovate, the apex rounded or acute; stamens 3-6 mm long; style 3-6 mm long; capsules recurved to 180°, narrowed at base, 1.3-3 cm long, about 1.5 mm wide; seeds more or less rounded, light tan, not tessellate, the surface with very slight, pointed papillae; n=18. Holotype: California, Kern Co., 5.7 mi. northeast of U.S. 6 on road to Randsburg, Thompson 1600, chromosome voucher, n=18 (US; isotype LA).

Mentzelia obscura is widely distributed throughout the Mojave and Sonoran Deserts from northcentral



Inyo Co. south into Baja Calif., eastward into western Arizona and Nevada, locally in Utah, in disturbed areas along roadside embankments and desert plains with Larrea, Encelia, Yucca brevifolia, and Dalea. It commonly occurs in mixed populations with M. albicaulis (n=36), M. californica (n=27), M. veatchiana (n=27), M. mojaviensis (n=27), M. jonesii (n=18), M. desertorum (n=9), M. nitens (n=9) and M. eremophila (n=9). Hybrids between M. obscura and species of different ploidy level are very difficult to obtain even in the laboratory and are completely sterile. As previously mentioned, artificial hybrids between M. obscura and M. jonesii, also n=18, are also sterile, and no naturally occurring hybrids have ever been found. Flowering period late Feb. - April.

CALIFORNIA: Inyo Co., 2 mi. west of Panamint Springs, Thompson 3160, chromosome voucher, n=18 (LA); Mesquite Springs, Wiggins 11550 (RSA). Kern Co., 2.9 mi. east of China Lake, Thompson 1640, chromosome voucher, n=18 (LA); Last Chance Canyon, Zavortink 2651, chromosome voucher, n=18 (LA); Red Rock Canyon, Zavortink 2460, chromosome voucher, n=18 (LA). San Bernardino Co., Sheephole Summit, Raven 11875, chromosome voucher, n=18 (LA); 2.8 mi. west of Cronese Valley, Thompson 3138, chromosome voucher, n=18 (LA); 1.8 mi. south of Ivanpah, Zavortink 2475, chromosome voucher, n=18 (LA); 12.7 mi. east of Yermo on road to Mt. Afton, Zavortink 2468, chromosome voucher, n=18 (LA). Riverside Co., Fried Liver Wash, Joshua Tree National Monument, Zavortink 2458, chromosome voucher, n=18 (LA); Corn Spring, Zavortink 2457, chromosome voucher, n=18 (LA). Imperial Co., along Rt. 78, 8.3 mi. south of the county line, Zavortink 2676, chromosome voucher, n=18 (LA). NEVADA: Nye Co., Frenchman Flat, Raven 18881, chromosome voucher, n=18 (LA). Clark Co., 13.1 mi. northwest of Indian Springs on road to Lathrop, Raven 12049, chromosome voucher, n=18 (LA). UTAH: Tooele Co., Wendover, Mosquin 4332, chromosome voucher, n=18 (LA). ARIZONA: Mohave Co., Willow Wash near Yucca, Zavortink 2727, chromosome voucher, n=18 (LA); 5.8 mi. south of Hoover Dam, Thompson 3032, chromosome voucher, n=18 (LA). Yuma Co., just south of Parker Dam, Zavortink 2715, chromosome voucher, n=18 (LA). MEXICO: Baja California, 15.5 mi. south of San Luis Gonzaga, Daniels 39, chromosome voucher, n=18 (LA).

MENTZELIA RAVENII Thompson & Roberts, sp. nov.

Herba erecta, ramis e basi pluribus; folia rosulae lobis brevibus rotundatis, rhache lata;



bracteae late 3-5 lobatae basi albidae, appressae; petala 5, lutea basi macula crocea, obovata, apice retuso, 5-10 mm longa; stamina 3-7 mm longa; stylus 4-7 mm longus; capsulae erectae, 1.4-2.3 cm longae; semina irregulariter angulata, parce tessellata, papillis rotundatis.

Plant erect, branching pattern spreading, stems stout, several branched from base, 2-4 dm tall; rosette leaves linear-lanceolate but broad, with short rounded lobes, upper leaves more ovate-lanceolate with fewer, sharp pointed lobes, broad at base; flowers solitary in the axils and terminal, opening in the morning; bracts broadly 3-5 lobed with a white area at the base, usually broader than long; petals 5, 5-10 mm long, yellow with an orange spot at base, obovate, the apex retuse; stamens 3-7 mm long; style 4-7 mm long; capsules erect, narrowed at base, 0.9-2.3 cm long, about 3 mm wide; seeds irregularly angled, slightly to moderately tessellate, the surface with rounded papillae;  $n=18$ . Holotype: California, Los Angeles Co., San Gabriel Mts., 4.3 mi. south of Pearblossom, Raven 11959 (US). This species has been named in honor of Professor Peter H. Raven, Stanford University, in recognition of his many collections of specimens and cytological material of Trachyphytum species in general and his collections of this species in particular which have aided the authors in determining the species limits.

Mentzelia ravenii occurs along roadside embankments and canyon slopes associated with Larrea and Yucca brevifolia, in desert margin areas in Los Angeles County and western Riverside County. This species is rare both in nature and in herbaria. Most herbaria specimens have been variously referred to M. gracilentia, M. veatchiana, or M. montana. Mentzelia ravenii occurs commonly with M. veatchiana ( $n=27$ ) and though similar to the latter species, can be differentiated on the basis of the following; M. ravenii has yellow petals while the desert populations of M. veatchiana are usually deep orange; M. ravenii has a spreading branching habit in contrast to the strict pattern of M. veatchiana; the bracts of M. ravenii are much broader and often somewhat clasping, while those of M. veatchiana are narrow and not clasping. Flowering period is March through April.

CALIFORNIA: Los Angeles Co., 3.9 mi. southeast of Pearblossom on road to Valyermo, Thompson 3044, chromosome voucher,  $n=18$  (LA); Big Rock Creek Road to Los Angeles County Playground, Craig 1039 (UC); along the Pearblossom Road near marker #2.87,



Zavortink 2446, chromosome voucher,  $n=18$  (LA); 1 mi. south of Pearblossom on road to Little Rock Dam, Zavortink 2445, chromosome voucher,  $n=18$  (LA); Soledad Canyon, Zavortink 2558, chromosome voucher,  $n=18$  (LA). Riverside Co., 3.8 mi. north of Alberhill, Thompson 1613, chromosome voucher,  $n=18$  (LA).

MENTZELIA TRIDENTATA (Davidson) Thompson & Roberts, comb. nov.

Acrolasia tridentata Davidson. Bull. So. Calif. 9: 71. 1910. Type: California, Inyo Co., banks of Haiwee Reservoir, Hasse & Davidson 2460, Apr. 26, 1910 (LAM!). Mentzelia tricusps Gray var. brevicornuta Johnston. Univ. Calif. Publ. Bot. 7: 444. 1922. Type: T. S. Brandegee, Barstow, California, May 14, 1903 (UC).

Acrolasia tridentata Davidson has been recognized by previous monographers (as in Darlington, 1934) as a synonym of M. tricusps var. brevicornuta Johnston, and identified in herbaria as this species or as M. involucrata. Mentzelia tridentata differs from M. involucrata in that it does not have white bracts, and in that respect it is similar to M. tricusps. However, the lateral cusps of the stamens are much shorter than the central cusp in M. tridentata, while the lateral cusps are longer than the central cusp in M. tricusps. The seeds of M. tridentata are more similar to those of M. involucrata than they are to M. tricusps; they are rounded and broadest at the middle, constricted on both faces above and below the middle, while the seeds of M. tricusps are ovate, broadest at the top, and constricted at the middle. The plants of M. tridentata are usually much smaller in general than M. tricusps, less than 1 dm. Mentzelia tridentata is quite restricted in range to buttes around the Barstow-Daggett area of San Bernardino County and the type locality in Inyo County. Flowering period is March through April. The chromosome number has been determined for several individuals from one population and is reported here as  $n=10$ . CALIFORNIA: San Bernardino Co., buttes north of Daggett, Thompson 3566, chromosome voucher,  $n=10$  (LA).

MENTZELIA TRICUSPIS Gray. Chromosome number for this species is reported here also for the first time as  $n=10$ .

CALIFORNIA: San Bernardino Co., 1 mi. west of Havasu Landing, Thompson 3590, chromosome voucher,  $n=10$  (LA). NEVADA: Clark Co., along Lone Mt. road,



5.3 mi. west of U.S. 95, Thompson 3573, chromosome voucher,  $n=10$  (LA).

MENTZELIA REFLEXA Coville. Chromosome number is also reported here for the first time as  $n=10$ .

CALIFORNIA: Inyo Co., Death Valley north of Furnace Creek, Thompson 3157, chromosome voucher,  $n=10$  (LA); Panamint Springs, Thompson 3161, chromosome voucher,  $n=10$  (LA).

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