1950

Mimulus Guttatus and Related Species

Gloria R. Campbell

Follow this and additional works at: <https://scholarship.claremont.edu/aliso>

Part of the [Botany Commons](#)

Recommended Citation

Campbell, Gloria R. (1950) "Mimulus Guttatus and Related Species," *Aliso: A Journal of Systematic and Floristic Botany*: Vol. 2: Iss. 3, Article 7.

Available at: <https://scholarship.claremont.edu/aliso/vol2/iss3/7>

MIMULUS GUTTATUS AND RELATED SPECIES

GLORIA R. CAMPBELL*

INTRODUCTION

The earliest treatment of the genus *Mimulus* was by George Bentham in the Scrophulariaceae Index in 1835. Other early revisions of the group were by Asa Gray, Botanical Contributions in the *Proceedings of the American Academy of Arts and Sciences*, 11:71-104, 1876, and by E. L. Greene, *Mimulus* in the Studies in the Botany of California and Parts Adjacent, *Bulletin of the California Academy of Sciences*, 1:66-127, 1885. Following these early publications no further study of the group as a whole appeared until the Monograph of the Genus *Mimulus* by Adele Lewis Grant in the *Annals of the Missouri Botanical Garden*, Vol. 11, 1924. The accumulation of material and proposed species for the widely spread and highly variable group including *Mimulus guttatus* and closely related species have been very great, and a thorough study of this group was shown to be necessary by the apparent confusion in classification as reflected in the existing literature and the determinations on herbarium specimens.

The geographical area of this study includes primarily Alaska, British Columbia, Washington, Oregon, California, and Idaho; however *Mimulus guttatus* is distributed largely west of the Rocky Mountain system and some specimens were studied and cited from southwestern Alberta, Mexico, and other states west of the Rocky Mountain system.

Methods of study employed by the author were as follows:

(1) *Field*. Extensive studies of the plants in the field were made throughout Western Oregon and the Willowa Mountains of Eastern Oregon, and in Southern California.

(2) *Greenhouse and Garden*. Growth studies were performed whenever viable seeds were obtained. *Mimulus guttatus* varieties *typicus*, *gracilis*, and *grandis*, *Mimulus Tilingi*, and *Mimulus laciniatus* were studied in this manner. Results of these studies are given in the discussions of *Mimulus laciniatus* and *Mimulus guttatus* var. *gracilis*.

(3) *Cytology*. Pollen mother cells were used for cytological information. Anthers were fixed for a period of from 4 to 24 hours in 2:1 alcohol-propionic. Smears were made with propionic-carmin, and the staining process was al-

*A paper based on a thesis presented to the General Faculty of Claremont College in partial fulfillment of the requirements for the degree of Master of Arts.

lowed to proceed for a period of 1 to 2 hours before camera lucida drawings were made.

Mimulus guttatus var. *typicus*:

Botanic Garden Propagation No. 6213, Campbell 365, 7 miles southeast of Hillsboro, Washington Co., Oregon, $n=14$.

Mimulus guttatus var. *gracilis*:

Botanic Garden Propagation No. 6040, Campbell 655, Cache Creek, about 3 miles east of Clear Lake, Lake Co., Calif., $n=14$.

Mimulus guttatus var. *grandis*:

Botanic Garden Propagation No. 6004, Munz 12373, Van Damme State Park at Albion, Mendocino Co., Calif., $n=14$.

Fig. 1—A, *M. guttatus* var. *typicus*, metaphase II, $n=14$. B, *M. guttatus* var. *gracilis*, metaphase II, $n=14$. C, *M. guttatus* var. *grandis*, metaphase II, $n=14$.

(Drawn at bench level $\times 1350$, reduced to $\times 800$.)

(4) *Herbarium Material*. The following is an alphabetical list of symbols, as given by Dr. J. Lanjouw, "On the Standardization of Herbarium Abbreviations," *Chronica Botanica*, 5:142-150, 1939, used for the herbaria in which the specimens examined and cited in this paper are located:

CAS—California Academy of Sciences, San Francisco.

CLUC—Herbarium of Mr. Ira W. Clokey, Univ. of California Herbarium, Berkeley.

DS—Dudley Herbarium, Stanford University.

GH—Gray Herbarium, Harvard University.

NY—New York Botanical Garden.

OSC—Oregon State College, Corvallis.

POM—Pomona College, Claremont.

RSA—Rancho Santa Ana Botanic Garden.

SAC—U. S. Field Station, Sacaton, Arizona.

UC—University of California, Berkeley.

UO—University of Oregon, Eugene.

US—United States National Herbarium.

UTC—Utah State Agricultural College, Logan.

WASH—University of Washington, Seattle.

WILLU—Willamette University, Salem, Oregon.

WYO—Washington State College, Pullman, Washington.

WYO—Rocky Mountain Herbarium, University of Wyoming, Laramie.

The writer wishes to express gratitude to Dr. Lyman Benson of the Department of Botany and Herbarium of Pomona College for inspiration and guidance in this undertaking and for aid in the solving of problems and in securing material.

THE MIMULUS GUTTATUS GROUP

Mimulus guttatus, *Tilingi*, *laciniatus*, and *nudatus*

Glabrous or pubescent annual or perennial herbs with fibrous roots. Stems quadrangular, branched or unbranched. Leaves opposite, palmately veined, highly variable. Pedicels longer than the calyx and lengthening in fruit. Calyx compressed laterally, becoming inflated at maturity, loosely enclosing the capsule; the teeth unequal, uppermost longest, lower pair frequently folding over and sometimes closing the opening. Corolla yellow, markedly bilabiate, the two upper lobes recurved upward, the three lower lobes curving downward, two prominent hairy ridges on tube below lower lip partly or completely closing the throat, the lower lip commonly spotted with varying shades of red; the stamens glabrous and included; the style glabrous or puberulent; the stigma two-lipped and included. Capsule membranaceous, the placentae completely united, dehiscent to the base along both sutures, septum not splitting. Seeds oval or oblong, small, less than 0.5 mm. in length.

KEY TO THE SPECIES

1. Flowers 1-5, rarely 7-8, per stem; the uppermost (floral) leaves not markedly and regularly reduced in size, free at bases; lacking a well-developed fibrous root system, commonly with light yellow rhizomes, often elaborately branched with small fibrous roots at the nodes; leaves clear, light green, margins with few teeth, rarely more than 15, 3-5 main veins; the corolla 1.8-4.5 cm. long; occurring at higher elevations above 2,500 feet in Alaska, Western Canada, Washington, and Oregon; above 4,500 feet in California, Idaho, and Montana, and above 6,800 feet in Colorado, Nevada, and Utah..... 1. *M. Tilingi*
1. Flowers numerous per stem, commonly more than 7-8; the uppermost (floral) leaves markedly and regularly reduced in size, frequently united at the bases; commonly with well-developed fibrous root systems, very rarely with yellow rhizomes; the leaves medium green, frequently tinged with red, margins of numerous teeth, commonly more than 15, 5-7 main veins, rarely 1-3, and then the leaves lanceolate or oblanceolate and pedicels spreading widely at maturity; the corolla 1-4.5 cm. long; occurring at lower elevations up to 5,000 feet in Alaska, Western Canada, Washington, and Oregon; up to 8,000 feet in California, Idaho, and Montana, and up to 10,000 feet in Nevada, Utah, Wyoming, and southward to Mexico.
 2. Stems commonly stout, fistulose, and succulent, 2-15 mm. in diameter, 2-95 cm. long; the leaves ovate, obovate, broadly ovate, suborbicular, or rarely oblong-lanceolate..... 2. *M. guttatus*
 2. Stems slender, 0.5-2 mm. in diameter, 3-38 cm. long; the leaves lanceolate, oblanceolate, deeply cleft, parted, divided, or pinnatifid.
 3. Leaves dentate or denticulate, lanceolate, or oblanceolate, 1.5-3 cm. long, 0.1-1.5 cm. broad, 1- or rarely 3-nerved; the pedicels elongated in fruit up to 2-4.5 cm. long, spreading widely at maturity placing the calyx at a distance from the stem; the upper calyx tooth scarcely exceeding the length of the others; the corolla 1.5-2 cm. long..... 3. *M. nudatus*
 3. Leaves deeply cleft, parted, divided, or pinnatifid, elliptic, ovate, or obovate, 0.6-5.5 cm. long, 0.4-3 cm. broad; the pedicels 0.5-2.5 cm. long, frequently recurving at maturity placing the calyx at right angles to the stem; the upper calyx tooth at least twice the length of the others; the corolla 0.7-1.8 cm. long..... 4. *M. laciniatus*

1. MIMULUS TILINGI Regel

Pubescent or glabrous annuals or perennials; roots small, fibrous, at nodes of light yellow, often elaborately branched rhizomes; stems slender, 2-35 cm. long, 1-2 mm. in diameter, decumbent or erect, unbranched or branching at bases or nodes, frequently rooting at the nodes, glabrous or sparsely pubescent, not geniculate, some producing numerous leafy stolons; internodes 1-11 cm.

long, 1-6 times length of the leaf; leaves simple, 0.5-5.5 cm. long, 0.3-3 cm. broad, ovate, broadly ovate, or rarely oblong or orbicular, the margins serrate, crenate, serrulate, or subentire, with few teeth, rarely more than 15, or doubly dentate with additional small teeth between, proximally attenuate or rounded, or obtuse, distally obtuse or acute, glabrous or pubescent, slimy or dry, 3-5 veined, clear, light green, sessile or with petioles up to 2.5 cm. long, pubescent or glabrous; uppermost (floral) leaves glabrous or pubescent, at maturity not markedly or regularly reduced upward, usually of nearly the same size or only slightly smaller and of same appearance as lower leaves; inflorescence of 1-5, rarely 7-8, flowers per stem; pedicels slender, only slightly elongated in fruit up to 2.5-9 cm. or rarely only 1 cm. long, often only 1-2 cm. longer in fruit than in flower, straight, glabrous, glabrate, or subglabrous; calyx 9-20 mm. long, 4-10 mm. broad, frequently dotted with large red spots, glabrous, glabrate, subglabrous, or puberulent, the sinuses glabrous or pubescent, the upper tooth $2\frac{1}{2}$ to 3 times length of the others, with very slight folding of lower pairs of teeth, teeth obtuse; corolla bright yellow, 1.8-4.5 cm. long, at least twice the length of the calyx; capsule 5-10 mm. long, 2-5 mm. broad, sessile or short-stipitate; style 1-1.5 cm. long, glabrous or subglabrous.

1A. *MIMULUS TILINGI* var. *typicus*, *nom. nov.*

M. Tilingi Regel in Gartenfl., 18:321, pl. 631. 1869, "in der Nähe von Nevada-City in Felsengebirge Californiens sammelte."

M. luteus var. *alpinus* Gray, Proc. Acad. Phila. 15:71. 1863.

M. Roezli, acc'd to Gray, Syn. Fl. N. Amer. ed. 2, 2: Suppl. 448. 1886, as syn.

M. Langsdorfii var. *platyphyllus* Greene, Journ. Bot. 33:4. 1895. "Collected long ago, on the shores of Nutka Sound, by Barclay." Type not seen.

M. Langsdorfii var. *argutus* Greene, loc. cit. "Sitka, Barclay; also Oregon, Tolmie, Nuttall, and others." Type not seen.

M. implexus Greene, *ibid.* p. 5, "higher Sierra Nevada of California." Type not seen.

M. Langsdorfii var. *Tilingi* (Regel) Greene, *ibid.* p. 8.

M. corallinus Greene, Erythea 4:21. 1896.

M. minor A. Nelson, Proc. Biol. Soc. Wash. 17:178. 1904.

M. Langsdorfii alpinus (Gray) Blankinship, Montana Agricultural College Science Bulletin 1:98. 1905.

M. implicatus Greene, Leaf. Bot. Obs. and Crit. 1:189. 1906.

M. alpinus (Gray) Piper, Contrib. U. S. Nat. Herb. 11:510. 1906.

M. minusculus Greene, Leaf. Bot. Obs. and Crit. 2:5. 1909.

M. veronicifolius Greene, *ibid.* p. 7.

M. lucens Greene, loc. cit.

M. Tilingi var. *corallinus* (Greene) Grant, Ann. Mo. Bot. Gard. 11:155. 1924.

Stems slender, 2-35 cm. long, 1-2 mm. in diameter, unbranched or branching at bases or nodes, rarely producing leafy stolons; internodes 1-11 cm. long, 1-5 times length of the leaves; leaves simple, 0.5-5.5 cm. long, 0.3-3 cm. broad, ovate, broadly ovate, or rarely oblong or orbicular, the margins serrate, crenate, or serrulate, sessile or with petioles up to 2.5 cm. long; inflorescence of 1-5, rarely 7-8 flowers per stem; pedicels 2.5-9 cm. long in fruit.

Moist ground, mountain rivulets, glaciers, and streams at higher elevations, 2,500-9,000 feet in Alaska, Western Canada, Washington, and Oregon; 4,500-12,000 feet in California, Idaho, and Montana; and above 6,800 feet in Nevada, Colorado, and Utah. Alpine Grassland and Tundra and Rocky Mountain and Sierran Forests; Nome, Alaska, southeastward to Illicillewalt Glacier, British Columbia and Waterton Lakes National Park, Alberta, Rocky Moun-

tains of Montana and Colorado; collected on Mt. Baker and the Olympic Mountains, Washington; Cascade and Blue mountains, Oregon; Coeur d'Alene, and Smoky Mountains, Idaho; Siskiyou, Sierra Nevada, San Bernardino and San Jacinto mountains, California; Sierra Nevada and southwest mountain ranges, Nevada; Wasatch and Raft River mountains, Utah. July to September (California: late June to September).

M. Tilingi var. *typicus* is a mountain group closely related to *M. guttatus* var. *typicus*. Distinction from *M. guttatus* is based upon presence of fewer flowers per stem, usually 1–5, or rarely 7–8; floral leaves not markedly reduced in size upward or connate; light yellow rhizomes, often elaborately branched; leaves clear, light green, margins commonly with less than 15 teeth; corolla large in proportion to size of the plant, 1.8–4.5 cm. long; calyx large in proportion to size of the plant, 0.9–2 cm. long, 0.4–1 cm. broad.

At elevations near the upper limits of *M. guttatus* and lower limits of *M. Tilingi*, the latter is less easily distinguished, often possessing a few more than 8 flowers and with some regular reduction of leaves upward: WASHINGTON: Twin Sister Range, Mount Baker National Forest, Whatcom County, *Muenschner* 10253; east side of Obstruction Point, Clallam County, *F. G. Meyer* 1247; south slope of Constance Pass, 4 miles north of the Dosewallips River, Jefferson County, *Rollins & Chambers* 2686; Skokomish River trail to Mt. Steele, *F. G. Meyer* 1132. OREGON: Hunt's Cove, *Sipe* 560; 1 mile south of Breitenbush Lake, *Peck* 18737; Linton Creek, Sisters Region, *R. C. Andrews* 243; Anna Creek Spring, Crater Lake National Park, *Coville* 1376; Oregon Caves, *Ingram* 1157. CALIFORNIA: Silver Lake, Amador County, *L. Benson* 2852; Camp Tulakes, east of Jenks Lake, San Bernardino Mountains, *Munz* 12,751; Lost Creek, San Bernardino Mts., *Munz and I. M. Johnston* 8574. MONTANA: Glacier Park, *M. P. Russell* in 1917. The only collections examined from Arizona and New Mexico possibly of the mountain form but closely resembling *M. guttatus* are from Smith Creek, Arizona, *J. Leiberg* 5721; New Mexico, *A. Fendler* 558 in 1847; Beulah, New Mexico, *Cockerell* (no date given).

Specimens cited: ALASKA: Kuiu Island, *E. P. Walker* 778; Ketchikan, *E. P. Walker* 982; Nome, *Haley* in 1926; Sanak Island, *Haley* in 1926; False Pass, Unimak Island, *Murie* 94. BRITISH COLUMBIA: w. of Skagit River, *Macoun* in 1905; Asul Rau Valley, *Palmer* in 1897; edge of Illicillewalt Glacier, *F. W. Johnson* 1557; nr. Emerald Lake, *C. Shaw* 1094; Roger's Pass, *Macoun* in 1890. ALBERTA: Upper and Lower Carthew Lakes, *Hitchcock and Martin* 7891, 7892; Sheep Mt., *Macoun* in 1895. WASHINGTON: Clallam Co.: Seven Lakes Basin, *G. N. Jones* 8326; Mt. Angeles, *Webster* 1945, *J. W. Thompson* 7849, 7555; Boulder Creek, *G. N. Jones* 8487; head of Promise Creek, *Mr. & Mrs. J. R. Leach* 2201. Jefferson Co.: upper Elwha Basin, *L. Leach* 2198. Whatcom Co.: Mt. Baker Lodge, *J. W. Thompson* 5736. County uncertain: Olympic Mts., *Piper* 2177 (type collection *M. veronicifolius*, WSC 23791, photo. POM); Marmot Lake, *F. L. Dickinson* 71. OREGON: Lane Co.: McKenzie Pass, *Detling* 3322, 3789; source Linton Creek, *Andrews* 241. Marion Co.: Jefferson Park, *D. Peters* 199; Breitenbush Lake, *Peck* 18737; Mt. Jefferson, *Coville & Applegate* 1186, *Peck* 9127; Stanley Range, *Sampson and Pearson* 133. Wallowa Co.: Wallowa Mts., *Constance and Jacobs* 1364, *G. Campbell* 484-B, *Finley* in 1912, *L. Leach* 104, *Maguire and Holmgren* 27078. Union Co.: West Eagle Creek, *Cusick* 3115. Baker Co.: 10 mi. n. Cornucopia, *Peck* 5633; Devil's Garden Camp, *Sweetser* in 1927. Deschutes Co.: Davis Lake, *Peck* 16952; Lakes Ranger Stn., *Peck* 5634; Powder River Mts., *Piper* 2518 (type collection *M. lucens*, WSC 23794, 23792, photo. POM), 2519. Klamath Co.: Crater Lake, *Walpole* 2274, *Coville & Applegate* 328, *Austin* 1542. Grant Co.: Strawberry Mt., *Henderson* 5676, *Cusick* 3601a; Anthony Lake, *Scullen* in 1929; Strawberry Lake, *Jewett* in 1915. Harney Co.: Steins, *Train* in 1935. County uncertain: Wallowa

Mts., *Cusick* 2468, 3115. IDAHO: Kootenai Co.: s. from Wiesner's Peak, *Leiberg* 1394. Blaine Co.: Smoky Mts., *Macbride & Payson* 3752; 2 mi. above Alturas Lake, *Cronquist* 3698. Custer Co.: Bonanza, *Macbride & Payson* 3419; Redfish Lake, *Evermann* 452; Wildhorse Creek, *Pennell* 1724. MONTANA: Glacier Co.: Glacier Nat'l Park, *McKelvey* in 1921, *M. E. Jones* in 1910, *Pease* 22155, *Kirkwood* 51; Blackfoot Glacier, *M. E. Jones* in 1909. CALIFORNIA: Siskiyou Co.: Mt. Eddy, *Eastwood* in 1912; Sky High Valley, *Howell* 15270. Trinity Co.: White's Creek Lake, *Tracy* 14380. Shasta Co.: Mt. Shasta, *Eastwood* 2062, *Bohmausson* in 1926, *Cooke* 13814, 11,483; Upper King Creek Meadow, *Heller* 16517; Loop Hwy, *Hermann* 2413; foot of Lassen Butte, *Eastwood* 1822, 1766. Plumas Co.: road from Clulcott, *Eastwood* 14925. Sierra Co.: 2 mi. w. Yuba Pass, *Bacigalupi* 1615; Webber Lake, *Haley* in 1927; Gold Lake, *L. S. Rose* 34363. Nevada Co.: Soda Springs, *M. E. Jones* 2608; Donner Pass, *Howell* 18341, *Heller* 7137; Coldstream, *Heller* 7004; nr. Donner Lake, *Torrey* 377a, *Davy* 3232; nr. Webber Lake, *Leiberg* 5245, *Lemmon* in 1883; western slope Washoe Mts., *Davy* 3174, *Michener & Bioletti* in 1893. Placer Co.: Donner Pass, *Heller* 13318; Washoe Mts., *Sonne* in 1895; above Coldstream, *Sonne* in 1886; Ward's Creek, *Eggleston* 21633; Summit, *Greene* in 1883, *Heller* in 1909; Donner Lake, *Greene* in 1883; Ellis Meadow, *Keyes* in 1920. Eldorado Co.: Lake Tahoe, *Setchell & Dobie* in 1901, *McGregor* 68, *Smiley* 157; Camp Sacramento, *Vortriede* in 1931, in 1927; Pyramid Peak, *Abrams* 12920; nr. Placerville, *Kelly* in 1921; Echo Lake, *Heller* 12539. Amador Co.: Silver Lake, *Newell* in 1929, *Hansen* 467. Alpine Co.: Twin Lake, *Wolf* in 1933; Gabbot Meadow, *Eggleston* 9518; Woods Lake, *Peirson* 12865; Twin Lakes, *Hansen* 1289. Calaveras Co.: Big Meadow, *Houwen* 136; Salt Springs, *Steinbeck* in 1923. Tuolumne Co.: Smedberg Lake, *Bartholomew* in 1934; Tuolumne Meadows, *Michaels* in 1922, *Harwood* in 1924; Camp Baxter, *Jussel* in 1930; Mt. Dana, *Bolander*, *Chesnut & Drew* in 1889, *Sharsmith* 909, 2359; Dana Meadow, *A. L. Grant* 1614, *Sharsmith* 429; Hog Ranch, *A. L. Grant* 971; Deadman's Creek, *Ferris* 11054; head Tuolumne River, *Brewer* 1754. Mariposa Co.: Yosemite, *Smiley* 887, *Solheim* 716, *Blasdale* in 1931, *H. M. Hall* 9159, *Schreiber* 2455, 1890, *Eastwood* 653, *Evans* in 1901, *Smiley* 670, *Eastwood* 82. Mono Co.: Barney Lake, *Mrs. H. C. Cantelow* in 1941; Mono Pass, *Howell* 20660; H. M. Hall Natural Area, *L. Benson* 12758; Slate Creek Valley, *Keck* 4448; Sonora Pass, *Wiggins* 8249; Deep Creek, *Alexander* and *Kellogg* 4078; Tamarack Creek, *Munz* 16059. Madera Co.: Jackass Meadow, *A. L. Grant* 1342; Agnew Pass, *Howell* 16593; Garnet Lake, *Howell* 16697; San Joaquin River, *Hastings* in 1927; Minarets, *A. L. Grant* 1579; Camino Creek, *Sweet* 270; Garnet Creek, *Howell* 16829. Fresno Co.: Graveyard Meadow, *A. L. Grant* 1513; French Canyon, *Frey* in 1935; Huntington Lake, *Pollard* in 1942, in 1943, *A. L. Grant* 1411; upper Mono Creek, *Payne* in 1946; Hume Lake, *Winblad* in 1937; Rancheria Creek, *Everett & Johnson* in 1935; Woods Creek, *M. G. Smith* in 1939; Mt. Goddard, *Hall & Chandler* 692; Evolution Lake, *E. R. Johnson* in 1936; Dinkey Creek, *Hall & Chandler* 389. Tulare Co.: Sequoia Nat'l Park, *E. Larson* in 1931, *Mrs. Charles Derby* in 1928, *Ferris* 10751, Farewell Gap, *Hopping* 213, *Purpus* 5243, *H. M. Hall & Babcock* 5669; Mineral King, *Hall & Babcock* 5553, *Coville & Funston* 1527; Mt. Whitney, *Culbertson* 4544, *Hall & Babcock* 5541; South Fork of Kern River, *Rothrock* 312 (type collection *M. minusculus*, US 64574); Little Five Lakes Basin, *Howell* 17664. Inyo Co.: Onion Valley, *Alexander & Kellogg* 3144; Mt. Whitney Trail, *Kerr* in 1939; Pinyon Creek, *Alexander & Kellogg* 2981; Big Pine Lakes, *Howell* 23847; Piute Pass, *Ferris* 8875. San Bernardino Co.: Mt. San Gorgonio, *Grant* 6352, *H. M. Hall* 7615; Bluff Lake, *Grimmell* 80, *Clokey* 5301; Fish Creek, *Munz* 17148; Mill Creek Falls, *Parish* 5063 (type collection *M. implicatus*, US 414890, isotype NY, photo. GH, NY, POM). NEVADA: Washoe Co.: Mt. Rose, *Howell* 14088, *Heller* 9969, 15441, *J. S. Martin* 201; branch of White's Creek, *P. Kennedy* 1886; above Lamoille Lakes, *Munz* 16290; Long Creek, *Borell* in 1928; Jarbridge River Canyon, *Train* 782; Terrace Ranger Station, *Holmgren* 1708; Washoe Mts., *Greene* in 1895 (type collection *M. corallinus*, NY, photo. POM). Ormsby Co.: Marlette Lake, *R. A. Allen* 556, *Train* 3262. Mineral Co.: Mt. Grant Grade, *Train* 4283. Esmeralda Co.: Chiatovitch Creek, *Duran* 3106. Nye Co.: North Twin River head, *Maguire & Holmgren* 24992. UTAH: Box Elder Co.: Left Fork Dunn Canyon, *Maguire & Holmgren* 22219. Summit Co.: Stillwater Basin, *Maguire*, *Richards & R. Maguire* 4248. COLORADO: Boulder Co.: Arapahoe Pass, *D. Andrews* 8 (type collection *M. minor*, WYO 48233, photo POM). County unknown: Colorado Territory, lat. 39°-41°, *Parry* 235a (type collection *M. luteus* var. *alpinus*, GH, photo. POM). ARIZONA: County unknown: Smith Creek *Leiberg* 5721.

1B. *MIMULUS TILINGI* var. *CAESPITOSUS* (Greene) Grant

Fig. 2, A.

M. Scouleri var. *caespitosus* Greene, *Pittonia* 2:22. 1889.

M. caespitosus Greene, *Journ. Bot.* 33:8. 1895.

M. Langsdorfii var. *alpinus* (Gray) Piper, *Mazama* 2:99. 1901.

M. Tilingi var. *caespitosus* (Greene) Grant, *Ann. Mo. Bot. Gard.* 11:154. 1924.

Stems commonly producing numerous leafy stolons which sometimes become branch-like, not commonly branching at the nodes, slender, 2–17 cm. long, less than 1 mm. in diameter; internodes, 1–5.5 cm. long, 1–6 times the length of the leaf; leaves ovate or elliptic, proximally rounded or obtuse, distally rounded or acute, 0.3–1 cm., rarely 2 cm. long, 0.3–1 cm. broad, margins minutely serrate or subentire; inflorescence of 1 terminal flower or 2–4 flowers at the top two nodes; pedicel 1–3.5 cm. long in fruit.

Moist areas, glaciers, mountain streams, and lakes, 4000–9500 feet elevation, Selkirk and Coast ranges of British Columbia, Canada; Olympic and Cascade mountains, Washington; and the Willowa Mountains, Oregon. Late July to September.

Specimens cited: CANADA: British Columbia: Glacier, *H. H. Rush* in 1909, Skagit River, *Macoun* in 1905; Chilliwack Valley, *Spreadborough* in 1906; Mt. Arrowsmith, *W. Carter* in 1917; Sproat Mt., *McCabe* 2932. WASHINGTON: Whatcom Co.: Mt. Baker, *Roush* in 1926, *Heller* 14739, *Turesson* 34, *Hitchcock* 12253, 12254, *J. W. Thompson* 5298; Chain Lakes, *Muenschner* 10578, *J. W. Thompson* 11,295. Clallam Co.: Mt. Angeles, *J. W. Thompson* 5540; e. side Obstruction Point, *F. G. Meyer* 1247a. Jefferson Co.: Constance Ridge, *F. Meyer* 723; Mt. Anderson, *R. T. Davison* in 1928. Okanogan Co.: N. Fork of Bridge Creek, *Elmer* 642. Snohomish Co.: Twin Lakes, *Broadbent* in 1935. Chelan Co.: Ingalls Creek, *J. W. Thompson* 7681; Ice Lake, *Morrill* 334. Pierce Co.: Paradise Valley, *L. S. Rose* 40762, *F. A. Warren* 590, *Eastwood* 1094, *H. & S. Parks* 21024, *F. Warren* 498, *Abrams* 9149; Nisqually Glacier, *Heller* 14977; Mt. Rainier, *J. W. Thompson* 12697, 7613, 12698, *Nevius*, *D'Evelyn* and *Baldwin* in 1931, *Piper* 6396a, *Piper* in 1888, *Pope* in 1904, *M. Armstrong* 449, *Allen* 72, *Piper* 2070, *Applegate* 4885, *Lyon, Jr.* 138; *Greene* in 1889 (type US 198879, isotypes WASH, US, UC, DS, NY, photo. POM), Head of Paradise Valley, *Abrams* 9149. Kittitas Co.: Mt. Stuart, *Elmer* in 1898. Yakima Co.: Mt. Paddo, *Suksdorf* 5832, 791; Mt. Adams, *Suksdorf* 479, in 1896, in 1901, 418. OREGON: Willowa Co.: upper Hurricane Creek, *Peck* 22601, 22543; Summit west of Ice Lake, *Peck* 18524.

2. MIMULUS GUTTATUS DC.

Glabrous or pubescent annuals or perennials; roots fibrous; stems erect or decumbent at the bases, 0.2–15 dm. long, 2–15 mm. in diameter, slender or stout and fistulose, frequently rooting at the lower nodes or occasionally reproducing by stolons, branched or unbranched, glabrous or pubescent; internodes 1–19 cm. long, longer or shorter or same length as leaves; leaf blades simple except for occasional small lobes at the bases, ovate or obovate or sometimes broadly ovate or orbicular or rarely oblong-lanceolate, 0.4–12.5 cm. long, 0.3–10 cm. broad, proximally obtuse or rounded, with 5–7 main veins, glabrate, puberulent, sparsely pubescent, or sometimes tomentose or glaucous, sessile or the petioles up to 9.5 cm. long, glabrous, pubescent, or tomentose; uppermost leaves (floral leaves) usually much reduced and regularly reduced upward, 3–20 mm. long, pubescent, tomentose, or sometimes glaucous, free, only slightly united, or connate-perfoliate, sessile, entire or toothed, apically acute or rounded; inflorescence sometimes scorpioid at first, of numerous (rarely less than 5–6) flowers in the uppermost leaf axils or sometimes in the axils of even the basal pair of leaves; pedicels slender or sometimes stout, usually much elongated in fruit, becoming 1–8 cm. long, straight or recurving in fruit, glabrous, glabrate, or sometimes pubescent or tomentose, sometimes reddish-tinged; calyx in fruit frequently red-spotted and red-ribbed, 6–30 mm. long, 3–15 mm. broad, glabrous, glabrate, pubescent, or sparsely pubescent, sometimes densely pubescent, the sinuses tomentose or glabrous, the upper tooth somewhat longer than the 4 lower teeth, the lower pair of teeth sometimes

folding over and nearly closing the orifice of the calyx; corolla 0.5–4 cm. long, usually at least twice the length of the calyx but rarely shorter than the calyx; capsule 5–12 mm. long, oblong, oval, or sometimes subglobose, sessile or short-stipitate; style 2–25 mm. long, glabrous or puberulent.

KEY TO VARIETIES

Leaves not conspicuously glaucous; uppermost free or pairs somewhat united at the bases, 3–10 mm. long.

Corolla at maturity 1.5–4 cm. long, twice the length of the calyx.

Calyx not at all truncate at base or top, sinuses tomentose, upper calyx tooth 2–3 times length of others, lower teeth sometimes folding over others; leaves glabrous or pubescent, lacking small tomentose area on dorsal side.

The calyx 6–22 mm. long, 3–15 mm. broad, glabrous, glabrate or sparsely pubescent; capsule 7–8 mm. long, oblong; pedicels slender, becoming up to 1–6 cm. long; leaf blades glabrous, glabrate, or pubescent on under surface. Inland.

Pedicels not markedly recurving below base of calyx in fruit; stems not geniculate; inflorescence not scorpioid at first; lowest leaf blade $1\frac{1}{2}$ –5 times length of the petiole, the petiole rarely only 5 mm. longer, very rarely red-tinged. Flowering late May to September.

2A. var. *typicus*

Pedicels markedly recurving 1–2 mm. below base of calyx in fruit; stems commonly geniculate; inflorescence frequently scorpioid at first; lowest leaf blade the same length or shorter than the petiole, the petioles rarely up to 5 mm. shorter than the blade, leaves and petioles commonly red-tinged. Flowering March to early July.

2B. var. *gracilis*

The calyx 17–30 mm. long, 10–15 mm. broad, pubescent or tomentose; capsule 8–12 mm. long, broadly ovoid; the pedicels stout becoming up to 1.5–4.5 cm. long; leaf blades pubescent or tomentose on under surface. Coastal.

2C. var. *grandis*

Calyx nearly truncate at base and top, sinuses glabrous, calyx teeth short, lower ones not folding over others; leaves glabrous except for retention of small tomentose area on dorsal side.

2E. var. *arvensis*

Corolla at maturity 0.5–1 cm. long, scarcely exceeding the calyx or shorter than calyx.

2F. var. *micranthus*

Leaves conspicuously glaucous; uppermost pairs connate-perfoliate, 5–20 mm. long

2D. var. *glaucescens*

2A. *MIMULUS GUTTATUS* var. *typicus* nom. nov.

M. Langsdorffii J. Donn in Sims, Bot. Mag. (Curtis Bot. Mag.) *pl.* 1501. 1812, as syn.

M. luteus J. Donn, *loc. cit.*, not Linnaeus. Sp. Pl. ed. 2. 884. 1763.

M. guttatus Fischer, Hort. Gorenk. ed. 2, 12, in 1812, *nom. nud.*

M. guttatus De Candolle, Cat. Hort. Monsp. 127. 1813. Description based on plants grown from seed sent by Langsdorff from Unalaska. Type not seen.

M. rivularis Nuttall, Journ. Acad. Phila. 7:47. 1834. Type locality: "valleys of the Rocky Mts." Type not seen.

M. Scouleri Hooker, Flora Bor. Amer. 2:100. 1840

M. splendens Hort. in Steudel, Nom. Bot. ed. 2, 150. 1841, as syn.

M. microphyllus Benthham in De Candolle, Prodr. 10:371. 1846. Type locality: "in rupibus ad flum. Oregon (Douglas)." Type not seen.

M. tenellus Nuttall ex A. Gray, Proc. Am. Acad. 11:98. 1876, as syn.

M. luteus var. *depauperatus* Gray, Bot. Calif. 1:567. 1876. Studied possible isotype: Mrs. Barrett, Aug. 10, 1889, GH, photo POM.

M. thermalis A. Nelson, Bull. Torr. Bot. Club. 27:269. 1900.

M. Langsdorffii var. *guttatus* (DC) Jepson, Fl. W. Middle California 406. 1901.

M. hirsutus Howell, Fl. N. W. Amer. 1:520. 1901. Type: in the Tualatin River near its mouth. July 1900, Thomas Howell, UO, photo POM.

M. grandiflorus Howell, *loc. cit.*

M. collinus Greene ex C. F. Baker, West Amer. Plants 1:18. 1902, *nom. nud.*

M. tortuosus Greene ex C. F. Baker, *ibid.*, 3:8, *nom. nud.*

M. vestitus Greene ex C. F. Baker, *loc. cit.*, *nom. nud.*

M. equinus Greene, Leaf. Bot. Obs. & Crit. 1:189. 1906.

M. puberulus Greene, Rydb. Fl. Colo. 311. 1906.

M. prionophyllus Greene, Leaf. Bot. Obs. and Crit. 1:190. 1906.

M. procerus Greene, *ibid.* 2:6. 1909.

TABLE OF VARIETIES

var. <i>typicus</i>	var. <i>gracilis</i>	var. <i>grandis</i>	var. <i>glaucescens</i>	var. <i>arvensis</i>	var. <i>micranthus</i>
Glabrous or sparsely pubescent.	Glabrous or sparsely pubescent.	<i>Pubescent.</i>	<i>Glaucous and subglabrous.</i>	Essentially glabrous.	Sparsely pubescent.
Stems slender or stout and fistulose, 2–13 mm. in diameter, not geniculate.	Stems slender or occasionally stout and fistulose, 5–7 mm. in diameter, <i>commonly geniculate.</i>	<i>Stems fistulose, 10–15 mm. in diameter, not geniculate.</i>	Stems slender or stout and fistulose, 1–6 mm. in diameter, occasionally geniculate, <i>glaucous.</i>	Stems slender or broad and fistulose, 2–10 mm. in diameter, not geniculate.	Stems slender or only moderately stout and slightly fistulose, 1–5 mm. in diameter, sparsely pubescent, not geniculate.
Internodes 1.5–18 cm. long, 1–3 times length of the leaves.	Internodes 1–14 cm. long, 1–9 times length of the leaves.	Internodes 2–11.5 cm. long, 1–3 times length of the leaves.	Internodes similar to those of var. <i>typicus.</i>	Internodes 6.5–19 cm. long, 3–8 times length of the cauline leaves.	Internodes 7–18 cm. long, 4–8 times length of the leaves.
Leaf blades simple, ovate, obovate, or sometimes broadly ovate, 0.5–12.5 cm. long, 0.3–10 cm. broad, <i>proximally obtuse or tapering to the petioles</i> ; glabrate or puberulent, sessile or the petioles up to 6 cm. long; the petioles glabrous or sparsely puberulent, <i>the lowest leaf blade 1½–5 times length of the petiole, the petiole rarely only 5 mm. longer</i> , rarely red-tinged.	Leaf blades simple or frequently with small lobes at the base, orbicular or broadly ovate, sometimes broader than long, size similar to var. <i>typicus</i> , proximally rounded or subcordate, glabrate or puberulent; the petioles 0.4–8 cm. long, glabrous or pubescent, <i>lowest leaf blade the same length or shorter than the petiole, the petioles rarely up to 5 mm. shorter than the blade, leaves and petioles commonly red-tinged.</i>	Leaf blades simple or sometimes with small lobes at the base, broadly ovate or orbicular, 2–11 cm. long, 2–8 cm. broad, proximally rounded, <i>pubescent or tomentose</i> ; the petioles 1–9.5 cm. long, glabrous or tomentose, lowest leaf blades same length, longer, or shorter than the petioles, not commonly red-tinged.	Leaf blades simple, orbicular, or ovate in outline, 1–10 cm. long, 1–8 cm. broad, proximally rounded or subcordate, <i>glaucous and glabrous</i> , the petioles 1–7 cm. long, some noticeably purplish-tinged, lowest petioles and leaf blades approximately same in length.	Leaf blades simple, except for small basal lobes, <i>orbicular or suborbicular</i> , 1.5–6 cm. long, 1.5–5 cm. broad, proximally subcordate or rounded, <i>glabrous except for retention of small tomentose area on dorsal side</i> ; the petioles 1–5 cm. long, glabrous or rarely puberulent, lowest petioles as long as or longer than leaf blades.	Leaf blade simple except for occasional small lobes at the base, orbicular, 1–6 cm. long, 1–6 cm. broad, proximally cordate, sparsely pubescent, petioles 1–5 cm. long, glabrous or subglabrous, lowest petioles same length or longer than leaf blades, petioles rarely to 5 mm. shorter than blades.
Uppermost leaves free or somewhat united at the bases, pubescent, much reduced, 3–10 mm. long, apically acute.	Uppermost leaves similar to those of var. <i>typicus.</i>	Uppermost leaves similar to those of var. <i>typicus</i> in degree of union and in size, however pubescence commonly greater.	Uppermost leaves conspicuously glaucous, connate-perfoliate, sessile, entire or serrulate, frequently <i>larger</i> than the other varieties, 5–20 mm. long, usually apically rounded.	Uppermost leaves not connate-perfoliate, glabrous except for small tomentose patch at base on dorsal surface, 6–8 mm. long, broadly ovate, sessile, margin dentate, not connate.	Uppermost leaves similar to those of var. <i>typicus</i> in degree of union and in size, however pubescent above and tomentose below.
Inflorescence never scorpioid.	<i>Inflorescence frequently scorpioid at first.</i>	Inflorescence never scorpioid.	Inflorescence never scorpioid.	Inflorescence never scorpioid.	Inflorescence never scorpioid.
Pedicels slender, becoming 1–6 cm. long in fruit, straight, pubescent, puberulent, or glabrate, not markedly red-tinged.	Pedicels slender, becoming 1–8 cm. long in fruit, <i>markedly recurving 1–2 mm. below base of calyx in fruit</i> , glabrous or glabrate, usually red-tinged.	<i>Pedicels stout</i> , becoming up to 1.5–4.5 cm. long, straight, glabrate or tomentose, not markedly red-tinged.	Pedicels slender, becoming up to 1.5–3.5 cm. long, recurving, less pronounced than var. <i>gracilis.</i>	Pedicels slender, becoming up to 1.5–5 cm. long in fruit, glabrous, not recurving.	<i>Pedicels short, 1–3 cm. long</i> in fruit, glabrous, straight, <i>only slightly exceeding the uppermost leaves.</i>
Calyx 6–22 mm. long, 5–15 mm. broad, upper tooth 2- or rarely 3-times length of the others, sparsely puberulent or glabrate; the sinuses tomentose.	Calyx 6–22 mm. long, 3–10 mm. broad, upper tooth 3- or rarely 2-times length of others, <i>lower pair of teeth folding over others and giving appearance of hand with index finger extended and pointing</i> , glabrate or pubescent, sinuses tomentose.	<i>Calyx commonly larger than var. typicus, 17–30 mm. long, 10–15 mm. broad</i> , upper tooth 2-times length of others, scarcely any folding of teeth, <i>pubescent or tomentose</i> , the sinuses tomentose.	Calyx 10–25 mm. long, 7–15 mm. broad, upper tooth only slightly longer than the others, lower pair of teeth folding over the others, glabrous, sinuses glabrous or tomentose.	Calyx 10–15 mm. long, 8–12 mm. broad, uppermost tooth scarcely exceeding others, <i>no folding of lower pair, all teeth short, and calyx nearly truncate at base and top, sinuses glabrous.</i>	Calyx 8–15 mm. long, 5–10 mm. broad, upper tooth 2–3 times length of others, lower pair of teeth only slightly folding over, sinuses glabrous.
Corolla at maturity twice length of the calyx, 1–4 cm. long.	Corolla at maturity twice length of calyx, 1.5–3.5 cm. long.	Corolla at maturity twice the length of calyx, 2.5–4 cm. long.	Corolla at maturity twice the length of the calyx, 1.5–3.5 cm. long.	Corolla at maturity twice the length of the calyx, 1.5–2.5 cm. long.	<i>Corolla at maturity scarcely exceeding the calyx or sometimes shorter than the calyx, 0.5–1 cm. long.</i>
Capsule 7–8 mm. long, oblong.	Capsule similar to var. <i>typicus.</i>	Capsule 8–12 mm. long, broadly oval.	Capsule oblong, 6–12 mm. long.	<i>Capsule oval or subglobose, 5–7 mm. long, 5–6 mm. broad, very rarely more than 1–2 mm. longer than broad.</i>	Capsule oblong, rarely subglobose, 5–7 mm. long, 3–5 mm. broad.
Style 8–20 mm. long.	Style 6–12 mm. long.	Style 12–25 mm. long.	Style 7–17 mm. long.	Style 9–10 mm. long, rarely 12.	<i>Style short, 2–5 mm. long.</i>
Widely distributed.	Widely distributed.	Ocean bluffs and dunes.	Tehama and Butte counties, California.	San Francisco Bay Region, California.	Northwestern California to the Bay Region.
Late May to September.	March to early July.	April to September.	April to July.	April to early June.	April to June.

- M. petiolaris* Greene, *ibid.* p. 7.
M. Langsdorffii var. *microphyllus* (Benth) Nelson & Macbride, Bot. Gaz. 61:44. 1916.
M. guttatus var. *depauperatus* (Gray) Grant, Ann. Mo. Bot. Gard. 11:170. 1924.
M. guttatus var. *decorus* Grant, *ibid.* p. 173, pl. 4.
M. decorus (Grant) Suksdorf, Werdenda 1:37. 1927.
M. Maguirei Pennell, Nat. Acad. Sci. Phila. 43:6. 1940.
M. guttatus subsp. *typicus* Pennell, Proc. Acad. Nat. Sci. Phila. 99:165. 1947.
M. guttatus subsp. *Scouleri* (Hooker) Pennell, *ibid.* p. 166.
M. platycalyx Pennell, *ibid.* p. 167. Type at Philadelphia Academy of Sciences: 1 mi. south of Wawona, Mariposa Co., Calif., Pennell 25580. Type not seen, but synonymy based on sheets determined as *M. platycalyx* by Pennell.

Moist areas near ditches, streams, and lakes mostly at relatively low elevations, but occurring up to 5,000 feet in Alaska, Western Canada, Washington, and Oregon, up to 8,000 feet in Idaho, Montana, and California, and up to 10,000 feet in Nevada, Utah, Wyoming, and southward to Mexico. Widely distributed in meadows and along streams in the Pacific, Sierran Montane, and Rocky Mountain Montane Forests, and the California Oak Woodland. Western Aleutian Islands, Alaska, southward almost wholly west of the Rocky Mountain system to Mexico. Late May to September. $n=14$.

Representative specimens: ALASKA: Atka, Aleutian Islands, Eyerdam 1150, E. Van Dyke 245, P. West in 1932, in 1933; Unalaska, Aleutian Islands, E. Van Dyke 146, Hanna in 1920, G. Haley in 1925, in 1926; Kodiak Island, Looft 37, Eyerdam 426, Rutter 36, Pennell 37; Port Hobron, Eyerdam in 1931, Eyerdam 66; Juneau, R. H. Williams in 1933, J. P. Anderson 496, Cooley in 1891, A. Shumway in 1891, Burglehaus 8068; Sitka, Bischoff in 1865-66, Mr. & Mrs. C. Smith 80, H. Hindshaw in 1896, Eastwood 979, Shaw in 1907; Indian River, Heller 14934; Texas Lake, McCabe 8653; Tongas Village, Mr. & Mrs. E. P. Walker 885. BRITISH COLUMBIA: Chilliwack Valley, Macoun 54477 in 1901, 54480; Hudson Hope, Raup and Abbe 3650; Okanogan, Macoun in 1889; Huntingdon, McCabe 3747; Bella Coola, McCabe 1392; Indian-point Lake, McCabe 304; Calvert Island, McCabe 4188; Lake Atlin, Setchell and Parks in 1930; Ft. Rupert, G. Hunt in 1904; Victoria, Macoun 87668 in 1908. WASHINGTON: Whatcom Co.: Bellingham, E. Hardin in 1925, Skagit Co.: nr. Anacortes, R. Sprague in 1922. Snohomish Co.: nr. Edmonds, G. N. Jones in 1933; Silverton, Piper in 1899. Jefferson Co.: Brinnon, R. Beattie 3014. Clallam Co.: Sequim, J. M. Grant 751; Mt. Angeles, J. Thompson 7849, 5541; Olympic Mts., Elmer 2573, 2583. Grays Harbor: Grays Harbor City, F. Lamb 1065; nr. Montesano, A. A. and E. G. Heller 4006, 3986; Quinalt Valley, H. Conard 403. Mason Co.: Skokomish River, Kincaid in 1892; Skokomish River trail to Mt. Steele, F. G. Meyer 1130, 1131. Island Co.: Whidby Island, Gardner 221. King Co.: Seattle, Meany in 1898, Piper 434; Lake Washington, Suksdorf in 1890. San Juan Co.: Kanaka Bay, S. M. and E. B. Zeller 946 and 949; Stuart Island, Lawrence 127, 149, Pierce Co.: Mt. Rainier, Flett in 1895; Spanaway Lake, Piper 2085. Thurston Co.: Olympia, Henderson in 1892. Okanogan Co.: Nespelem Road, Fiker 711; Nason Creek, Sandberg & Leiberg 618. Stevens Co.: Colville, F. Kreager 524; Deep Creek Valley, Hedgcock in 1935. Spokane Co.: Hangman's Creek, Suksdorf 8887, in 1889; 10 mi. n. Spokane, F. Kreager 77. Kittitas Co.: Ellensburg, Whited 1270; Bald Mt., J. W. Thompson 14,846. Cowlitz Co.: Kalama, L. Goodwin 28. Skamania Co.: Moss Creek, Suksdorf 2774. Yakima Co.: Mt. Aix, J. W. Thompson 15,075; Cold Creek, J. Cotton 394. Klickitat Co.: Falcon Valley, Suksdorf in 1885, 1915, 1919; Klickitat River, Flett 1149, 1146. Benton Co.: Prosser, G. N. Jones 381. Adams Co.: Crab Creek, J. Nichols in 1908. Whitman Co.: Lewiston Grade, Hitchcock & Muhlick 8370; Pullman, Elmer 164, Eastwood 13114. Asotin Co.: 10 mi. w. of Clarkston, Hitchcock & Samuel 2571. OREGON: Clatsop Co.: John Day, Sheldon 11196, 10182; Columbia River, Scouler (isotype *M. Scouleri*, NY, photo POM). Multnomah Co.: Mt. Scott, Sheldon 12289; Sauvies Island, Suksdorf in 1894. Clackamas Co.: Oswego, Howell in 1892 (type *M. grandiflorus*, UO, photo POM); Applesby Creek, G. Campbell 321; Oregon City, Lyon 59 (type collection of *M. guttatus* var. *decorus*, type Mo. Bot. Gard. Herb. 866366, isotypes US, DS, CAS, GH, NY, photo POM). Hood River Co.: Hood River, Barrett in 1889 (possible isotype of *M. luteus* var. *depauperatus*, GH, photo POM); Mt. Hood, L. Benson 2499, 2520. Washington Co.: Forest Grove, F. E. Lloyd in 1893. Polk Co.: Mill Creek, Peck 16211. Lane Co.: Spencer Creek, Detling 2746; Hand Lake, Detlin 5419. Douglas Co.: Elk Creek, A. Kimber 39. Klamath Co.: Crater Lake Nat'l Park, J. W. Thompson 12,251, Heller 13061. Umatilla Co.: 4 mi. n.e. Pendleton, Peck 22201. Wallowa Co.: Royal Purple Creek, G. Campbell 484-A. Deschutes Co.: Goose Creek, Henderson 13890. Crook Co.: Big Meadows, Leiberg 533. Lake Co.: Warner Range, Leiberg 2662; Summer Lake,

Eggleston 6830; Drake Peak, Scullen & Colbry in 1930. Harney Co.: Alvord Creek, *Henderson* 9131; Harney Valley, *Leiberg* 2373. CALIFORNIA: Humboldt Co.: Eureka, *J. P. Tracy* 1923. Siskiyou Co.: Shasta Springs, *Heller* 8027; Compton's prairie, *Heller* 13271. Shasta Co.: Hat Creek, *C. L. Hitchcock* 6562. Lassen Co.: Westwood, *Heller* 15183. Glenn Co.: Alder Springs, *Heller* 12771. Butte Co.: Chico Meadows, *Heller* 11492; Jonesville, *E. Copeland* 464. Mendocino Co.: 5 mi. n. Willits, *Heller* 13758. Lake Co.: Horse Pasture, *Heller* 5924 (type of *M. equinus*, US 417302, isotypes at GH,NY,POM,DS, photo NY,GH). San Mateo Co.: Woolsey Canyon, *J. T. Howell* 5297. Santa Clara Co.: Mt. Hamilton Rd., *Heller* 7433; Granada, *Eastwood* 210. Monterey Co.: Santa Lucia Mts., *Plaskett* 156 (isotypes *M. procerus* at GH,US, photo POM,GH). Santa Barbara Co.: Blake, *Abrams* 6526. Nevada Co.: below Emigrant Gap, *F. MacFadden* 12729. Eldorado Co.: Fallen Leaf Lake, *Mrs. A. F. Rodda*. Calaveras Co.: West Point Bridge, *G. Hansen* 1801. Mono Co.: Lundy, *Minthorn* 170. Tuolumne Co.: Herring Creek, *Wiggins* 8530. Fresno Co.: Upper Dinkey Creek, *C. V. Morton* 2870. Tulare Co.: National Bridge Meadow, *Culbertson* 4259. Kern Co.: Bakersfield, *Heller* 7838, *L. Benson* 3295. Los Angeles Co.: Claremont, *C. F. Baker* 3460; Pacoima Canyon, *J. Ewan* 4729. San Bernardino Co.: San Bernardino, *Parish* 4790; Bear Valley, *Abrams* 2834, *Fosberg* 55466. Inyo Co.: Shepard Canyon, Argus Mts., *Coville and Funston* 740 (type of *M. petiolaris* US 47223, isotypes DS,NY, photo POM,GH,NY). San Diego Co.: Hatfield Creek, *Wiggins* 2575. IDAHO: Shoshone Co.: Elk Creek, *Abrams* 813. Blaine Co.: Ketchum & Guyer Hot Springs, *Nelson & Macbride* 1278. MONTANA: Flathead Co.: Bigfork, *M. E. Jones* in 1908. Madison Co.: Sheridan, *L. Fitch* in 1896. WYOMING: Yellowstone Nat'l Park, *A. & E. Nelson* 6285 (type of *M. thermalis*, WYO, photo POM), *W. W. Jones* in 1900, *B. F. Harrison* 211H, *F. Burglehaus* in 1893. Carbon Co.: Sandstone-Encampment Road, *C. L. Porter* 1348. NEVADA: Washoe Co.: 4.5 mi. s. Mt. Rose, *Hitchcock & Martin* 5560. Nye Co.: Beattie, *Heller* 10420. UTAH: Salt Lake Co.: Salt Lake City, *A. O. Garrett* in 1904, *M. E. Jones* in 1880. Summit Co.: Upper Stillwater Fork, *E. B. & L. B. Payson* 5062. COLORADO: Boulder Co.: Ward, *Bethel, Schmoll & Clokey* 4288. Gunnison Co.: above Cimmaron, *Baker* 392. Archuleta Co.: Pagosa Springs, *C. F. Baker* 587 (isotypes of *M. puberulus*, POM,UC,US). ARIZONA: Apache Co.: Luka-Chukai Mts., *G. Goodman & L. Payson* 2868. Coconino Co.: 2 mi. w. of Williams, *Maguire, Maguire & Piranian* (isotype of *M. Maguirei*, UTC). Santa Cruz Co.: Patagonia Mts. *Hastings & Hope* 7048. County uncertain: Willow Spring, *E. Palmer* 527 (type of *M. prionophyllus*, US 47278, photo GH,POM). NEW MEXICO: San Miguel Co.: Trout Springs, *Arsene* 20810. Dona Ana Co.: Organ Mts., *Wootton* in 1905. MEXICO: Nachoguero Valley, *Mearns* 3378; Chichupa, Chihuahua, *M. E. Jones* in 1903.

2B. *MIMULUS GUTTATUS* var. *gracilis* (A. Gray) G. Campbell, *comb. nov.*

Fig. 2, B and C

- M. luteus* var. *gracilis* A. Gray apud Torrey in Emory, Rep. on the U. S. and Mex. Bound. Survey, 115. 1859.
M. nasutus Greene, Bull. Cal. Acad. Sci. 1:112. 1885.
M. geniculatus Greene, *ibid.* p. 280. Type locality: "Tehachapi, Kern Co., Calif. Mrs. Curran." Type not seen.
M. glareosus Greene, Pittonia 1:282. 1889.
M. guttatus var. *insignis* Greene, Manual Bay Region, 277. 1894. Type locality: "Napa and Sonoma counties". Type not seen.
M. Langsdorfii var. *insignis* Greene, Journ. Bot. 33:4. 1895.
M. subreniformis Greene, Erythea 3:67. 1895. Burney Falls, Shasta Co., Calif., *Baker & Nutting*. Have seen isotypes UC 27110 and 27111.
M. marmoratus Greene, *ibid.* p. 73.
M. Langsdorfii var. *nasutus* (Greene) Jepson, Fl. W. Middle California, 107. 1901.
M. Langsdorfii var. *californicus* Jepson, *loc. cit.* Type locality: Sacramento and Coast Range valleys. Have not seen type.
M. remotifolius Greene ex C. F. Baker, West Amer. Plants 2:14. 1903. *nom. nud.*
M. paniculatus Greene, Leaf. Bot. Obs. and Crit. 1:189-190. 1906.
M. cuspidatus Greene, Leaf. Bot. Obs. and Crit. 2:4. 1909.
M. erosus Greene, *loc. cit.*
M. clementinus Greene, *ibid.* p. 5.
M. cordatus Greene, *loc. cit.*
M. Langsdorfii var. *minima* (*sic*) Henry, Fl. So. Brit. Columb. 268. 1915. Type locality: Paisley Island. Type not seen.
M. Bakeri Gandoger, Bull. Soc. Bot. Fr. 66:219. 1919.
M. puberulus Gandoger, *loc. cit.*, not Greene, Leaf. Bot. Obs. and Crit. 2:4. 1909.
M. puncticalyx Gandoger, *loc. cit.*

M. Parishii Gandoger, *loc. cit.*, not Greene, Bull. Calif. Acad. 1:108. 1885.

M. guttatus var. *nasutus* (Greene) Jepson, Man. Fl. Pl. Calif. 928. 1925.

M. unimaculatus Pennell, Not. Nat. Acad. Sci. Phila. 43:5. 1904. Type: Rim of Pueblo Canyon, Sierra Nachas, Southern Arizona, G. J. Harrison 7892, Acad. of Nat. Sciences of Phila. Saw isotype, SAC.

M. pardalis Pennell, Proc. Acad. Nat. Sci. Phila. 99:164. 1947.

Occurring at relatively low elevations with var. *typicus* from Central British Columbia southward in Washington, Oregon, Western Idaho, Southwestern Montana, California, Western Utah, Arizona, Southwestern New Mexico to Northern Mexico; the common insular form of Puget Sound and the California Coast. April to early July (California: March to early July). $n=14$.

The early blooming season of var. *gracilis* as compared to var. *typicus* was noticed first in herbarium studies of the groups. Seeds of *M. guttatus* var. *typicus* (7 miles southeast of Hillsboro, Washington County, Oregon, G. Campbell) and *M. guttatus* var. *gracilis* (Myrtle Creek, Douglas County, Oregon, Detling 3872, UO) were planted January 17 and grown under identical conditions in the greenhouse. Germination time was identical for both varieties; however, var. *gracilis* began flowering the first of April and var. *typicus* showed no signs of buds by May 6.

M. guttatus var. *gracilis* is an early flowering form blooming as early as the middle of March, but occurring most abundantly during the latter part of April, in May and in June. This early growth in cooler temperatures may be responsible for the abundance of red coloration (possibly anthocyanin pigments) occurring in the leaves, stems, calyces, and pedicels. Plants of this group grown in the greenhouse exhibited this red coloration while those of var. *typicus* did not. The extreme form is very striking and it differs greatly from the extreme form of var. *typicus*, but the great number of intermediates makes it uncertain whether the populations are sufficiently differentiated to be considered as separate varieties without further study of the forms in the field. This will require extensive field study of the group from April through July with special notice of forms occurring in the latter part of June. A thorough study of these entities in the field may make classification of this group as a variety inadvisable, or on the other hand may provide information showing var. *gracilis* and var. *typicus* as readily segregated populations. Specimens lacking mature fruits are very difficult and sometimes impossible to determine. Intermediate forms: WASHINGTON: Grant Co.: Grand Coulee 8 miles above the Dry Falls, H. T. Rogers 597. Lewis Co.: V. Gessell in 1926. Yakima Co.: Tieton Basin, Pacific Forest Reserve, Cotton 459. Klickitat Co.: Bingen, Suksdorf 2136 in 1892. OREGON: Multnomah Co.: Near Troutdale, Flinn in 1915. Crook Co.: Vicinity of Laidlaw, Whited 3060. Grant Co.: North Fork of John Day River, near Toll Gate Mines, H. E. Brown, in 1896. Harney Co.: Silvies River, near mouth of Emigrant Creek, Peck 5642. County uncertain: Upper Canyon Creek, Ochoco Forest, Peck 17169. CALIFORNIA: Siskiyou Co.: Near Yreka, G. Butler 449. Shasta Co.: Montgomery Creek, Eastwood 644, Eastwood and Howell 7891. Nevada Co.: Lower end of Donner Lake, Heller 7163. Fresno Co.: Pine Ridge, H. M. Hall & Chandler 136. Los Angeles Co.: Little Santa Anita Canyon, Abrams 2612. Bear Flats above Claremont, D. Crawford in 1915. San Diego Co.: Cuyamaca Lake, Abrams 3877. Harvey's

Ranch, near El Nido, *Abrams* 3538. Five miles northwest of Warner's Hot Springs, *Fosberg* 8440.

Representative specimens: BRITISH COLUMBIA: Chilliwack Valley, *Macoun* 54479, 54476; Bella Coola, *McCabe* 129; Elk River Valley, *W. A. Weber* 2384; Sproat, *Macoun* in 1890. VANCOUVER ISLAND: Sooke, *J. R. Anderson* 624; Cedar Hill, *Macoun* in 1887; Nanaimo, *Eastwood* 9827; Alberni, *W. R. Carter*. WASHINGTON: Clallam Co.: near Blyn, *Otis* 2387. Island Co.: Whidby Island, *J. W. Thompson* 6089. King Co.: Seabeck, *F. Pickett* 1336. Cowlitz Co.: near Kalama, *J. W. Thompson* 10109. Skamania Co.: near Rands, *Hitchcock & Marsh* 3365; Mt. Adams, *Suksdorf* in 1885. Klickitat Co.: Bingen, *J. W. Thompson* 8163, *Suksdorf* 5016 in 1905 (type collection *M. puberulus*, WSC,DS,US, photo POM); n.w. of Bingen *Suksdorf* 2775 (type collection *M. punctulix*, UO,DS,WSC, photo POM). Okanogan Co.: Oroville, *M. E. Jones* in 1911; e. of Omak, *Fiker* 697. Stevens Co.: Loon Lake, *Beattie & Chapman* 2101. Chelan Co.: 15 mi. e. Steven Pass, *J. W. Thompson* 6439. Spokane Co.: Bonnie Lake, *St. John, Pickett & Warren* 3292. Whitman Co.: Wilma, *St. John, Cowan & Warren* 3304; Rock Lake, *Sandberg & Leiberg* 110; above Wawawai, *Constance & Clements* 1062. Yakima Co.: Mt. Adams, *Suksdorf* in 1885; Rattlesnake Mts., *Colton* 417. Garfield Co.: Almota, *Piper* 2783; Wawawai Ferry, *St. John* 6087. Asotin Co.: Zindel, *St. John & R. H. Brown* 3892. OREGON: Clatsop Co.: Saddle Mt., *Howell* 90; G. B. & R. P. Rossbach 394. Multnomah Co.: Elk Rock, *Sheldon* 11959, 11962; Bridal Veil, *Suksdorf* in 1885, *Peck* 5610. Clackamas Co.: Oregon City, *J. W. Thompson* 4157, *Henderson* in 1899, *Lyon, Jr.* in 1905. Linn Co.: McKenzie Falls, *Sheldon* 12690; Crabtree, *Hatch & Hammond* 20. Lane Co.: North Fork Siuslaw River, *Detling* 2524; 1 mi. below Lowell, *Constance, Henderson & Rollins* 1486. Seuferts, *Sheldon* 10123, 9126 (unusually small); The Dalles, *Sheldon* 10034. Wallowa Co.: Snake River Canyon, *Peck* 18176; Innaha Canyon, *Peck* 17484, 17503. Grant Co.: near Humphrey's, *Henderson* 5176; near Prairie City, *Henderson* 5493. Crook Co.: Laidlaw, *Whited* 78. Douglas Co.: Roseburg, *Peck* 14795, 14797, *Howell* in 1887, *J. W. Thompson* 2004. Curry Co.: Deer Creek, *Henderson* 5857. Josephine Co.: Deer Creek, *Detling* 4011; 5 mi. w. of Merlin, *Peck* 14772. Jackson Co.: 3 mi. n.e. Medford, *Peck* 20494; Jenny Creek, *Applegate* 4302; Tom's Creek, *Applegate* 2099. Harney Co.: Steen's Mt., *Howell* in 1885, *Howell* 1254, *Leiberg* 2455, *Henderson* 9130. Malheur Co.: Harper Ranch, *Leiberg* 2125. County unknown: Eastern Oregon, *Cusick* 1627 (cited by auth. of *M. Bakeri*, WSC,UC,US,DS, photo POM). CALIFORNIA: Del Norte Co.: Gasquet Flat, *L. M. Brown* 188; Crescent City, *Abrams* 8452. Siskiyou Co.: near Marble Mt., *H. Chandler* 1694. Tehama Co.: Pine Creek, *Heller* 11339. Butte Co.: Table Mt., *Heller* 15028; Berry Canyon, *Heller & H. E. Brown* 5503; Chico, *E. Copeland* 3017, *Gray* in 1885. Glenn Co.: Newville-Covelo Road, *Heller* 12344. Lake Co.: Cache Creek, *Heller* 13147. Sonoma Co.: Knight's Valley, *H. Edwards* in 1877, (type collection *M. nasutus*, NY, photo POM); Adobe Canyon, *Bioletti* in 1893. Napa Co.: Wooden Valley, *Constance* 2040; Knight's Valley, *Heller* 15545; Napa Valley, *Bigelow* (Whipple's Expedition 1853-54), type collection *M. luteus* var. *gracilis*, GH; "Napa Co.," *Thurber* 498 in 1852 (lectotype of *M. luteus* var. *gracilis*, GH, photo POM); Calistoga, *Greene* in 1894 (possible type collection of *M. glareosus*, UC 26938, photo POM); Mt. St. Helena, *C. F. Baker* 2608 (type collection *M. Bakeri*, CAS, GH,POM,US,NY). Marin Co.: Kentfield, *Eastwood* 60; Phoenix Lake, *J. T. Howell* 11201; Sausalito, *H. Edwards* in 1876. Santa Clara Co.: above Alhna Soda Spring, *Heller* 7508. Monterey Co.: Tassajara Hot Springs, *Ferris* 8313. San Luis Obispo Co.: San Luis Obispo, *Parry* 1850 (type collection *M. luteus* var. *gracilis*, NY). Sutter Co.: Marysville Buttes, *Heller* 11359. Nevada Co.: 10 mi. w. Grass Valley, *C. L. Hitchcock* 6417. Placer Co.: Magra Stn., *K. Brandegee* in 1908. Calaveras Co., San Andreas, *Eastwood & J. T. Howell* 8710; Mokelumne Hill, *F. E. Blaisdell*. Tuolumne Co.: Spring Gulch, *Ferris* 1626; Red Hills above Peoria Flat, *Ferris* 1602 (type *M. pardalis*, isotypes CAS,CLUC, photo POM); Phoenix Lake, *A. L. Grant* 948. San Joaquin Co.: Stockton, *E. E. Stanford* 149. Stanislaus Co.: Knight's Ferry, *Bancroft* in 1895 (type collection *M. marmoratus*, UC, photo POM); Adobe Creek, *A. Carter* 1407. Madera Co.: 5 mi. above Pollasky, *Heller* 8158. Tulare Co.: Coffee Camp, *R. C. Foster* 170. Kern Co.: 5 mi. w. of Woody, *G. Campbell* 1431 (unusual height); Weldon, *B. Evermann* in 1915. Ventura Co.: North Fork Ventura River, *Clokey* 6916. Los Angeles Co.: Pasadena, *G. B. Grant* in 1904, *McClatchie* in 1893. San Bernardino Co.: San Bernardino, *Parish* 4749 (possible isotype of *M. Parishii*, UO,DS,WSC, photo POM); 4th July Canyon, *A. M. Alexander & L. Kellogg* 1359. Inyo Co.: w. of Bishop, *Heller* 8323; Great Falls Canyon, *Alexander & Kellogg* 1909. Riverside Co.: Magnesia Spring Canyon, *Munz* 12007; 20 mi. n. Idyllwild, *M. E. Jones* in 1926; San Jacinto Mts., *H. M. Hall* 2190. San Diego Co.: Witch Creek, *R. D. Alderson* in 1894 (type collection *M. paniculatus*, DS,GH, photo POM); Escondido, *C. Meyer* 95. San Clemente Island: *N. Murbarger* 86; *Trask* 343 (type *M. clementinus*, US 469640, isotype NY, photo NY, GH, POM). Santa Cruz Island: Dix Canyon, *Clokey* 5669; Prisoner's Harbor, *Clokey* 5975; Lady's Harbor, *Munz & Crow* 11871. County uncertain: Upper Stanislaus River, *Greene*

in 1889 (possible type *M. cuspidatus*, DS). IDAHO. Nez Perce Co.: Lewiston, *Heller & Heller* 3143; Hatwai Creek, *Sandberg, MacDougal & Heller* 66. Boise Co.: 1.5 mi. n. Elk Lake, *Hitchcock & Muhlick* 9834. Owyhee Co.: Silver City, *J. Macbride* 913. NEVADA: Washoe Co.: near Verdi, *Sonne* in 1890. Pershing Co.: Unionville, *Watson* in 1865; West Humboldt Mts., *Watson* in 1867. White Pine Co.: Cherry Creek, *M. E. Jones* in 1891. Clark Co.: Griffith's Mine, *Clokey* 8116. UTAH: Box Elder Co.: Dunn Canyon, *Maguire & Holmgren* 22196. COLORADO: Fremont Co.: Canon City, *Brandegee* in 1871 and 1877. Mineral Co.: Wolf Creek Pass, *S. McKelvey* 4740. ARIZONA: Yavapai Co.: Prescott, *O. Nelson* 10257. Pinal Co.: Superstition Mts., *J. W. Gillespie* 551. Pima Co.: Tanque Verde Canyon, *L. J. Brass* 14158, 14221; Bear Creek, *Eastwood* 8154; Sabino Canyon, *L. Benson* 9454. Santa Cruz Co. Ruby road, *K. M. & M. C. Wiegand* 2133. NEW MEXICO: Bear Mt., near Silver City, *O. B. Metcalfe* 28 (type *M. cordatus*, US 495156, photo POM). MEXICO: Baja California: Santa Aque-da, *E. Palmer* 233 (type *M. erosus*, US 47277, photo GH.POM); All Saints' Bay, *Greene* in 1885. Chihuahua: Chihuahua, *E. Palmer* 145, 17, 289, 16, *C. Hartman* 613; Sierra Madre, *Pringle* 1347; Memelichi, *Gentry* 2780.

2C. *MIMULUS GUTTATUS* var. *GRANDIS* Greene

Fig. 2, D

M. guttatus var. *grandis* Greene, Man. Bay Region, 277. 1894.

M. Langsdorffii var. *grandis* Greene, Journ. Bot. 33:7. 1895.

M. grandis (Greene) Heller, Muhlenbergia 1:110. 1904.

M. guttatus subsp. *littoralis* Pennell, Proc. Acad. Nat. Sci. Phila. 99:165. 1947. Type from near Otter Rock, Lincoln Co., Oregon, *Maguire* 17304, Acad. Nat. Sci. Phila. Type not seen, but studied other specimens determined by Pennell as subsp. *littoralis*.

M. guttatus subsp. *arenicola* Pennell, *ibid.* p. 166. Type: Pacific Grove, Monterey Co., Calif., Pennell 26020, Acad. Nat. Sci. Phila. Type not seen but studied other specimens determined as this subspecies by Pennell.

Moist ground along ocean bluffs from southwestern part of Pacific County, Washington, to Monterey Bay, Monterey County, California. April to September, however collections have been made in October, November and January. *n*=14.

This is a very pubescent variety with broad succulent stems; large, pubescent or tomentose calyx, 17–30 mm. long, 10–15 mm. broad; and densely pubescent leaves.

Specimens examined: WASHINGTON: Pacific Co.: Sea View, *Henderson* in 1886, *Spiegelberg* 688; Ilwaco, *Piper* 4998; Cape Disappointment, *Abrams* 11266. OREGON: Douglas Co.: Winchester Bay, *Peck* 20206a. Lincoln Co.: Waldport, *D. Overlander* in 1927, 1 mi. s. Seal Rock State Park, *G. Campbell* 362; Yachats, *Sweetser* in 1909, *B. Cooke* 17348; Newport, *Lewis, Wheatley and Doyle* 13, *Spillman* 147, *Goodding and Gilkey* in 1923; Otter Rock, *McCalla* 5031; Depoe Bay, *Gilkey* in 1933. Lane Co.: Cape Cove, *Detling* 5020; 3 mi. s. of Cape Perpetua, *Peck* 21594; Siltcoos Lake, *Henderson* 16712; Cleawox Lake, *Detling* 3421; Heceta Head, *Detling* 2921; Ocean View, *D. Demaree* 21416; Crow, *Detling* 4951. Coos Co.: Marshfield, *Haydon* 553; Coos Bay, *H. D. House* 4689, 4775; Coos Bay Life Saving Station, *Henderson* 13750. Curry Co.: Humbug Mt., *H. Lewis* in 1940; Pistol River Mt., *J. W. Thompson* 4568. CALIFORNIA: Del Norte Co.: Crescent City, *H. E. Parks* 8322. Humboldt Co.: Stone Lagoon, *Applegate* 3995; Eureka, *L. Benson* 453; Trinidad, *J. Tracy* 12501; Bolinas, *K. Brandegee* in 1907. Sonoma Co.: Bodega Point, *Eastwood* 4885; mouth Gualala River, *Mason* 4651. Marin Co.: Stinson Beach, *C. B. Wolf* 357; Avalis Beach, *B. Schreiber* 2187; Sand Dune Beach, Tomales Bay, *B. Schreiber* 614. San Francisco Co.: San Francisco, *Greene* in 1886; *A. A. & E. G. Heller* in 1896, *Baker* 312, *Pease* in 1910, *F. S. Earle* in 1888, *Brandegee* in 1890. Alameda Co.: Berkeley, *H. Walker* 87, *Greene* in 1887, *Greene* in 1883 (type collection of *M. guttatus* var. *grandis*, US 64579, photo POM), *Greene* in 1885; Claremont Canyon, *Davy* 723. San Mateo Co.: near Ocean View, *Heller* 8376; Santa Cruz Peninsula, *Dutton* in 1900, *Abrams* 2422; Pilarcitos Lake and Canyon, *Davy* 1138; 2 mi. s. of Pescadero, *Yates* 5217; 2 mi. n.e. Pigeon Pt., *N. Carlson* 98; Half Moon Bay, *D. Demaree* 9123, *Schmitt* in 1913. Santa Cruz Co.: Capitola, *Pendleton* in 1908; Ellicott, *Akey* 146. Monterey Co.: Carmel Bay, *A. Elmer* 4054; Carmel River, *Patterson & Wiltz* in 1907; Moss Beach, *Heller* in 1903; Monterey, *V. Bailey* in 1891; Nacimiento River, *H. Jensen* 14; Pacific Grove, *F. Woodcock* in 1913, *Heller* 6795, *Abrams* 7302, *O. Jenkins* in 1907, *Patterson & Wiltz* in 1907, *E. Cannon* in 1891, *G. Newell* 1914;

Asilomar, Youngberg 215, I., Benson 8420. County uncertain: Howell Mt., Brandegee in 1885; Nipomo, Brewer 419.

2D. *MIMULUS GUTTATUS* var. *GLAUCESCENS* (Greene) Jepson

Fig. 3, A.

M. glaucescens Greene, Bull. Cal. Acad. 1:113-114. 1885.

M. guttatus var. *glaucescens* (Greene) Jepson, Man. Fl. Pl. Calif. 928. 1925.

Moist meadows and canyons, vernal damp areas, and grassy streambanks at lower elevations from 200 to 2,500 feet in Tehama and Butte counties, Calif. April to July.

This variety is marked by the glaucous covering of the leaves and stems and by the large, connate-perfoliate and entire or serrulate uppermost leaves.

Specimens examined: CALIFORNIA: Butte Co.: Little Chico Canyon, Mrs. R. M. Austin in 1896; Chico, E. Copeland 3177, Greene in 1890; Little Chico Creek, Mrs. C. C. Bruce 2106 in 1897; 2106 in 1898, A. Gray in 1885, Mrs. R. M. Austin 213 in 1883, Leiber 5003, E. Palmer 2052; "in Butte Co.," Mrs. R. M. Austin in May 1883 (type collection, CAS 792, photo. POM); Durham, Mrs. J. H. Morrison in 1932; DeSabra, H. M. Edwards in 1917; 2 mi. n. of Chico, Gould 304; Berry Canyon, Heller & H. E. Brown 5461; Table Mt. Olive Ranch, Heller 10755; 12 mi. n. of Chico, Heller 11340; e. of Chico on Butte Creek, Heller 15060; Table Mt., Heller 15028. Tehama Co.: Deer Creek Hwy, Heller 16173; Red Bluff, E. Wicke and E. Pendleton in 1917. Location unknown: Fremont's Expedition in California, 1845-7.

2E. *MIMULUS GUTTATUS* var. *ARVENSIS* (Greene) Jepson

M. arvensis Greene, Pittonia 1:37. "Wet fields Howell Mt. and elsewhere." Type not seen.

M. Langsdorfii var. *arvensis* (Greene) Jepson, Fl. W. Mid. Calif. 407. 1901.

M. guttatus var. *arvensis* (Greene) Grant, Ann. Mo. Bot. Gard. 11:174. 1924.

Stream banks and moist foothills in meadows and open areas of the California Oak Woodland. At low elevations in the valleys from central Lake County, Sonoma and western Napa counties, southward in the San Francisco Bay area to northern Monterey County, Calif. April to early June.

This group differs from var. *typicus* and the other varieties of *M. guttatus* by a small, tomentose area at the middle of the dorsal surface of the floral leaves which is frequently retained in the leaves after enlargement; the uppermost calyx tooth scarcely exceeding the others, producing a nearly truncate appearance of base and top of calyx; and the ovoid or subglobose capsule, 5-7 mm. long, 5-6 mm. broad, very rarely more than 1-2 mm. longer than broad.

Specimens examined: CALIFORNIA: Lake Co.: Kelseyville Highland Springs, L. Benson 884; Houghs Mineral Springs, Wolf 2073; Siegler Springs, Blankinship in 1923. Napa Co.: Rutherford, Jepson in 1893. Sonoma Co.: Santa Rosa, Heller & H. E. Brown 5306; near Windsor, Heller & H. E. Brown 5331; Glen Ellen, M. S. Baker 637; Santa Rosa Creek, Heller 5687. Marin Co.: Olema, Henderson 15638. Alameda Co.: Berkeley, H. Walker 440, H. Chandler 1022, Michener & Bioletti 1687a. San Mateo Co.: Crystal Springs Lake, Davy 1078; Belmont, Greene in 1887, in 1886; Coal Mine Ridge, M. Barry 249. Santa Clara Co.: Smith Creek, Heller 8517; Stanford University, Burnham in 1894, Abrams 2370; w. of Los Gatos, Heller 7393; Crystal Springs, Wight in 1900; w. of Saratoga, Pendleton 707 & 717; Alma, H. R. Davis in 1920; Permanente Creek, Abrams in 1915, M. Daniel in 1915. Monterey Co.: Salinas Valley, E. Abbott in 1889.

2F. *MIMULUS GUTTATUS* var. *micranthus* (Heller) comb. nov.

Fig. 3, B.

M. micranthus Heller, Muhlenbergia 8:132. 1912.

M. nasutus var. *micranthus* (Heller) Grant, Ann. Mo. Bot. Gard. 11:182. 1924.

Moist land in meadows, fields, hillsides and the open areas of stream banks from 50 to 4000 feet elevation in the Pacific Forest and California Oak Wood-

land. California in the North Coast Ranges from southern Siskiyou, Humboldt, Trinity, and Mendocino counties south to Contra Costa and Santa Clara counties; one collection from south of Milford, southeast edge of Lassen County. April to June.

This variety differs from the other varieties in the short corolla, scarcely exceeding the calyx or included within the calyx; short style, 2–5 mm. long; and short pedicels 1–3 cm. long in fruit.

Specimens examined: CALIFORNIA: Siskiyou Co.: Metcalf's ranch, *Heller 13256*. Humboldt Co.: 6 mi. from Garberville, *Jussel* in 1931; Alder Point, *Tracy 1883*; Trinity River Valley, *Tracy 7435*; Mattole River, *Tracy 12252*; Fort Seward, *Tracy 4457*; Chalk Mt., *C. C. and S. K. Harris 3331*; Freshwater Creek, *Tracy 3000*; Alton, *Tracy 3688*. Trinity Co.: Hennessy Rd., *Tracy 6999*. Lassen Co.: s. of Milford, *Ripley and Barneby 5681*. Mendocino Co.: nr. Hopland, *Eastwood and Howell 1308*, *Wiggins 10203*; 2 mi. n. of Laytonville, *Heller 15892*. Lake Co.: 7 mi. e. of Bartlett Springs, *Kildale 4965*; Hough's Springs, *Abrams 12530*; Cold Brook Camp, *Kildale 2044*. Contra Costa Co.: Wildcat Canyon, *Davy 6929*. Santa Clara Co.: Stanford, *Greene 881*; w. of Los Gatos, *Heller 8936*; nr. Congress Springs, *Heller 7410* (isotypes US, NY, WASH, GH, UC, photo. POM).

3. *MIMULUS NUDATUS* Curran

Fig. 3, C.

M. nudatus Curran ex Greene, Bull. Calif. Acad. 1:114. 1885.

Subglabrous annuals; primary tap root and laterals; stems erect and slender, 2–8 cm. long, 1–2 mm. in diameter, not rooting at the nodes or producing stolons, freely branching, glabrous; internodes 2–8 cm. long, 2–6 times the length of the leaves; leaf blades simple, lanceolate or oblanceolate, shallowly dentate or denticulate with few teeth, small, 5–30 mm. long, 1–15 mm. broad, proximally acute or attenuate, distally acute or obtuse, glabrous, 1 or occasionally 3 main veins; petioles 8–15 mm. long, glabrous; uppermost (floral) leaves glabrous or pubescent, reduced, 3–10 mm. long, linear, not connate, sessile, denticulate or entire; inflorescence a raceme of numerous flowers, rarely less than 5–6, in uppermost leaf axils; pedicels slender, 2–4.5 cm. long in fruit, not recurving, spreading widely at maturity placing calyx at a distance from the stem, glabrous; calyx 6–15 mm. long, 4–7 mm. broad in fruit, glabrous, upper tooth nearly same length or only slightly longer than the others, the apices acute, the lower pair of teeth folding over and nearly closing the calyx opening; corolla 15–20 mm. long, corolla at least twice the length of the calyx; capsule 7–8 mm. long, 3–5 mm. broad, oblong, short-stipitate; style 5–8 mm. long, glabrous.

Moist gravelly areas in Lake County, California. April–June.

The leaves of *M. nudatus* differ from any of the other species of the *Mimulus guttatus* group in that they are small, 5–30 mm. long, 1–15 mm. broad, lanceolate or oblanceolate, and usually have 1 or occasionally 3 main veins. The wide spreading of the pedicels at maturity placing the calyces at a distance from the stem is another character distinguishing this species.

Specimens examined: CALIFORNIA: Lake Co.: Bradford, *Brandegee* in 1890; Kelsey Mountain, *Curran* in 1884 (Kelsey Mt. is probably Mt. Konocti), (type collection, GH, possibly DS); 8 mi. s.e. Middletown, *Ripley and Barneby 6925*; Monticello road, *Clausen 1056*; Colusa–Lake Co. line, *Heller 16104*, *Eastwood and Howell 5636*; Cache Creek, *Heller 13142*.

4. *MIMULUS LACINIATUS* A. Gray

Fig. 3, D.

M. laciniatus A. Gray, Proc. Am. Acad. Sci. 11:98. 1876.*M. Eisenii* Kellogg, Proc. Calif. Acad. of Sci. 7:89. 1877.

Subglabrous annuals; roots of central tap and laterals; stems slender, 3–38 cm. long, 0.5–2 mm. in diameter, erect or only slightly decumbent at the base, not rooting at the nodes, freely branching from the base, sometimes geniculate, glabrous; internodes 2–9.5 cm. long, twice the length of the leaves; leaf blades cleft, parted, divided, or pinnatifid, 0.6–5.5 cm. long, 0.4–3 cm. broad, ovate, elliptic, or obovate, proximally attenuate, acute, or obtuse, distally obtuse, 3 main veins, glabrous or sparsely pubescent; petioles 0.5–3.5 cm. long, glabrous or pubescent; uppermost (floral) leaves much reduced, 3–7 mm. long, regularly reduced upward, subglabrous, free at the bases, dentate or deeply dentate, apically acute; inflorescence a raceme of numerous flowers, rarely less than 5–6 per stem, in uppermost leaf axils; pedicels slender, usually much elongated in fruit to 1–3 cm. long, frequently recurved at maturity, glabrate or pubescent; calyx 4–15 mm. long, 3–7 mm. broad, reddish-purple spots mainly near ribs, the ribs reddish-purple, glabrous or sparsely pubescent, sinuses tomentose, the upper tooth 2–3 times the length of the lower pairs, apically acute, very rarely obtuse, the lowest pair folding over the middle pair; corolla 7–18 mm. long, at least twice the length of the calyx, usually with one red dot on lower lip larger than the others; capsule 3–8 mm. long, 2–3 mm. broad, oblong, sessile or short-stipitate; style 7–10 mm. long, glabrous or puberulent.

Wet rocky areas, vernal pools, and damp sand around lakes in the Sierran Forest from 3,000 to 8,500 feet. California from Tuolumne County southward along the western edge of the Yosemite National Park to northeast Fresno County. May to July.

This species may be distinguished by the cleft, parted, divided or pinnatifid leaf blades. The corolla and calyx, although comparable to *M. guttatus* in size-relationship (corolla at least twice the length of the calyx) are small, the calyx being 4–15 mm. long, 3–7 mm. broad, and the corolla 7–18 mm. long. The recurved pedicels, early blooming season, and frequently one larger red spot on the lower corolla lip are reminiscent of *M. guttatus* var. *gracilis*. Seeds from a specimen collected at "old Wawona Road about 1.5 miles west of Summit of Chowchilla Mountain grade, elevation about 4900 feet, Mariposa County, *Rimo Bacigalupi* 2431, June 8, 1941," POM, GH, UC, and determined as *M. laciniatus* were planted in the greenhouse January 17. Germination of these seeds and those of *M. guttatus* planted at the same time was coincidental; however *M. laciniatus* produced flowers the middle of April, and by May 6, *M. guttatus* grown under identical conditions showed no indications of flowering. Other characters of the specimen collected in Chowchilla Mountain grade were displayed by the plants grown in the greenhouse.

Rarely plants of this species have deeply dentate leaf margins rather than being cleft, parted, divided, or pinnatifid; however these specimens can be readily distinguished from other species by the small calyx and corolla, e.g., near Potter Creek, about 21½ miles from Huntington Lake, A. Carter 83, POM.

Specimens examined: CALIFORNIA: Tuolumne Co.: Strawberry Lake, A. L. Grant 951;

Hog Ranch, *A. L. Grant* 997, 983; Mahan Peak, *Sharsmith* 3692; Dardanelles, *A. Alexander* and *L. Kellogg* 3746, *Eggleston* 9391; below Hetch-Hetchy Dam, *Bacigalupi* 1425; Wheats Meadow, *Eggleston* 9314. Mariposa Co.: Wawona Road, *Bacigalupi* 2431; bank of Merced at Clark's *Sullivan and Gray* in 1872 (*GH* type collection of *M. laciniatus*, phot. *POM*), *T. Meehan*; Yosemite, *Bacigalupi* 1863, *H. M. Hall* 9073, *H. Evans* in 1901, *Chandler and Babcock* 1018, *Mrs. G. D. Bacon* in 1902, *Bolander* 4899, *Abrams* 4485. Madera Co.: road to North Fork, *Eastwood and Howell* 5417. Fresno Co.: Potter Creek, *A. Carter* 83; Pine Ridge, *Hall and Chandler* 123; 5 mi. s.w. General Grant Park, *L. Rose* 40670. Tulare Co.: Giant Forest, *K. Brandegee* in 1905. County uncertain (probably Fresno Co.): *Eisen*, no date, (type collection of *M. Eisenii*, *CAS* 793, *UC*, photo *POM*).

Fig. 2.—A, *M. Tilingi* var. *caespitosus* (Greene) Grant, isotype, Mt. Rainier, Washington, Edward L. Greene in 1889, WASH 15642. B, *M. guttatus* var. *gracilis* (A. Gray) Campbell. Specimens grown in greenhouse from seeds collected at Myrtle Creek, Douglas Co., Oregon, Detling 3872, UO. C, *M. guttatus* var. *gracilis* (A. Gray) Campbell, lectotype, Napa County, George Thurber 498, March 1852, G.H. D, *M. guttatus* var. *grandis* Greene, presumably the type or an isotype, Berkeley, California, E. L. Greene in 1883, US 64579.

Fig. 3. A, *M. guttatus* var. *glaucescens* (Greene) Jepson, type specimen, Butte County, Calif., Mrs. R. M. Austin in 1883, CAS 792. B, *M. guttatus* var. *micranthus* (Heller) Campbell, 27 Mile Drive near Congress Springs, Santa Clara Co., Calif., A. A. Heller 7410, May 12, 1904, isotype GH. C, *M. nudatus* Curran, isotype, Lake County, Calif., June 1884, Mrs. Curran, GH. D, *M. laciniatus* A. Gray, type specimens, South Fork of the Merced at Clark's Ranch, Calif., Sullivan and Gray in 1872, GH.